

UNIVERSITY OF SOUTHAMPTON

Wordsworth and the Geologists: A Correlation of Influences

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**John Frederick WYATT
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ABSTRACT
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Wordsworth and the Geologists: A Correlation of Influences
by John Frederick Wyatt

This study is about Wordsworth's understanding of geology, his attitude to the rapidly growing science, his knowledge of four major geologists and his friendship with two of them. It is also about the four geologists and their interest in issues which also occupied Wordsworth's attention, such as the earth's duration and decay, the benefits and limitations of scientific enquiry, the idea of 'universality' in nature, and the strength of the awakened human mind. Where there is evidence of the influence of Wordsworth's poetry, chiefly on the two younger geologists, this is examined.

The study concentrates on the writing of Wordsworth in his middle and later years: A Topographical Description of the District of the Lakes, The Excursion, The River Duddon: A Series of Sonnets, and the Itinerary Poems. Each of these texts is examined from the point of view of what is revealed about the poet's understanding of geology and about his occupation with larger issues of belief and the relationship of the human to the material world. An emphasis is placed on reading the poems in the context of the sequences in which Wordsworth intended them to appear.

Each of the four geologists, James Hutton, George Bellas Greenough, Adam Sedgwick, and William Whewell, is considered in turn, but each study of a geologist is intercalated with a study of texts by Wordsworth in order to develop inter-related themes. By using original sources or original texts of published material, the geologists are studied as natural philosophers, concerned with issues of philosophy and scientific method. The point is made that they were men with a wide range of intellectual interests and this created a strong bond of sympathy with Wordsworth and, for some, with Coleridge. The concluding chapter examines the notion of 'influence' and illustrates the reciprocity of influence between poet and geologist, the conventional ideas of a 'spirit of the times', and the unity between science and the humanities.

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CHAPTER ONE: INTRODUCTION: UNDERSTANDING "THE OLOGIES".

If the reader looks no further than the opinion of Wordsworth's sister, then, amongst the Wordsworth family, geology was the least interesting of subjects. Writing to her Scottish friend, Mary Laing in 1827, Dorothy Wordsworth somewhat condescendingly declines to assist in finding rock specimens for her friend's new interest:

I am so ignorant of all that lies beneath the surface of this earth of ours that I think there is little chance of my bringing home anything that the geologist would care about. Whenever I find a very pretty stone I shall think of you and pick it up (W.L.IV: 533).

Mary Laing must have persisted, because a year later Dorothy wrote that she was glad that Mary has "so many rational and agreeable amusements", but she herself "is neither mineralogist nor geologist" (W.L.IV: 574). Mary Wordsworth is similarly modest, or perhaps accurate, about her interests in geology. Writing to John Kenyon in August, 1827, she tells him that a neighbouring cottage has been rented by two maiden ladies, "who are admirers of scenery and understand the ologies (in the latter we do not participate, the sciences do not flourish at Idle Mount" (W.L. IV: 540). Mary Wordsworth used a family joke for the name, Rydal Mount, but do we assume she was serious about the lack of interest in the "ologies" and, in particular, geology? The traditional answer to this question is to find Wordsworth's own statement in Book III of *The Excursion*, where the Solitary condemns:

He who with pocket-hammer smites the edge
Of luckless rock or prominent stone, disguised
In weather - stains or crusted o'er by Nature
With her first growths, detaching by the stroke
A chip or splinter - to resolve his doubts (W.P.V iii: 178-182).

It is the purpose of this thesis to examine more closely the question of what Wordsworth knew about "all that lies beneath the surface of this earth" and whether, to continue with Dorothy Wordsworth's clause, he was interested in "anything that the geologist would care about". I shall try to interpret the last-quoted clause in all its senses because, as I hope the thesis will demonstrate, I believe there was a shared interest between Wordsworth and certain of his geologist contemporaries. Discovering whether Wordsworth "possessed" up-to-

date geological knowledge is not the first or even one of the main objectives, although, when there are revelations of what I take to be geological information in his writing, I shall pursue the clues as far as they lead. My chief interests are, however, in the way geologists interpreted the "unveiling" of nature, to use a favourite metaphor of the time (See for instance, Davy, H. 1851: 270), and in the inklings of Wordsworth's own adjustment to their interpretations. The word "adjustment" is inadequate to describe what I believe was the process of Wordsworth's thinking about the natural world, particularly in his later years, which are the chief focus of this thesis. The word is not only inadequate because it conveys a feeling of mechanical adjustment of poetry to "new facts", it is also false in suggesting that geological discovery was a one-way influence on Wordsworth's underlying beliefs about the natural world. A major element of this thesis is concerned with the opposite process, the influence of Wordsworth on a number of famous geologists.

At this point the metaphor of my title ("a study of correlation") will, I hope, usefully hold in suspension a judgement of who influences and who was influenced. Instead, as in the geological use of the term, I shall attempt to "determine the similarities" or find what may be "equated in terms of time" (Allaby, M. 1985: 166). William Wordsworth's long life, from 1770 to 1850, spanned eighty years of change in virtually all spheres of British life. These years coincide with what one later observer (Zittel, K. von 1901) described as "the golden years" of British geology, a phrase which was seized on by historians of geology in the early decades of our own century (Woodward, H.B. 1907). These were certainly times of rapid growth in the popularity of the science and of its institutional development. In 1807, the Geological Society of London was founded and, in the years that followed, geology was elevated to the prestigious level of well-established disciplines such as astronomy, chemistry and physics. What connection is there between a major poet and this crucial period in the development of geology? Was there merely a coincidence of living in a common period of history or was there significance in the experience of change that poet and geologists both shared?

In recent years there has been a growing interest in the geology of the late seventeenth century, and of the eighteenth and the early nineteenth centuries, in their continuity, and in the position of geology within the general culture of the period before 1850. One of the earliest explorations of the relationship between

the literary figures of the period and the development of geology as a science was in the doctorate study and subsequent papers by Dennis Dean (1968, 1973 and 1981). Dean's valuable thesis has rarely been improved upon in its concentration on major literary figures, chiefly Wordsworth, Sir Walter Scott, Byron and, to a lesser extent, Southey and Shelley. His central opinion is that creativity occurs simultaneously in a number of fields of human endeavour and, in particular, in the period of his study (1770-1830) "literary trends influenced geological theorising; geological trends influenced literature" (Dean, D. 1968: 3). Anyone studying the interplay of literature and geology is indebted to Dean for his knowledge of both fields and for his ability to trace connections and also to identify tensions. I have been able to concentrate more fully on Wordsworth's later poetry, and therefore, in a number of ways, my conclusions differ from Dean's, but I was encouraged by this source of ideas. Other writers who have considered the relationship between geology and literature in the period are acknowledged at points in the text (See Note 1).

Three problems afflict anyone enquiring into the development of geology as a science in the early nineteenth century. The first is the term "science" itself. I hope that I have consistently reminded the reader that the word at this period retained its meaning of organized knowledge (See Note 2), as well as a growing independent meaning of an area of study opposed to other cultural activities. The second problem is what the word meant at any one time to a particular person or persons, in this case the Wordsworth family. I shall consider in two chapters the importance of order and discrimination in Wordsworth's work after 1810, but for the moment the following quotation from Dorothy Wordsworth's letter of 1813 about Derwent Coleridge illustrates the use of "scientific" in a restricted, but important sense:

He is very clever. I should wish him to be put in the way of some profession in which scientific knowledge would be useful; for his mind takes that turn. He is uncommonly acute and accurate (W.L.II: 91).

Both institutions and individuals experienced the word "science" changing its connotations as the period of this study developed. We shall see similar semantic problems congregating around "natural history" and "natural philosophy".

A third problem for a writer who considers Wordsworth and science in general is the long-standing belief that he (and indeed other Romantic writers) were anti-Science (See Note 3). Recent work on Wordsworth's and Coleridge's early years and on their range of associates (see, for instance, Sharrock, R. 1962, Pittman, C.L. 1980, Levere, T. 1981, Roe, N. 1988, Fitzgerald, J.M.P. 1984, Gill, S. 1989) has confirmed a different point of view, that the poets were closely involved with scientific radicalism and political radicalism at the end of the eighteenth century and in the first decade of the nineteenth century. My study perhaps adds a further development to this more complex view of Romanticism and the sciences (See also Cunningham, A. and Jardine, W. eds. 1990). The long-standing connection of Wordsworth with Newton and Mathematics has, of course, breached the simplistic view of Wordsworth as the anti-scientist (Schneider, B. 1957, Durrant, G. 1970, Thomas, W.K. and Ober, W.V. 1989). Seminal works of some years ago on this topic (Lovejoy, A. 1960 (1936) and Piper, H. 1962) are still relevant.

The argument that Wordsworth was not antagonistic to all aspects of science does not have to recommence on every occasion, but I believe it is important now to look below surface impressions in order to examine in detail what the poet received from his awareness of scientific exploration and scientific theories. It is more important, however to examine through specific instances the nature of the attraction between poet and scientist, where these relationships occurred as more than passing acquaintance. This, I hope, is what this thesis attempts to do in the case of four contemporary geologists.

The main plan of this thesis.

It is my intention in the chapters that follow to trace in a number of Wordsworth's works written after 1810 how he approached issues which also concerned the geologists. Where it is possible to do so, I shall give instances of direct knowledge of mineralogy or of geological theory. These inklings of scientific knowledge are relatively few and I am anxious not to make too great an issue out of them. However, there are important matters about Wordsworth's use of the specialist language of geology to be noted. If Wordsworth is not "the poet of geology", he is equally not a descriptive poet, in the sense of writing topographical poetry. The landscape is one of the centres of his work, but the other is the human mind. The interrelationship between the two is the main

business of his poetry. Nevertheless, there is one major topographical work, *A Guide to the District of the Lakes*, to which I give attention in Chapter Two. Equally the locations in which his dramatic personæ are described, as in *The Excursion*, and the features of the mountains, lakes and valleys revealed by the weather, the sunlight or moonlight are the stimulus for so much of the poetry that it would be over-scrupulous to deny that he is a landscape poet. As a poet sensitive to place, he reveals an awareness of natural forms which the geologists were also studying. Where there are such instances and where there is an interplay with geology and geologists I have tried to demonstrate them.

One feature of *A Guide* is its orderly presentation of description and, more than that, its own commendation of orderliness and clarity. These themes and the powerful, unusual word "distinctness" occupy sections of the second, third and fourth chapters in particular. They are, I shall argue, qualities that the geologists also sought in their analysis of the features of the earth. Other themes that I assert the geologist and the poet shared are not methodological but theoretical with implications reaching deep into systems of belief and into convictions about the nature of human life and other ultimate concerns. I shall therefore dwell for some time on such matters as the expanding idea of "Deep Time", to use the term now popularized by Stephen Jay Gould (1988 (1987)), and the concepts of permanence and decay which I trace in the poems after 1810.

The thesis also takes up the network of relationships that Wordsworth maintained with geologists. I have already commented on the evidence for a substantial involvement with scientist-radicals in the poet's younger life. The figure of Humphry Davy also remains in the foreground well into Wordsworth's middle years, and I have noted that Davy was a confident geologist as well as a chemist. In this thesis I have selected four geologists, James Hutton (1726-1797), George Bellas Greenough (1778-1855), Adam Sedgwick (1785-1873), and William Whewell (1794-1866) for closer attention, because in each case I believe there are illustrations of the later prose and poetry, which in turn reflect upon their work. It seems unlikely that Wordsworth met Hutton, but I shall trace their intellectual connection, through Coleridge as an intermediary, in Chapter Three. Similarly, Greenough was not, except for one recorded occasion, in direct touch with Wordsworth, but he was important at two stages, first in his connections with Coleridge in Germany and in England until 1805 and later in the

intellectual circles radiating from the Geological Society and London drawing rooms. With Sedgwick and Whewell, there is no mistaking their close connection with the poet, to the point when the word "friendship" is obviously appropriate. The problem of defining Whewell as a geologist, when his fame rests on a variety of other scientific activities, is taken up in Chapter Nine, but I am confident that his work can be included in a survey of this kind. More important than the last point, is my argument that these men were distinguished not by their specialism in science, but by their range of studies, not least in philosophy.

The decision to concentrate on these four geologists is not made merely because of chance contacts with Wordsworth at different periods of his long life. I have deliberately attempted to focus on actual working geologists and, more important, "writing geologists" in order to avoid generalizations about a "class" of scientists, which tend to dominate some histories of the social context of literature. It is undeniably true that these four geologists displayed, in varying degrees, features that social historians find in their contemporaries from other spheres of study. There is, however, a theoretical issue that has occupied my attention, which is best summed up by Secord in *Controversy in Victorian Geology* (1986). He proposes that future research should consider the way networks of researchers, individual careers and institutional structures have shaped the addition of what is commonly called "new" knowledge. He has also asked for a concentration on what scientists actually did, rather than on summaries of theories which they produced. I can not claim to have satisfied fully both his programmes of methodological points, but my aim has been to focus on the detail of the geologist's own arguments for "doing geology" and on their revelation of their own geological and philosophical experience. Thus, where I can, I have relied on original editions of their writing and, in two cases, unpublished notebook material.

My reading of Foucault's attempts to substitute the study of the "positivity of discourse" for vaguer notions or even reifications such as *Zeitgeist* or "world-view" has provided for me an intriguing possibility to justify the mixture of "cases" presented in my thesis. Here are two geologists with strongly documented knowledge of and interaction with Wordsworth and his family, whereas the other two were known to him through reading and influential friendships, particularly of Davy and Coleridge. Foucault's massive list of the discourse that, in ~~the~~

opinion, establishes an "historical a priori" includes both the direct and indirect circle of literary and scientific contacts:

...and so many authors who know or do not know one another, criticize one another, invalidate one another, pillage one another, meet without knowing it and obstinately intersect their unique discoveries in a web of which they are not the masters, of which they cannot see the whole, and of whose breadth they have a very inadequate idea - all these various figures and individuals do not communicate solely by the logical succession of propositions that they advanced, nor by recurrence of themes, nor by the obstinacy of a meaning transmitted, forgotten, and rediscovered; they communicate by the form of positivity of their discourse... (Foucault, M. 1972: 126-127).

I have used the adjective "intriguing", because Foucault's thesis on science (and, in relation to the period I consider, on "Natural History" to which he devotes particular attention in *The Archeology of Knowledge*) is definitely one to intrigue anyone seeking an understanding of the nature of scientific knowledge and its changes. My task, however, is to de-mystify where I can and not to propose an over-arching theory. Instead, I hope to present some details from the geologists themselves, from those who knew them, including, of course, Wordsworth, and to juxtapose this information in order to see what patterns emerge. In doing so I may be able to present, to use two terms used by Foucault himself, "a regularity" and a "correlation" (See Note 5).

One aspect of three of the four geologists studied in this thesis is their own sense of belonging to a specific scientific community. The Geological Society of London and the Royal Society were the institutional expressions of that sense of community. The same remark is true in a different setting of the first geologist under scrutiny, James Hutton. He was a member of a different community in Edinburgh, and, of course, of an earlier period. As Oldroyd has commented about the later part of the period of this study: "Victorian geologists took pride in their communality and were indeed one of the most visible scientific communities in Britain at this time" (Oldroyd, D.R. 1990: 1). The social context in which geology was made and disseminated has been the proper concern of a number of historians of science (See, for instance Morrell, J. and Thackray, A. 1981 and 1984). One apparently discordant feature in the geological community was the excitement created by the great controversies of the period (recorded by Secord, J.A. 1986, Hallam, A. 1989, Oldroyd, D.R. 1990 and, from a slightly earlier period in the history of science, by Gillispie, C.C.

1951). It is important, as Secord has insisted, that we should not be dismayed by the amount of controversy. Discord certainly sounded loudly, but underlying the debate and argument was a unity which usually led to reconciliation and a new wave of interest in developing the science. Throughout the period of my study, the role of an institution, the Geological Society of London, in holding together the varying "schools" of geology, a place where debate could be joined and resolved, is of prime importance. Three of the four geologists studied here were Presidents of the Society and I shall have occasion to refer to its significance in the following chapters.

One other aspect of unity has interested me. It is the evidence for a "high culture" of scientists, poets, politicians and philosophers. In the concluding chapter, I shall consider the issue of "Two Cultures" more closely, but I shall present throughout the work some evidence of a common intellectual culture, rather than assert a general social culture. I shall frequently make the point that the geologists were not only geologists, but also academics of considerable standing in other fields. More than being all-rounders, they shared with Wordsworth a similar educational background. My next step in the chapters that follow is to argue that for three of the geologists, Wordsworth was himself part of their educational growth.

It is at this point that I should explain how I have used the work of professional historians of science to find support for or illumination on the geologists of the early nineteenth century. In common with the majority of those who have recently studied the early records of science and the scientists who made them, I am not proposing a theory of "great scientists" each of whom added his rock to the cairn that has become "Science". As Toulmin put it in his study of Priestley and Lavoisier in 1957.

For one of the preoccupations which has done most to cloud our understanding of the science, both of our own and of earlier generations, is a logical one: the idea that a new theory supersedes an old one as a result of direct hand-to-hand contest. According to this doctrine, a new theory can prove its merit over an old through a single "crucial" experiment, as a result of which the old theory is left dead upon the field and the young contender, as in Fraser's account of primitive societies, reigns in its place in the sacred grove (Toulmin, S.E. 1957: 205).

Although it is an important part of my task to identify what Hutton, Greenough, Sedgwick and Whewell achieved, I do not set out to show a form of progression in knowledge from one to the other. I hope I share the attitude of historians such as Porter, R.S. (1977), Rudwick, M.J.S. (1976), and Secord, J.A. (1986) in not rejecting geologists of the past because their theories are dated. There is one other self-inflicted problem with a framework built on a "progression of science" principle. It presumes that one hypothesis held sway until the next one came along. In fact a number of conflicting hypotheses could be in existence in any decade of the period of this thesis. They were not always locked in conflict, although the famous controversies, such as Werner versus Hutton or Sedgwick versus Murchison, appear now to have occupied everyone's attention. In truth, as Shapin (1982), Rudwick (1985) and Oldroyd (1990) point out, the early nineteenth-century members of London's Geological Society seemed to thrive on disagreement. Sometimes, more simply, they adapted superficially incompatible theories, for instance merging Huttonianism into Catastrophism. I develop that point of view in Chapter Seven. If too linear a view of successive theories of science is held, it is dangerously easy for students of literary works to make sweeping assumptions such as "Wordsworth was a Catastrophist" when, like his contemporary geological friends, he was able to hold a number of views in some kind of suspension, in his own case making use of what he selected from them for his own poetic purposes.

Underlying the sections of this thesis which make use of the work of historians of science or which attempt to relate what the geologists were achieving in the period, is a basic attitude about what science is. It is one I share with Roy Porter, whose approach is that: "All sciences are made. They are fabrics constructed by human choice and work" (Porter, R.S. 1977: 6 and see also: 236). The seminal work of Roy Porter and of Martin Rudwick in books and articles prepared the way for anyone wishing to describe connections or, as I have described them in the title, "correlations" between poetry and geology. The word "correlation" was chosen deliberately, but quite coincidentally matches Foucault's consideration of the word in *The Archeology of Knowledge* (1972 and Note 5), which I shall consider in the final chapter of this thesis. At this point, I refer only to that influential writer in order to position my own approach to the history of science. It is a different position than Foucault's at a number of points, not least in placing high on my own agenda individual human influence on changes in science. Gutting says of Foucault's texts that their "main effort is to

define archeology as an approach to the history of thought that eliminates the fundamental role of the human subject" (Gutting, G. 1989: 227-228). Any student of the period covered by this thesis would be perverse in trying to eliminate the individuality of the actors from the geological and literary scene. Perhaps in some contexts the discipline of "the archeological method" may be necessary, but, encouraged by the claims for the power of the human mind made by Wordsworth and also by the four geologists represented here, I would be capricious to iron out the human subject. An approach emphasising continuity, from the point of view of the changes or movements of scientific history, is also valuable because it corresponds with the literary dimension of this study. On the one hand, it is useless to deny that Wordsworth's and Coleridge's poetry represented a turning point in literary history; they themselves not only sensed that it did, but publicly claimed that a new day had dawned. On the other hand, I have tried to consider the two poets as inheritors of the traditions of the previous centuries. Wordsworth's own reliance on myths, to follow one approach, demonstrates a source of inspiration from travellers' tales of the previous two centuries. Inheritors though they are, Coleridge and Wordsworth are undeniably of the Romantic period. Stephen Prickett asks us to consider "the two poets as a single romanticism" (Prickett, S. 1980 (1970): 173), but we need a more detailed way to describe these poets in their own time. The twin forces of continuity and change were at play, as I shall attempt to demonstrate in the following chapters, in Wordsworth's poetry, but also in the writing of his geological contemporaries. I have already claimed they were men of similar background and wide ranging culture and education, and the following chapters will elaborate those points (See also Note 6).

The choice of texts

This thesis is based on a number of decisions about the material available for study. I have presented each chapter concerned with Wordsworth's poetry, or in the case of Chapter Two, a major prose work, in the sequence of the first publication in major collections by the poet. Each chapter on Wordsworth is followed by a study of one of the four geologists, again roughly chronologically, by the order of their birth. This intercalation of poetry and geologist is, as it were, a stratigraphical approach and it has a purpose. My aim has been to link the themes of the literary chapters with the themes devoted to the scientists. Inevitably some cross-referencing is necessary because the issues raised in one

strata do not neatly match the issues raised in the adjacent strata. However, the aim has been to try to present both literary and scientific study as close to each other as possible, in order to maximise any resonances.

The poetry and prose of Wordsworth composed after 1810 has been the chief focus of attention. There are three reasons for this choice, the first being the least related to the theme of interrelationships with science. Quite simply these are the less well studied poems. Second, these years were the early years of the foundation and establishment of the Geological Society of London. The period after 1810 obviously can not include the first of the four major geologists, James Hutton, but it does not take much ingenuity to argue that his influence was fanned alive by the popular acceptance in the 1830s of Lyellian "actualism" or, as Whewell called it, "uniformitarianism" (Whewell, W. 1832: 126). The other three geologists were, of course, men whose careers flourished in the period 1810-1860. I shall not attempt to suggest that Wordsworth's poems published, say, later than *The Excursion* itself were the material which stimulated them, however *The Excursion* is a text of considerable importance for them and for their contemporaries, therefore I have considered that major work in detail in Chapter Four. The placing of this chapter in the sequence may be valuable in raising connections in the reader's mind with themes touched upon with all three subsequent geologists. It would be true to say that Greenough, Sedgwick and Whewell probably knew best the poetry of Wordsworth's younger years, the poems in fact also most famous in our own day. I shall not be punctilious in avoiding these earlier verses, if they can prove a point and, more often, I shall need to consider aspects of *The Prelude*, a poem which the geologists would not have seen, at least in its entirety.

The last point raises the issue of my choice of texts. In one sense *The Prelude* of 1805 (or of 1799 for that matter) is a "late poem", published after Wordsworth's death. Like many of Wordsworth's poems, it was extensively reconsidered and partially revised. Because there is a valuable scholar's edition with useful double and, for Books I and II, treble texts, by Abrams, M.H., Gill, S. and Wordsworth, J. (*Prelude*, 1805 and 1845), I have chosen to quote from that work. Stephen Gill has correctly described the problem of finding a good text:

Problems of text, however, face anyone reading Wordsworth, from scholar-critic to essay-writing student, and it is essential that all should understand what the issues are and what the significance is of decisions editors have made (Gill, S. 1983: 173).

In the event, I have compromised by quoting from the Cornell Wordsworth editions where they included poems I wish to examine, but, because the majority of the poetry after 1815 has not yet been edited by Cornell's team, in general I have used the de Selincourt and Darbishire Oxford editions for most of the later work. For Wordsworth's prose work, I have quoted from Owen and Smyser's edition of three volumes of prose (W. Prose).

Sources of "good" texts for the four geologists studied have been, on the whole, more straightforward. Where there were unpublished notebooks or correspondence which related to my subject, I have turned to such material. This is particularly true in the case of Greenough and Sedgwick. The geologists' own publications, in the form that they were edited or approved by them, and lectures and addresses by them are the second source of material, bearing in mind my previous procedural point that I have sought to bring forward for attention philosophical, theological or educational works as well as geological texts. Other major sources, biographies and Victorian collections of "life and letters", have more problems. The great Victorian biography industry was well organised to deal with editing the correspondence of Sedgwick and of Whewell. Similarly, in an early period, Playfair undertook the same task for James Hutton. Even though these texts were carefully selected by the biographers, they are still prolific veins with valuable yields. Inevitably the nineteenth-century biographers restricted their attention to their own interests. More recent work has on the whole been more searching. A considerable revival of interest in James Hutton and the Edinburgh or Scottish "Enlightenment" (see Chitnis, A. 1976 and 1986) has been aided by the detailed collections by J.M. and V.A. Eyles, whose papers are gathered in the University of Bristol library. Similarly a major preliminary task of categorising Greenough's papers at University College Library, London has been achieved by J. Golden (1981), with more to be completed with the collection of papers currently held at the University of Cambridge library. Greenough's career and his work in geological mapping was opened up for modern experience by Rudwick (1963) and Laudan (1974). As I have said, Sedgwick and Whewell benefited (and their source material was not misused) from their Victorian biographers. In very recent years attention has again been

paid by scholars to unpublished early notebooks of Whewell (See Fisch, M. 1991 and Fisch, M. and Schaffner, S. eds. 1991).

It has been my objective to consider the language produced by the geologists themselves, rather than the way that later interpreters "translate" what they said. Just as there is an acknowledged "text" for the student of literature, difficult though it is to decide exactly which text to consider, so there is a "text" for the literary enquirer in the geologists' technical publications, lectures, addresses, correspondence and, as I shall illustrate, occasionally in their own verse. I hope that the study of the language, or the varieties of language, of the geologists will relate in a number of ways to the language of Wordsworth. To find the right word ("relate to", "correspond with", "resonate with") is one of the quests of this thesis. Susan Gliserman in her study of Tennyson and his relationship with science and scientists used the term "cultural interaction or exchange" (Gliserman, S. 1975: 278). Gillian Beer's provocative article on the relation of literature to science uses and develops the two terms. "transformation" and "translation" (Beer, G. 1990). These critics give a valuable indication, in their search for a suitable term, that the process is two-ways between poetry and science. That proposition is also the foundation of my own thesis which might be summarized simply as the question, "What kind of evidence is available to find out who influenced and who was influenced?" The concluding chapter will, I hope, take on board the convenient, but wide-ranging term, "influence".

I end this introduction with two phrases from the notebooks of a scientist who was "apprenticed" to Adam Sedgwick, one of the geologists studied in this thesis. Charles Darwin, as a geologist, is not often studied, but he has a genuine right to be considered as a student of that science. In the following passage he uses the language of literature to describe his experiences of being a geologist and, in so doing, uses two key words from his mentor's favourite vocabulary, "poetical" and "imagination". What Darwin wrote says much about the intellectual processes and correlations which I wish to elaborate in the following chapters:

I a geologist, have ill-defined notions of land covered with ocean, former animals, slow force cracking surface, etc. truly poetical... There is much imagination in every view (Manier, E. 1978: 94).

**CHAPTER TWO : DURATION AND DECAY:
A GUIDE THROUGH THE DISTRICT OF THE LAKES.**

Duration and decay appear to be opposed in Wordsworth's topographical studies of the Lake District and they are the two powers which contemporary geologists also set in opposition in their own studies. Dorothy Wordsworth, as ever a companion source for the poet, sums up the polarity in her journal of the Wordsworths' European tour of 1820:

No spectacle that I ever beheld - not even the ocean itself - has had an equal power over my mind in bringing together thoughts connected with duration and decay - eternity and perpetual wasting - the visible and invisible power of God and Nature (DWJ.II:286).

The location described in that passage was the Alps in all their grandeur, but the same sentiments were generated in the more familiar and more domesticated mountains and valleys of Westmoreland and Cumberland.

The 1820 edition of the *Topographical Description of the Country of the Lakes in the North of England* was a work which was to become popular and even to make money for the author at a time when his poetry was selling fitfully. Later editions (of 1822 and 1823) lost the word "topographical". The admired 1835 edition and three subsequent editions published in Wordsworth's life-time used as part of a title the words, *A Guide*, the term which I shall use in this thesis, partly because it is more familiar and shorter, but also because it was under this title in 1842 that Wordsworth's friend, Adam Sedgwick, contributed a set of geological "letters" or essays to which I shall refer in a later chapter (Note 1). The loss of the adjective "topographical" from the title, however, is regrettable because it accurately described a work which displayed many of the qualities of systematically organized description which a modern geographer would comprehend and even emulate. The editions subsequent to the first edition of 1810 (which was unattributed to Wordsworth at that time) through to 1835 are only amended in detail, for instance to exemplify such matters as the influence of climate, to make comparisons with continental mountains, and to insert lengthier passages describing expeditions to Scawfell and Ullswater. All editions remain

essentially topographical in style and purpose. Even the most altered edition, of 1835, although it assumes more of the trappings of a guide for travellers, does this only by commencing with "a preparatory division", as the modern editors (W. Prose II) describe it, devoted to the various means of access to the Lake District. Much of the 1835 edition remained unaltered from the earlier forms and so it retained its descriptive flavour with accretions such as the addition of two of Wordsworth's own poems: "To - on her first ascent to the summit of Helvellyn" and "Ode: The Pass of Kirkstone." The last poem is no mere decorative embellishment. On the contrary, as I shall try to argue later in this chapter, it draws together distinctive themes from the prose description of the region.

In short, *A Guide* in its various forms is a good text with which to study the reciprocal influence of Wordsworth and the geologists. At a fairly straightforward level, it is an extended topographical description which, by the very nature of the linguistic register appropriate for geographical accounts, is likely to reveal at least a few hints of Wordsworth's understanding of the terms used by geologists and geographers. There is, however, more to consider than the chance indication of language usage. The Lake District's mountains, valleys, lakes and tarns are, to the untrained and uneducated eye, a complex and even chaotic assembly of physical forms. Chaos, ruin, and a desolate, disturbed landscape were attractions for writers of guides, such as William Gilpin, Thomas Gray and Thomas West, whose works had influenced countless visitors to the district, who came in search of shock and surprise. Their readers sought sublimity in scenes which would have lost a "frisson" of excitement, if they had been analysed in the interests of order and planned description. The most noticeable feature of Wordsworth's guide is exactly this quality of orderliness and careful analysis. Disorder and randomness are brought into form and the reader is led to a clarity of understanding by a selection of controlled language. It is the same device of language, carrying out the function of classifying, categorizing and ordering, which the geologists employed in their own way to impose a form of sense on what appears to be a disorganized, senseless mass of material. I shall begin by considering this feature of *A Guide* and what it has to reveal about Wordsworth's approach to landscape, then progress to the confusing indications of Wordsworth's knowledge of geological theories.

One further quality of *A Guide* will be the subject of the final section of this chapter. This is the attention paid in the work to the landscape as a record of human history. This feature demands no apology in a study of geologists, because, as later chapters will reveal, they, like Wordsworth, saw a close connection between land and people. In the spectrum of the sciences, from the physical, depersonalized and abstract at one extreme to the human and historical at the other, geology was interpreted by many contemporaries of Wordsworth as standing at the latter pole, as a close cousin of studies of archeology and pre-history. If *A Guide* was being classified in a twentieth-century library, because of its range of contents from geographical description through evidence of historical occupation to a concern for damage to the fragile landscape, it would be identified as Environmental Studies.

The range of interest in *A Guide* calls for one more preliminary comment: it should not be read as a separate or aberrant work in a poet's canon of publications. Although it was produced first as a set of serially published accounts to accompany engravings by Joseph Wilkinson, the work took on a literary intent as soon as, or even before, that task was accomplished (W. Prose II: 127-128). Two more ambitious essays, "An Unpublished Tour" and "The Sublime and the Beautiful", were drafted before 1820, the first attributed, edition. By 1820, therefore there was already a more serious purpose in the description of a landscape. The poet's task was not put aside. Even more important was the form which the 1820 edition took. It was produced as a companion part of a collection of poems, *The River Duddon, a Series of Sonnets: Vaudracour and Julia: and Other Poems* (W. 1820). In a preparatory note, Wordsworth linked the descriptive prose with the poetic collection: "from a consciousness of its having been written in the same spirit which dictated several of the poems, and from a belief that it will tend materially to illustrate them" (W. Prose II:132). I shall, in Chapter Six, try to illustrate the connection between the poems and the topographical description, a task made easier by the poet's consciousness of a similar "spirit". In his notes to *The River Duddon: a Series of Sonnets* and to the "Ode: Composed upon an evening of extraordinary splendour and beauty" there are direct references to the material which the reader will also find in the prose description. I have already commented on the inclusion of "Ode: the Pass of Kirkstone" in the 1835 edition. The fact that it appeared within the text of *A Guide* fifteen years after the publication of *A Topographical Description* should not confuse the reader. The ode is like the other poems with

which it was published in the 1820 collection, a partner to the prose description. This guide is, in short, a cohesive work in and part of the central body of writing in Wordsworth's middle years, living on with his approval in edition after edition into the later years of the poet's life. The themes of the poems are reflected in the orderly description of the landscape and it is to these qualities I now turn.

"A Scientific Review"

The *Topographical Description* of 1820 began with a description of a model of Alpine scenery, which the poet had seen in Lucerne. It was also described in detail by William Coxe in his *Travels in Switzerland*, a work that Wordsworth consulted. This model or visual aid provided an example of good practice in setting out a complex scene, "But it supplies also a more substantial pleasure: for the sublime and beautiful region, with all its hidden treasures, and their bearings and relations to each other, is thereby comprehended and understood at once" (W. Prose II:170). This model, Wordsworth continued, provides a method which he will pursue for the benefit of the traveller to the Lakes. The reason for his strategy of presentation is that it will enable the traveller's recollections to have:

a more orderly arrangement than his own opportunities of observing may have permitted him to do; while it will be still more useful to the future traveller, by directing his attention at once to distinctions in things which, without such previous aid, a length of time only could enable him to discover. It is hoped, also, that this Essay may become generally serviceable, by leading to habits of more exact and considerate observation than, as far as the writer knows, have hitherto been applied to local scenery (W. Prose II:171).

In short, the work is about order and discrimination, a task for categorising and organising. Dorothy Wordsworth's letter to Catherine Clarkson of 18 November, 1809 refers to an earlier unpublished version of the text with, again, a reference to orderliness. The letter also uses a most interesting word:

It is the only regular and I may say *scientific* account of the present and past state and appearance of the country that has yet appeared (W.L.II:872).

The word "scientific" is worth our attention, not because we can assume it is synonymous with geological knowledge, but because it denotes an attitude to the ordering of knowledge. It is not unusual for Dorothy to use the word "scientific", as I noted in Chapter One in a reference to Derwent Coleridge. From the contexts of her usage it appears to denote regularity and order. It is not, in short, the opposite of "poetical" as might be assumed in other, more modern contexts, but a quality in its own, functionally useful and general right. In 1814, writing again to Catherine Clarkson, she wrote:

Joanna Hutchinson and John M. [Monkhouse] beg their best remembrances. They are busy putting up Books and they want me to help them. We have been making ourselves merry with their unscientific way of putting them up - all by the backs (W.L.II:167).

A Guide, then, was the appropriate place for orderly arrangement and analytical discourse ("attention...to distinctions"), I shall, in Chapters Three and Four, spend time on the important word "distinctions"; at this point I wish to concentrate on the descriptive quality of orderliness. Following the example of the Swiss model, Wordsworth places himself and thence his reader high above the Lake District mountains on a theoretical vantage point. This elevation reduces, or rather improves the perception of the Lake District's contorted ranges and deep valleys so that a description can be pursued in a methodical, orderly fashion. The device is that of the map-maker, who is, after all, a model-maker working on a flat surface, but essentially seeing things from on top. This was the period in the history of geology when map-making took on an importance for the further development of descriptive studies. William Smith had produced the first versions of a geological map by 1815 and, as we shall see in Chapter Five, George Bellas Greenough and the Geological Society of London were actively engaged in producing a geological map during the first thirteen years of the Society's life. Even more active, the geographers and explorers were completing work on unexplored regions and, nearer to home, on territories that had hitherto been described by diagrammatic systems rather than by what we would identify as a useful map. The effect of wide-scaled exploration and more extensive travel was to give status to the topographer. Travellers could rely on maps as well as descriptions. Surveyors, like Colonel Mudge celebrated in a poem of Wordsworth's (see Note 2), completed details of even the most difficult terrains by triangulation and other surveying techniques. The astronomer no longer held a uniquely lofty vision. Comprehending space

became the property of ordinary travellers as well as of scientists and natural philosophers. Wordsworth's device of seeing the mountain mass of the Lake District as if from a station in the sky was an appropriate one for the times.

Wordsworth asks his reader:

to place himself with me, in imagination, upon some given point; let it be the top of either of the mountains, Great Gavel, or Scawfell; or, rather, let us suppose our station to be a cloud hanging midway between those two mountains, at not more than half a mile's distance from the summit of each, and not many yards above their highest elevation (W. Prose II:171).

From this point of view the radiating valleys and intervening ridges of the mountains could be described as the spokes of a wheel radiating from the hub above which the inspired reader hovered. The author was in a position to describe the major features by an orderly, clockwise routine, encompassing a seemingly complex, but in fact structured and comprehensible area. Although Wordsworth should not be thought to have invented the device, he claimed some pride in its freshness of view, for instance when writing to Lady Beaumont in 1810 (W.L.II:404). The same device was also to reappear in a different guise in another country. In the collection of poems that followed his tour of the Continent in 1820, Wordsworth again transports himself to a point of visionary vantage:

Fancy has flung for me an airy bridge.
Across thy long deep valley, furious Rhone.
Arch that *here* rests upon the granite ridge
Of Monte Rosa - there on frailer stone
Of secondary birth, the Jungfrau's cone (W.P.III:199).

Another example of an imaginary vantage point, in a narrative poem on this occasion, would be the opening lines of "Peter Bell". The image of flight and poetic observation appears again in *The Prelude*:

Anon I rose
As if on wings and saw beneath me stretched
Vast prospect of the World (*Prelude*, 1805: 377-379).

One critic has particularly noted the aesthetic implications of the simile "like spokes from the nave of a wheel" used by Wordsworth in *A Guide* to describe the arrangement of mountain ranges and intervening valleys. In Kelley's view the hub of the imagined wheel "is not the true centre of the region", but it is the centre of Wordsworth's image of the region which "organises the sublime and the beautiful features of the Lakes" (Kelley, T.M. 1988: 16). She traces the influence of Coleridge who also favoured the image of an old coach wheel in a discussion of abstractions and the beautiful. In geographical terms, however, the axis of Great Gable and Skiddaw, in fact, serves very well as a centre from which drainage patterns were established in the region. The image of the wheel, in my own reading of the passage, is not out of place in a description of a landscape which, in geomorphological terms, actually is a central, eroded dome with radiating valleys. In short, I place more emphasis on Wordsworth's practical choice of a vantage point than on the aesthetics of the description that followed it. Visions from mountain peaks are a familiar element in Wordsworth's poems. In *The Prelude* and *The Excursion* the view from above plays a dramatic role in the movement of ideas within these longer poems. Prospects were a well-worn feature long before Wordsworth's descriptive task was attempted and "stations" were usually elevated. In Shaftesbury's *The Moralists* there is a dialogue based on the fanciful idea of a flight above but close to the earth in order to study the "Map of Nature" (Shaftesbury, Lord, 1773: 382). Closer in time to Wordsworth's *A Guide*, Housman's *Topographical Description* of the Northern Counties of 1800 also imagines "supposing ourselves ascending to a sufficient height above the fine spreading modern-built town of Manchester with a powerful command of sight" in order to survey a large area (Housman, J. 1800: 6).

The device used by Wordsworth is particularly significant because it is a method of describing a natural region not a deliberately selected sector of a landscape, and, furthermore, it is a whole, complex and diverse region on a grand scale. The sweep of territory may be vast but it is possible to capture it by language. The apparent chaos and complexity is given order. By a careful interpretation, a systematic arrangement is visible. Nature has been understood and her patterns laid open by the power of the human mind exercising its gift of orderly observations. Imagination, was, however, necessary and so this device was proposed in order to elevate the mind above the seemingly uncomprehensible, and yet preserve its sense of grandeur. The sweeping horizons from

the sea inland to the range upon range of alternating mountain ridges and deep valleys are systematically set out for the reader, preparing the way for what Gill has described as a "gem of Romantic writing" (Gill, S. 1989:285).

What other evidence of order is to be found in *A Guide*? To ask this is to open the question of how different this guide is from the others which were in wide circulation from the middle of the eighteenth century onwards. Ousby finds that Wordsworth's *A Guide* stands at the end of a tradition and indeed empties from that tradition many of its features which had become apparently inevitable conventions (Ousby, I. 1990). To read Gray or Gilpin, or Thomas West on the Lake District is to inhabit the world of the picturesque. An example would be that of West describing the cascade at Groves above Ambleside:

The parts of this cataract are noble. The deep, dark hue of the rocks in the gloomy bosom of a narrow glen, just visible by day and the foaming water tinged with a hue of green caught from the trees and shrubs that wave over the fall, render this scene highly awful and picturesque (West, J. 1780: 76).

The descriptions of an expedition into the caves of Yorkshire included in the 1780 edition of West's Journals are catalogues of emotional delight and prepared sensations which the traveller ought to feel. These are composed landscapes arranged for a painter. As Ousby also comments, Wordsworth holds a "near-silence" on the subject of painters; he presents a literary landscape.

Of course, Wordsworth was conscious of his predecessors and acknowledged the tradition, particularly of the more practical guide-writers such as West and Green. He too made judgements about aesthetic matters. If we excluded aesthetic issues, *A Guide* would be unrecognizable. His language includes some of the vocabulary of the earlier writers ("sublime" is a frequent epithet, precipices are "awful", shadows are "solemn"), but his reader is no longer assumed to be a traveller who seeks a painted or paintable, re-ordered landscape complete with stock emotions. Wordsworth is explicit about the people he addresses. His purpose is:

to furnish a Guide or Companion for the *Minds* of Persons of taste, and feeling for Landscape, who might be inclined to explore the District of the Lakes with that degree of attention to which its beauty may fairly lay claim (W. Prose II: 155).

The new travellers have minds as well as feelings. They must "explore" the landscape with concentration, attending to what is there to be appreciated. That is not to say that they can expect a dry, tedious description. The principal beauties will not only be identified, they will be considered, evaluated and compared with other outstanding features at home and overseas. For the experienced, discerning traveller, there are specific comparisons with mountainous scenery in Scotland and in the Alps. After 1815, Switzerland and Northern Italy returned to the itinerary of the wealthier classes. Comparisons between continental and English mountains could now be made by connoisseurs. These were not novel exercises, for comparisons of mountains had been a regular feature of guides such as those by Gilpin and West. Wordsworth was continuing an eighteenth-century tradition, but changing it into an early nineteenth-century mode. A glance at a work such as Otley's *Concise Description of the English Lakes* (Otley, J. 1823) conveys how much more closely Wordsworth's text is to the nineteenth-century guidebooks in order and style.

The first of Wordsworth's principal sections, as in Otley's description, systematically describes the chief landscape features: Mountains, Vales, Lakes, Islands, Tarns, Woods, Rivers and Climate, and ends with an evocative description of night by Dr Brown, "a native of Cumberland". Wordsworth then sets the orderly tone with a significant noun by saying he will proceed with "our survey" (W.Prose II:175). The form, surface, and colour of the mountains is carefully described, with an appreciation of the effect of light and of the seasons on the hills. The features of the vales are similarly covered with some comparative remarks on the Welsh valleys. Similarly the lakes are compared with North Wales and with Scottish and Alpine lakes. Aesthetic guidance when required is added to explanations of form and size. Size is not everything: "In fact, a notion of grandeur, as connected with magnitude, has seduced persons of taste into a general mistake upon this subject" (W. Prose II: 180). Each of these major elements of the landscape receives its due and weighted commentary. Place-names are identified and the author's own preferences displayed, but any traveller could find his way to the key "stations" if the purpose was to view.

The second section of the work moves from Nature which has "discriminated this country from others" (W. Prose II:51) to the historical and human. This is an interesting departure illustrating Wordsworth's own awakening interest in Nature-before-man on which I shall comment at the end of this chapter and note

as a feature of the *River Duddon: a Series of Sonnets* in Chapter Six. Again this section displays a systematic description, first archeological, then historical completed by what would now be called the human geography of the area. The following, third section brings the account up-to-date with a thoroughly critical review of the effects of contemporary change, the influx of tourists, the rise of new country estates, the effects of insensitive building and tree-planting by the newcomers and an over-view of other environmental matters. It is here that the issue of discrimination takes over from analysis and order. These are the argumentative sections intended to engage the reader in a reasoned response to the proper care and maintenance of the country in which he has become involved. As the title page of the 1835 edition of *A Guide* clearly indicates, it is intended for both "tourists and residents."

It is possible to see, from the above survey of *A Guide's* attention to a systematic, discriminating description, and to natural detail, why Dorothy Wordsworth was able to apply her term "scientific" to the work. This guide is however, not merely orderly and discriminatory, although it certainly has both these qualities. The reader must also be aware that it is the result of close, careful observations of scenery, climate and the works of mankind and their interaction. The Wordsworthian topographer observes as a geographer or geologist observes. Well before theories of glacial erosion became accepted by the geological establishment, Wordsworth's experienced eye was identifying features which, by the middle of the century, became accepted as classic glaciated mountain scenery: "the bottom of these valleys is mostly a spacious and gently declining area, apparently level as the floor of a temple, or the surface of a lake, and broken in many cases, by rocks and hills, which rise up like islands from the plains" (W. Prose II:178). Similarly, in describing the configuration of the lakes of the region, Wordsworth notes that the bases of the mountains "may run for a long space in straight lines, and these parallel to each other" (W. Prose II: 181). Wordsworth is a careful topographer whose descriptions would clearly pass approval today in studies of mountain scenery. Writing about the surface of the mountains he notices;

the soil is laid bare by torrents and burstings of water from the sides of the mountains in heavy rains; and not unfrequently their perpendicular sides are seamed by ravines (formed also by rains and torrents) which, meeting in angular points, entrench and scar the surface with numerous figures like the letters W and Y (W. Prose II:175).

In describing the effect of the "decomposition of iron in schist rocks", there is sharp and detailed description which is both geological and at the same time the material for a poet's notebook:

The iron is the principle of decomposition in these rocks; and hence, when they become pulverized, the elementary particles crumbling down, overspread in many places the steep and almost precipitous sides of the mountains with an intermixture of colours, like the compound hues of a dove's neck (W. Prose II:175-176).

I shall return in the next chapter to the likely source of that description. Here we may note that Wordsworth is conscious of the geological agents of change in the landscape. He notes even the smallest rivulet, which "will be found to have been not useless in shaping by its deposits of gravel and soil in time of flood, a curve that would not otherwise have existed" (W. Prose II:181-182). Similarly, he is conscious of processes which are not visible to the human eye but which work away under the soil and even below the surface of lakes:

...from the multitude of brooks and torrents that fall into these lakes, and of internal springs by which they are fed, and which circulate through them like veins, they are truly living lakes, "*vivi lacus*"... (W. Prose II:185).

Perhaps one of the most revealing comparisons with earlier guides to the Lake District is the description of the colours of the hills. Gilpin in 1786 is primarily interested in the landscape painter's vision and he uses a broad brush for descriptive purposes:

The natural colour of the rocks is either grey or red. We have of each kind in England; and both are beautiful; but the grey rock (which is the common species in this scenery) makes the finer contrast with the foliage either of summer or autumn...I call red or grey the natural colours; but more properly they are the ground only of a variety of tints. These tints arise from weeds, mosses and lichens of various kinds (Gilpin, W. 1786:107).

Some thirty years later, Wordsworth's description of the colour of the same mountains is more exact. He relates the colours of the rocks to their composition. Geology and botany and meteorology are admitted into the description:

...but schist being the substance of the mountains, the predominant colour of their rocky parts is bluish, or hoary grey - the general tint of the lichens with which the bare stone is encrusted. With this blue or grey colour is frequently intermixed a red tinge, proceeding from the iron that interveins the stone, and impregnates the soil (W. Prose II:175).

The passage continues to explain why the scree is composed of "compound hues", the changing colours of the ferns through the seasons, the colours of winter and overall the effect of cloud formations and sunlight on the high mountains.

These few examples of close observation and recording of natural history from only one section of *A Guide* can be repeated in many other instances describing not only the physical features but also the changing climatic moods and the wild life of the district. We must now turn to ask more precisely the question: given that *A Guide* reveals Wordsworth as an accurate (and felicitous) communicator of physical features, does this mean anything more than a sharp eye for landscape? Is there evidence of a framework of specialist knowledge? I shall next examine the glimpses we are given of Wordsworth's knowledge of the material from which the landscape is made.

Glimpses of Special Knowledge: the understanding of geology.

This guide was not written specifically for any one group of travellers, but there is one reference to a specific interest group in the "Directions and Information" section which, it will be remembered, in the 1835 editions begins the text and in the earlier editions came later in the collection. Writing about the route into the Lake District from the Tees - a route full of personal significance for the writer because of his courtship and marriage - Wordsworth says:

Every one has heard of the great fall of the Tees above Middleham, interesting for its grandeur, as the avenue of rocks that leads to it, is to the geologist (W. Prose II:155).

Similarly he comments on an ebbing and flowing well at Giggleswick Scar "worthy the notice of the Naturalist" (W. Prose II:156). We know from later correspondence with Adam Sedgwick that Wordsworth was aware of the potential readership of geologists, amateur and professional. They discussed in the early 1820s the possibility of Sedgwick writing geological notes to accompany

A Guide. This project was not achieved until the 1842 edition, whereas the guide to the district by Jonathan Otley, published in 1823, dealt with these specialist matters in exactly the manner of the 1842 guide, that is to say with a separate section on geology. Otley himself was a tourist guide and experienced collector of fossils and minerals. Wordsworth was not and did not attempt to convince a reader that he was a qualified writer for the specialist interest groups of mineralogy or geology.

There are, however, some interesting indications of specialist knowledge. One specific reference to the mineralogy of the district is at first sight an indication of inadequate knowledge of the subject, but appearances are not what they seem. I have already quoted the paragraph of *A Guide* describing the colours contributed by the composition of the rocks of the mountains. Part of the passage is necessary to repeat for a different purpose. In describing the mountains, in the first three editions, Wordsworth wrote:

The MOUNTAINS are for the most part composed of the stone by mineralogists termed schist, which, as you approach the plain country, gives place to lime-stone and free-stone, but schist being the substance of the mountains, the predominant *colour* of their *rocky* parts is bluish, or hoary grey - the general tint of the lichens with which the bare stone is encrusted (W. Prose II:175).

This sentence has interesting additions. "Free-stone" was added in the 1820 edition. By the 4th edition (1823), Wordsworth included more mineralogical information by adding to the beginning of the sentence the words "In the ridge that divides Eskdale from Wasdale, granite is found but..." (W. Prose II:175). Kelley asserts that the influence of Otley (specifically in an article in *The Lonsdale Magazine* (Kelley, T.M.:1988) had provided the extra technical information. They were not terms exclusive to Otley of course. William Smith used both "freestone" and "schist" in his memoirs and assumed they were commonly understood (See Sheppard, T. 1917). Whatever the actual source of the information, there is undoubted evidence of Wordsworth's knowledge of minerals, however slight. The technical term, "schist", in particular would seem at first sight to be an over-simplified categorization for the considerable variety of lithology in the region. Otley's *Description* of course contains a more elaborate description in geological terms of the variety of rock type. However, Wordsworth's work is at least using a technical language compared with earlier literary guides such as Gilpin's.

There is more to consider. The word "schist" in the period between 1790 and 1830 is a term frequently applied to the hard, but easily split, grey rocks of great antiquity in mountainous areas. These rocks were for many years confusing to geologists because they appeared to be formed in layers, breaking horizontally like sedimentary rocks, yet they were obviously in areas of so-called "primitive" formation. As a modern editor of a facsimile of John Playfair's work on James Hutton, the subject of the next chapter, writes: "The term 'schistus' is used with various meaning: usually schist will convey the meaning, although 'gneiss' is sometimes meant. Occasionally it is used in the way we now use 'basement complex'" (Playfair, J. 1802:ix). Adam Sedgwick in his paper to the Geological Society of London in 1831 on the "General structure of the Lake Mountains of the North of England, and on the great dislocations by which they have been separated from the neighbouring chains", having defined the boundaries of the region, continues:

Within these limits are found two distinct classes of rocks, all the central region being composed of crystalline, unstratified rocks, irregularly associated with great formations of schist, which are subdivided (according to the system first published by Mr Otley of Keswick) into three well-defined groups, while on the outskirts of these older formations is a broken zone of carboniferous limestone and extensive deposits of superior (secondary) strata (Sedgwick, A. 1831:247).

Geologists of a little earlier decade who used the term "schist" to describe this type of "primary" rock were William Smith and George Bellas Greenough, the first President of the Geological Society. Greenough applied it to areas of mountainous country in the Peak District and in the Lake District in the widely distributed text of 1819, *A Critical Examination of the First Principles of Geology* (see Chapter Five and Greenough, G.B. 1819). The professional geologist gave more elaborate attention to schists, sub-classifying them according to their mineralogical constituents. I shall refer to Hutton's frequent use of the word "schist" with a sub-classification in the next chapter. Humphrey Davy in his public lectures of 1811 distinguished micaceous schists which he defined as "primary rocks" from argillaceous and siliceous schists which he deemed to be secondary in age (Davy, H. 1811:12 and 20).

The quotation from Sedgwick's address to the Geological Society also serves to remind us that Wordsworth's description of the mountain complex also distinguishes between a central core and an outer ring of different rocks. There may be more geological background to this simple distinction of zoning than at first appears. During the eighteenth century, there was a beginning of understanding that complex mountain structures could often be interpreted as a central "primary" dome, surrounded by newer rocks. The Italian naturalist, Giovanni Arduino (1714-1795), distinguished between rock types of primary, secondary and tertiary systems in mountainous areas. His work was extended by Peter Simon Pallas (1741-1811) with material from his explorations in the Urals and the Altai Mountains (Levin, H.L. 1988:11). Whether the actual detail of the discoveries of these two innovators in geological description was known, for instance even to Sedgwick, is uncertain. However, the contemporaries of Wordsworth by the time of the drafting of *A Guide* would have been accustomed to descriptions set out in the manner that I have noted. Travel writers who saw themselves as natural historians, such as Alexander von Humboldt, would have attempted a similar method of zoning in order to describe the structure of large areas of land. I shall comment elsewhere that Wordsworth's library included many works of this kind.

Returning to the mineralogical information to be gleaned from *A Guide*, I would like to comment on three more details. First, the word "granite", introduced in the 1823 edition, deserves consideration. Perhaps even more than "schist" it was used fairly freely by amateur geologists to describe a particular age and type of rock, rather than to describe a precise mineralogical specimen. The key features of "granite" for the non-expert was that it was hard, crystalline, had no evidence of layering or of fossils, and was found in a landscape that appeared to be very old indeed or "primitive". Dorothy Wordsworth's *Journal of a Tour of the Continent of 1820* gives instances of "granite" being used when she wishes to convey the age and solidity of mountain masses. She writes in different entries: "the white granite of the mountains", "shut in by the granite and the snowy summit of the Alps", "Mount Blanc is granite" (D.W.J. II 1941: 196,268,285). A more interesting mineralogical statement in *A Guide* is the passage quoted earlier about the screes at Wastdale. The language in that section - "the iron is the principle of decomposition in these rocks" - is interesting because it is so technical. I shall demonstrate in the succeeding chapter devoted to James Hutton that a likely source for this usually precise mineralogical reference is

Playfair's adaptation of Hutton's important geological work. One final mineralogical reference is the word "alluvial" (W. Prose II:182) which again is of particular relevance in the next section of this chapter. (Note 4).

There are slight indications in *A Guide* of a branch of geology which, eventually - but long after the early publications of *A Guide* - was to become a science, with its own name, geomorphology (See Chorley, R.J. et.al. 1964). In a number of senses, I have already indicated Wordsworth's appreciation of the patterns of the Lake District mountains and valleys, all relevant to the modern geomorphologist's interests. Wordsworth is also concerned with shape and, to use his own word, "form" when describing the Lake District Mountains:

Their *forms* are endlessly diversified, sweeping easily or boldly in simple majesty, abrupt and precipitous, or soft and elegant (W.Prose II: 175).

He returned again to these two broad categories of mountain shape, the abrupt and the gentle, in the fragment, *The Sublime and The Beautiful*. Here he wished to explore the aesthetics of mountain shapes and, significantly for one of the chief topics of this chapter, he considers the interrelationship of shape, sense of duration, and sublimity:

A mountain being a stationary object is enabled to effect this in connection with duration and individual form, by the sense of motion which in the mind accompanies the lines by which the Mountain itself is shaped out. These lines may either be abrupt and precipitous, by which danger and sudden change is expressed; or they may flow into each other like the waves of the sea, and, by involving in such image a feeling of self-propagation infinitely continuous and without cognizable beginning, these lines may thus convey to the Mind sensations not less sublime than those which were excited by their opposites, the abrupt and precipitous (W. Prose II: 352).

It is obvious that this two-fold distinction of mountain shapes (abrupt and smooth) is a relatively simple geomorphology. However, pause for thought is provided by a passage in a geological text by the Scottish geologist, James Hutton, the subject of the next chapter. In a world-wide sweep for examples of mountain shapes from the Alps to the Appalachians, Hutton also considers there are two kinds of shape: soft and smooth and hard and rocky (Hutton, J. 1759/1795: 408-409). He, of course, attempts an explanation based upon the mineralogical constitution of the mountain mass: the schists of Wales,

Cumberland, the Isle of Man and the south of Scotland are his favoured example for the production of soft and smooth shaped mountains. "Hard, rocky" mountains are two kinds. One sub-group is formed from horizontal or inclined strata which determine ledges and sharp ridges. A second sub-type (the "insulated") is formed by extinct volcanoes. It is interesting to note that Wordsworth is also conscious of the effect of volcanic activity on a landscape. Writing in *A Guide* about the Lakes and their renewal by springs he makes a comparison:

...they are truly living lakes, *vivylacus*; and they are thus discriminated from the stagnant and sullen pools frequent among mountains that have been formed by volcanoes...(W.Prose II: 185).

Wordsworth, of course, may have been thinking of the landscape of Southern Italy, known to Coleridge (see Chapter Five) rather than what we now know as the Borrowdale Volcanic Series.

Although the phenomenon of Floating Islands is not a major geomorphological feature, it deserves mention here as one of the aspects of the district which contemporary geologists wished to explain and which Wordsworth carefully notes. Indeed a Floating Island is described by Dorothy Wordsworth in a seven stanza poem which her brother included in a collection of *Miscellaneous Poems* in 1842 (W.P. IV: 162-163 and editor's note). The brief passage in *A Guide* is as follows:

It may be worth while here to mention (not as an object of beauty, but of curiosity) that there occasionally appears above the surface of Derwent - water, and always in the same place, a considerable tract of spongy ground covered with aquatic plants which is called the Floating, but with more propriety might be named the Buoyant Island (W. Prose II:184).

The source of this information, if it was other than Wordsworth's own observation, was close at hand. Jonathan Otley published articles about the phenomenon as early as 1814 in *The Lonsdale Magazine* and the feature is elaborated in a separate section of Otley's *Concise Description* of 1823. A Floating Island is doubly interesting. It not only indicates a scientific phenomenon but also serves as an image of transience, for Floating Islands, eventually and almost magically, "disappear". The poem referred to a few lines previously makes full use of the illusory permanence of the feature. The transience of what appears to be solid is a pervasive theme of *A Guide* to which I shall return in the final section of this

chapter.

Glimpses of knowledge in "primitive frames and secondary agents": the case for Burnet's influence

From considering what might be called the raw material of geology, I next wish to turn to two other aspects of the science, the study of processes and the hypotheses which explain the history of the earth. These two approaches to geology, it has been argued, are as essential to modern geology as they were in the early nineteenth century (see Note 3).

If mineralogical information and knowledge of geological processes is well hidden in the language of *A Guide*, there is more surface information on the contentious issue of historical geology, or, as Wordsworth's early contemporaries would have called it, the theory of the Earth. The following passage from the section where Wordsworth describes the origin of the Lakes gives a good example of key words to initiate this discussion.

That uniformity which prevails in the primitive frame of the lower grounds among all chains or clusters of mountains where large bodies of still water are bedded, is broken by the *secondary* agents of nature, ever at work to supply the deficiencies of the mould in which things were originally cast (W. Prose II: 181).

In this passage is a distinction between "primitive frame" and secondary processes. This distinction is important for geological studies of the theory of the earth from the late seventeenth century on into the second decade of the nineteenth century. There are more examples. When Wordsworth described the Vales he made the same distinction:

And, it may be observed, that, in one circumstance, the general shape of them all has been determined by that primitive conformation through which so many became receptacles of lakes (W. Prose II:178).

This language is similar to the section in "Desultory Stanzas" in *Memorials of Tour on the Continent* already quoted above, where Wordsworth refers to Jungfrau's cone being of "secondary birth" compared with the "granite" of Monte Rosa (W.P.III:199).

The continuation of the passage describing the processes that had produced the lakes relates scientific to aesthetic theory. Wordsworth assumes the

continuing beneficial effects of Nature, as if the first form of the landscape was somehow awesome but authentically inadequate:

Using the word *deficiencies*, I do not speak with reference to those stronger emotions which a region of mountains is peculiarly fitted to excite...Sublimity is the result of Nature's first great dealings with the superficies of the earth; but the general tendency of her subsequent operations is towards the production of beauty, by a multiplicity of symmetrical parts uniting in a consistent whole. This is everywhere exemplified along the margins of these lakes (W. Prose II: 181).

However, Wordsworth does not see the "secondary" powers of Nature as invariably benign. He notes a few lines further on that, although the streams which slowly and patiently erode the mountain mass conveniently deposit their "gravel and soil" and "elements of fertility", there is a negative consequence in the long term:

These alluvial promontories, however, threaten, in some places, to bisect the waters which they have long adorned; and in course of ages, they will cause some of the lakes to dwindle into numerous and insignificant pools; which, in their turn, will finally be filled up (W. Prose II:182).

Wordsworth has correctly identified two geological details. The first, about which I have already made a comment, is the word "alluvial" for the most recent sedimentary deposits (Note 3). The second is the correct noting of that classic example of the process of "delta" formation between Crummock Water and Buttermere. (At least eight years before the first version of *A Guide*, John Playfair had also noted evidence of the gradual filling up of lakes by mountain streams in the Lake District). It is worth noting however that the above quotation from *A Guide* is followed by the admonition to check "these intrusive calculations" and to be "content with appearances as they are". The recording of grander "secondary" changes in landscape is not always checked, particularly in comparisons between the Lake District and Switzerland:

Havoc, and ruin, and desolation and encroachment, are everywhere more or less obtruded; and it is difficult, notwithstanding the naked loftiness of the *pikes* and the snow-capped summits of the *mounts*, to escape from the depressing sensation that the whole are in a rapid process of dissolution; and, were it not that the destructive agency must abate as the heights diminish, would, in time to come, be levelled with the plains. Nevertheless, I would relish to the utmost the demonstrations of every species of power at work to effect such changes (W. Prose II: 231).

This passage is paralleled in Dorothy Wordsworth's journal of their tour of the Alps in 1820:

In passing through the Rigi valley, perpetual marks of falling ranges or decay of mountains are visible, yet no fearful devastation; scars gradually wasting - and fragments tumbled down. Threads and ribbands of cataracts were now gently performing their work; but their paths on the declivities told a plain tale both of perpetual and fitful wasting (D.W.J. II: 163).

The consequences of avalanches, not only of ice but of rock, were immediately visible to the travellers at Goldau because of the effect of the major flood of 1806. Similar catastrophes were perceived at the Lake of Uri. It was on the excursion to the Mer de Glace from Chamouny, that a very significant impression was made on Dorothy herself; as ever, we must assume it was felt by all their family group. It is with her recording of an overwhelming but conflicting impression of "duration and decay" that this chapter begins.

Returning to *A Guide*, "secondary agents" in the Lake District on the whole appear to improve a landscape rather than to precipitate cataclysmic decay, although Wordsworth clearly recognises major changes may occur when he notes that "the sea appears to have been retiring slowly for ages from this coast. From Whitehaven to St. Bees extends a tract of level ground, about five miles in length, which formerly must have been under salt water" (W. Prose II:188). The phrase "slowly for ages" conveniently allows me to turn to the theoretical context in which modern writers have assumed that these views of the geological processes were held.

Two important frameworks of thinking are revealed by the above discussion. First, there was an implicit acceptance of a long process of time during which erosion shapes and alters the earth's landforms. In some areas, such as the sea coast and the high Alps, the effects of erosion were clearly relatively new. The processes are visible in historic time. Also any well-read person knew that volcanic activity can have a dramatic effect on landscape. In general, however, the processes act so slowly that the span of time is very extensive if major changes in physical features are to occur. From this first presumption follows a second, geological viewpoint, namely a distinction between primary forms and secondary processes. The line between the two is not, as far as the evidence provided by *A Guide*, by the journals of the Wordsworth family, and by the

poems, always clear. Is the primary formation before the Biblical Flood or is it a consequence of that catastrophe? Is the Flood relatively recent or primordial? What, for instance, would a contemporary geologist have made of the following revealing reference? It is from Dorothy Wordsworth's *Journal of a Tour on the Continent* (1820) when the travellers visited the Fall of the Aar and noticed that the River Ingrund leaves an open plain by a narrow passage overhung with trees:

It reminded us of the Pass of the Duddon, a miniature of *this* pass - and of my brother's sonnet and, if great things may follow so closely upon little, I will add that we thought with awe of those convulsions of nature by which the chasm had been formed; for the water by its own force could never have eaten its way through such a barrier (D.W.J.II:130-131).

Did Dorothy Wordsworth mean by these "convulsions" phenomena occurring after the primal formation of the earth or did she mean that they were the primal formation itself? Are they intended as an indication of a sequence of catastrophes? Is she rejecting aqueous erosion and espousing a cataclysmic theory? These are impossible questions to answer because of our limited knowledge of the Wordsworths' reading of contemporary geological texts. However, some indications of knowledge of theories of the history of the earth are tantalisingly hidden in *A Guide* and a number of attempts have been made to identify Wordsworth's position. My opinion is that ingenuity is required to establish a consistency in Wordsworth's knowledge of such matters.

The most impressive argument to support the identification of an influence on Wordsworth's thinking is contained in the study, *Mountain Gloom and Mountain Glory* by Marjorie Hope Nicolson (Nicolson, M.H. 1963). The central purpose of her thesis is to explain the major change of taste and aesthetic attitudes to mountain scenery throughout Western cultural history. The shift of appreciation, she records, was from the view that mountains represented disorder, and should either be avoided completely or at least sparingly described by using conventional forms, to the Romantic view which sought inspiration in lonely mountain regions. A major thinker in Nicolson's intellectual route-map was Thomas Burnet (1635-1715) whose *Telluris Theoria Sacra* of 1684 represents both a continuation of a classical and Christian tradition and a major influence which moved that tradition in a new direction. Burnet has been recognized by others (Hodson, F. 1961, Porter, R.S. 1977, Gould, S.J. 1988 (1987), for a major literary allusion see Lowes, J.L. 1927) not only as a theologian, but also as a

forerunner of nineteenth-century English geology.

Burnet faced up to a long-standing dilemma in Christian and Hebrew theology: what did God create out of chaos, a beautiful world or a fallen, imperfect world? The doctrine of Noah's Flood provided one answer but raised another. If the world after Eden had been flawed, was its weakness, which had been exacerbated by human misdeeds before Noah's special exemption from the Flood, redeemed when the Flood's waters receded? Did God's covenant imply a new start? The arguments were confused because of disagreements about whether the Flood actually covered all the higher mountain ranges. If they did not, then the old unredeemed territory persisted. A further dilemma was posed by the doctrine that eventually the world would face a final Deluge or apocalyptic disintegration. Burnet attempted an argument which attempted to reconcile all these questions. His solution, as Gould has so persuasively argued with an illuminating study beginning with the frontispiece of *Telluris Theoria Sacra*, is that of an arrow-like explanation of a geological progress, yet with a consciousness of the journey of the world's history returning to the point where it began:

In other words, Burnet displays his narrative (time's arrow) in the context of time's cycle - an eternal divine presence at the top, a circular arrangement of globes beginning and ending in Immanence, a complex set of correspondence between our past and our future (Gould, S.J.: 1988:22).

Burnet's starting point was a near-perfect sphere: "As to the form of it, it was all one smooth continent, one continued surface of the earth, without any sea, any Mountains or Rocks; any Holes, Dens or Caverns: And the situation of it to the sun was such as made a perpetual Equinox" (Burnet, T. 1684: 240). The surface of this perfect "continent" was composed of a layer of life-giving substance ("terrestrial licquors"). Adam and Eve shared this Eden. With the flood, however, a total environmental disaster occurred and its aftermath was to leave the "ruins of a broken world", which we have largely inherited. Layers of rock below the liquid layer were projected upwards as the arch of the outer layers of the previously perfect sphere cracked open, with sectors of strata collapsing inwards. Hence great ranges of mountains were thrown up and the inner fires of the earth were released with dire results:

We suppose the great Arch or circumference of the first Earth to have fallen into an Abyss at the Deluge, and seeing that it was

larger than the surface it fell upon, it is absolutely certain, that it could not all fall flat, or lie under the water (Burnet, T. 1684: 147).

The waters that had also been released from fissures at first created the Deluge itself and then receded, but, of course, created an oceanic territory distinct from and even antagonistic to terra firma. All was not permanently ruined. Human will, encouraged by God's forgiveness, permitted a reconciliation to be effected. Human labour cleared forests, drained marshes and rendered the ruined earth habitable. The softer agencies of rain and rivers smoothed the harsher edges of the ruin and washed down eroded remnants which became fertile soil.

The evidence that Wordsworth was acquainted with Burnet's work is undeniable. One text was in the Pinney Collection (See Note 4 to Chapter One) and two others in his own library or in Coleridge's (Shaver, C.L. and Shaver, A.C. 1979). Whether he took on board in any uncritical way the geological theory is doubtful. One of the chief arguments put forward by Nicolson to establish a direct influence on Wordsworth's idea of the theory of the origin of the earth is the passage in *A Guide* quoted above, where Wordsworth compared "that uniformity which prevails in the primitive frame of the lower grounds" which "is broken by the secondary agents of nature" (W. Prose II:181). Nicolson also finds supporting clues in "Ode: the Pass of Kirkstone" and *The Excursion* Book II:

Far and near
We have an image of the pristine earth,
The planet in its nakedness: were this
Man's only dwelling, sole appointed seat,
First, last, and single, in the breathing world,
It could not be more quiet (W.P.V ii: 359-364).

The word "primitive" in these instances bears a considerable weight of hypothesis in Nicolson's argument. "Primitive" is, however, not a term confined to Burnet's theories. It is used by Otley for instance in the much more technical sense of the earliest form of rock. Indeed, Otley applies it to a region: "We have in this district none of those granite peaks which are described as occurring in other primitive countries" (Otley, J. 1823:94). A British follower of Werner, the German mineralogist (see Chapter Three), would use the word alternatively with "primary" to describe the oldest, most consolidated rocks of the earth surface. James Hutton in 1795 weighs and considers the appropriateness of the term "primitive" and finds it wanting, not because it is inappropriate in a geological text, but because his theory

challenges the existence of evidence of first origins (Hutton, J. 1797 I: Ch.4). However, he and his close colleague, John Playfair, both continued to use the word. In short, the word "primitive" as a geological term may have originated with Burnet, but was no longer solely his. As we shall see in the next chapter, the *Encyclopaedia Britannica* of 1797 was owned by Wordsworth, and it extensively reported on Hutton and other geologists. Its columns on "the Earth" were a rich source for a general reader for the language used by geologists, few of whom would have acknowledged a debt to Burnet.

The excerpt from *The Excursion* quoted above appears to me to be slight evidence to support a view that Wordsworth was wholly captivated by and committed to Burnet's geological theory. It is one episode amongst many in *The Excursion* which creates a scene for dialogue in a hidden glen or secret, high-level, wooded valley, set apart like a modern Eden. Notice that the context of the words "pristine earth" is determined by the preliminary phrase, "an image of". As I shall illustrate later, Wordsworth frequently uses a simile to introduce a description. Alternatively, he uses a distancing word such as "image", to convey a description which we can read either as a justification for belief in, say, the Flood or a catastrophe, or it can be taken at its linguistic surface meaning: "this is like the Flood or an image of the Flood". Add to this the literary context in which Wordsworth composed. In writing of any aspect of the primitive form of the earth, he was always conscious of the seminal Miltonic Eden and Milton's evocation of its loss. It is, in short, possible to comprehend a wider array of influences than one late seventeenth-century theologian. Coleridge's famous dictum in a letter to Southey in 1803, "Wordsworth's words always mean the whole of their possible meaning" (Griggs, S.J. 1956: II:977), certainly applies here.

My argument is not to deny the effect of Burnet on eighteenth-century geologists who, in their turn, contributed to the intellectual environment in which Wordsworth lived. As Roy Porter has commented, Burnet belonged to a group of natural historians who were "seeking to establish the theory of the Earth as an exact science within natural philosophy with, some hoped, mathematical precision" and as such contributed to the development of geology "at most, a growing, if inexplicit, agreement on the agenda for solutions to the problems of the Earth" (Porter, R. 1977: 24 and 88). It is with this ancestry in mind that one could agree that Wordsworth was an inheritor, but it is not necessary to trace direct linguistic connections with Burnet's own works in order to live comfortably with that line of influence.

One important strand of Nicolson's thesis is however much less contentious, that of a tradition of aesthetic theory. I believe that both Coleridge and Wordsworth enjoyed reading Burnet, not for "scientific" explanations, nor indeed for direct aesthetic doctrine of sublimity and beauty, but because he was a stylist. Coleridge preferred Burnet's Latin prose style to his English (Coburn, K. 1957: I: 1656). Wordsworth in his middle years found poetic satisfaction in his Latin passages. In the letter, *The Kendal and Windermere Railway*, Wordsworth specifically commends Burnet's Latin:

In the *Sacra Telluris Theoria* of the other Burnet there is a passage - omitted, however, in his own English translation of the work - in which he gives utterance to his sensations, when from a particular spot he beheld a tract of the Alps rising before him on the one hand, and on the other the Mediterranean Sea spread beneath him. Nothing can be worthier of the magnificent appearances he described than his language (W. Prose III:342).

By 1810, Burnet was, for Wordsworth, an antiquarian, a distinguished, stylish antiquarian, but hardly a source book for the kind of geological and geographical information that he wished to convey in the "scientific review" of *A Guide*.

The landscape of "perpetual wasting".

Wordsworth's predecessors who composed guidebooks for the Lake District guided the reader's and traveller's eye to see what could be admitted as picturesque. Sometimes they advised the use of mechanical means of concentration, for example Thomas West advised the use of "the glass" at Latrigg (West, T. 1780: 94). Wordsworth, like them, draws the attention to the best "stations", but he is also a guide to what he would prefer not to see. He criticizes with passion the damage done to woodlands by thoughtless cutting or by insensitive re-planting. He condemns the construction of buildings with obtrusive materials in inappropriate sites. *A Guide* is one of the earliest documents of conservation and, as such, it indicates a consciousness that the natural world, however beautiful, is at risk of deterioration. It is worth noting the proportion of *A Guide* devoted to destruction and the correspondingly urgent requirement for conservation. In one sense *A Guide* could be read as a plea to hold back forces of extinction and to retain the essential Lakes against over-visiting, over-enclosure and, where larches were concerned, over-planting. The threats to survival of nature are not only in the future. In the second section of *A Guide*, there is reference to the extinction of species such as the Leigh deer (W.Prose II:

194-195). By the time of the third edition, there was a new inclusion of extinct animals, the wild swine which were once common in Boardale (a tributary valley of Martindale). The red deer of Martindale are said in that edition to be the "descendants of the aboriginal herds". It is Man's advent that has changed the natural inhabitants of the landscape. The poet quotes Thomas West as an "animated writer" who had conjectured that there had been, before man's arrival, "the balance of nature in the empire of beasts" (W.Prose II:194). Wordsworth's own description of that pre-human landscape is no less animated. The reader:

may see or hear in fancy the winds sweeping over the lakes, or piping with a loud voice among the mountain peaks; and, lastly, may think of the primeval woods shedding and renewing their leaves with no human eye to notice, or human heart to regret or welcome the change (W. Prose II:194).

This passage, which I shall consider again in Chapter Six, has echoes or is itself an echo of the poem which is appended to the fifth edition of *A Guide*, "Ode: the Pass of Kirkstone".

The second section of *A Guide* continues with a summarised history of the human occupation of the Lake District, or at least of those parts which could be reached by people with a desire to settle. The remnants of very old civilizations are recorded, and this theme reappears in the accompanying sonnets in 1820. Wordsworth attributes the stone circles, locally called 'the Daughters of Long Meg' to the Druids, a fashionable explanation in his age. The sense of awe with which he regards these vestiges of ancient people is apparent in an extended footnote added in 1822, which included a sonnet, "A Weight of awe not easy to be borne" (W.P.IV:410), which was finally re-published in a sequence of sonnets in 1833. *A Guide* at this point has passed from topography to history, from the natural landscape to the landscape penetrated by humanity. *A Guide* is remarkable because of this easy transition from natural to human history. In later chapters, I shall illustrate the same relaxed transition in the work of geologists. Without pre-empting the comments which I shall make later, I note here that the geologists like Wordsworth closely related their studies of natural phenomena to the sequences of human history. Geology and history were close companions.

The human occupation of the Lake District, however, was the beginning of a wasting process, a disturbance of a balance. Celts, Romans and Normans succeed each other as conquerors. There is a sense of the loss of the original landscape in *A*

Guide, a process held in check for centuries because some areas were too remote to be occupied by new conquerors. The Leigh deer, the wild boar, the original red deer and the forests in which they sheltered have not survived, not because of Divine planning, but because of the human, acquisitive, conquering spirit. This is a modern concept of extinction, willed by greedy "getting and spending". To a certain extent the land has been betrayed by its own beauty and by the very sensibility which opened the eyes of people to the remote mountains and lakes. Here is a major change of view about the relationship of humanity and nature. The two are not in a pre-ordained balance, except where Nature has an advantage of remoteness or wildness.

The prophecy that warns about the extinction of Lakeland beauty is also the experienced voice that recorded the usurpation of Nature in the French Revolution. Rudwick comments that it is not an idle use of language that impelled the palaeontologist, Cuvier, to use the historical term, "revolution", about the periods of disturbance within the grander time-scale of geological change (Rudwick, M.J. 1976:133). A less protracted "revolution" was taking place in the Lake District for social as well as for aesthetic or for tourist reasons. Wordsworth notes that, concurrent with the advancing groups of new settlers, there is a major technological movement. Owing to the "invention and universal application of machinery", the power of the "native peasantry" to sustain themselves by home-based manufacturing has been reduced. The estatesmen, such as Michael in the *Lyrical Ballads*, are reduced to mortgaging their land or to losing it. Their failure contributes to the infiltration by new owners and to new ways of grazing, building and planting. Long-term interest eroded by short-term gain and rapid change is but another aspect of the themes of duration and decay, as potent and troubled a theme in social and environmental matters as in provinces of biological survival and extinction. The two spheres coalesce in the poem, "Ode: the Pass of Kirkstone".

"While Faith, from yonder opening cloud".

The "Ode: the Pass of Kirkstone", although published simultaneously with "The River Duddon: a Sequence of Sonnets" and the 1820 *Topographical Description*, was not incorporated into *A Guide* until the 1835 edition. It is, however, directly relevant to earlier editions. The first verse paragraph of the poem can lead the reader to a number of immediate conclusions which have to be re-tested and reformed on closer reading.

Within the mind strong fancies work,
 A deep delight the bosom thrills,
 Oft as I pass along the fork
 Of these fraternal hills:
 Where, save the rugged road, we find
 No appenage of human kind,
 Nor hint of man, if stone or rock
 Seem not his handy-work to mock
 By something cognizably shaped;
 Mockery - or model roughly hewn,
 And left as if by earthquake strewn,
 Or from the Flood escaped:
 Altars for Druid service fit;
 (But where no fire was ever lit,
 Unless the glow-worm to the skies
 Thence offer nightly sacrifice;)

Wrinkled Egyptian monument;
 Green moss-grown tower; or hoary tent;
 Tents of a camp that never shall be raised;
 On which four thousand years have gazed! (W. Prose II: 251).

This first verse appears at first view to be a fanciful description of a mountain scene which is carefully orthodox in its attitude to geological history. The rocks, their strange shapes appearing like human artefacts, may have been left from the Flood. They have (or may have) "four thousand years" of history behind them - a significantly orthodox figure, indeed close to Archbishop Ussher's dating of the origins of the earth. The power of the verse, however, lies not in its doctrine but in its analogies. The stones and rocks are only "cognizably shaped", a mockery or a model of human artefacts. Their origin may have been catastrophic ("by earthquake strewn") or pre-diluvian ("from the Flood escaped"). The vocabulary is that of possibility not actuality. The phrase "as if" turns the fact to a simile. The rocks may appear like Druid altars but "no fire was ever lit" in that place (except for the natural glow-worms's light). The final figure, the encampment, is plainly a further fancy that strikes the poet as he tries to compare the appearance of this remote scene with the busy, well-populated human lowlands. The true appreciation of the apparently religious, orthodox phrase, "four thousand years", can only be grasped when it is read in its context of a set of analogies culminating in the landscape's overall analogy to a pre-historic tent (See Note 5). The stanza is about illusion and appearance. The first line should have guided us in that direction: "Within the mind strong fancies work" (W. Prose II:251). In "Ode: the Pass of Kirkstone" the images are of human artefacts, of human history or of animal skeletal forms applied to the inanimate. Wordsworth's great gift of infusing life into the worlds of "rocks and stones and trees" and uniting them with the world of humanity is illustrated by the compari-

son. The ode's first verse paragraph displays the non-organic with all the trappings of the history of humanity.

The "Ode: the Pass of Kirkstone" continues with human history as its major theme. Nicolson has noted that the early seventeenth-century distinction between barren, dangerous mountains and civilized vales is here reversed. The mountains are where purity is to be found, the vales are the resort of "wages of folly, baits of crime." The uplands have been the passage-ways for the marches of history, from the conquering Romans onwards, but the pass has remained, while the conquerors come and go. The high slopes are now the retreat for those who wish to escape for renewal: "Who comes not hither ne'er shall know, How beautiful the world below" (W.Prose II:253). As with many of the poems of the middle and later years, the ode ends in reconciliation after a pause, a sequence of out-of-time rest and withdrawal before renewal and reconciliation with the world is effected. The healing power of the upland pass has consisted in effect in allowing the poet's mind and imagination full play. There the mists have parted to reveal an illusion: altars, towers and tents, the shrill martial notes of legions, the "vapoury bourn". The play of mind with the illusion, yet concurrently the recognition of the realities of rocks and mist, mountain and moor, have made a healing. The ode ends with a visionary clarity, the cloud opens and proclaims the positive message of encouragement. The intermingling of appearance and reality in this ode is in close association with a dominant mode of description in *A Guide*. The mountains and the lakes are presented as a setting for Fancy, if the traveller is sensitive to appearances, yet these appearances never override the knowledge and understanding of the reality behind them. Let me illustrate this from a few episodes in *A Guide* which can be placed alongside the ode we have been considering.

In *A Guide* there are a number of points where Wordsworth takes pains to illustrate how the traveller may perceive transitory visions of the mountains particularly when they combine with mist and sunlight. Thus, in the section "Miscellaneous Observations", Wordsworth relates the appearance in Ullswater of a "magnificent Castle", which, his previous knowledge tells him, to his regret, is only the reflection of a ruined tower. Earlier ages, he adds, may have believed in "subaqueous palaces, gardens, and pleasure grounds - the brilliant ornaments of Romance" (W.Prose II:237). Modern man knows, however, "the actual processes of Nature". In an earlier section describing the lakes, he notes that their very surface can be so clear that someone in a boat might imagine that it was "suspended in an

element as pure as air, or rather that the air and water were one" (Wordsworth, Prose II:185). Mists and "vapours exhaling" from the lakes and meadows" give a "visionary character to everything around them". The inverted image of a large bird, such as a raven or a heron, may be seen in the lake amongst reflected clouds. These visions have a powerful effect on the feelings of the spectator, yet the writer of *A Guide* is not concerned merely to shock and amaze the traveller. Wordsworth is also a scientific guide in that he carefully describes, but also explains phenomena. He aims to show how "other elegant fancies may have had their origin, less in invention than in the actual processes of nature" (W.Prose II: 238).

A good example of Wordsworth's role as a de-mystifier, yet as a poet who wants us to be as equally aware of mysterious visions and scientific phenomena, is the description of what appeared to be a "newly-created Island" in Grasmere one winter's day. Wordsworth and his companion behaved at first like Gray's or Gilpin's contemporary travellers. They were "alarmed". They then recovered and in a different mood began to examine and describe. They created a map of the island in prose. Then came the apostrophe:

Marvellous was the illusion! Comparing the new with the old Island, the surface of which is soft, green and unvaried, I do not scruple to say that, as an object of sight, it was much the more distinct. "How little faith," we exclaimed, "is due to one sense, unless its evidence be confirmed by some of its fellows!" (Wordsworth, Prose II:238).

The "island" gradually disappeared, having been revealed as a reflection in a bed of ice. Wordsworth gives a technical explanation. The ice "had produced the illusion, by reflecting and refracting (as persons skilled in optics would no doubt easily explain) a rocky and woody section of the opposite mountain named Silver-how" (W.Prose II:238). This is both the country of illusion and of the emotions that accompany illusion, yet also the country where rational explanations are given and accepted.

It is, however, in the two pieces in *A Guide* directly borrowed from his sister's journals that we best see illustrated the Romantic interpretation of the landscape together with a correcting steer of reality. From the summit of Scawfell Pike, Dorothy sees what she believes is a ship at sea. The wise, experienced old guide who conducts the party points out that what she sees is also like a horse. Then reality takes charge - it is in fact a changing cloud. Minutes later the guide's experience and good sense enabled him not only to see the phenomena, but also to interpret

their meaning. He sees a storm coming when the party only sees the clear light of the sun.

The next example taken from Dorothy Wordsworth's journal is the excursion on the banks of Ullswater where there is another instance of illusion and reassurance. The Wordsworths walk home with their friend in the moonlight:

...we espied his lady's large white dog, lying in the moonshine upon the round knoll under the old yew-tree in the garden, a romantic image, - the dark tree and its dark shadow - and the elegant creature, as fair as a spirit! The torrents murmured softly: the mountains down which they were falling did not, to my sight, furnish a background for this Ossianic picture; but I had a consciousness of the depth of the seclusion, and that mountains were embracing us on all sides; "I saw not, but I felt that they were there" (W. Prose II:246).

The reality is there all the time, so very real that, even though it can not be seen, it can be felt and heard, its voice softly continues as a background to a beautiful illusion. These passages are important for my argument because they both demonstrate the capacity of human Imagination to seize on a moment of illumination and to infuse it and the spectator with feeling; however, understanding is never abandoned and the reality never disappears. The actuality of the experience of the old guide saves the party from at least a soaking and, at worst, a dangerous experience, for clouds are indicators of storms, even if they also look like ships or horses. I shall illustrate in the chapter about the River Duddon sonnets that the same alternation of Romantic, fanciful illusions and the reality of the mountain river are held together in a poetic matrix. The "Ode: the Pass of Kirkstone" further illustrates this holding together of reality and rapid transformation of vision with which the Lake District is uniquely blessed. Its physical configuration of mountain slopes arranged in different aspects combines with the rapidly changing weather patterns to produce an ever-changing scenery, rich with emotional potential.

Byatt has drawn attention to the importance of the play of light in the descriptions by Wordsworth in *A Guide* and by Dorothy in her journals. Taking the description of the tarns in *A Guide*, she notes the melancholic sensations produced by the scenes of the high mountain tarns and their association with an atmosphere of decay. The passage Byatt refers to is about the high fells with rocks and boulders strewn around these lonely small lakes:

... - the contribution of ages! A not unpleasing sadness is induced by this perplexity, and these images of decay; while the prospect of a

body of pure water unattended with groves and other cheerful rural images by which fresh water is usually accompanied and unable to give furtherance to the meagre vegetation around it - excites a sense of some repulsive power strongly put forth, and thus deepens the melancholy natural to such scenes (W. Prose II: 187).

Because of its loneliness the imagination of the visitor is "tempted to attribute a voluntary power" to the changes produced by wind and sunlight. The landscape produces melancholy because it appears decayed and deserted, yet it appears on the contrary to have a life and a spirit of its own. Byatt sees in passages such as this an essential unity: "It is an image again of eternity in change and decay" (Byatt, A.S. 1970:274).

The "Ode: the Pass of Kirkstone" not only illustrates the same themes of mortality and forlorn destruction but also the hope of reconciliation. These themes of duration and decay, of threat and reconciliation, within the same landscape, in my view, are the essence of Wordsworth's middle and later years. The writer of *A Guide* is conscious that he is inhabiting a solid world. He knows that his task as a poet-guide is to control, to explain and to describe what is apparently complex, chaotic, and ultimately indescribable. He knows too that former interpretations of this landscape, picturesque visions and carefully constructed views glimpsed through Claude glasses from selected stations, produced a distorted and untrue picture - an illusion in itself. Yet the hard reality of mountains, lakes, tarns and vales is also a living, interacting entity which is perpetually changing and reshaping. The duration is both the duration of the original "primary" origin of the earth and the duration of the forces that erode that old form. It is a continuous landscape from pre-human times through the histories of the ancient people who erected Long Meg and its companion stones on into the present day. Sunlight, moonlight, wind, frost and rain, the changing seasons and the responding grass and bracken interact with what is only superficially an inactive, dead landscape to produce a territory which is permanent and can transcend human history. Yet human history is included within it:

Here, 'mid his own unvexed domains,
A Genius dwells, that can subdue
At once all memory of You, -
Most potent when mists veil the sky,
Mists that distort and magnify;
While the coarse rushes, to the sweeping breeze,
Sigh forth their ancient melodies! (W. Prose II:251-252).

That passage from "Ode: the Pass of Kirkstone" conveys the sense of overriding duration of the mountains, yet it follows hard on the heels of the first verse paragraph with images of a landscape in ruins "as if by earthquake strewn,/Or from the Flood escaped". The mists and the sweeping winds play their powerful part in the spirit of a living landscape as much as the rocks and the waters.

The particular genius of Wordsworth's poems to infuse both the organic and the non-organic elements of nature with feeling, to make even the stones have life, has been long recognized. Wordsworth is pre-eminently the poet of the actual, rooted in the world of mountain, valleys, and the rocks of which they are composed. To trace the ordering of his experience through this major work of prose description is particularly interesting. I shall move in the next chapter to consider a geologist whose concerns are also with duration and decay as well as with the recording of "distinctions in things", a recorder of what is truly there in the landscape to be observed and put into order by, to quote from *A Guide*, "habits of more exact and considerate observation" (W. Prose II:171).

CHAPTER THREE : JAMES HUTTON: DECAY NATURALLY REPAIRED.

One of Wordsworth's essays, written during the early part of the decade which saw the publication of a Topographical Description, contains a physical image of looking down into the unmeasured depth of the Tilberthwaite Quarry:

... the curious Stranger will be brought to the brink of a steep, from which he will have an opportunity of looking down and he will not look down without emotion into the cleft thro' which this brook flows. Among sensations of sublimity, there is one class produced by images of duration, [or] impassiveness by the sight of rocks of ever-lasting granite, or basaltic columns, a barrier upon which the furious winds or the devouring sea are without injury resisted. In the chasm above which we are now standing, Nature has employed contrary means to seize upon the imagination: the predominating impression being of decay and change, and danger and irregular power, and havoc and insecurity. Permanence is indeed seated here but it is upon a shattered and unquiet Throne (W. Prose II: 317-318).

This extract from what modern editors call "An Unpublished Tour" contains much to link the previous chapter with the main tenet of the geological theory to be raised in this chapter, namely the inter-play and balance of duration and decay. The passage also raises what I take to be a dominant theme of the poetry of the middle and late years, the issue of a long, almost unimaginable, depth of time.

In later chapters, I shall give further instances of Wordsworth's expression of time in the poems written after 1813, but some instances may be mentioned immediately in order to provide an introduction to the geologist who, more than any other at the turn of the century, made his readers aware of what S.J. Gould has called "deep time" (Gould, S.J. 1988 (1987):7-8). Immediately to hand, in the collection of poems of 1820, is the "Ode: the Pass of Kirkstone", on which I have said enough to indicate its span of temporal interest in and beyond historical time. However, "Ode: the Pass of Kirkstone" does not stand alone. The "Vernal Ode, 1817", and the "Ode: Composed upon an evening of extraordinary splendour and beauty", all, to quote Gill, "actually invite the reader to consider the passing of time embodied in the poet's evolving canon" (Gill, S. 1989:324). They are significant for the poet's direction in the final forty years of his life. The scale of the understanding of time is significant too; to quote Gill

again:

But all of the poems dwell on the human being as a creature of time, on experience placed in the context of the aeons of the past and the unimaginable timelessness of the future (Gill, S. 1989:324).

An image from a prose work first published in 1810, *Essays upon Epitaphs*, will complete these introductory remarks. Wordsworth prepared his reader for the discursive exercise on the nature of epitaphs by imagining a child by the banks of a stream. There is an important difference between this child-like conveyor of truth and the central figure of "Ode: Intimations of Immortality", with its evocation of a distant, receding past. The child in the essay ruminates on the unlimited sea to which the river is flowing:

"Towards what abyss is it in progress? what receptacle can contain the might influx?" And the spirit of the answer must have been, though the word might be sea or ocean, accompanied perhaps with an image gathered from a map, or from the real object in nature - these might have been the *letter*, but the *spirit* of the answer must have been *as* inevitably, - a receptacle without bounds or dimensions; nothing less than infinity (W. Prose II: 51).

Both past and future are conceivable, but equally incomprehensible. Wordsworth has conveyed the extent of limitless time that he shared with people of his generation. In this chapter I shall examine the work of one geologist, James Hutton, who typifies this attitude to the stretch of time.

It is common to believe that John Playfair's *Illustrations of the Huttonian Theory of the Earth* (1802) was the chief means of access to Hutton's work. I shall point out that there is enough evidence of a more direct availability of Hutton's writing for people like Wordsworth and Coleridge. Before doing so, it would be proper to record that Playfair uses similar language to that used in the description of the Tilberthwaite Quarry quoted at the opening of this chapter. Accompanying his friend, James Hutton, on a geological excursion, Playfair comments on looking into a quarry: "the mind seemed to grow giddy by looking so far into the abyss of time" (Playfair, J. 1803: 73). There is one more coincidence of language between Playfair and Wordsworth. I have already referred to the passage in *A Guide* where Wordsworth describes the scree at Wastwaster and uses a technical language: "The iron is the principle of decomposition in these rocks; and hence when they become pulverized, the elementary

particles crumbling down, overspread in many places....." (W Prose II : 175-176). In Playfair's explanation of Hutton's geological theory there is a close parallel:

Among the various aeriform fluids which compose our atmosphere, one is already distinguished as the grand principle of mineral decompositionBy the action of air and moisture, the metallic particles, particularly the iron, which enters in such abundance into the composition of almost all fossils, becomes oxydated in such a degree as to lose its tenacity; so that the texture of the surface is destroyed, and a part of the body resolved into earth (Playfair, J. 1802, ii: 97-98).

One more small piece of linguistic evidence for a connection between Wordsworth's knowledge of the processes that shape the landscape and Playfair's *Illustrations of the Huttonian Theory of the Earth* is the adjective "alluvial" used in *A Guide*, as I have noted in Chapter Two. In the *Oxford English Dictionary* (1987) the earliest reference to the word (but not to "alluvium" or "alluvion") is from Playfair's *Illustrations*. It appears also to be the earliest use of the word not associated solely with marine deposits. These linguistic matters are small, technical details with a limited power to confirm a link or connection between a poet and a scientific writer. They may serve in the same way as a "trace fossil" or a fossilised "burrow" indicates something more substantial and gives a clue towards a richer meaning. Gaull takes a different view than mine, discussing the connection between the poet and Hutton as merely owing to "their common antecedents in the landscape, a common preoccupation with floods and fountains, earthquakes, winds, boulders, rainbows, shells and so on" (Gaull, M. 1979: 39). I prefer, with Dean, (1968) to regard the evidence of the language more seriously than this, therefore I shall now want to seek that deeper connection directly in the work of James Hutton. First, I shall suggest that Wordsworth could well have known of his work through a network of friends and associates and through wide-ranging reading.

Wordsworth's knowledge of James Hutton.

What evidence have we that Wordsworth knew of Hutton or of his work? As will be the case with the next geologist studied in this thesis, George Bellas Greenough, the connection is strongest through Samuel Taylor Coleridge. Coleridge owned and read Hutton's *An Investigation of the Principles of Knowledge*, but the evidence from marginal notes is that he may not have owned the three volumes until after 1808 (see Note 4). However there was a much earlier

connection with Hutton's published work. In the Eyles Collection of papers concerned with James Hutton and his contemporaries at the University of Bristol, there is a reference to a letter from the Josiah Wedgwoods, senior and junior, to James Watt senior dated 25 August, 1787 promising to send by the first coach two books. One is the *Theory of the Earth* by Dr Hutton. According to Eyles (1950), this must have been the pamphlet related to the address to the Royal Society of Edinburgh of 1785. The list of books in the auction of Wordsworth's library after his death included copies of transactions of this society, but we have little evidence of their years of publication (Shaver C.L. and Shaver A.C. 1979). Certainly both Wordsworth and Coleridge were well aware of the ideas from "Scottish Enlightenment". Wordsworth's first visit to Scotland was in 1801 to Glasgow with Sir William Rush and his family and Basil Montagu (Moorman, M. 1968 (1957) I:514), but in 1803 there was a thorough expedition with Dorothy Wordsworth and, initially, with Coleridge, ending with a visit to Edinburgh. The Wordsworths met Sir Walter Scott on this excursion and, as I shall mention below, Scott had known Hutton and many of the Edinburgh literati. Dean (1968) has made a very convincing case for regarding Scott as a Romantic writer directly influenced by geological knowledge.

Coleridge's Notebooks contain useful information on Hutton and confirm Dean's conviction that Hutton's work as a geologist was well distributed through English reviews from 1788 onwards (Dean, D.R. 1973). It is not only Hutton as a geologist that attracted Coleridge's attention. In 1795 he refers to Hutton's *An Investigation* (Coburn, K.I.:244) in his notebooks. Again in 1806 there is a quotation from Hutton (Coburn K. II:243), with an editorial comment on Wordsworth. Coburn bases this opinion on the letter Ernest Hartley Coleridge found in Samuel Taylor Coleridge's copy of *An Investigation*. This was a letter from Wordsworth dated 7 November, 1806, with a quotation from Pindar which had referred to the Sun-god being transformed into a plot of land rising from the bottom of the sea, a plot "rich for man and a good pasture." Coburn comments, "I believe his [Hutton's] usefulness to Coleridge has been insufficiently recognised." She suggests that Hutton's *An Investigation* encouraged Coleridge to move away intellectually from Hartley, Berkeley, and Priestley and towards Kant (Coburn, K. I:243). Another classical analogy with Hutton's geological theory has been identified by Dean (1968: 121) in Coleridge's notebook reference to nature "as an industrious Penelope for ever unravelling what she had woven, for ever weaving what she had unravelled" (Coburn, K. II 2351).

Further evidence of Coleridge's awareness of Hutton is included in Cottle's *Recollections* which includes a letter of 1796 from Coleridge about Erasmus Darwin, referring to the *Theory of the Earth* (Cottle, J. 1848:85-86). Dean (1968) makes a confident statement that Erasmus Darwin, through his association with James Watt junior and Joseph Priestley was a principal channel conveying information about the Edinburgh intellectual world for English writers. Piper (1962) also identifies Priestley as the source of Hutton's view that matter was only apparently inert, but in fact was in a condition of opposed forces (see also King-Hale, D. 1986). Certainly Darwin's writings were well-known sources to both Coleridge and Wordsworth (Ulrich, D.W. 1984). They may have rejected Darwin's verse as a model for their own poetry, but they were keenly aware of his doctrines and of his attempts to join scientific knowledge and poetry. Dean particularly illustrates the likely connection between Hutton and Darwin from direct reference in Darwin's *Economy of Vegetation* on "central fires". A reference to "central fires" alone does not, of course, justify a connection with Hutton, who is inclined to use subterranean "heat" as often as he uses "fire". In Darwin's *The Botanic Garden* there is a reference similar to that quoted by Dean:

Where, in basaltic caves imprison'd deep,
Reluctant fires in dread suspension sleep
Or sphere on sphere in widening waves expand
And glad with genial warmth the incumbent land
(Darwin, E. 1791:13).

Here, in one of Darwin's voluminous notes, he instances scientific evidence, not from Hutton, but from a Vulcanist, de Mairan, and also from two Neptunists, de Luc and Kirwan. A more direct reference to Hutton is, however, clear in another note by Darwin which refers to the formation of agate ("scots pebbles") and the evaporation of salt by "subterraneous fires". These theories Darwin specifically acknowledged as Hutton's (Darwin, E. 1791:71).

One more passage from *The Botanic Garden* indicates that Darwin was well versed in Huttonian geology, although there is no direct attribution and confusingly hard on the heels of this extract there is a reference to Kirwan, Hutton's opponent:

the surface of the earth consists of strata many of which were formed originally beneath the sea, the mountains were afterwards forced up by subterraneous fires as appears from the fissures on the rocks of which they consist, the quantity of volcanic productions all over the world, and the numerous remains of craters of volcanoes in mountainous countries (Darwin, E. 1791: 70).

A fruitful study might be made of the eclecticism of Erasmus Darwin and the variety of sources which inspired him. *Zoonomia or the Laws of Organic Life*, for instance, includes a number of suggestive references to theories of "the perpetual chain of causes and effects" and to the expanding powers of the mind engaged in the pursuit of knowledge to the end of wisdom and knowledge of the Creator (Darwin, E. 1796 I:533 and 537). These ideas, as we shall see, were close to the progressive philosophy of knowledge espoused by Hutton.

One more member of the Wordsworth's earlier milieu, who could well have introduced Hutton's theories to Wordsworth and Coleridge, is Humphry Davy. Chitnis (1986) points out that Playfair had courted Davy's future wife!. The intellectual network was close. I have suggested in the introductory chapter, and will elaborate in the chapter on George Bellas Greenough, that Davy was more than a provider of a fleeting glimpse into the world of science, and that he was a long-standing influential figure for both poets. Although not usually considered as a geologist, Davy, like many of his contemporaries, had wide-ranging scientific interests with enough confidence to give public lectures on geology at the Royal Institution. Davy made a wide survey in his lectures and selected from a variety of geologists, carefully differentiating Neptunists from Vulcanists and giving every one his due. With Hutton he treads a wary line, disagreeing with him in the presumption that in an endless cyclic sequence the existing world must be entirely destroyed and then rebuilt. In a striking phrase for our purposes, he adds, "we have too many pledges of duration" (Davy, H. 1811:45). Whatever reservations he may have held, Davy gives Hutton a respectful outing not only in direct references but also by implication confirming both wind, frost and water as well as plutonic activity as agents of decomposition, erosion, and "fusion".

It can only be conjecture, but it is conceivable that Davy was one of the sources by which the Wordsworths learnt of the revisions made by Hutton and then by Playfair to eighteenth-century theories of the earth's formation. Hutton, for instance was prominent in the demolition of Buffon's theories of "epochs" in

the world's history. On their European tour of 1820, Dorothy Wordsworth's journal makes a comment during the party's visit to Buffon's former home at Montbard that his work will be secure, "though his theories have been exploded by the researches of less fanciful investigators" (Wordsworth, D. 1941 II:316). The epithet "fanciful" is exactly the tone of the "modern" scientists such as Hutton and Playfair. When Playfair compares "the systems of Hutton and Buffon he seizes on Buffon's surmise of a continuous cooling of the earth and castigates this gloomy view as a reminder of "the wild fictions of the Scandinavian mythology" (Playfair, J. 1802:485).

It is, finally, interesting to note what modern research has shown to be available in Wordsworth's own library. The Wordsworth family held Coleridge's own library for about twenty years and within that collection was his copy of Hutton's *An Investigation* (Shaver, C.L. and Shaver A.C. 1979) as well as collections of Davy's lectures. Of equal importance is the *Encyclopaedia Britannica*, the third edition of 1797, which included a long section on Hutton's *Theory of the Earth*. Although we do not know when these volumes were purchased we do know from one of Coleridge's letters to James Tobin in 1800 that the encyclopaedia was available in a well-stocked library in Keswick:

In the way of books, we are extraordinary well off for a country place. My landlord has a respectable library full of dictionaries and useful modern things, ex. gr. the Scotch Encyclopaedia, the authors of which may the devil scotch, for toothless savants that poison with drivel! (Griggs, E.L. ed. 1956 II: letter 343).

It is interesting to note that in the advertisements in the end papers of the 1820 collection of Wordsworth's poems, which included *A Guide*, is Playfair's *Illustration* and other geological and mineralogical works. I have already made sufficient comments on the availability of geological articles in such works as *The Edinburgh Review*. Accessibility is one thing, the absorption of accessible material and the acceptance or rejection of it is another and I must therefore turn to a summary of the work of James Hutton to assess its likely impact on Wordsworth.

"An exquisite relish for whatever is beautiful and sublime in science" (John Playfair (1802:91) on Hutton's life.

The facts of James Hutton's life are fairly straightforward; the interpretation of his significance and the extent to which his contribution to geology was original remain open to debate even today. He is, to an extent, like Wordsworth himself, emerging from an eighteenth-century tradition and standing at a turning point of intellectual history. Hutton's education and training were initially in Edinburgh. His medical training went hand in hand with a rapid growth of interest in chemistry. A life-long friendship with James Black is of importance in the later formulation of Hutton's geological theories. He was, as modern biographies show (for example, Bailey, E.B. 1967, Jones, J. 1984), interested in practical science. He investigated modern agriculture in the most advanced region for innovation at that time, Norfolk, and applied his experience to his own farming in Scotland. This was after studying medicine, at the Sorbonne and later in Holland. He became qualified as a doctor, submitting a doctorate to the University of Leiden in 1749 on the circulation of the blood (Donovan, A. and Prentiss, J. 1980). A fortunate business partnership involving the manufacture of what we would now call "bulk chemicals" gave him financial freedom, which enabled him to follow his many scientific interests and, in particular, to develop a reputation in geology. The major geological works are to be found in addresses to the Royal Society of Edinburgh in 1785 from which emerged a larger publication in 1795 (Hutton, J. 1795), but the chief interpreter of his geological theory, as I have shown, was his friend, John Playfair who, in 1802, published *Illustrations of the Huttonian Theory of the Earth* (Playfair, J. 1802 and see Note 1).

One of the major points of my thesis is that the geologists who were known to Wordsworth, either in person or through other sources, were men with a wide range of interests, not exclusively concentrated on geology or even on what we would now call "science". Hutton was such a man. Like his friend, Playfair, he was something of a polymath. I have already mentioned the practical interests in medicine, agriculture, and chemistry. Hutton was also a philosopher. His text, *An Investigation of the Principles of Knowledge* is a long, three-volume excursion into "the human intellect" and addressed "to the thinking part of mankind" (Hutton, J. 1794:iii). I shall later try to illustrate the relevance of this work to Wordsworth's concept of the powers of the mind. At this point I express my

agreement with Chitnis who reminds us to treat Hutton as a serious moral philosopher both in his geological and epistemological writing, an attitude which will enable the modern reader to appreciate him as part of the literati of the Scottish Enlightenment (Chitnis, A.C. 1976:171). Certainly Hutton's friends and acquaintances, whether in the convivial and intellectual circle of the Oyster Club, of which he was a founder-member, or in correspondence and dialogue in the Royal Society of Edinburgh included a sparkling array of intellect such as Robert Adam, James Hall, David Hume, Walter Scott, Adam Smith and James Watt.

What still remains to settle into accepted judgement, if it ever does, is the relative originality of Hutton in the history of geology. Partly because of the strong support for him by the eminent Victorian geologist, Sir Archibald Geikie (Geikie, A. 1905), following Lyell's undeniable success in promulgating what others called "Uniformitarianism", and partly because of the persuasive writing of John Playfair, something of a monument was erected around Hutton's reputation. The irony is that for some years after his death in 1797 this reputation was limited. Hutton's theories were always controversial but there is a striking resilience about his stature even in our own century. Tomkiewich in 1948 had no doubt about Hutton's achievement, comparing it with that of Newton in physics (Tomkiewich, S.I. 1948). Dott however, asks modern readers to rectify Hutton's fame by eliminating "Lyellian myopia" (Dott 1969:122). When this correction has been applied, Dott argues, we can appreciate Hutton as a major force synthesising and unifying in his geological field as Newton and Lavoisier did in their different fields. Other historians (such as Gerstner, P.A. 1971) have been at pains to illustrate that Hutton's scientific theories are directly descended from Newton, and owe something to later eighteenth-century physicists such as Thomas Beddoes. Porter (1978 and 1978a) suggests that Hutton's contemporary, G.H. Toulmin, deserves some credit for Hutton's ideas. For my thesis, the continuity of Hutton's work is actually more important than the quality of its originality. It is the consistency of his thought with contemporaries, as well as the innovative ideas, that strikes another chord of sympathy with Wordsworth's own position in intellectual history. Roy Porter's masterly survey of geological history (1977) probably gives the most balanced view on which we can start to work.

The irony of Hutton's reputation is that two long-lasting geological concepts properly associated with his name, rarely claim the same attention as his vaster and more dated *Theory of the Earth*. These two concepts are aspects of "the abyss of time" which Hutton appeared to contemplate without fear or religious tremor. It was Hutton who most clearly explained the phenomenon known as unconformity. There is a classical diagram in *Theory of the Earth* showing a peaceful rural landscape including a country gentleman out on his business. Beneath his feet are two planes of structure, the uppermost, younger rocks are lying over an older, different structure of strata and the difference between the two formations is clearly marked by a "plane of unconformity". Although "unconformity" became a more complicated concept than Hutton first imagined, even in its simplified form it signifies a separation of two different periods of the earth's history, with one sequence of processes completed (if that is a word which can be applied in Huttonian theory) and a new sequence taking its place long afterwards.

The second concept, the idea of the intrusion of molten material into a mass of already existing rock, earned him the title of "Plutonist". Such an interpretation of geological activity represents, like the idea of unconformity, massive processes occurring over vast stretches of time. Hutton's recording of both processes should remind us that he cites actual sites as verification of a theory, quoting observations in cuttings, quarries and exposed rock faces (see note 3). Controversy has collected around the extent to which Hutton's reputation rests on his field-work, rather than on preliminary reading, followed by thoughts in the seclusion of his study. Porter says that what was important about him was "the distinctive intellectual framework within which his fieldwork was undertaken" (Porter, R. 1977:185). Gould (1988(1987)) regards Playfair and Lyell as the main proposers of Hutton's experiential approach to geology. Hutton, he continues, never misrepresented his position, which was that of a speculative thinker who followed up theories with observation rather than in the reverse order. Gould also draws our attention to the philosophical implications of the two seminal concepts mentioned above. The principle of unconformity supports Hutton's view that the earth did not decline into ruin on one primitive occasion, on the contrary the record reveals a sequence of former surfaces each with a long history of reduction and ruin. The intrusive granitic and doleritic masses confirmed to Hutton that nature had been rebuilt - the concept of repair has been added to the doctrine of ruin.

It is the overall theory of ruin recovered and repaired, the cyclical reconstruction and destruction of the earth's landforms, by which Hutton's name is most widely known and, in his own times, with which he was associated, albeit by a minority, until his reputation's restoration by Lyell in 1830. In Edinburgh, as Gillispie (1951), Chitnis (1970) and Hallam (1989) have described, his overall theory was widely discussed, so much so that rival camps were established. In 1808 a break-away group established to promulgate an opposing hypothesis (Wernerism) divided the Royal Society of Edinburgh. Fierce disagreements broke out in public as well as in private. It is not easy to assess how widely Hutton's reputation spread outside Scotland. Although I agree in one respect with Porter's judgement that Hutton's work was "ambivalently regarded and little read by nineteenth-century Englishmen and Continentals, even by actualists, until Geikie's championing" (Porter, R. 1977: 152), I find evidence that his observations and attitudes were incorporated quickly if quietly into popular scientific works. A year before the publication in 1795 of *Theory of the Earth*, Richard Sullivan's six-volume work, *A View of Nature in letters to a traveller among the Alps* (1794), examined Hutton's theory of the earth for over five pages and concluded with a comparison of Hutton and Buffon. I have illustrated that the *Encyclopaedia Britannica* of 1797, which from its original Edinburgh base was purchased by English private libraries, dedicated considerable space to a reasonably impartial summary of Hutton's theories in the section entitled "The Earth" (*Encyclopaedia* 1797: VI). Gillispie has pointed out that members of the Geological Society of London such as Phillips, Greenough, Brande and Bakewell who produced manuals for amateur and full-time geologists, "adopted Huttonian expressions and described rocks and ridges in a Huttonian manner without troubling to offer any comprehensive explanation" (Gillispie, C.C. 1951: 89). Humphry Davy's popular lectures of 1811 (Davy, H.:1811) contain direct and indirect reference to Hutton. He was far from being an insignificant figure in enlarging the consciousness of the educated people of both England and Scotland to aspects of geological process and geological time. What then, was the "theory of the earth" that is associated with his name?

Hutton's major work, *Theory of the Earth with Proofs and Illustrations* has been so well interpreted by Playfair, in what is generally regarded as an attempt to render the unreadable readable and to make it open and available, that the temptation is to use the 1802 *Illustrations* as the vehicle for explanation. However, Hutton's own work is in fact more readable than is often thought to be

the case, crammed though it is with long quotations from supporting works or, more commonly, from critics such as the Irish geologist, Kirwan. Furthermore its sequence of argument tells us much about the processes of his thought. Playfair can be visited by the reader for help and maintenance of clarity. The opening paragraphs of Hutton's work reveal his framework of personal belief:

We perceive a fabric erected in wisdom to obtain a purpose worthy of the power that is apparent in the production of it (Hutton, J. 1795: 3).

Hutton is a late eighteenth-century figure in thought as the above brief quotation indicates in three ways. He is a Deist with an unshakeable trust that what he has discovered is not likely to disturb his faith in a well-prepared, divinely ordained system. The other philosophical component of this brief passage is the word "power". Third, the earth is a structure. Hutton also uses the word "machine" for the earth, a true eighteenth-century image again, but there is an emerging new difference. It is a "fabric" or a machine with an activity close to that of a living thing, in that it is empowered to remain in perpetual motion. Machines wear out. This machine, the Earth, must be "considered as an organized body such as has a constitution in which the natural decay of the machine is naturally repaired" (Hutton J. 1795 I: 15-16).

In Hutton's paper to the Royal Society of Edinburgh of 1785, he had expressed the notion of repair more clearly:

This is the view in which we are now to examine the globe; to see if there be in the constitution of this world, a reproductive operation, by which a ruined constitution may be again repaired, and a duration or stability thus procured to the machine, considered as a world sustaining plants and animals (Hutton, J. 1785: 216).

Donovan and Prentiss (1980) have noted how Hutton's medical dissertation prefigures the language of his later philosophical and scientific studies. Hutton's conception of the world is part mechanical and part biological. Here, as in other respects, he stands at a threshold between the world of Descartes (the living observer set in opposition to the dead, observed object) and the Romantic notion of a living organism in a relationship with humanity.

Hutton's text concentrates on durability and repair. Together with the notion of power they are the essential starting points for understanding his theory. Hutton's world is in a state of "continual succession". The world is so constructed that what wears away forms new land, which in its turn provides the material for more erosion. The forces which we can observe in the present, in our own world, together with occasional plutonic activity are sufficient to empower the cycle of destruction balanced by renewal, although some of the processes are so slow that they are indiscernable. Quoting from de Saussure, he illustrates the sense of deep geological time by instancing the formation of marble and limestone from the calcareous matters of minute marine bodies, an awesomely slow process.

Hutton rejects an early primitive stage which some theorists take as a given, first landscape on which processes of change occur. He has no recourse to such primitive mountains and valley formations, indeed preferring the word "primary" to "primitive", although neither he nor Playfair abandon the term. The existing shapes of the landscape are created by erosion of water, frost and chemical decomposition. The material which is removed will provide, in the course of almost unimaginable time, the material for the next mountain, but how can degraded material be formed into solid rock? For this explanation, Hutton requires two "powers", pressure and fire. The waste material from the destruction of the land gathers below the sea and is subject to massive pressure. Under such pressure chemical reactions occur which have a large-scale effect, consolidating loose materials. The second "power" is subterranean "heat" which behaves under pressure in an different way than heat would behave on the surface of the earth.

The power of subterranean heat has a two-fold function. It raises land above the sea, creating the next material for the endless processes of erosion to continue. The power of the "fires" is also observed in modern times in volcanoes and lava flows. They give an inkling of a process which has been essentially the same, although at times on a vaster scale, over all the world. Volcanic action is not a totally catastrophic force. At least the philosopher may reconsider too hasty a judgement in that direction, if he considers that divine dispensation has, by volcanic action prevented total destruction and, once more, restored a world at risk:

A volcano is not made on purpose to frighten superstitious people into fits of piety and devotion; nor to overwhelm devoted cities with destruction; a volcano should be considered as a spiracle to the subterranean furnace, in order to prevent the unnecessary elevation of land, and fatal effects of earthquakes, and we may rest assured, that they in general, wisely answer the end of their intention, without being in themselves an end, for which nature had exerted such amazing power and excellent contrivance (Hutton, J. 1795: 146-147).

Hutton wisely distinguished between plutonic activity, which produced volcanic cones, and plutonic overflows of igneous material, which resulted in the lava flows, sills and dykes, the whinstone and "trap" stone of his own northern landscape. I have already commented on the valuable addition to geological understanding through Hutton's explanation of igneous intrusions. It should also be borne in mind that the "amazing power and excellent contrivance" also satisfactorily explained for him (but not at all for most of his contemporaries) the origin of granite. The following passage from a paper read to the Royal Society of Edinburgh in 1790 will be of interest because it uses the mineral terms used, however simply, by Wordsworth in *A Guide*:

Granite which has been hitherto considered by naturalists as being the original or primitive part of the earth, is now found to be posterior to the Alpine schistus which schistus being stratified is not itself original; though it may be considered perhaps as primary, in relation to other strata which are evidently of a late date (Hutton, J. 1790:81).

The importance of this last evidence was sufficient to put Hutton at one pole of controversy and to earn for him the title of a party, the Plutonists. Playfair was anxious in writing a brief sketch for an autobiography of Hutton to detach his reputation from a similar "school" of geological theory, the Vulcanists (Playfair, 1803:53). The key concepts that distinguish Hutton from the Vulcanists, Playfair correctly emphasises, are pressure and heat. Gerstner (1971) reminds us that Hutton was establishing by this joint "motion" a force acting in opposition to attraction, a position which was basically different from other scientists of his own decades who were occupied with the idea of a heat "substance" called "caloric". Fitzgerald (1984) relates Hutton's concentration on heat (the solar substance) to an implicit acceptance of Newton's major force, gravity. She traces convincingly the connection between Hutton and Priestley and their common interest in matters of the spirit as well as of chemistry. Hutton's fruitful association with Black enabled him to be a geologist with an

understanding of chemistry, a combination of scientific interests to be repeated in various proportions of successful inter-professional achievement by successors like Davy, Herschel and Whewell. The united forces of pressure and heat particularly distinguish Hutton from the Vulcanists and the clue to the difference is in their terminology. As I have already pointed out, Hutton writes of "subterranean heat" as much as of "subterranean fires".

The identification of Hutton as a Plutonist, as distinct from a Vulcanist, should not conceal one other more obvious division, that between Hutton and "Neptunists". The followers of the German mineralogist, Werner, deserve a whole chapter in a text on controversies. I have already referred to the deep divisions in Edinburgh scientific society, but the argument was wide-spread. The controversy has been so well described in modern works (such as Chorley R. 1964 and Hallam, A. 1989) that it would be wasteful to repeat the principal features of the great divide between the Wernerists and the Huttonians as they were sometimes called. Sufficient to say that, whereas Werner proposed a sequence of earth-forming events beginning with an irregular "surface", covered with an aqueous layer including particles in sediment or in solution, Hutton assumed a state of perpetual change with no first stage on which all followed. In one of Hutton's most famous phrases:

The result, therefore, of this physical inquiry is, that we find no vestige of a beginning, no prospect of an end (Hutton, J. 1795:200).

This nicely balanced aphorism was an important statement of a procedural method. It occurred in the earliest record of Hutton's theory in the address to the Royal Society of Edinburgh in 1785 and it is, of course, repeated in Playfair's *Illustrations*. What is not often noted is that Hutton is in effect side-stepping the issue of a first cause, on grounds of methodology. His statement is about "vestige" and "prospect", in short he is concerned with evidence. Where the inquirer can not find evidence, then the enquiry is fruitless. But as there is not by human observation proper means for measuring the waste of land upon the globe, it is hence inferred that one cannot estimate the duration of what we see at present, nor calculate the period at which it had begun, so that, with respect to human observation, this world has neither a beginning nor an end (Eyles, V.A. 1950: 382). In this respect Hutton's method is to set the scene for a generation of geologists to follow. Hutton's own words established, or perhaps I should say

"limited", the agenda for the geologists who were to form the Geological Society of London on Baconian principles:

A theory of the earth, which has for object truth, can have no retrospect to that which had preceded the present order of this world; for, this order alone is what we have to reason upon, and to reason without data is nothing but delusion (Hutton, J. 1795:281).

If Werner and Hutton differ in respect of first causes, they differ even more markedly in the progress towards an end of the world. As we have seen, Hutton proposes a perpetual cycle which, though it may appear to be active "rest exists not anywhere, nor is it found in any other way, except among the parts of space" (Hutton, J. 1795:222). Werner's theory of the construction of the world begins with precipitation in chemical and material forms, the former more vigorously at first and the latter more actively in later phases. Gradually the vast world-covering ocean diminishes and the earth in its present form is revealed with water-formed rock formations eroded into the primitive slopes formerly covered by the first great sea. Then surface erosion plays its part and destruction begins. Werner's time-scale is perhaps not as vast as Hutton's but it implies a long, slow process. Despite the long eras of surface erosion, there is the promise of an ending, however long-term and unimportant in a human time-scale that might be. As modern writers (such as Greene (1982) and Laudan (1989)) have pointed out, Wernerians had a bad record in the history written by the "victors", Lyellian uniformitarianism or "actualism". What Werner established was a very useful clear system of categorising minerals and rocks (no mean scholarly accomplishment) and, more significantly, a set of principles on which the stratigraphic column was to be built with considerable refinement in following decades. Werner encouraged an understanding of sedimentology from which considerable achievement followed.

What may be extracted from discussions of "Hutton versus Werner", is the preponderant equilibrium in Hutton's system, the essential message of decay balanced by destruction. This theme is of obvious significance for a student of Romanticism. Is Nature in harmony with humanity? Is the earth so much in harmony that it grows old and dies like human beings die? The alternative is the material, physical world which is exposed to decay by material physical forces as inimical to itself as to humanity. Finally, is there evil and corruption written into

the composition of the physical world, so that its apparent durability as a home for mankind is an illusion. These questions are aroused by explanations or theories of the earth. To Hutton the first question, (is Nature in harmony with humanity?) is proper but all the rest are irrelevant to scientific understanding. He found certainty from first to last in his studies. His solid confidence was in a benign creator who had not merely constructed the world but established a mechanism of action which would maintain it for ever. The purpose of this never-ending device was straight-forward, to provide an appropriate home for men and women:

Such, indeed is the admirable contrivance of the system, that, in the works of nature, nothing shall be destroyed more than is necessary for the preservations of the whole (Hutton, J. 1795 II:197).

Hutton's confidence in the "admirable contrivance" is strong enough to allow him to avoid the temptation to believe the world is now *in stasis*, as the French geologist, de Luc, had supposed. There is an illusion that mountains, particularly when clad with vegetation, look at permanent rest. This only means that the process of denudation is progressing very slowly indeed. The progression of meandering rivers and the formation of river terraces is used to illustrate his point that later stages of change are very slow and almost imperceptible. Even more impassive in appearance are the mountains in the dales of the Rivers Tweed and Teviot, with their well-wooded cover. However stable they appear, "rest exists not anywhere" (Hutton, J. 1795 II:222). The "economy of nature" is a wise system in an admirable physical relationship for, as Hutton concludes at the end of this second volume, the "revolutions of that [the world's] surface is the most vital subject of inquiry". Wordsworth uses the same term "oeconomy of nature" in *A Guide* (W. Prose II: 185) when he notes that the Lake District tarns are "auxiliars to Lakes" in absorbing the full effect of rainfall and thus avoid the destructive power of heavy rain and protect the lower valleys and plains. The earth, with its cycle of evaporation and rainfall is - and here Hutton uses the word we would use today - "a system". "Thus we may perceive the mutual dependence upon each other of those two habitable worlds, - the fluid ocean and the fertile earth" (Hutton, J. 1795 II: 559).

I have concentrated on Hutton's work deliberately, but it should not be forgotten that, in the adjustments Playfair made to Hutton's theories, there were emphases with long-term effects on geology. Playfair, for example, takes into consideration the extinction of species (Playfair, J. 1802: 469), an issue soon to absorb the Geological Society of London. Despite the major additions to Hutton's ^{work} by his friend and "translator", I believe Hutton's own work is the important clue to the attitude to nature of the geologists who were contemporary with Wordsworth. Perhaps one of the most striking elements of Hutton's work, which, though not absent from Playfair's explanation of his colleague's theories, is not prominent in *Illustrations*, is Hutton's enthusiasm for the activity of studying geology. The inherent virtue residing in the study of nature is applauded by all the geologists I shall present in this thesis. I shall argue that this high ideal was both a necessary counter-argument to the condemnation of science as a dry and unnatural activity and to the Romantic criticism that science extracted life from the natural object of study. I shall also argue that Wordsworth's passionate concern for the active quality of the human mind is paralleled by the powerful arguments of writers like Hutton aimed at justifying the benefits acquired by the geologist in his daily task.

First of all, Hutton argues, the geologist sees order where the unskilled may see chaos: Hutton proposes at the opening of his *Theory of the Earth*:

We shall thus also be led to acknowledge an order, not unworthy of Divine wisdom, in a subject which, in another view, has appeared as the work of change, or as absolute disorder and confusion (Hutton, J. 1795 I:6).

Those who only see disorder and confusion are led to believe in a former state of perfection and regularity. Hutton's theory has a theological benefit for it does not require "recourse to any unnatural supposition of evil, to any destructive accident in nature, or to the agency of any preternatural cause in explaining that which actually appears" (Hutton, J. 1795 I:165). There is pleasure for the geologist in observing regularity and order:

"instead of being disgusted with disorder and confusion; and he is made happy from the appearance of wisdom and benevolence in the design, instead of being left to suspect in the Author of nature, any of that imperfection which he finds in himself" (Hutton, J. 1795 I: 167-168).

This is a splendid example of Hutton's Deism, but it also reveals a philosophy of the nature of man. In the same passage he describes man as "the intellectual being", distinguished from the animal kingdom by "the desire of knowledge". Here is one amongst many instances where Hutton's major work as a geologist is influenced by his intellectual activity as a philosopher of human knowledge and it is to that area of Hutton's studies that I next wish to turn. Hutton's survey of knowledge illustrates not only the framework for his geology but also a way of considering the human mind which resonates with Wordsworth's understanding of the power of the mind.

James Hutton: The progress of reason from sense to science.

The full title of Hutton's three-volume study of 1794 is *An Investigation of the Principles of Knowledge and of the Progress of Reason from Sense to Science and Philosophy*. It is not an easy text to read, because it is so painstakingly methodical. It is exhausting as well as exhaustive. As with the *Theory of the Earth*, Hutton pursues the writing of others assisted by considerable quotations and his conclusions are often repetitive. Coleridge sums up its virtues and its defects in a pencilled note on the title page of the first volume in his own copy. It is noteworthy that many of the pages are still uncut:

"I can not walk *with* these, because I could walk *in* them." said a Wag of a very much too large pair of shoes. Something of the sort might be applied to this Work. There is a great Metaphysical Talent displayed in it, and the writer had made an important step beyond Locke, Berkley and Hartley - and was clearly on the precincts of the Critical Philosophy - with which and the previous treatises of Kant he appears to have had no acquaintance. In short there is sense, and strong sense; but it loses itself in its own enormous House, in the Wilderness of the multitudinous Chambers and Passages - As Poor Sarah Stoddart (afterwards, poor lass! Mrs Hazlitt) complained to me of her Brother's Lectures and Remonstrances, "He drives it *in* and *in* and *in* (to my head) till he drives it out, out, out again. I feel as if there was a Hole thro' my head and nothing remaining but a Buz (Hutton, J. 1794 I: title page).

Coleridge had quickly appreciated that Hutton, the philosopher, like Hutton, the geologist, stood at a turning point in intellectual history. He inherited ideas from seventeenth- and eighteenth-century thinkers such as Locke, Newton, Berkeley and Hartley but reached conclusions compatible with Kant's and in tune with those, like Coleridge, who took from German philosophy a new way of

understanding the processes of the human mind.

Modern writers have identified both the inheritance and the novelty of the contribution of Hutton's philosophy. Peter Jones says: "In brief, Hutton saw himself as remaining more rigorously faithful to Lockean premises than anyone else had done, and as pursuing a Humean account of causation to its limit" (Jones, P. 1984: 182). Similarly Donovan and Prentiss (1980) in their detailed analysis of Hutton's medical dissertation trace a link between Hutton and Newton. They assert that Hutton revives a "neo-mechanist" philosophy which had been displaced by materialist concepts during the mid-eighteenth century. Chitnis (1976) sees *An Investigation* as a "commonplace eighteenth-century natural theology" relying on a belief in the wisdom of God and the underlying order of created nature, however he draws attention to the influence of this theological stand-point on the science that Hutton promulgated:

If the *Theory of the Earth* is seen against this background then it can be viewed not as a work of a mere observer of rocks, but a demonstration of the progress of the human mind achieved through an exposition of the order of the natural world (Chitnis, A. 1976: 171).

O'Rourke (1978) also examines the close connection between Hutton's theory of knowledge and his theory of geology.

The major impression of the text is one of order, both in the substance of what is described and in the style in which it is written. The doctrine is unequivocally delivered in Book III of *An Investigation*: there is a "natural aversion to the thought of disorder" (Hutton, J. 1794 III:117). The true development of the human mind by the providential nature of things leads to the avoidance of chaos and to the transformation of what appears to be disorder into a regularity. Because this is a natural development, fulfilling the end which nature has in view in the education of man, the seeker after knowledge achieves happiness as an end, and the means are order, knowledge and the knowledge of order (Hutton, J. 1794:III:123). Hutton takes a traditionally rational view of human understanding of the order of nature. "Instinctive knowledge" is the lowest level of knowledge, close to the animal. Thinking and knowing are distinguished; knowing is a first-level activity of the mind, thinking is the way to true knowledge and, furthermore, the active mind of man is admirably suited for its purpose because it is "made to know" (Hutton, J. 1794 II:419). The order that the

thinking person can perceive is not, however, the end or purpose of the activity. Order and the knowledge of order are, to repeat, the means towards an end not the end itself. To concentrate on order in itself might imply that there is a material, fixed, external world opposed to the non-material world of the mind. Once again, we can see a connection between Hutton's philosophy and Hutton's geology, where he proposed an essentially fluid world rather than a world of linked chains of causation from a fixed beginning to a pre-determined end. In his philosophy of perception Hutton is a non-materialist. He writes in Volume III of *An Investigation* that all external things have power, energy and force. Nothing is really passive. It is, he writes, a "vulgar prejudice" to regard all external matter as permanent. Those who had attended his geological lectures at the Royal Society of Edinburgh would make the necessary connection.

If external bodies are not fixed and permanent nor are they received by the human mind in a fixed and rigid manner. "Man exists not only passively as a sensitive being, but also actively or actually in the operation of his thought" (Hutton, J. 1794 III: 712). There are three steps on the ladder of education. First we know "instinctively by nature". Nature then proceeds to encourage us to teach ourselves. The third superior stage is education by "art" (formal teaching) when we require the help of another person. "There is a progress of the human intellect advancing more and more towards perfection by certain steps" (Hutton, J. 1794 III:6). Hutton's psychology of perception is similarly by steps. The first is that of being excited by sensations from material things, which excitement encourages our perception. "Our imagining faculty" is then led "to the conception of things" "with magnitude and figure" (Hutton, J. 1794 III: 48). This stage of perception is still a lowly one. Man must next distinguish the true from the imagined. In order to encompass such discrimination, a third rung of the ladder, a scientific approach, is necessary. In a collection of essays, *Dissertations on Different Subjects in Natural Philosophy*, published two years before *An Investigation*, Hutton gave particulars of the inductive process, which in a different and more articulated form we are to meet again in Chapter Nine in the study of William Whewell. Hutton's method, he confidently asserts, is:

the true method of physical investigation viz: to analyse our ideas of external things, by separating, with all the accuracy of metaphysical reflection matter of fact from matter of opinion, - that which has the testimony of sense, from that which is only imagined by the mind itself, without having the sanction of external information... Having in this manner analysed our natural knowledge, and generalised those abstract or distinguished ideas, we acquire scientific principles for the progress of our knowledge, principles which may then be employed in philosophy, for the understanding of external things, and for seeing in them the evidence of design ... (Hutton, J. 1792: xii-xiii).

Throughout the three volumes of the 1794 text, Hutton is quite clear that the final "step" above the scientific way of knowing is upward to wisdom, which is the domain of the superior and mature field of study, philosophy. At the same time, this does not imply that the ideal thinker, whom he calls the Man of Science, is only at an intermediate, or immature, level. Point after point is driven home to justify the vital activity of the Man of Science.

He is not just a receiver of nature or actual things. He must understand science and know scientifically the principle of his knowing... the purposes of life lead naturally to those of science... In like manner; his mind is either displeased with or hates the thought of inconstancy and contradiction. Men of science take pleasure and delight in communicating knowledge to the species (Hutton J. 1794 III: 88, 116, 119).

The phrase "Men of Science" in this passage (or "scientific men", as used by Hutton in his 1785 abstract (Eyles, V.A. 1950: 381)), will awaken echoes of Wordsworth's "Preface" to *Lyrical Ballads* of 1802. Hutton writes in 1794 about contemporary "Men of science" taking delight in serving others, whereas Wordsworth reserved a time in the distant future for his "Man of science" to become a partner of the poet in the service of humanity. It may be a significant fact that both Hutton and Wordsworth used the term, but I have not yet traced the origin of the phrase. "Man of taste" is a fairly common usage in the eighteenth century, and it continued into the nineteenth century in John Clare's notebooks. Clare also refers to "the man of discernment" (Clare, J. 1983: 289 and 223). Why "Man of science" appealed both to Hutton in the 1790s and to Wordsworth as he prepared the "Preface" to the second edition of *Lyrical Ballads* is not easy to tell, nor can one confidently claim that Hutton provided the phrase for Wordsworth. Perhaps a phrase emerged for both when it was needed. For Wordsworth the task in preparing the "Preface" was to respond to a "man of science", Humphry Davy. One fainter connection between Wordsworth's

"Preface" and Hutton's language in *Dissertation on Different Subjects in Natural Philosophy* of 1792, may have already been perceived. Hutton, I have already quoted on "the true method of physical investigation viz. to analyse our ideas of external things, by separating, with all the accuracy of metaphysical reflection, matter of fact from matter of opinion, - that which has the testimony of sense from that which is only imagined by the mind itself..." (Hutton, J. 1792: xii). In 1802 in the "Preface" to *Lyrical Ballads*, Wordsworth made one of his memorable footnotes:

But much confusion has been introduced into criticism by this contradistinction of Poetry and Prose, instead of the more philosophical one of Poetry and Matter of Fact, or Science" (W. Prose I: 135)

Of course, modern readers must remind themselves that at this period "science" had a wider connotation than our current uses of the term. To Hutton "science is the application of our judging faculty to the subject of our understanding" (Hutton, J. 1794 I:21).

Whatever the difference between Wordsworth's use of the term "Man of science" and Hutton's, they share one thing in common, as witnessed by the long quotation from the *Dissertations* of 1792. Both writers engage with what Hutton calls "external things" and "the sanction of external information." This methodological point, and there are many similar in *An Investigation*, has correctly been taken as a castigation of "cabinet" geologists of former times who constructed theories of the earth based purely on imagination and not on the experiences of observation over a number of sites (see Note 2). There is however more to the point than the one of geological procedure. Nature and the human mind act in collaboration. The process is an active one. *The Dissertations*, although including a series of essays on such practical scientific matters as the theory of rain, the theory of phlogiston, principles of volume, hardness, fluidity and conjectures on heat in the solar substance, concludes with a metaphysical judgment which might well be in place in a poet's discussion of the interaction of nature and the human mind:

It is not in man to know beyond the use of those faculties with which he has been made to judge... But of this he is certain, that his mind is informed by the active powers of matter, and that of such active matter are formed those passive and inert things which are termed bodies (Hutton, J. 1792: 685).

The emphasis in *An Investigation* is, I repeat, a two-way process. The mind is not merely a receiver, it must be active in its participation with nature. The human mind has scientific capability from its beginning. Children learn to speak "imbibing science with their mother's milk" (Hutton, J. 1794 II:35), again an image familiar to readers of Wordsworth. Growth does not naturally occur however, for men are also lazy and indulgent. However each time a distinction is "made in a reasoning mind" additional knowledge is created and there is "a progress of the intellect by which means the mind of man is made to grow" (Hutton, J. 1794 II: 35).

Hutton's psychological theory is one of development away from the natural state to one of higher, cultivated development. One of the best illustrations that Hutton does not hold a simplistic view of humanity in a state of nature is his pungent argument against geographical determinism. As we shall see in Chapter Six on *The River Duddon; a Series of Sonnets*, Wordsworth also had reservations about the simple life of the recently discovered and falsely Edenic prairies of America. Hutton is in no doubt that merely being in nature is not enough:

Is it the uncultivated woods of North America that breeds ferocious bands, who with an obstinacy hardly known pursue the intention of their hostile minds, who, in the hands of their tormentors, insult the weakness of their cruel enemies, and give such a dignity to the barbarous usage of a savage people, by the splendour of their fortitude, as would have honoured Ancient Rome? - No, woods may breed a race of hardy trees, but the want of culture in the soil cannot cultivate the mind of man, or be the cause of courage... The man is only made by the education of the mind (Hutton, J. 1794 III:95).

We know from Playfair's biography of Hutton that he was widely read in travellers' accounts, as indeed was Wordsworth. Their reading did not confirm the virtues of the unreflective savage. Hutton expresses the activity of corresponding with nature in a complex sentence, but one which is committed to development of the human psyche. He draws a distinction between:

being taught by nature alone, or in a more simple manner; and, on the other hand, by nature, not simply or alone, but cooperating with the action of the mind itself, thinking in a reflex manner from its instinctive or more simple knowledge in a new careers of conscious thought (Hutton, J. 1794 III: 80).

A marked feature of Hutton's theory of knowledge must be the self-consciousness of the thinker. "Happiness consists, not in feeling pleasure, but in knowing the pleasure we feel" (Hutton, J. 1794 III:745). The Man of Science is always conscious of his processes of thought, not just in order to separate truth from error, but also because each new experience creates the next step on the ladder to personal perfection. The ultimate step is pleasure or happiness, an ordained state which the Almighty has in His wisdom arranged in His divine plan. In the following quotation from the address to the Royal Society of Edinburgh, Hutton introduced the word "pleasure" and thereby prepared the way for the legitimisation of geological activity which was to occupy his successors for fifty years:

Man is not satisfied like the brute, in seeing things which are, he seeks to know how things have been and what they are to be. It is with pleasure that he observes order and regularity in the works of nature, instead of being disgusted with disorder and confusion (Hutton, J. 1785: 286).

There are two levels of pleasurable human observation, of course, the contemplation of the orderliness of nature itself and the self-knowledge of the ordering mind of the human being. There is no doubt in Hutton's scheme which is the higher:

In how much then as we admire the order, the beauty, the magnificence of the material universe, which we perceive, or which we truly know in having it revealed to us, so much more we must admire the mind of man, a being that is made to know, that is made to act in consequence of that knowledge, that is made to reason in order that it may become wise, and is made to become wise, in order that it may become happy (Hutton, J. 1794 II: 419).

Wordsworth's own comparison of the world of nature and the "world" of the human mind in the final lines of *The Prelude* can surely be placed alongside Hutton's prose song of appreciation of the powers of the mind. Like Hutton, Wordsworth writes about the mind that "becomes" as well as about the qualitative difference between mind and nature:

and we may teach them how:
Instruct them how the mind of man becomes
A thousand times more beautiful than the earth
On which he dwells, above this frame of things
(Which, 'mid all revolutions in the hopes
And fears of men, doth still remain unchanged)
In beauty exalted, as it is itself
Of substance, and of fabric more divine
(*Prelude* 1805 XIII: 445-452).

The last quotation together with earlier themes from Hutton's philosophical work will I hope indicate that it is possible to make connections between Wordsworth and Hutton. "Connections" is a suitably imprecise word at this point of the thesis to indicate only the common intellectual world they shared through reading, through a shared inheritance from the eighteenth century and through the conversation of mutual acquaintances. I have indicated earlier in this chapter, how Wordsworth and Coleridge knew of Hutton's work, but we can never really know when an idea in reading or in conversation comes into play in a poet's work. At first sight the obvious possibilities of links between the philosopher-geologist and Wordsworth appear to have been in his earlier years. Hutton died in 1797 and Playfair's *Illustrations* were produced in 1802. The contacts through Erasmus Darwin and Coleridge's Bristol acquaintances again were at the end of the eighteenth century. The concentration of my thesis is on the work of Wordsworth after 1810 and I must rely, in making connections between the poet of these later years and the *fin-de-siècle* philosopher, on the lasting effects of books and conversation, the "uncleared cheques" of intellectual discourse. At the same time, I shall, in this chapter, refer particularly to the *The Prelude* of 1805 as a work which I regard almost as a "seed-bed poem" in which ideas to be garnered in the later poems are prepared and hardened off. I want now to identify two themes in Huttonian geology and philosophy of knowledge which I find in Wordsworth's work either in *A Guide*, or *The Prelude* or in later works to which I shall refer in chapters dedicated to poetry after 1810. The themes are the active mind, and duration and decay. I shall return finally to Hutton's search for clarity and "distinctness".

"The active mind."

Enough quotations have already been provided to illustrate Hutton's immersion in theories of activity in science. He is far from original in proposing that the physical universe is not inert, but in a physical state of change and

activity (see Donovan, A.L. 1982 and FitzGerald, S.M.P. 1984). Piper's seminal work, *The Active Universe* (Piper, H.W. 1962) traces the English Romantic conception of the living universe, which could be understood through imagination, back to the late eighteenth-century philosopher-scientists, such as Priestley, Darwin and Hartley. Piper also acknowledges the role of James Hutton in extending Priestley's notion that inert matter is a living force:

The belief that inanimate objects were in a literal sense alive came nearest to establishing itself as a scientific orthodoxy during the years of Wordsworth's most active poetic life (Piper, H.W. 1962:115).

Piper does not, however, believe that Wordsworth read *An Investigation*. Piper's thesis, although important, particularly in the context of the phrase the "stream of tendency" which I shall consider again in the next chapter, is necessarily forward-looking into the nineteenth century and therefore he spends less time on the network of scientist-philosophers by whom Hutton and Wordsworth were, perhaps separately, influenced.

A recent study of Wordsworth by Fitzgerald (1984) has concentrated on the relevance of eighteenth-century physical chemistry and physiology to Wordsworth's early development as a poet attempting to cope with social morality. She sees Wordsworth's reading of Hartley and Erasmus Darwin reinforced particularly during a brief residence in Bristol. Then there followed the conversations with Coleridge, leading at first to a position of moral necessitarianism. The "Ruined Cottage" of 1798, for instance, includes the necessitarian sentiment that nature by its influence on man will lead to good:

Thus deeply drinking in the soul of things
We shall be wise perforce, and we shall move
From strict necessity along the path
Of order and of good (Butler, 268-271).

Fitzgerald's thesis progresses to Wordsworth's escape from this doctrine after 1800 and his own formulation of the principle of "elective imagination" in correspondence with Nature. Wordsworth's "imagination" is an active, choice-making faculty, growing and developing, refining and maturing through experience. Putting aside the times when Hutton dismisses "imagination" in geology as a weak substitute for empirical study, we can find similar "elective" processes in Hutton's theory of human mental activity. There is a quality of

mind of Hutton's Man of Science which is not so distant from Coleridge's "secondary organizing" power of the imagination, which moves the observer into a new order of perception. Hutton frequently opposes, against what appear to be objective circumstances, what the mind does with its first and subsequent perceptions of these circumstances.

Hutton's geological studies are close in spirit to the interpretation of nature in Wordsworth's early years elaborated by Fitzgerald. His *Theory of the Earth* is presented at times as a programme laid down by the Almighty for the scientist-geologist to uncover, which will inevitably lead deeper and deeper into virtue as well as into knowledge. However, not all is necessitarian. Virtue does not simply arise "perforce." There is a strong element of human will within Hutton's thesis of moral progression. Education must be added to natural processes. All will not follow automatically by contact with nature and, although scientific enquiry produces a compound interest, progressively enhancing the mind of the scientist, there are levels of enquiry which demand higher powers than scientific investigation, namely the philosopher's supreme activity, the will to seek wisdom. Although to reach the last volume of *An Investigation* seems a long journey, it repays attention, if only in the section on Education. Hutton asserts that human nature is indeed perfectible, but individuals are not:

The human mind is never perfect; for, the utmost perfection of man is to know his ignorance, in discovering an indefinite field of knowledge to which he has not yet attained (Hutton, J. 1794: III:721).

Perhaps a geologist of 1790, aware of the magnitude of the world and the dimension of time he has begun to explore, inevitably exercises some reservation about the perfectibility of knowledge. This must be particularly true of a geologist who knew it was profitless to seek first causes and final ends. That truth is also relevant to the poet in his later years, whose concern, as Jonathan Wordsworth has put it, remains with the aspiring mind rather than the certain mind (Wordsworth, J. 1982: 35).

Much earlier than the period on which I concentrate in this thesis, Wordsworth had expressed in *The Pedlar*, and then reworked into a personal form in *The Prelude* of 1805, a statement of the human mind growing and developing, reinforced by its own success in feeling:

...but that the soul -
Remembering how she felt, but what she felt
Remembering not - retains an obscure sense
Of possible sublimity, to which
With growing faculties she does aspire
With faculties still growing, feeling, still
That whatsoever point they gain they still
Have something to pursue (*Prelude* 1805 II: 334-341).

Hutton's ascending powers of thought are obviously in a different domain but nevertheless belong to a system of sensibility. We should be careful about identifying the experience of Hutton's Man of Science as one of thought rather than one of feeling. His keen appreciation of the "pleasure" of intellectual activity should be remembered. Playfair asserts of Hutton's geological activity that he had an "exquisite relish" (Playfair, 1809:91). The eagerness of the human mind to know, and the sense of perfectibility never attained, yet with success reinforcing and enlarging the human mind, are qualities of the human spirit common to both poet and philosopher-geologist.

To return to the important point of connection between Wordsworth and Hutton, both are concerned not with a mind like a machine ready to receive images, but one which enhances "forms". As the mind works on the forms, it itself develops ready to receive new sensations to be processed. Wordsworth's passage in *The Pedlar* can be put alongside other passages in *The Prelude* and in the later poems to illustrate a doctrine of growth, which, in Hutton's narrower sphere was just as important.

He had received
A precious gift, for as he grew in years
With these impressions would he still compare
All his ideal stores, his shapes and forms
And, being still unsatisfied with aught
Of dimmer character, he thence attained
An active power to fasten images
Upon his brain (Butler, J. 1979).

The child's mind is not content with and perhaps even disturbed by "aught of dimmer character". Clarity, a term to which I shall refer in the concluding

passages of this chapter, is more satisfying, but "satisfaction" is hardly the strong enough language to apply to the outcome of Wordsworth's "mind in action". In Hutton's case also there is a stage beyond mere satisfaction. The true activity of the mind leads to consequences of considerable energy. I have mentioned pleasure, but in the following passage from Hutton's medical dissertation occurs a Wordsworthian abstract, "joy":

Nature, everywhere the most amazingly and outstandingly remarkable producer of living bodies, being most carefully arranged according to physical, mechanical, and chemical laws, does not give even the smallest hint of its extraordinary and tireless workings and quite clearly points to its worth as being alone worthy of a benign and omnipotent God: and carries this bright quality in all of its traces, in that, just as all of its general mechanisms rejoice, so also do all of their various smallest component parts rejoice in the depth of wisdom, in the height of perfection, which lie far beyond every investigation of the human mind (Donovan, A. and Prentiss, J. 1980: 29).

The excuse for such a lengthy extract from a work of Hutton's younger years is that it illustrates the "frontier position" on which he stood. Its language contains the elements of Deism and mechanistic imagery, but at the same time, the enthusiasm and sensibility which presaged a new generation of involvement in natural phenomena. As in his geological theory, so in his theory of the mind, Hutton proposes a cycle of energy. The mind develops by its own activity and, as it develops, it interacts with external things and is in turn enhanced by them.

Duration and Decay.

My second chapter opened with the record of Dorothy Wordsworth experiencing the contrasting sensations of visiting the Chamouny glacier with, on the one hand, ruin and decay, and on the other permanence: "eternity, and perpetual wasting" (DWJ II: 286). She was conscious of William Wordsworth's original journey to the Alps in 1790. Yet in 1820 there was an even deeper level of complexity of experience, because William's journey was vividly in his own mind, and therefore, because of the intensity of their relationship, inevitably in her own, as they travelled through this evocative region. More than the rich air of reminiscence of her brother in his vigorous youth, she breathed in, of course, the memory of its poetic record in the *Prelude*, the poem shared only by a few.

One passage in Book VI of *The Prelude* has attracted considerable attention in respect of Wordsworth's understanding of contemporary geological theory. It is a richly romantic sequence of interest to those who seek for a millennial vision as well as for those pursuing evidence of scientific knowledge:

...The immeasurable height
Of woods decaying, never to be decayed,
The stationary blast of waterfalls,
And everywhere along the hollow rent
Winds thwarting winds, bewildered and forlorn,
The torrents shooting from the clear blue sky,
The rocks that muttered close upon our ears -
Black drizzling crags that spake by the wayside.

...
Were all like workings of one mind, the features
Of the same face, blossoms upon one tree,
Characters of the great apocalypse,
The types and symbols of eternity,
Of first, and last, and midst, and without end
(*Prelude* 1805 VI:556-564 and 568-572).

Jonathan Wordsworth, for instance, suggests that this passage and a manuscript draft of *The Ruined Cottage* provide evidence of the influence of Milton and of Thomas Burnet (Wordsworth, J. 1982: 193). After reading Hutton's own work, I am more inclined to hear echoes from the geologist who more directly preached a cyclical, renewing theory. It is the cyclical nature of Hutton's theory of the earth's formation and of human mental growth which should interest the reader aiming to make connections with Wordsworth's convictions in the *The Prelude* of the living, continuing role of nature. *The Prelude* is, after all, a document of a relationship between the developing inner life of a man and the "active universe" of the earth's various forms. The non-human world is a partner in this ever-changing, but persisting universe. Unlike Coleridge's dead world in "Dejection", which only has the semblance of life given by the human mind, the natural world and the human are continuously interacting.

For both Hutton and Wordsworth, beginnings and endings are of less importance than permanence and durability, yet a moving, active, reciprocal permanence and durability. The world decays but it also renews and it thereby has duration. People live in a setting in which they can assume that there is continuous blessing, enhanced by their own development as sentient (or in Hutton's case "thinking") beings. The dilemma of Hutton's thesis for the survivors of the revolutionary decades was its apparent threat of perpetual ruin,

the attraction was in its promise of renewal and, more important, in its suggestion of ordered economy. The geological lectures of Humphry Davy in 1811 are a useful source to note the public expression of both ways of regarding Hutton. Wordsworth and Coleridge might, like Davy have noticed a threat in Hutton's thesis of the remorselessly destructive powers of nature. This doctrine seems to Davy to be "in many respects erroneous". He gives many instances of the creation of recent re-building of terra firma (the accumulation of soil, coral islands, volcanic islands). These are all reassuring for "we have so many pledges of duration" (Davy, H. 1811: 45). Davy's alternative, a stable secure world is, however, not markedly different from Hutton's own conception, given an acceptance of slow, cyclic processes which balance decay against renewal:

By wise and beautiful laws the equilibrium of things is constant. Life is preserved by operations which appear destructive, order and harmony arise from what at first view seems derangement and confusion, the perfection of the work is perceived the more it is studied, and it declares, in distinct language, the power and wisdom of the author (Davy, H. 1811: 43-44).

Hutton and Davy both regard the natural order, the process that maintains that order process and the person observing the process as matters of joy. Hutton says of the Man of Science, "It is with pleasure that he observes order and regularity in the works of nature, instead of being disgusted with disorder and confusion" (Hutton, J. 1785: 296). Davy grants that "mountain country, which is the very theatre of science is always impressive and delightful", but "a new and nobler species of enjoyment arises in the mind, when the arrangement of it, its uses, and its subserviency to life are considered (Davy, H. 1811: 9). Both scientists in these statements claim for the scientist pleasure and "delight" and in this way associate themselves with the emotions of the early nineteenth-century geologists. However, the ancestry of their sentiments in the enthusiasm of the eighteenth century is also present. Shaftesbury for instance in Volume II of *Charactersticks* (See Note 5) also confirms that there is order in nature, although we do not always first perceive it. Even when Nature appears to be "most ignorant or perverse in her Productions she is really wise and provident." Shaftesbury's wise, experienced observer, like Hutton's and Davy's scientist, gains access to a sense of beauty through the ordering processes of the mind:

It is on the contrary, from this Order of inferior and superior things, that we admire the world's Beauty, founded thus on Contrarieties: whilst from such various and disagreeing Principles, a universal Concord is established (Shaftesbury, 1773: 214).

The distinction between the eighteenth-century philosopher and the later thinkers is in the movement and action that the later scientists see in the system, well summarised in one of Hutton's best phrases: "this active scene of life, death and circulation" (Hutton, J. 1795: 281).

In concluding this chapter, I do not wish to apportion exact influence of Hutton on Wordsworth. It is not straightforward to make a summary of what Wordsworth may have acquired from his reading of Hutton or of Playfair "translating" Hutton. The linguistic clues - the geological terminology, remarkably close to Playfair's, the terms, "Man of Science" and "Matter of Fact" from Hutton's investigations - are interesting, but hardly conclusive. What is more persuasive is to read Hutton's work after reading *A Guide* and the poems written after 1810. Then it is possible to feel that the same philosophical spirit is at work, continuous with the eighteenth-century writers that they both read and yet changed to new views of the human mind. One final paradox of Hutton's work will lead to the next chapter. Hutton is justly famed for a large-scale theory of the earth, but this reputation rests on a trust in accurate recording of small-scale, local observation. Even discounting modern disagreement about whether Hutton was a genuine "field geologist", it is certain that he demanded clarity based on what geologists saw before them in cuttings and quarries. In Hutton's 1785 address, he makes a procedural statement about the beginning of the present cycle of our earth. In making his point, he uses a word signifying clarity, a word of importance in Wordsworth's poetic vocabulary, as we shall see in the next chapter:

We have been now supposing that the beginning of our present earth had been laid in the bottom of the ocean, at the completion of the former land, but this was only for the sake of distinctness (Hutton, J. 1785: 303)

CHAPTER FOUR : THE EXCURSION: "PROPERTIES THAT SPREAD".

For the student of Wordsworth's exploration of the relationship between nature and mankind, *The Excursion* is such a large monument that it is impossible to ignore it or to circumvent its considerable girth. It seems at first sight to be the worst possible source for inklings of the writer's interest in science in general, never mind in one particular science. It contains (or, as I shall say later, appears to contain) a crushing, dismissive reference to botanists and geologists. Its focus is on the human mind, its suffering and its sources of consolation rather than on the natural, non-human world. Add to this emphasis the overlay of a later generation's approval of its lofty, reassuring sentiments, because they appeared to be a reaffirmation of conventional religious faith, and the reader faces a major text with hardly a finger-hold for the study of natural history.

There is an additional, general, literary difficulty for the modern reader, accustomed to looking into poetry for doubts and open-ended issues, for growth, poetic change and existential questionings. *The Excursion* appears, at least at first sight, to be a weighty document of untroubled confident assurance. As Stephen Prickett says:

There is no doubt, I think, from Wordsworth's "Preface" to *The Excursion*, that he felt his calmness and assurance to be signs of maturity. Such a maturity, however, was one that seemed to preclude, by its very definition, the further modification from experience (Prickett, S. 1980: 151-152).

There is not the initial "set" of mind or anticipatory attitude we expect from a poet in an age of rapidly expanding scientific knowledge. Our own century, deeply imbued with the Uncertainty Principle and ever ready to discard the theory of today (because, by definition, it must be out-of-date), finds the apparent confidence of *The Excursion* unacceptable. I say "apparent" because there is considerable internal evidence that Wordsworth's intellectual journey, although it may have reached a point of maturity, was not ended. My purpose in this chapter is to try to illustrate some of the complexities underlying the assurances of this long poetic work. In order to consider issues raised by the dialogue of the characters in the poem, I shall select from this dialogue statements which reveal something of Wordsworth's possible understanding of contemporary scientific

and, thence geological, theories, or which correlate with the understanding of their own task by major geological figures of the time. Three important themes can be selected in order to lead directly to a way of appreciating the effect of contemporary scientific activity on the poet. As I hope to demonstrate in later chapters, all three themes have significance for geologists as they developed their new science in the early decades of the nineteenth century. The topics selected from the Wanderer's arguments with his friends are the idea of "distinctness", the essential nature of order and law in creation, and the unity of nature and humanity. Before dealing with each theme in turn, I shall consider what is said explicitly in *The Excursion* about science and about geology in particular.

"The pocket-hammerers".

Direct reference to explanations of landforms, theories of the earth or more precisely to geological enquiry are few. As I indicated in Chapter One, a key passage in Book III of *The Excursion* is most often quoted by those who have written about geology and literature in the early 19th century (See Cannon, S.F. 1978; Gaull, M. 1988). It is worth looking more closely at the passage and where it occurs. The Solitary is in full flow describing his unassuageable grief. The Wanderer has, significantly for the themes of this study, attempted to console him with the planned, benevolent intention of Nature:

Among these rocks and stones, methinks, I see
More than the heedless impress that belongs
To lonely nature's casual work: they bear
A semblance strange of power intelligent,
And of design not wholly worn away.

... And I own,
Some shadowy intimations haunt me here,
That in these shows a chronicle survives
Of purposes akin to those of Man,
But wrought with mightier arm than now prevails (W.P.V iii: 80-84
and 87-91).

I shall return to this suggestion by the Wanderer that "rocks and stones" are not the random result of purposeless powers later, but, to continue the narrative, we have to note that the Solitary's reply dismisses consolation and takes a cynical view of Nature:

...The shapes before our eyes
And their arrangement, doubtless must be deemed

The sport of Nature, aided by blind Chance
Rudely to mock the works of toiling Man (W.P.V iii: 124-127).

The "freaks of Nature" may have raised the Wanderer's mind to an ecstatic level, but they have the opposite effect on his companion. The Solitary can however appreciate that others find comfort and even happiness in these "shapes". The "Wandering Herbalist" has obvious pleasure in his work and, to come to our point, so have the new bands of geologists:

Nor is that Fellow-wanderer, so deem I,
Less to be envied, (you may trace him oft)
By scars which his activity has left
Beside our roads and pathways, though, thank Heaven!
This covert nook reports not of his hand)
He who with pocket hammer smites the edge
Of luckless rock or prominent stone, disguised
In weather stains or crusted o'er by Nature
With her first growths, detaching by the stroke
A chip or splinter - to resolve his doubts;
And, with that ready answer satisfied,
The substance classes by some barbarous name,
And hurries on; or from the fragments picks
His specimen, if but haply interveined
With sparkling mineral, or should crystal cube
Lurk in its cells - and thinks himself enriched,
Wealthier, and doubtless wiser, than before (W.P.V iii: 173-189).

This is a very damning passage for geologists. It appears to condemn them as collectors of trivia and destroyers of the body of innocent Nature. I shall return in Chapter Seven to Wordsworth's explanation to Professor Sedgwick many years later, when he asked him not to confuse the writer with the character. Nor must we! He added that he was criticising mineralogists not geologists, a distinction which is not the main issue at this point. What is important is the context of the above passage, that is to say its place in the dramatic dialogue. The sublimity and assurance promised by the Wanderer in the contemplation of the natural world could not be felt by the Solitary in his saturnine mood. If the Wanderer's consolation could not lift him out of his gloom, equally the absorbed collectors seemed even further apart in emotional state. It is their happiness that the depressed spectator envies. Admittedly he has a side-swipe at the barbarity of naming and classifying, but the main thrust of the passage is the Solitary's distance from the satisfactions of the pursuit of knowledge. That pursuit was meaningless for him. Those who see in this passage an attack on the inhumanity of science (that is to say science in the sense that we use the term, in opposition to Literary or Humane Studies) should also note that the Solitary's

opening remarks in this long speech are addressed in mocking tones to historians, who are in "the antiquarian humour", and are "pleased to skim along the surfaces of things" (W.P.V iii:134-135).

The above well-known passage is however not the only reference to geology. There are small signs or traces of "modern knowledge" even in these upland pastures of the mind. The Solitary is not unacquainted with scientific pursuits. Like the Reverend Wonderful Walker in *The River Duddon: A Series of Sonnets* he has collected botanical specimens and fossils. His untidy room into which his two friends are shown is scattered...

With books, maps, fossils, withered plants and flowers,
And tufts of mountain moss. Mechanic tools
Lay intermixed with scraps of paper, some
Scribbled with verse: a broken angling-rod
And shattered telescope, together linked
By cobwebs, stood within a dusty nook (W.P.V ii: 663-668).

Later, in Book VII, in the example of the deaf man, whose epitaph in the churchyard is read by the friends and the Pastor, we are led to admire the range of reading he enjoyed, including "science severe":

...The bowels of the earth
Enriched with knowledge his industrious mind;
The ocean paid him tribute from the stores
Lodged in her bosom; and, by science led,
His genius mounted to the plains of heaven (W.P.V vii: 502-506).

This noble soul attained a state of exaltation through his quest for knowledge. He plainly stands in opposition to the small-minded archeologists, botanists and mineralogists castigated by the Solitary. Their problem, although they were blissfully unaware of it, was the inadequate level of emotional satisfaction, at least by the Solitary's austere standards. I believe that the studies of the four geologists presented in this thesis will identify and claim "higher" satisfaction for the geologist than that of mere collecting or the affixing of names. They too felt their powers were engaged in matters above "cabinet geology", although issues of nomenclature and the methodical collection of specimens were basic procedures which they respected and on which their higher speculations were built.

In another respect the passage in Book III of *The Excursion* accords with the attitudes taken by contemporary geologists. After the passage condemning the archeologists, botanists and mineralogists, the Poet-narrator interposes a model

which, he feels, the Solitary cannot reject, the innocent boy playing with a toy water-mill in the mountain stream. The Solitary's response is relatively brief - let him stay as long as he can in his innocence, if the only result of maturing imagination and questioning leads to no place of assurance, no haven of secure virtue or goodness. The Wanderer reminds the Solitary that he had been seen earlier consoling the boy in his mourning with a statement of hope in immortality. The Wanderer concludes that "Wisdom is oft times nearer when we stoop/Than when we soar" (W.P.V.iii:231-232). The Solitary agrees with him. It is better to stay close to earthly realities than to indulge in speculations. In a sentence very close to the sentiments of James Hutton or of George Bellas Greenough, the next geologist I shall present, when they turned geology away from conjecture and attempted to build the new science on observation and reality, the Solitary sums up a practical philosophy:

Here are we, in a bright and breathing world.
Our origin, what matters it? (W.P.V iii: 237-238).

The next turn of the dialogue is, however, significantly Wordsworthian and not the habitual framework of thought of geologists. The Solitary suggests in a lighter manner that, "In lack of worthier explanations" we may as well turn to myths and travellers' tales to seek the first cause and origin of the earth. Perhaps humanity emerged ready-made out of a cave, as the American Indians proposed, or began as golden grasshoppers, as suggested in Greek mythology. At a number of moments in this study, I find Wordsworth's mind playing with the material of myth to place against scientific explanations or to absorb the questions raised by the phenomena of landscape. In Chapter Six I shall return to this point in connection with sonnets in the "River Duddon" sequence. These references to the myths of the classical past or to the legends and folk-tales of contemporary primitive people are not Wordsworth's (or in this specific context the Solitary's) alternative explanations of phenomena nor are they seriously intended oppositions to scientific theories. They are rather presentations of the historical fact that, at other times and in other places, men have found consolation and satisfaction in narratives which explain their world. To the Solitary they lead not to resolution and recovery but to a stoic understanding: "thought which may be faced,/Though comfortless!" (W.P.V iii: 262-263).

Distinctness, Distinction, and Distinct.

There is one important direct reference to science in Book IV of *The Excursion* which is worth very close examination, because it reveals much of Wordsworth's understanding of knowledge and how it is acquired, and touches the very centre of his attitude to scientific activity. In my last sentence "science" and "scientific activity" have been used in two different senses, old and modern. In the following passage, Wordsworth is writing about the general area of knowledge in a traditional sense, but the development into the specialised meaning of today is also apparent from what follows from the Wanderer's statement. The Wanderer sets out a long argument to correct the Solitary's despondency. His message is one of the gradual education of the mind in its communion with "the Forms of nature". He proposes a gradual development of the mind, a moral education, which will grow into "the glorious habit by which sense is made/Subservient still to moral purposes,/Auxiliar to divine" (W.P.V iv:1247-1249). The newly clothed and no longer dejected spirit will then be ready for a further enhancement. It is in a prepared condition for a stage in the liturgy of human development.

.....Science then
Shall be a precious visitant; and then,
And only then, be worthy of her name:
For then her heart shall kindle; her dull eye,
Dull and inanimate, no more shall hang
Chained to its object in brute slavery;
But taught with patient interest to watch
The processes of things, and serve the cause
Of order and distinctness... (W.P.V. iv: 1251-1259).

I have stopped this quotation at a significant word. It is one which all too easily transcribes as "distinction", which might well appear to be a synonym. In Chapter Three, I concluded with James Hutton's use of the term. As I shall try to demonstrate by pursuing the term and its associated variants in Wordsworth's writing, the choice of the word "distinctness" is significant and precise in meaning.

Beginning with the word that is a close neighbour to "distinctness", Dr Johnson's Dictionary (1755) gives eight different meanings for the word

"distinction", including social distinction and a variety of shades of sense gathered around the idea of the individual identity of things or people. "Distinctness" in Johnson's Dictionary, however, has only two narrowly differentiated meanings. One is concerned with clarity and unimpeded vision. It is supported by a quotation from John Ray's *The Wisdom of God Manifested in the Works of Creation*. The other meaning is "such separation of things as makes them easy to be separately observed." I believe that Wordsworth is conscious of both meanings in his commissioning of science as the "precious visitant" (See also Note 1).

Following first the meaning associated with clarity, there is a substantial reason for pursuing Johnson's reference to John Ray's use of "distinctness". Wordsworth at various times either owned or had access to Ray's *The Wisdom of God*. It was in the library at Racedown (Pinney Papers), and, later, the Wordsworths held Coleridge's copy of Ray's *Travels in Europe, 1673* (Shaver C.L. and Shaver A.C. 1979). The most interesting connection between Ray and Wordsworth in this context is the function of the eye in the pursuit of a form of clarity which means something more than "clearness". It is concerned with seeing things as they really are, rather than what they first appear to be. There are, Ray says, two reasons why all the membranes and humours of the Eye are perfectly pellucid and void of colour; first for clearness, secondly for the "Distinctness of Vision" (Ray, J. 1750:208). If the eye had been itself "tinctured" with a colour it would "refund the Colour upon the Object and so it would not be represented to the Soul, as in itself it is. So we see, that thro' a colour'd Glass things appear as well more dim and obscure, as tinctur'd with the Colour thereof" (Ray, J. 1750: 208). The eye is not only a beautiful organ in itself, it is the means of conveying such qualities as beauty to the soul. Ray employs a lively set of images to convey the eye's functions and in so doing adopts again the word "distinct".

As the Eyes are the Windows to let in the Species of all exterior Objects into the dark Cells of the Brain for the Information of the Soul, so are they flaming Torches to reveal to those abroad how the Soul within is moved or affected. These Representations made by the Impressions of external Objects upon the Eye are the most clear, lively and distinct of any other (Ray, J. 1759: 207).

The "dull eye" of science, in Wordsworth's passage quoted above from *The Excursion*, will change. As a "precious visitant" it will assume the qualities it does

not currently possess, chief among which is the capacity to admit light to the heart. In its future role of assistance to the developing mind of man, the eye will no longer be "dull and inanimate". In the literal sense of "animus", science when "chained" to an object is without a spirit and lifeless, whereas, to use Ray's term, if it is to light the soul with a flaming torch, it must be a living entity. Wordsworth too uses a metaphor of heat for the inner "heart" of science which will "kindle".

There are similar passages in *The Prelude* where the eye and the inward absorption of objects in their essential truth appear in juxtaposition.

'Twas only then when gross realities,
The incarnation of the *spirits* that moved
Amid the poet's beauteous world - called forth
With that distinctness which a contrast gives,
Or opposition (*Prelude* 1805 VII; 509-513).

Wordsworth here uses the term "distinctness" about his awakened experience achieved through Shakespeare's drama. After that passage there is a figure of seeing: "As by a glimpse, the things which I had shap'd/And yet not shap'd, had seen and scarcely seen" (*Prelude* 1805 VII: 513-514). In *The Prelude* often threatening moods are conveyed by terms describing the unclear, the "undistinguishable" as in "spots of time" in his childhood and in his days as a young man in London (*Prelude* 1805I: 330-331 and VII: 700). Clarity implies unimpeded access to the heart for Wordsworth, just as it implies an open channel to the Soul for John Ray. The act of seeing is not a mechanical, optical process, it is an active, flowing process associated with the expression of feeling. For Ray it is a window through which others may see the inner changes of mood and of affectations. For Wordsworth the eye is the vital route for human development. The babe who grows by experiencing human love "Doth gather passion from his mother's eye" (*Prelude*, 1805 II: 243). The essential nature of sight and eventually of clear sight is revealed in a passage in *The Excursion* where the Wanderer castigates the scientists whose treble handicap is first, that they can not see, second, they have the gift of sight but do not use it and, third and above all, their blindness is without joy:

Shall men for whom our age
Unbaffled powers of vision hath prepared,
To explore the world without and world within,
Be joyless as the blind? (W.P.V iv: 944-947).

In an earlier draft of this passage, the reference is even more specifically to the scientists who "the optic glass of science has prepared" or attempt to "weigh/The planets in the hollow of their hand" (W.P.V iv: page 139). In the same book of *The Excursion* there is another passage which might almost be a translation into Romantic terminology of Ray's "eye" and "soul". In Wordsworth's case there is a division of labour between eye, heart and soul. The Wanderer says that even the uneducated have a moral sense learned at their mother's knee.

a Man so bred
(Take from him what you will upon the score
Of ignorance or illusion) lives and breathes
For noble purposes of mind: his heart
Beats to the heroic song of ancient days;
His eye distinguishes, his soul creates (W.P.V.iv: 828-833).

The ultimate activity, the soul's, is creativity. The heart's role is to feel. The eye in this passage, like the heart and the soul, is active in its function of distinguishing. The distinguishing faculty of the eye is, of course, the one that attracts my attention in this section because it is a faculty reflected upon by geologists as they consider their science.

It is always difficult to justify an influence on a writer's language from one source of reading and it is particularly difficult in the case of a writer who is exceptionally widely read. In the case of the influence of Ray on Wordsworth there are reasonable grounds for a statement that Wordsworth would have been conscious of the interests of John Ray in the human powers of perception through vision, but he is not the sole source of ideas. In a sense, Ray's moral theories of perception are themselves an inheritance of Newton's physical theories, particularly in the *Optics*, which remained an important text for undergraduates of Cambridge in Wordsworth's own day and beyond (Schneider, B.R. 1957). One other source of ideas, closer to Wordsworth's own period, may have contributed to the notion of philosophical clarity or "distinctness". This was the direct or indirect influence of late eighteenth-century German thought on Wordsworth's conceptualization of the power of the human mind. Coleridge's interest in Kant is well known and it is conceivable that on return from Germany (when Coleridge's reading of Kant may have developed) there was discussion of Kantian ideas of the mind with Wordsworth. For an understanding of the capacity of the human mind to seek distinctions between things, Kant's theory is a

theoretical underpinning. He proposes a fruitfulness in Nature which produces in every component a characteristic of "continuous development and progressive diversification" (Lovejoy, A.O. 1960: 268). This diversification in the object is what the mind seeks out in its quest for "distinctness" and yet does not seek thereby to destroy the wholeness of which the distinct elements are a part. Here is a theoretically stated position retaining both identity and unity which is mirrored in Wordsworth's phrase "the exactness of a comprehensive mind" (*Prelude* X: 844) which, to anyone reading the four geologists presented in this thesis, seems singularly appropriate.

I now wish to turn to the second meaning of "distinctness" as defined by Dr Johnson: "the separation of things". In an essay comparing the three countries, Germany, England and France, Coleridge lists as German qualities the "Idea or Law Anticipated, Totality and Distinctness" (Coleridge, S.T. 1818: 421). "Distinctness" in this instance is perhaps synonymous with "clarity". However in a notebook at the end of 1800 and in the first month of 1801, Coleridge makes a distinction between the German words "Klar" and "deutlich" which he renders in English as "clear" and "indicable". The quotation is lengthy, but it is an important one for an appreciation of the second meaning of the word "distinctness" as defined in Dr Johnson's Dictionary, a meaning which I believe Wordsworth also intended in the passage in *The Excursion* about Science's future role:

I hold a clear and indicable notion of Rain - it is a multitude of Drops of Water falling together and successively through the air from the clouds or from above at least - it is clear, for I have an intention accompanying each word which I use in the analysis - and it is indicable, for I can in like manner analyse snow and hail and running water, etc. and show that Rain is different from them. But Red is a clear notion [but not indicable]...and this is the distinction between clear and muddy-headed men/and this too the business of Education, in its latter stages. I say, latter, because I believe nothing more unfavourable to intellectual progression, than a too early habit of rendering all our ideas distinct and indicable (Coburn, K. 1957 I:902).

This linguistic feat of analysis continues with a reference to the particular sciences of chemistry and, to a lesser degree, botany. Their function is to engage in "discovering whether or not your notions of a thing are completely distinct (ausführlich)" (Coburn, K. 1957 I:902).

Coleridge's strictures on educating people to make distinctions between things

at too early a stage in their cultural growth touches the very heart of the problem of "distinctness". On the one hand, we are not surprised in reading Wordsworth to find that he is critical of "that false secondary power by which/In weakness we create distinctions" (*Prelude*, 1805:II 221-222). *The Excursion* contains a famous statement of the presumptuous whose acquired factual knowledge and technical control of the world during what we now call the Agricultural and Industrial Revolution, have maintained them in a degraded state. This classic statement of the deadened nature of a certain kind of knowledge has at its heart a statement of the loss of wholeness:

Enquire of ancient Wisdom; go, demand
Of mighty Nature, if 'twas ever meant
That we should pry far off yet be unraised;
That we should pore, and dwindle as we pore,
Viewing all objects unremittingly
In disconnexion dead and spiritless (W.P.V iv: 958-962).

How does the reader square this criticism of disconnecting human faculties with the vision which saw Science as a "precious visitant" with benign powers of "distinctness"? The answer begins in Wordsworth's explanation of the main purpose, of what he then called *The Recluse*, in a letter to Catherine Clarkson of January, 1815:

One of the main objects of *The Recluse* is to reduce the calculating understanding to its proper level among the human faculties.
(W.L.III:189).

His aim is not to eliminate science but to put it in its proper place. The Wanderer's correction of the Solitary's despondency is couched in just such terms of gradation and hierarchy:

"Happy is he who lives to understand,
Not human nature only, but explores
All natures, - to the end that he may find
The law that governs each; and where begins
The union, the partition where, that makes
Kind and degree, among all visible Beings (W.P.V. iv: 332-337).

The discriminating, distinguishing mind is functioning as it was intended, but not in spiritless machine-like ways. On the contrary its reward is joy - "for knowledge is delight". There is more reward still. Delight "Breeds love" and thence an ascent to adoration, which is the highest form of love. Hutton's hierarchy of reward for the scientist exploring the earth and distinguishing in what appears to

be an undifferentiated mass a system and a history comes to mind in this ladder of intellectual progression. I shall examine, through the work of the other three contemporary geologists, the ascending levels of rewards which they claim arise from their analysis of the landscape.

I want to remain a little longer with the second meaning of "distinctness", as defined by Johnson: "such separation of things as makes them easy to be separately observed." In *The Prelude* Wordsworth deplored the process of separation either because it was a false categorization or because it broke into parts what was inherently whole. For Coleridge there was a further inherent danger in the over-discriminating mind, that of excessive individuality. In a letter to Southey in September, 1802 he makes a perfect statement of the opposition of wholeness and singleness and significantly it includes a figure of speech from science or chemistry in order to explain what should not be the case:

Nature has her proper interest; and he will know what it is who believes, and feels, that everything has a life of its [sic] own, and that we are all one life. A poet's heart and intellect should be combined intimately combined, and unified, with the great appearances in Nature - and not merely held in solution and loose mixture with them, in the shape of former Similies (Griggs, E.L. II: 864)

Within this passage is both a statement of "a life" for "every thing" and yet "one life" for all. Similarly in the great hymn of unity in *Home at Grasmere*, used again in the "Preface" to *The Excursion*, Wordsworth combines individuality and unity allowing both their role:

How exquisitely the individual Mind
(And the progressive powers perhaps no less
Of the whole species) to the external world
Is fitted; and how exquisitely too -
Theme this too little heard of among men -
The external world is fitted to the Mind (Darlington, B. 1977:
1006-1011)

"Distinctness" in its second meaning is concerned with individuality but predominantly with the perceptive faculty of being able to distinguish between one thing and another, which to the untrained eye appear to be the same. Again the figure of "the eye" is a starting point. In Book III of *The Prelude* Wordsworth claimed that in Cambridge days he "had an eye/which in my strongest workings evermore/Was looking for the shades of difference/As they lie hid in all exterior forms" (*Prelude* III 156-159). It is the fine distinctions, the shades of difference,

which occupy the maturing mind, not in order to deplore them because they break up or separate the unity of nature, but in order to enjoy them because they reveal the elements of union. We can look again at the lines from *The Excursion*.

"Happy is he who lives to understand,
Not human nature only, but explores
All natures, - to the end that he may find
The law that governs each; and where begins
The union, the partition where, that makes
Kind and degree, among all visible Beings (W.P.V iv: 332-338)

In these lines is the same spirit the geologists pursued in seeking "distinctness". They sought clarity, particularly within what appears to be a mass of undifferentiated material. Hutton's painstaking analysis of how the scientific mind works is however more closed and dogmatic than Wordsworth's never-ceasing, open enquiry. Wordsworth's theme is exploratory. Notice in the passage from *The Excursion* just quoted the word "explores". Nevertheless both men are aware of the processes of the mind that enable it to particularize and to comprehend how individuals join in a unity. An examination of the word "distinctness" reminds us of the absorbing problems involved in distinguishing "objective" and "subjective" reality, for the poet and for the geologists. Hutton writes in his *An Investigation*:

[it is] by the knowledge of identity and difference that is first formed the science of ourself, by knowledge of quality and inequality that the science of external things is made to proceed in our mind (Hutton, J. 1794 II: 48).

He too is concerned with inner and outer knowledge, with psychology as well as geology, and I shall try to illustrate in the following chapters on the three nineteenth-century geologists, how they also concerned themselves with the human mind and its processes.

Order and Law .

The preceding quotation from *The Excursion* also introduces a word used frequently, but in a variety of contexts, in that work. "Law" relates to "order" in the universe as "order" does to "distinctness". Chapter Two has placed some emphasis on the orderliness of the description of landscape in *A Guide*. In *The Excursion* order and law are prominent for a different reason, they are part of the moral argument. Science, it will be remembered from the original quotation

that began the analysis of "distinctness" in the previous section of this chapter, had a moral duty. Its task was "to watch the processes of things" as a servant of a "cause" and that cause was not only "distinctness" but also "order" (W.P.V iv:1259).

One way of considering the overall argument of *The Excursion* is to see it as a persuasive text of order and law opposed to chaos. The very opposite of order is embodied in the figure of the Solitary. His mind and mental condition, sunk in despondency, is paralleled by the untidy disorder of his cell. The Solitary considers the earth's forms in Book III and, with more than a mild enquiry, asks if the origin of the earth and all the earth nurtures is not "The sport of Nature, aided by blind Chance/Rudely to mock the works of toiling Man" (W.P.V iii 126-127). The Wanderer's scheme of correction to this deep despair is to reassert the orderly nature of the universe. "The calamities of mortal life" are not denied, human beings may be "sad or disturbed". That last word is again an epithet of disorder. Whatever the circumstances humans have experienced, the "procession of our fate, howe'er/Sad or disturbed, is ordered by a Being/Of infinite benevolence and power" (W.P.V iv: 13-15). Both these aspects of God's actions, orderliness and benign intention, are frequently discussed in the works of contemporary geologists. They found confirmation for their religious faith in providence and confirmed their faith by reading *The Excursion*, as they found confirmation of orderliness, not of randomness, in their studies. Even the most convinced Catastrophists in Great Britain - and by 1814 there was a growing conviction in Great Britain and in France of successive phases of catastrophe (Gillispie, G. 1951) - were certain that there was an underlying order associated with intention. "Directionalism", or the theory of an intended progress towards a Divine goal, was possible to hold hand in hand with a belief in successive extinctions and renewals of the earth's processes. Similarly the Wanderer in *The Excursion* is able to accept individual catastrophe at the same time as a general progression of the human condition, a progression which was intended and Divinely dispensed.

The geographical setting in which this dialogue of order and direction takes place is interesting in its own right. I shall conclude this chapter with a more detailed examination of the choice of locations for the peregrinations of the group of friends in *The Excursion*. At this point, however, I do not want to lose the opportunity to point out that the upland regions, the high pastures and the

barest ridges and fells, formerly the emblems of the decay and ruin of the world, become in *The Excursion* the setting for order. Whereas for Burnet, and for those who followed or modified his work, the cultivated parts of the world represented order partially imposed by human beings onto disorder, or, within a doctrine of pre-lapsarianism, order partially restored, for Wordsworth the high fells are the places where renewal occurs in the human heart. The monuments of ruin and decay for Burnet, became for Wordsworth the texts of avowal of faith and, above all, of law:

"Happy is he who lives to understand,
Not human nature only, but explores
All natures, - to the end that he may find
The law that governs each (W.P.V iv: 332-335).

The word "law" is used in *The Excursion*, in a number of senses, but frequently, as in the last quotation, in the same way that a contemporary scientist would use the term, for fixed and unvarying principles or regularity. Here I disagree, at least as far as Wordsworth's poem is concerned, with Marjorie Nicolson's assertion that Wordsworth, Byron and Shelley had "delight in irregularity" (Nicolson, M. 1963: Introduction). There is another wider sense of "law", which Wordsworth prefaces with the word "general" in the next quotation. It is an overriding, major condition of life on earth laid down by the Creator, affecting the past, the present and the future:

...time will come
When they shall meet no object but may teach
Some acceptable lesson to their minds
Of human suffering, or of human joy.
So shall they learn, while all things speak of man,
Their duties from all forms; and general laws,
And local accidents, shall tend alike
To rouse, to urge... (W.P.V iv: 1235-1242).

This level of law or laws is eternal. In the section when the friends take simple lessons from the graveyard with the help of the Pastor, they are confronted with the depressing threat of change. What are they to learn from the memory of the long-dead Elizabethan knight? Despite the inevitable changes and revolutions in society, the Wanderer reassures his companions, there is a law of direction, a doctrine of gradual conservation. The "vast frame of social nature" is always changing. There is "restless generation" and restless decay: "And by this law the mighty whole subsists; / With an ascent and progress in the main" (W.P.V vii:

1004-1005). In the ninth and final Book of *The Excursion*, the word "law" occurs seven times. It also was used three times in the lines omitted, according to de Selincourt and Darbishire, from the final text of that Book. It is easy to suggest that the frequency of the word confirms the growing conservatism of Wordsworth and an expression of his anxiety about civil and social disorders. I believe this is an over-simplified reading of the essentially complex issues that law and orderliness raised for Wordsworth and to which he devoted a never-completed enquiry. The word "law" is not confined to the middle and later years of the poet's life. In the 1805 *Prelude* Wordsworth writes as characteristically as in 1814 in answer to a question of doubt and despair:

What then remained in such eclipse, what light
To guide or cheer? The laws of things which lie
Beyond the reach of human will or power,
The life of Nature, by the God of love
Inspired - celestial presence ever pure (*Prelude* 1805 XI: 96-100).

In the confusion of London, we have seen the powerful word "undistinguishable" applied to disorder. Again, in Book VII of *The Prelude*, dispersion and confusion are the opposite of law:

An undistinguishable world to men,
The slaves unrespited of low pursuits,
Living amid the same perpetual flow
Of trivial objects, melted and reduced
To one identity by differences
That have no law, no meaning, and no end (*Prelude*, 1805 VII; 700-705).

In Chapter Nine of this thesis, I shall have further occasion to consider the importance of scientific "law-making". Gillian Beer has drawn attention to this topic in her seminal study of Darwin. She writes that the early Victorian "tracking of fixed laws" was:

...part of the comforting inheritance of Romantic thought in Victorian science which seemed to assure a continuance of natural truth through the action of permanent discoverable laws" (Beer, G. 1983:66).

The Excursion played its part in administering comfort to the Scientists. I believe that Wordsworth found himself in a boundary position between two opposing tendencies, change and law. Just as with the tension he explored between the virtue of "distinctness" and the weakness of "false distinctions" and separateness, so he explored both the virtue of living in the moment and the quality of permanence through law and order. Durrant, in his argument for continuity of

Wordsworth's scientific interests from Newton, sees the principles of law (in a Newtonian context, the laws of astronomy, physics and mathematics) as "constantly at war" with the "principle of joy". The scientific laws create a philosophy "which offers no consolatory or merely encouraging account of life" (Durrant, G. 1970:16). In *The Excursion*, however, I find Wordsworth able to sustain his belief in the essentially lawful and ordered nature of reality and to use it as one of the forces of reassurance and encouragement to the despondent Solitary. Of course, "law" in *The Excursion* is more than Newtonian physical law. It is both moral law and a Divine law which lead to a reconciliation of creator and created and a harmony of the elements of the created world. *The Excursion* represents one more significant reconciliation of laws, those of the two elements, duration and decay, topics which have occupied previous chapters. Consider the long sections on the transience of human life through two or more books of *The Excursion* located in the Pastor's graveyard. Then oppose this view with the evidence of a greater power of duration which at least holds back decay with superior laws, even if it does not completely reverse it:

"...How beautiful this dome of sky;
And the vast hills, in fluctuation fixed
At thy command, how awful! (W.P.V iv: 34-36).

Universality.

One of the difficult aspects of writing about Wordsworth's system of thought, as it is revealed through *The Excursion*, and one which perhaps denies that his thinking in any form could be properly described as a system, is that key passages can be used to lead off into different and even opposing avenues of explanation. The same passage can illustrate the value of order and distinctness and also demonstrate the core argument that nature is in a complex unity. I shall try not to repeat too often the quotations which I have already used in previous sections of this chapter, but I aim to draw attention to this last-named concept of unity, which I have called "universality". This is the word used by the geologist, Adam Sedgwick, in his correspondence with Wordsworth arising from his fulfillment of the promise to write a contribution on geology to add to *A Guide*. Sedgwick said that on this topic no one had put forward nobler views than Wordsworth (Sedgwick, A. 1842:F3). Its meaning to Sedgwick was the wholeness and interconnectedness of nature, both organic and non-organic under Divine dispensa-

tion.

There is a close connection between the Wordsworth's expression of faith in the unity of nature and the justifications used by early nineteenth-century geologists for the spiritual and moral value of their work. They shared in common a belief in a benign providence working through all things, whether material or spiritual. The universe may appear rugged, cold and detached from human standards of caring, but it is in fact a carefully constructed well-intentioned system. The Wanderer puts it thus:

"These craggy regions, these chaotic wilds,
Does that benignity pervade, that warms
The mole contented with her darksome walk
In the cold ground; and to the emmett gives
Her foresight and intelligence that makes
The tiny creatures strong by social league (W.P.V iv: 427-432).

The interdependence of nature, even in apparently inhospitable regions, is not however a mechanical, reproductive, self-sustaining cycle. It is a system which has enjoyment at its heart by a "participation in delight":

What other spirit can it be that prompts
The gilded summer flies to mix and weave
Their sports together in the solar beam,
Or in the gloom of twilight hum their joy? (W.P.V iv: 445-448).

The worst kinds of scientist or knowledge seeker, as in the poem "The Stargazers" or the botanists and geologists criticized by the Solitary, lack this natural joy that much simpler beings possess. The sin of the narrow scientists is to divide and to partition and, above all, to carry out the task as dull-eyed, observers rather than as participants in the universal forms of nature. Their view of the world is one of naming of parts. Such scientists inhabit a broken universe, for they will claim that they depict what they see - a divided reality. The Wanderer is at pains to persuade his listeners that first impressions of dispersion and separation in the physical world are misleading. The underlying unity of all life is there to be seen, if it is discerned with sensitivity, faith and love by those who have an educated, loving, receptive mind. In the future, scientists will be admitted to this vision, but they must approach as servants not masters. Returning to the lines I quoted earlier from Book IV which refer to the admission of science to the highest appreciation of nature, we notice the religious tone. Science will be a "previous visitant", admitted to a place of

and constitutional: the scientist of the future will be allocated "a province" which he is to hold in loyalty. ("a support not treacherous") supporting "the mind's *excursive power*" (W.P.V iv: 1251-1259). Science is to be enrolled in the service which it has the potential to undertake with dignity. Science can become an integral part of creation, as one ministering activity participating in a greater unity, and as an activity of the human mind, which is in the inner sanctum of that unity.

The chief reference for the testament of wholeness of Nature and of Man's part in that unity is in the climax of *The Excursion* in Book IX. This final book opens with a long invocation by the Wanderer, eventually leading to the closing, near-idyllic scenes of the final narrative. These episodes have in dramatic terms the most movement of the long poem, because they depict changing scenes and involve a larger cast of participants than in earlier books of the poem. The ideal family, including the idealized children, join the philosophizing friends walking towards the lake in a state of what can only be called transcendent peace. They row across the quiet lake, rest on an island, and then return to the hill-slopes for an evening's blessing by the Pastor. The party eventually divides and the narrative quietly concludes with a promise of the completion of the poem, *The Recluse*, to follow. Book IX is, in effect, the closing movement of a pastoral symphony. It is opened by a confident theme stated by the Wanderer with an elaborate testimony:

"To every Form of being is assigned."
Thus calmly spake the venerable Sage,
"An *active Principle*: - howe'er removed
From sense and observation, it subsists
In all things, in all natures; in the stars
Of azure heaven, the unenduring clouds,
In flower and tree, in every pebbly stone
That paves the brooks, the stationary rocks,
The moving waters, and the invisible air.
Whate'er exists hath properties that spread
Beyond itself, communicating good,
A simple blessing, or with evil mixed;
Spirit that knows no insulated spot,
No chasm, no solitude, from link to link
It circulates, the Soul of all the worlds (W.P.V ix: 1-15).

This highly charged testament flows on with great interest for those tracing Wordsworth's changed attitudes in his middle years to childhood and maturity with their relative ability to appreciate nature's unity or the "active principle".

The passage concludes with the firm view that Man and his social forms can also partake of this principle. Humanity's "active powers" when unimpeded by individual sorrow and civil circumstances are naturally strong and will lead to the suppression of "noxious qualities" (such as plainly have ruined the Solitary's composure). The "active principle" will encourage overflowing gladness and a rich blessing for the mature years of a happy man. This is a vision promised for the fulfilment of all people, yet the actuality is sadly marred in modern life by social pressures and accidents. The "active principle" is at its full in childhood (we should expect no less from this poet), but is still available for the old and the mature. Two issues related to contemporary studies of geology are raised by this episode in *The Excursion*. One is the choice of language used in the passage; the other is the theory of an interactive, unified universe.

The term "active Principle" which begins the passage has been examined in some detail by Piper (Piper, H.W. 1962). I have already in Chapter Three drawn attention to Piper's thesis about the origins of the idea of an active universe. He traced, it will be remembered, the idea's origins to the circle of philosopher-theologian-scientists and political theorists with whom Coleridge and Wordsworth had contact in Somerset, Bristol and London. Perhaps these relationships were established even earlier for Wordsworth in Paris (See Roe, N. 1988). Piper lists the vocabulary common to Coleridge, Wordsworth and the group of scientists associated with Joseph Priestley in Birmingham in 1790. He notes some of the key words and phrases in the passage from *The Excursion* quoted above that indicate the same philosophical family: "Form", "in all natures", "properties". In my view, a closer examination of the passage reveals that the Wordsworthian statement is grander and wider than a political or scientific theory. His language is universal in the sense of including the universe; the stars, the shifting, changing clouds, the invisible air as well as the tangible natural forms of water, rock, flowers and trees. His business is with the "Soul of all the worlds". The plural "worlds" is a further indication of the vast scope of the spiritual manifesto that the Wanderer proclaims in this section. There is a further use of the word "action" a few lines later than the excerpt quoted above which gives a particularly Wordsworthian accent to the language he appears to share with the philosophical scientific community: "The food of hope/Is meditated action" (W.P. IV ix: 20-21). Action is not uncontrolled or free, a wild energy loose in the physical universe, but under the control of the meditating mind of Man. In Chapter Six, I shall consider again the issue of control in the context of *The River Duddon: a*

Sequence of Sonnets. Through advancing maturity, the reined-in human mind realises "the principle" of nature as an "active principle". The intriguing task is to trace a similar respect for the activity of the human mind in relation to external objects in the writings of geologists when they reflected on the nature of being a scientist. This I attempt to do in the subsequent chapters.

The second word of interest is the figure of a chain ("from link to link/It circulates"). A chain is a frequent enough figure of speech throughout intellectual history, the most commonly used phrase being undoubtedly, "the Great Chain of Being" (Lovejoy, A.O. 1960). The image could, of course, be interpreted in a mechanical way: a linked set of parts, which, at its most mechanical, would act as a preordained set of passive components articulated in a unity. Such an image was familiar to the Associationists. Ideas, to the followers of Hartley, were chain-like, with the human mind as a link between natural objects or events, but essentially, despite the molecular nervous vibrations in the mind, one of those material objects in itself. The first major section of Book IX of *The Excursion*, interrupted only by a short question from the Solitary, who is by this stage calmer in attitude and almost reconciled, contains the best examples of Wordsworth's use of the familiar image of the chain of being in a distinctively dynamic manner. In Wordsworth's hands the figure of speech takes on movement. He infuses the abstract idea of connectedness with his own personal perception of potential energy.

The images in the opening lines of the final book of *The Excursion* quoted above illustrate the special nature of the Wordsworthian interpretation of what links Man and Nature. The images are about movement, not stasis, they are about a variety of forms of linkage (links of sound as well as vision), about "breathing in" sensation as well as about sensations received through the five receptor senses. In short, they contain the qualities that come from an active participant. It is possible to list the moving, changing and living images of principles at work, selecting only from the first forty-eight lines of Book IX:

"the unenduring clouds;" "the moving waters"; "properties that spread"; "no insulated spot,/No chasm, no solitude; from link to link/It circulates;" "[we] breathe the sweet air of futurity"; "their happy year spins round"; "so moves the man"; "the walks/of childhood"; "the incense that ascends"; "to breathe in such estate"; "the stir of hopeful nature"

(W.P.V ix: 6, 9, 10, 13-15, 25, 33, 34, 37-38, 42, 46, 47-48).

One final point on the language of these lines of the Wanderer in Book IX: these figurative emphases or choices of image would be incomplete without an acknowledgement that a powerful set of words associated with "flowing" persists throughout the opening speech. It culminates in what is the key phrase for many critics, "the mighty stream of tendency" (W.P.V ix: 87). De Selincourt and Darbishire's notes on this phrase are substantial, pointing out the connections that contemporaries, such as Hazlitt, made between it and Godwin's theories of the progress of human nature towards perfection. The common image of the river or stream as a sign for the progression of human life is well-worn, but, if we look more closely, the apparent near-cliché is actually more subtly operated. If we take the passage which contains "the mighty stream of tendency", the imagery is clearly not of a lowland stream emerging (like life) into an estuary (of eternal life). In this passage "the stream" is audible, it is the "voice of cataracts" in the upper regions.

What more than that the severing should confer
Fresh power to commune with the invisible world,
And hear the mighty stream of tendency
Uttering, for elevation of our thought,
A clear sonorous voice, inaudible
To the vast multitude (W.P. V ix: 85-90).

Here the cataract is itself the communication and the communicator, if only human beings can allow themselves to be the active receptors. Wordsworth uses figures of speech deliberately close to non-figurative language. There are, perhaps unseen, streams, heard in the mountains by few people, but the poet's partnership with nature is a communion with a voice that does not require one physical source. "The stream of tendency" is the voice of nature as well as the image of the progress of humanity. Any other image of movement, trite or fresh, well-worn or newly minted, would not have done, for this is the language of the hills itself.

Out-of-Door Allusions

A.S. Byatt (1970) has engaged with the issue of unity in Coleridge and Wordsworth. I have already referred to one of her valuable chapters, where she considers *A Guide* in some detail. In so doing she is one of the few critics to relate the prose work both to the poetry and to Dorothy Wordsworth's journals.

The processes of perception of the sublime, its diversity and yet its strange unity holding differences in tension, also engage Byatt's attention. She summarizes her feelings thus:

Wordsworth's living sense of the unity of matter beneath the changing and shifting forms of natural objects, man rolled round in earth's diurnal course with rocks and stones and trees and his further sense of the unity of these in the way an imaginative vision sees one in the other, one form as an image of another form (Byatt, A.S. 1970: 272).

The correspondence of forms is the material for my final comments on *The Excursion*, particularly because Wordsworth makes use of the Lake District setting in a unique way for his dramatic excursion. The forms of the mountains become the image of forms of human life.

The geographical context of *The Excursion* is not at first sight as neat a fit as might be imagined for an excursive poem with an identified, distinct location. *The Prelude* has proportionally more purely descriptive poetry about identifiable places in England, France and Switzerland. This is not to say that the dramatic action of *The Excursion* could take place anywhere. There is a carefully defined journey from beginning to end. David McCracken (1984) notes that it is when we consult Wordsworth's own guidance on the writing of the poems in his conversations with Isabella Fenwick, that we see that he is precise in the nature of the locations for the incidents in his poems. Fenwick recorded "the scene where these interviews and conversations are supposed to occur" (W.P.V.: 375). The setting for the story of Margaret and the ruined cottage, he admits, was remote from the Lake District, being composed during his years in Dorset and Somerset. As he drily notes, a traveller would require "seven" league boots to reach the Furness Fells from there in the time allocated to the Poet and the Wanderer. We should not, however, be too easily persuaded that the location of Book I of *The Excursion* is in the Quantocks. Just as there are episodes of description later in the work which take the Solitary to France and to North America, so in Book I there is a substantial section of the childhood of the Wanderer in the Scottish Highlands. Whatever the exact location of the narrative, there can be no doubt that *The Excursion*, even in these early pages, is a poem of mountain experiences.

The rest of the geography, the poet told Miss Fenwick, was straightforward:

up the Langdale valley and then on up the western fell-side to look down upon Blea Tarn, where the Solitary lives. The journey moves an "over a low ridge" into Little Langdale and pauses at a house at the head of this valley, which he "converts" into the Parsonage. Here by a poetic sleight of hand he turns the valley into Grasmere's vale with its lake and parish church. The green hill which, in the final Book, the party ascend in order to hear the Pastor's homily on the sunset is on the side of Loughrigg Fell. Most recently McCracken (1985) has traced the journey of Book II to Book IX in some detail. As he correctly points out: "there is more in this poem than an excursion of rambles, for the travellers move with active minds that habitually transform places into 'spots'. The true subject of the poem is what the Wanderer called 'the mind's excursive power'" (McCracken, D. 1985: 171). It has been common to suggest that Wordsworth took considerable liberties with his physical or geographical settings (see, for instance Bernhardt-Kabisch, E. 1979). A consideration of what Wordsworth actually presented as locations for dialogue will however demonstrate that, although he was not writing another *Guide* in verse, and although there are "rearrangements" of the landscape, he was conscious of the landforms surrounding his home and the meanings that they held for him.

The most striking geographical description is in Books II and III, concerning the upland valley to which the Solitary had retired. The friends ascended high above the values where most people dwell. Resisting the temptation to join in the rural summer fair, they dedicated themselves to a climb to upper slopes. Their objective is the highest level: "We scaled, without a track to ease our steps,/A steep ascent; and reached a dreary plain,/With a tumultuous waste of huge hill tops" (W.P.V ii: 323-325). At this high point there is a surprise in the landscape for there in the upland region is a valley:

Urn-like it was in shape, deep as an urn;
 With rocks encompassed, save that to the south
 Was one small opening, where a heath-clad ridge
 Supplied a boundary less abrupt and close;
 A quiet, treeless nook, with two green fields,
 A liquid pool that glittered in the sun,
 And one bare dwelling; one abode no more! (W.P.V.ii: 333-339).

This description is a perfect summary of the upland cirque or cwm, the glaciated hollow formed, for example, in North Wales, and in the Scottish Highlands, as well as in the Lake District. At the southern end ("the heath-clad ridge") is

the moraine, breached perhaps by a stream, and in the uneven but relatively level floor of the armchair-like hollow a small depression has provided conditions for a tarn or small mountain lake. The level valley floor can be reasonably fertile and in summer provides upland pasture.

This geographical feature is, however, no mere backdrop to the stage. Its isolation, its sense of being a physically suspended valley above the normal valleys and above the lowlands of human habitation, provide an image of the Solitary's own isolation. The first impressions of the place upon the narrator-poet's mind are wholly positive. It is like another Eden:

...Far and near
We have an image of the pristine earth,
The planet in its nakedness: were this
Man's only dwelling, sole appointed seat,
First, last, and single, in the breathing world,
It could not be more quiet (W.P.V ii: 359-364).

Permanence and duration stretch before them. Then, in one of those turning points at times used with effect in this poem (others are the bleating of a lamb and the crying of a raven), the serenity is shattered by a reminder of decay. The funeral dirge is heard eerie and disembodied at first, approaching from below. The shock is doubled by the Wanderer's immediate presumption that it is his friend, the Solitary, who has died. Locations of retreat and withdrawal, such as the urn-like valleys are never totally apart from the realities of the world. They are only moments of stasis in the narrative.

Another similar moment, located in what I take to be the same geological feature, is in Book III. Here the word "cirque", (see Note 2), later to be in the vocabulary of glacial geologists in Great Britain, is used by Wordsworth, although he would not have realized its geomorphological significance in 1814 any more than the members of the Geological Society at that period:

Upon a semicirque of turf-clad ground,
The hidden nook discovered to our view
A mass of rock, resembling, as it lay
Right at the foot of that moist precipice,
A stranded ship, with keel upturned, that rests
Fearless of winds and waves
(W.P.V. iii: 50-55).

In this small, well-hidden area to which the Solitary leads the friends are two

more material features, each a visual metaphor of the issues they are to discuss. There are standing stones here conveying their message of destruction of past civilizations. The image of the upturned boat is, of course, a reinforcement of the wrecked landscape. There is movement (but no movement) in the fall of water over the steep cliff at the back of the cirque:

And softly creeping, like a breath of air,
Such as is sometimes seen, and hardly seen,
To brush the still breast of a crystal lake (W.P.V iii: 71-73).

These are the emblems of eternity and change, of duration and decay. To the Wanderer they are a "wealth"; to the Solitary, who in his own way values them, they might well be "the sport of Nature, aided by blind chance". One image however confirms the Wanderer's hopeful message, the almost impossible survival of a holly growing out of the barren tablet, one of the standing stones. Life continues. Frail though it may seem, it can be interpreted narrowly in human terms: "in these shows a chronicle survives/Of purposes akin to those of Man (W.P.V. iii: 89-90).

This passage has richness in it for the reader seeking to understand the choice of location for the debate that follows. Like Blea Tarn and its upland valley, this smaller patch of rest in the high fells included an element of paradox. A lowland physical feature, a valley, has been transported to higher regions, nature has been reversed. The Wanderer continues with the spirit of paradox to describe the peculiar nature of their hidden arena. It is a "strait", but not between rocks in an ocean. The sky above is reversed into a "chasm", an "abyss/In which the everlasting stars abide". This descriptive passage is not a simple conceit. It has also important literary connections. De Selincourt and Darbishire note the term "lapse" describing the fall of the stream (it is also used in *The River Duddon: a Series of Sonnets* (see Chapter Six) as well as in Book VIII of *The Excursion*). The editors draw the reader's attention to an inheritance from Milton. Similarly at the end of the verse paragraph, Wordsworth's own note on the line "lost in unsearchable eternity" reminds the reader of the poet's own recent study of Thomas Burnet's Latin text of the *Theory of the Earth*. This is a carefully constructed passage of verse description where the scene is realistic enough to satisfy a geologist's description of highland landforms and yet of profound importance as a figure for the mental and moral state of humanity.

The two upland valleys act as the place of debate for what critics have taken to be the two major books of *The Excursion*, Books III and IV, (Johnston 1978, Gates 1978), but they are not the only locations which act as "out of door allusions". The later books should not be neglected. Indeed *The Excursion* has to be regarded as a whole drama located in one geographical region. Book V opens with a formal farewell from the Poet. A rapid summary of the upland valley's physical distinctiveness is included within a conventional formal tone.

"...once more farewell,
Majestic circuit, beautiful abyss,
By Nature destined from the birth of things
For quietness profound!"
Upon the side
Of that brown ridge, sole outlet of the vale
Which foot of boldest stranger would attempt,
Lingering behind my comrades, thus I breathed
A parting tribute... (W.P.V. v: 8-15).

The location of Book V and the following three Books of *The Excursion* remains mountainous, for this is a poem about the high country. The mountains are the major allusion. The Churchyard is "among the mountains" and the dead within are recalled and placed in their homes amongst the fells. The Pastor's house is a large establishment but it too is not a lowland dwelling:

But lo! where from the rocky garden-mount
Crowned by its antique summer house - descends,
Light as the silver fawn, a radiant Girl (W.P.V. viii: 491-493).

The Pastor, unlike the Solitary, has made a comfortable, civilized home even though his place of retirement from the world is remote. There are interesting details of description about the Pastor's ideal dwelling, which indicate considerable care by Wordsworth in selection and composition. Consider for instance the adaptation of nature in the sheltered path from the manse to the Church:

Along a hedge of hollies dark and tall,
Whose flexible boughs low bending with a weight
Of leafy spray, concealed the stems and roots
That gave them nourishment (W.P.V. viii: 442-445).

The hedge naturally protects the Pastor in his regular walk to the church. Nature has been assisted however: "a careful hand/Had marked the line, and strewn its surface o'er/With pure cerulean gravel, from the heights/Fetched by a neighbouring brook" (W.P.V. viii: 450-453). The pathway unites home and

Nature has joined with mankind in linking domestic and religious ideals.

A similar example of a closely observed natural description being used to relate to the human condition is in the elaborate figure in the closing lines of Book VIII to describe the two young boys who run to the travellers with their fishing trophies:

Him might I compare,
His looks, tones, gestures, eager eloquence,
To a bold brook that splits for better speed,
And at the self-same moment, works its way
Through many channels, ever and anon
Parted and re-united: his compeer
To the still lake, whose stillness is to sight
As beautiful - as grateful to the mind (W.P.V. viii: 576-583).

The braided stream, finding its natural unity in and through the still Lakeland tarn, is the appropriate image for the mountain idyll. Is it possible to separate humanity from nature, the human children from the streams and lakes in which they sport and which provide the images for the Narrator-Poet? The interplay of humanity and landscape is conveyed by the language, which, by its choice of images, acts as a unifier to the scene.

The narrative is of course completed in the lower regions, in the valley and in the journey on the lake, in the rest on the island and the return. There is however one more upland location. The Pastor leads the party up to the fell-side again to admire a fine sunset and to deliver a homily. The day closes as the story ends and the friends disperse. Although the closing lines are set in low pastures, there is in the final book one image of the high fells which in many ways sums up the essential truths of *The Excursion*. It is spoken by the Wanderer with a deliberately chosen text from the physical geography of the district in which the action takes place. Age is the theme and the consolations for the loss of the first vigorous life which is so clearly seen in the Pastor's children at play. The Wanderer rejects the common image of a descent into a vale of years. Age is to him "a final Eminence", it is, like the Lakeland mountains, "bare/In aspect and forbidding" but its perspective advantages are powerful. Age is:

...a place of power
A throne, that may be likened unto his,
Who, in some placid day of summer, looks
Down from a mountain-top, - say one of those
High peaks, that bound the vale where we now are.

Faint, and diminished to the gazing eye,
Forest and field, and hill and dale appear,
With all the shapes over their surface spread (W.P.V. ix: 55-62).

The "gross and visible frame of things" becomes unsubstantial for older people, but the Soul is freed to attend to other "finer Passages of sense". Typically the sounds of the insects' buzz and the murmur of leaves have diminished, because of the contemplative's distance above them, but the sound that never dies is "the voice/Of waters, with invigorated peal/From the full river in the vale below,/Ascending! (W.P.V. ix: 66-69). The mountain cataract is the objective correlative of the philosophical concept of "the mighty stream of tendency". Although it is "inaudible to the multitude", it is available permanently for all humanity, even in declining years, if only human minds become receptive to its sound.

Mountains, valleys, rivers combine in this passage to send a triple message. They are, at a surface level, the conventional images for the ages of mankind, but they are also the unchanging physical features where value and truth abide. Although we are transitory, they remain. There is a further dramatic message. They have also been the vital location for the dialogue between the participants in *The Excursion*. Like the human protagonists, they too have voices; the sounds of wind and water and the cry of birds and mountain sheep. Nature's own unity and its unity with human life has been reinforced in this, Wordsworth's major poem of his middle years. The most positive statement about "universality" is made in this final episode of the narrative. Unlike D.Q. Smith (1978), who explores what he calls "the strange reticence" of the Wanderer in the final book of *The Excursion*, I find the narrative reaches a genuine climax in Book IX, given two assumptions. First, I assume that there is a deliberate creation of a mood of peace, with its physical allusions in the lake, the glorious sunset and the dusk. Debate pursued in the hot hours of day has been superseded by acceptance in the calm of evening. The second assumption I believe we must accept is that Wordsworth in these final passages is establishing a tone which is not completely final. He leaves open the possibility of an extension of his life's work into the full achievement of *The Recluse*. Given this approach to reading the final Book, the reader can feel that Wordsworth has satisfied his aim of demonstrating the play of minds on the topic of an assurance for mankind. Geoffrey Hartman sees this conclusion quite differently:

The Excursion is not successful even on its own terms [since] it ends with the main disputant still unregenerate, and with the issue of renovation unresolved after nine books (Hartman, G. 1977 (1961): 290-291).

Hartman, however does continue to add: "Yet it evokes, like all of Wordsworth's poetry a sense of the rock on which humanity is founded."

My reading of *The Excursion* assumes that it is a successful poem on its own terms, which were not to vanquish a Solitary's doubts, but to display the "excursive power of mind". Wordsworth is attempting a difficult two-handed task: at once to reassure the reading public and at the same time to explore understandings of the mysterious relationship between humanity and the created universe. The difficulty of the task explains why it almost inevitably fails for most readers, because the certainty of a benign, guiding Providence is asserted at the same time as the presentation of a universe of mysterious signals. The physical universe is at the same time magnificent and appears to teach us all we require to feel about the ultimate grandeur of the Divine plan, but also it is a territory of danger (the old man lost on the fell who eventually succumbs) and decay (Margaret's ruined cottage and the succession of stories read from the graveyard epitaphs). The potential of all mankind is considerable, but the poor, particularly in the new urban, industrial wilderness are "mere instruments", deeply oppressed, and hardly human. Even the "noble" savage of the New World is a creature of low ambitions and of squalid culture. Active minds must seek assurances despite the conflict of evidence before them. Even at points of confident faith, Wordsworth brings us back to reality, with a reminder of the practicality of the material world. The lamb's bleat or the raven's cry, the sound of wind and "waters numberless" (W.P.V. iv: 1173) are the firm realities of the world in which the mind travels. As such there is never a final solution, because the active mind is at play with the ever-changing, yet continuing world. Therefore there is no permanent rest, although there are moments of pause, foretastes of a state which is not this world's. As firmly as Hutton rejects the idea of a frozen world in a state of unchanging balance, although it might appear to be so, Wordsworth presents an active, moving universe, with brief periods of quiet.

In order to illustrate the "excursive" play of the mind on a situation of hard reality, I shall conclude by selecting one very important passage where the Wanderer tries to give the Solitary an alternative way of exercising the powers of

his mind. In Book II, the Solitary describes, in terms familiar to readers of the early poems and, to readers after 1850, of *The Prelude*, a "spot of time". When the old man of the fells has been rescued by his neighbours, the Solitary sees a vision in the clouds "of a mighty city - boldly say/A wilderness of building" (P.W.V. ii: 835 - 836). The word "wilderness" gives us an indication of the mixed nature of the experience. It is also a glimpse of magic richness, with "alabaster domes, and silver spires." The vision splendid moves the Solitary to a prayerful cry, yet it also hurts him to the heart and leaves him dejected:

'I have been dead,' I cried,
'And now I live! Oh! wherefore *do* I live?
And with that pang I prayed to be no more!- (W.P.V. ii: 875 - 877).

Johnston (1978) suggests that the Wanderer interprets this as the misleading and ultimately life-denying level of awareness reached by imagination when it is least supported. Johnston goes on to suggest that in Book IV the Wanderer proposes a series of alternative mythic explanations from a variety of religious faiths in order to counteract depression (to quote Wordsworth's own language in the "Argument" to Book IV, "Superstition [is] better than apathy"). I too find Wordsworth's conscious recourse to myths from classical sources as from travellers' accounts intriguing. (See Chapter Six). What I do not accept however is that Wordsworth's proposal in Book IV that mythic explanations are better than no explanation at all is the last counter-argument to the Solitary's uncontrolled vision. Reading *The Excursion* as a continuous text reveals a sequence of arguments and counter-proposals to despondency. The cumulative effect of reading this sequence of arguments is to realise that the root of the Wanderer's reassurances is not in myth but in the reality of the location. Loose, unconnected and dangerous vision, such as the Solitary's "mighty city", must be grounded in the reality of the rocks, the lakes, and the falling cataracts of a particular place.. Furthermore, each of the books of the poem points towards the finale's carefully arranged locations of rocks, lakes and cascading streams. The vision of *The Excursion* is also grounded in a particular local history, in the human record in the two long Books devoted to the country churchyard in the Lakeland fells. Charles Lamb's perceptive appreciation of the churchyard scenes of *The Excursion* is worth recalling:

The part (or rather main body) which has left the sweetest odour on my memory (a bad term for the remains of an impression so recent) is the Tales of the Churchyard (Lamb, C. 19787: 95).

The messages conveyed by the epitaphs in the graveyard and the living example of the Pastor and his family reveal the reality of human affection in a small community. Here in a Lakeland hamlet is the earthly source of true satisfaction that the Solitary has vainly sought throughout Europe and North America, hardly noticing that relief is around him as he attempts to escape his past. This recluse has no need to look further for relief and reaffirmation than the living text of particular place and a particular culture (See Note 3).

The next chapter, devoted to a prominent geologist of Wordsworth's time, who was educated in his younger life in the same intellectual milieu, was no recluse. He was a man of the city and of public prominence. What he shared with Wordsworth, however, was a commitment to grounding statements of truth in the close observation of nature. His work will also at times contrast with Wordsworth's messages in *The Excursion*, but it will also illustrate a similar interest in the power of the active human mind. *The Excursion* is a dialogue about faith, about consolation for life's hardness, about the virtues of simple living in close touch with nature in opposition to the rising tides of industrialisation and urban affliction. It is about all these things, but it is essentially concerned with the way the human mind carries out its task of exploration. Wordsworth's own phrase, "the mind's excursive power", is, of course, a variation on the title of his poem. Geologists who professed to be natural philosophers, and not mere collectors or dull-eyed analysts, also claimed to be operating with the aid of that bright power. They described the methods of their working minds and then praised the joy that it brought to them. The next chapter illustrates "the excursive power of the mind" in action through one of the earliest figures of English geology to be identified with the growth of a powerful institution for scientific debate.

CHAPTER FIVE : "GREENOUGH'S NEATNESS - ONE PARALLELOGRAM OF BROWN PAPER":-GEORGE BELLAS GREENOUGH.

When Samuel Taylor Coleridge was preparing to depart for Malta in 1805, he was helped and encouraged by a friend of his days in Göttingen, George Bellas Greenough. Coleridge received inspiration to visit Sicily and Malta from his friend's notebooks and practical preparation in the shape of provisions for the voyage (Note 3). One gift was scientific: "Maüy's *Mineralogy* packed up with Greenough's neatness - one parallelogram of brown paper" (Coburn K. 1957 II:2014). This description tells us not only about the friend's interest (two years later he was to found and to become the first President of the Geological Society of London), but also about his character - neat, orderly and crisp.

For the few who have picked up a reference to George Bellas Greenough in studies of the early Romantic poets, the name has at best only meant a brief companionship in Germany, begetting two of Coleridge's abysmal jokes. The high-spirited journeys of Greenough with his friends, the Parrys and Clement Carlyon, earned Coleridge's pun, "Carlyon-Parry-Greenation". We have Coleridge's word for it that, in Göttingen, he sat beside Greenough in Professor Blumenbach's lectures on physiology and diverted him with the suggestion that one of their boorish countryman had escaped from a demonstration specimen bottle (Coburn, K.I: 1657). This chapter will try to demonstrate that Greenough is more than a marginal figure in the establishment of an educated scientifically interested public and that he is certainly worth attention in literary studies at a level above that of providing Coleridge with material for language games. In many respects, Greenough is a figure who represents many of the elements of early nineteenth-century society with different sympathies from those of Wordsworth and the circle of friends in his middle and later years. He is a dissenter, although, as Porter (1977) notes, many dissenters became enthusiastic geologists. Greenough was also a Liberal in politics and close to Utilitarianism in social ideals. Despite these differences, I hope to suggest many points of intellectual connection between Wordsworth and Greenough.

The histories of the development of geology by both contemporary and recent commentators, despite certain qualifications about the benefits he brought to geology (see Laudan R. 1977), have awarded Greenough the undispu-

ted title of initiator. It cannot be denied that, over a long period from when he was one of the founding fathers of the Geological Society of London in 1807 and through the years when he was elected its President (in 1811, 1813 and 1833), he exercised a major influence on the institutional growth of the science. The problem for the student of literary and cultural influences is that there was, and is, doubt about the true effect of that influence. Shortly after the launching of the Geological Society he was deeply involved in controversy with the President of the Royal Society, Joseph Banks, about the likely effect of the new society in disturbing the unity of serious study in science. The controversy raged until even one of his closest associates, Humphry Davy, resigned from the Geological Society in protest at Greenough's determination to establish what many leaders of science felt was a rival scientific organisation (See Note 2). Although Davy was to return to the geological fold, their friendship never seems to have developed subsequently, that is if correspondence, or the lack of it, can be taken as evidence. Greenough was deeply engaged at various periods in other scientific disputes, particularly with the Werner-Hutton controversy, and, in later periods of his life, he enlisted on the losing side of the struggle surrounding the powers of glaciers in valley erosion and in mountain landscape formation. Although, by the very nature of his work with the Society, he was continuously in touch with the eminent geologists of his time, not least with fellow-presidents, Sedgwick and Whewell, he does not occupy a major place in the published records of their friendships. Perhaps the fact that he was not a "Trinity man" at a time when that species was in the ascendant placed him off-centre.

Modern historians of science have necessarily shed a narrow beam of light on Greenough, the founder of an institution, rather than illustrating the depth of his thinking and the philosophical context of his geological interests. Thus, Sheets-Pyenson is interested in the close links between the Geological Society and the Government's Geological Survey founded in 1835. She attributes a direct influence on government policy from Greenough's passionate campaign for map-making and for good techniques of geological cartography (Sheets-Pyenson, 1982). One of the major modern historians of geology, Martin Rudwick provides a detailed analysis of Greenough's political skills exercised in the foundation of the Society and in the widespread influence on amateur geologists across the nation (Rudwick, M. 1963 and 1976), but he also comments that Greenough is "an unjustly neglected figure" (Rudwick M. 1985: 66). However, even in this apparently well-lit corner of historical interest, some doubts have

been cast on whether the policies of the early Society were in fact advantageous to the growth of the science in England. Laudan is firmly of the opinion that Greenough's powerful leadership was a dead hand on geological "improvement". "Geology in England did not begin to flourish until a younger generation of geologists argued for a more liberal methodology, and put it into practice" (Laudan R. 1977: 537). There is general agreement that the founders of the Geological Society were committed to a Baconian attitude about evidence in establishing scientific statements (Porter, R. 1977, Laudan, R. 1977) and that in "the Geological Society's Baconian crusade" Greenough "was in the van" (Porter, R. 1977: 2). The attitude of taking nothing on trust, but relying on carefully collected and analysed field observation, the avoidance of theory and the concentration on physical evidence, all have something to say to us about possible connections between scientist and poet. Such issues will be drawn together in the second half of this chapter. I shall also demonstrate there that Greenough was, however, not unreservedly committed to a Baconian method, at least in his philosophical writing.

It could be argued that the chief difficulty for a student of Greenough is the absence of published sources. Greenough did not acquire, before or after his death, a biographer. If he had enjoyed the benefits of someone such as Lyell's sister-in-law, or Mrs Stair Douglas, who so devotedly collected William Whewell's letters and literary remains, we might have had constructed for us a figure to be admired by future generations. In the University of Cambridge Library Collection there is the beginning of a life of Greenough, a holograph remnant by a descendant, Mrs Greer. It is only concerned with childhood and his travels to Göttingen and tells us nothing more than Greenough's own jottings. The biographer of today starts with a further disadvantage. Greenough's papers, although written in a neat and highly legible hand, are not easy to date. The two major collections, at University College Library, London (Golden, J. 1981) and currently at the University of Cambridge Library, together with the minor collection at the Geological Society are, in a sense, too tidy. It is not a straight-forward task to identify, for instance, whether the well-kept travel notebooks were written on return from European journeys or whether they were the result of immediate notetaking. Their orderliness suggests the former. The larger bound notebooks and commonplace books are not dated at all and contain many loose slips of paper, so clues as to the progress of Greenough's thoughts are minimal. In a strange way the reader gains an impression that dating rarely matters.

Whether it is because the collections have been carefully organised by other hands or whether the truth is that Greenough had no revisions to commit to paper because his life was confident and serene, the issue of progression of ideas does not trouble the modern reader.

The Greenough papers present to us a keen, mature, confident mind with few perplexities and hesitations. His thoughts are like his neat, cursive, controlled script. From the written evidence, however, it is possible to build an impression of the first President of the Geological Society of London, to trace his interrelationship with members of the early Wordsworth circle, chiefly through Coleridge, and, with the good fortune of the help given by certain excerpts, to identify the main props of his system of beliefs. These beliefs span philosophy, religion and politics as well as narrower judgments on geological matters. I shall argue that the total tapestry of the man is woven from threads which also compose the fabric of Wordsworth's beliefs. Whether the connection is accidental or directly that of the poets's influence on a contemporary is, I shall conclude, very obscure, but the clues are tantalizingly scattered.

"...I loved and esteemed you more than any I met there." - Greenhough's friendship with Coleridge and links with Wordsworth.

George Bellas Greenough (originally named George Bellas but renamed when adopted by a rich relative) was born eight years later than Wordsworth. He was orphaned at an early age and brought up by his maternal grandfather, Thomas Greenough, who bequeathed to him a substantial legacy in 1795. Greenough was rich enough never to need to seek employment for money and, although he was a frequent traveller in the United Kingdom and Europe, he owned a substantial house in Regents Park and was therefore able to be a London-based wealthy patron of science as well as a participant field geologist. Despite both experiencing the sadness of bereavement in early childhood, the life-story of Greenough could not be more different from that of the impoverished Wordsworths, at least in their early and middle years. Similarly, Greenhough's chance encounter with Coleridge occurred only because both were in the same European centre of study, not because they belonged to the same social milieu.

There is a notebook with an orderly list of events in his childhood

(Greenough, G.B. CUL), but, apart from indications of fascination with toys and remembered major events (such as going to the theatre), it is not a revealing document. In 1795 he went up to Cambridge. After keeping nine terms at "Pembroke Hall", but not taking a degree, Greenough, like others, looked to Germany for an education. He enrolled at the University of Göttingen, matriculating on 8 September, 1798, originally with the intention of studying law. At Göttingen he read widely, recording particularly a study of Plato. It was however science that captured his mind. He attended Professor Blumenbach's lectures on natural history (Note 1), at first in order to learn the language but, according to his autobiographical notes, he was soon entranced by natural history and particularly by the study of minerals. We must not be too naive about Greenough's conversion to science. His notebooks also tell us that at Cambridge he had attended lectures on anatomy and on chemistry. However, we must take the convert's word for the significance of the teacher. In 1840 in an address to the Royal Geographical Society he gave an obituary on his former tutor:

He it was who first inspired me with a love of natural history. My fortunate introduction to that great and amiable man gave an entirely new direction to my studies and decided the destiny of my after-life (Greenough, G.B. 1840: xiv).

We know that Coleridge also attended Blumenbach's lectures in that cold winter of 1798 while the Wordsworths were wrapped in their coats in their inadequate rooms in Goslar (see Moorman, M. I :413). Later, in June, 1800, Coleridge was to write to Humphry Davy with enthusiasm (unfulfilled enthusiasm) that he was planning to translate a 1797 edition of Blumenbach's "Manual of Natural History", a work which, inter alia, included sections on minerals, "earthy Fossils" and petrifications (Griggs, E.L. 1956: 590).

The German experience shared by Greenough and Coleridge, although it did not include William and Dorothy Wordsworth who wintered in Goslar, included John Chester, who accompanied the Wordsworths and Coleridge to Germany. When the Wordsworths emerged from the cold fastness of Goslar to travel via Nordhausen to meet Coleridge at Göttingen, Greenough and others had departed for a brief excursion. Greenough's notebooks refer to Coleridge not being able to travel with them "unless Wordsworth would accompany him and Wordsworth we were assured would never assent to this unless he again were accompanied by his sister". Similar references including Wordsworth's name occur in notebooks and in letters between Coleridge and Greenough when

they met again in England in 1801 (Greenough UCL: 147 and 713 and Griggs, E. L. 1956 II: 718-719). Greenough knew of Wordsworth's translation to the Lake District and bought *Lyrical Ballads*. There is one source of information by Carlyon suggesting that Greenough, Carlyon and Coleridge visited Wordsworth in the summer of 1801 (see Carlyon, C. 1836 I : 116-117 and IV 1858 index), but it is not supported by any other evidence in the standard biographies such as Moorman, Reed or Gill. There is also some evidence of a coming together of interests through Coleridge in Coleridge's excitement at reading Greenough's journals of his travels to Sicily and Malta (letter of Coleridge to Wordsworth: Griggs, E. L. II: 1059).

Greenough's Italian journals of 1802 are worth study because they reveal a geologist relating to landscape in a way that literary men and women of the time would have done. Indeed Kathleen Coburn, editor of the *Notebooks*, suggests a directly Romantic influence from geologist to poet: "Is Coleridge thinking of Greenough's description of Etna as confirmation of Wordsworth's view of nature as 'the language of the senses' ('Tintern Abbey') or even more of his own lines in 'Frost at Midnight'?" (Coburn K. II:1889). The reference is to Coleridge's notes on a moonlit scene which reminds him of a passage in Homer. Sultana suggests that this association of ideas came from Greenough's account of Etna "in the context of a talk on the sublime" (Sultana, D: 1969 194). Greenough's notebooks themselves, if they are the prime source of Coleridge's information, contain remarkably little geological information, but equally, they do not read like a Romantic prose poem. What they do prepare for the traveller is a landscape of drama and geological revolution. On 21 June, 1803 Greenough visited Baia:

...for what changes has this country not undergone! Vallies are become mountains and mountains vallies - here the land has driven back the sea - there sea has encroached upon the land. In no part of Europe are there so frequent revolutions of nature (Greenough, G.B. UCL: 7/9)

The political figure of speech would not be missed by contemporaries. What strikes the reader of the notebooks is the close familiarity of the writer, and his anticipated audience, with the voices of the past. Greenough closely records wherever there are classical allusions. He reads Virgil's *Georgics* walking along the promontory of Possolippo: "The persual of them can never give me so much pleasure elsewhere as in the country where they were written" (Greenough, G. B.

UCL:7/10). Etna, which was to captivate Coleridge's imagination, is certainly not described as a geologist might have written. It is mysterious and distant:

May 2nd: Yesterday we had constantly a view of Etna peering above the other mountains - today we saw it much more distinctly a large quantity of white smoke issuing from the crater joins with the clouds and forms with them a long streak across the sky (Greenhough, G. B. UCL: 7/10: 250)

The next part of the journey takes him to Syracuse and he enthusiastically records archeological and historical excavations. The world he offered to Coleridge and his friends was one enriched by the culture they all shared, the culture of ancient Greece and Rome, the Mediterranean fields of Romance. At times Greenough writes notes which freely mingle literature and geography, history and fiction:

Mount Eryx is famous for another grand historical event - here was the cave of Polyphemus whence Ulysses leaped so dexterously - hence it was that the Cyclops hurled at his vessel two immense rocks which are still to be seen, one near the coast of Trapni - the other near the Algidas (Greenough, G.B. UCL: 7/10:196).

A very interesting comparison can be made if we put beside these traveller's notes, a passage from Wordsworth's *Prelude*. At the end of Book Ten of the 1805 *Prelude*, Wordsworth also praises the cultured history of Sicily. It is a country which has always fired his imagination: "Child of the mountains, among shepherds reared,/Even from my earliest schoolday time, I loved/To dream of Sicily/" (*Prelude* 1805 X: 100-108). At this juncture of his life Sicily is particularly enriched because Coleridge may be returning thence (and, as we know, a few years earlier voyaged there en route to Malta). The end of Book Ten is an evocation of a classical landscape and something like a literary votive-offering for the safe return of his friend. It is however more specifically something in addition which makes a distinct association with Greenough's journal. Wordsworth not only prays for Coleridge's safe return, he also prays both for "motions strong and sanative" to heal Coleridge's sickness and his own deep sadness and grief in "This heavy time of change for all mankind" (*Prelude* X: 986). The literary allusions of Sicily are, to use his own word, "restorative" and "a comfort to my grief". Significantly Greenough also writes of the classical myth of restoration in his notebook, not however in Sicily but a few pages earlier in the notebook referring to the neighbourhood of Naples:

The word Pausilippo is said to be of Greek origin and signifies grief dispelling ... in truth the mountain deserves its name, the

variety of its grounds, the fertility of its soil on which grow wild from nature's hand the Indian fig (Castico Opuntia) and the Aloa so rare and so esteemed in our hot houses, the excellence of its vines, the luxuriance of its foliage, the abundance of its grain all claim our admiration, but more than all the extent and beauty of its prospect which unfolds to the ravished eyes the beautiful city of Naples...if such a prospect could dispel the sorrows of the ancient Greeks what must be its effect in our days when to our sense of natural beauty these objects recall to our minds so many classical associations...(Greenough, G.B. UCL, 7/9:52).

The fact that the descriptions of the Naples area are more "picturesque" and fulsome than the descriptions of Etna, which Coleridge and Davy claim to have heard from Greenough, is less important than the memory that the geologist's travels left in their mind. Perhaps, even more important is that his words may have been carried into the mind of Wordsworth, who would only hear of these travels at third hand, but with the highly charged addition of them being relayed by his close friend.

Greenough's connections with Coleridge were few after 1810 and, as far as written evidence is concerned, non-existent with Wordsworth. He may, of course, have met him in London through Whewell's or Sedgwick's social circle, but there is no record of visits to Rydal Mount. Greenough recorded reading Wordsworth's poetry to a young lady in 1833. The only other connection between Wordsworth and Greenough in later years is in a letter of Wordsworth to Viscount Lowther in 1819 commenting on a failed business venture in which Greenough was indirectly implicated (W.L. III: letter 564). Southey also comments, "I am sorry Greenough should have exposed himself" (Curry, K. 1965 II: 208). It is not however in meetings or brief encounters that I shall attempt to create an impression of Greenough's participation in the same milieu of ideas as the poet. It is in his musings on philosophy, his reflections on the activity of geology, and his revelations of the belief system which underlay his energetic organising of geology and geography in the first half of the nineteenth century, that I shall propose a correlation.

"The veteran geologist and geographer".

This sub-title is taken from an obituary of Greenough (*Literary Gazette*: 234) and it serves to remind us not only of the long successful life of Greenough in scientific circles, but also that he was a broad-ranging leader in geography as

well as in geology. George Greenough was however not only a geologist and geographer. He read widely in Classical and modern literature, he took an interest in fine art, architecture, and in social questions. He was elected to the rotten borough of Gatton in Surrey in 1807 and represented it in the House of Commons until 1812. The obituary mentioned above described him as "a consistent liberal and an early and staunch supporter of the Catholic claims" (*Literary Gazette*: 234). His file of correspondence includes many letters supporting his action in resigning from a commission in the Light Horse Volunteers and in making a widely circulated public statement of protest following the Peterloo Massacre. However, wide though his attention was spread, it is his geological, topographical activities that consistently commanded the attention of his generation and first deserve our interest.

I have already commented on what we would now call the "management skills" of Greenough. They developed early. As a young man, he was Secretary of the prestigious Royal Institution. Despite his considerable experience of field-work and extensive travels in Europe, he published very little, perhaps because of the time taken up with administration. Apart from Presidential Addresses, he is remembered in the history of geological writing, if at all, for his one book *A Critical Examination of the First Principles of Geology* which was not published until 1819 (Greenough, G.B. 1819). Obviously he did not command a position of scientific leadership on grounds of a portfolio of writing. However, an inkling of why he was respected as a geologist is gained from a study of that one publication. It was in fact a widely read work both in English and, in translation, in Europe. The book was advertised, with other natural history texts, on the back cover of Wordsworth's collection of poems of 1820. The list of contents indicates the relatively new emphasis of geology in the second decade of the century. This is no longer a theory of the earth, like Hutton's text. The first paragraph is about stratification and the last is on mineral veins. It is a textbook which provides the readers, many of whom were amateurs and part-time collectors of geological specimens, with a review of theories and hypotheses, but more pertinently with a systematic criticism of theories which, Greenough believed, could not be supported by empirical evidence. The reader finds here for instance, a list of statements about the nature of granite, whether it can be said to be stratified, and about the conflicting nature of theories about its origin:

"Whence this contrariety of opinion? Are our senses at variance, or our judgements? The cause I think is obvious. Everyone uses the word *stratum*, no one enquires its meaning; the remedy is obvious - definition (Greenough, G.B. 1819:9).

This passage illustrates the tone of the text - an educational endeavour to clarify and define and to guide the new geologist through the confusing labyrinth of opinion. Laudan (1974) describes Greenough's scrupulous attention to nomenclature with his avoidance of words like "*stratum*" and "*formation*" (the last in common use through Cuvier's influence) as "excessive reluctance". Her view is that the refusal to adopt a terminology before the subject was fully understood "defeated the Geological Society's early aim of improving geological nomenclature" (Laudan, R. 1974 : 258). It is true that, only when he feels confident, does Greenough settle on a firm view so that the tyro can have some firmness beneath his feet. He dismisses most of Hutton's theories about the figure of the earth when that shape is simplified to a scale to eradicate its surface irregularities ("the statical figure"). He agrees with what appeared then to be the rapidly developing consensus that mountain and valley formations arise from differential hardness of rocks. He patiently discards all theories to explain Boulder Stones (or erratics) which do not emanate from a Deluge. On the cause of mineral veins, he leads the reader to reject both Wernerian and Huttonian theories in favour of an explanation based on his own observations (Rudwick M. 1962). In short this educational text was written to give security to a new generation and to provide a platform for them to pursue their studies unbeset by doubts and conflicting explanations.

Further evidence of Greenough's role as a teacher-leader is provided by modern historians of science who have drawn attention to the importance of an early publication by the Geological Society of a widely-read textbook entitled, *Geological Inquiries* (see Laudan, R. 1977 and Rudwick, M. 1963). It is now generally accepted that Greenough played a major part in this anonymous publication. The aim of the work was to provide a guidebook for the hundreds of regionally based geologists, to give them guidance on observation and measurement, and to encourage the collecting of specimens. One important purpose was to enable far-flung enthusiasts to correspond with the London society about their findings and so to build up a more complete picture of the geology and topography of the kingdom. For this gathering exercise to be nationally credible the participants had to observe basic procedures and to use the common language of

the science. I shall illustrate later how important the sense of orderly collecting and recording was for Greenough. The tone of the volume is reassuring. The task can be achieved with discipline and control despite the huge scale of the material being studied. Literary readers will note the term "sublime" in the following passage of instruction:

Geology in its comprehensive sense is consequently a sublime and difficult science, but fortunately for its progress it is susceptible of divisions into many different departments, several of which are capable of being extended by mere observation (Rudwick, M. 1963: 334).

It is only when a reader has the time or inclination to put contemporary texts of different fields of study next to each other that a recognition of the common atmosphere and sympathy between them flashes forth. In this instance, it is noteworthy how, though very different in execution and therefore in style, Wordsworth's *A Guide to the District of the Lakes* assumes the same task of educating a readership. Both *A Guide* and Greenough's only attributed publication attempt to put the reader right by illuminating a secure path of understanding. In Wordsworth's case it "was the Author's principal wish to furnish a Guide or Companion for the Minds of Persons of taste" (W.W. P II:155) by showing the most advantageous way of appreciating the mountains and lakes together with a correction of the bad habits learned from the damaging teaching by "gurus" of the picturesque. In Greenough's geological instance the intention is also to eradicate false starts however well-intentioned.

To leave Greenough's contribution to geology at the level of educator and administrator would be to omit the major aspect of the science with which his name was most clearly associated in the early part of the century. It was Greenough who first launched and then steered the Geological Society's project for the geological mapping of England. The fact that William Smith's geological map was not only published well before Greenough's came out but also retained for many years the reputation of being the major innovation of geological cartography should not blind posterity to the contribution Greenough made to mapwork both geological and topographical. Laudan's doctoral study concludes that "although in some respects Greenough's map of the strata was more detailed and accurate, in all important ways the two maps were identical" (Laudan, R. 1974 : 228). Greenough was also responsible for a major cartographic exercise in India although he never visited the sub-continent. Rudwick's fascinating

study of the "visual language" of geology (1976) is most useful because it also explains the technological improvements, from copper-plate to steel engravings, which accompanied the rapid growth of interest in mapping by European and American geologists in the first decades of the century. Greenough was quick to appreciate what the new technology would achieve, particularly in colour printing. His orderly, organizing mind seized on the advantages of a consistent practice setting out of labelled keys on the borders of a map, and his notebooks contain trial samples of colour coding. He approved of colours being consistently associated with strata. Greenough also realised the value of surveying as a basis for stratigraphic mapping. In 1811, according to Laudan (1974) he consulted Colonel Mudge about using the Ordnance Survey sheets for Devon and Cornwall as a base map. Here again is a name which links with Wordsworth's experience (see Chapter Two). Greenough wrote his own evaluation of the Society's geological mapping project. It occurs in a late additional note of about 1854 added to the manuscript for his *Preface to the Geological Map of England, 2nd edition*:

...in all works of much daring there must be much liability to error and those who march first are always exposed to the greater dangers, the map of England was in my hands the work of a debutant who had no previous experience - and of an individual who understood single-handed in the infancy of the science a work which in its maturity is now supposed to require the exertions of the government commission (Greenough, G.B. UCL : 2/2a).

His inclinations are naturally towards practicality and to observation of evidence: "It is as difficult to make a philosopher of a theorist or a dragoon of a postboy or a fine parliamentary speaker of a lawyer" (Greenough, G.B. GSL: 971:108). Whatever the date of his jottings in notebooks, whether early in his life or in advanced years, the tone is one of eighteenth-century clarity. The tenor is also scornful of the weak-minded: "Men cling to erroneous theories when they know them to be so, as mothers have most fondness for rickety children" (Greenough, G.B. UCL:29/7). It would be straightforward to construct a characterisation of Greenough, the geologist and geographer, as the modern cartographer par excellence, no lions or tigers drawn in unexplored areas, but careful detailed mapping with punctilious attention to detail, colour and accuracy. From one perspective this is true, and yet there is evidence of a deeper thinking man who was influenced by the ideas of the early Romantic writers as much as by the Rationalism of the century in which he was born and educated. I shall return to those features more generally in discussing his religious and philosophical jot-

tings, but for the moment I consider the evidence for regarding him as the Romantic geologist and geographer, or rather the flashes of it that are available to us.

In the first place it is easy in acknowledging his Baconian inheritance to neglect the fact that Greenough is as self-conscious as is Sedgwick about the charge of aridity laid against those who study rocks. Greenough is at pains to apologise for the unavoidably restrained tone of the work of the contemporary geologist. In a set of jottings and papers written perhaps in the late 1830s, he explains how the science had necessarily become smaller in the scale of excitement and diminished in emotional volume. The "imagination" is an important word to note as I shall indicate in the last section of this chapter.

When the Society was founded novelty presented itself to us in every direction - whatever part of the Kingdom our investigations were carried on, we were sure to be rewarded by making discoveries and the English geologist was tempted to explore the strata of his own country which by many of the same motives in the 14th century operated so powerfully in urging on to the coasts of the new world the adventurers of Portugal and Spain. These motives have now ceased to act: there is no longer any portion of England, Scotland or Ireland of which the principal features are not known to us, and tho' perhaps there is scarcely a square mile in which slight discoveries may not still be made, yet these in general must be so slight, so little calculated to affect the imagination, that we must be prepared to expect a considerable and rapid falling off of that interest which the public has taken of late in geological researches unless we continue by some means or other to support the flame with fresh fuel (Greenough, G.B. UCL: 16/1).

Shades of the prison house may be observed closing on the growing science as it moves away from its early freshness.

All is not, however, a grey nostalgia for simpler joys of exploration from a world of the too well-known. Greenough, like many of his contemporaries in the Geological Society, is still stirred by his material, both in terms of the wonders of the natural world which the geologist or geographer describes and in terms of the process of geologizing, the activity of studying nature. His language is selected from the vocabulary of aesthetics:

It is always useful to enlarge our ideas of nature by reflecting on the comparative littleness of those objects which we are accustomed to consider the most sublime. The interest, however, which mountains and valleys are calculated to excite in us, depending not upon their relation to our planet, but upon their relations to our

species, is little affected by any comparison that may be instituted between their magnitude and that of the world at large (Greenough, G.B. 1819:95).

This is from the pen of one of the most pragmatic geologists of the time, more given to methodology than to mythology, to process than to poetry. Greenough, though rarely showing it, is capable of the flights that we shall see in more excited colleagues such as Whewell and Sedgwick when they extol their scholarly pursuit. At another point in his presidential address to The Royal Geographical Society in 1840 he describes the pursuit of seeking causes as occasioning "delight, not to say the glory" (Greenough, G.B. 1840 i lxxxii). Such a quest he regards as "the noblest part" of a geographer's craft, although (here the pragmatist speaks out) not that part which is most useful to the world and which will encourage worldly success. Whether it is his own original idea or someone else's that he wishes to keep close to himself for future reference, we shall never know, but on a slip of paper in the unpublished notebook entitled "Philosophical Dictionary" is found an elevated mission for science. It reads:

Science is the attribute of the most high - and every addition to our knowledge brings us so much nearer to the condition of the Godhead (Greenough, G.B. UCL: 29/3).

This admittedly rare soar into more elevated levels of discourse acts as a prelude to a section setting out the framework of belief that supported Greenough's activity as a geologist, a scientific organiser and a politician. Again the scattered evidence to be sifted in the following paragraphs is contained in the unpublished notebooks.

Greenough's political and philosophical views.

Greenough's political views would serve as types for a study of the transition from late eighteenth-century ideas to those of the Victorian period. As with Coleridge and Wordsworth there is no abrupt break. There is both inheritance of a tradition and, conversely, the incorporation of ways of seeing the world which would not have been possible in the past. Only the French Revolution, for Greenough as for his contemporaries, marked a distinct point of history which made everything that followed an adjustment. I shall try to illustrate how Greenough exemplifies the continuity between eighteenth-century and nineteenth-century intellectual life as well as witnessing to the revolution in vision that marked the new century. In doing so I have noted the close connection

between Greenough's views and those of the younger Coleridge. The later mental voyages of Coleridge were to travel far beyond Greenough's vision of the nature of the state and of humanity under its authority. In brief, the evidence we have is that Greenough held views with which Coleridge and Wordsworth would not, for the most part, have been unfamiliar, and in certain instances would have regarded as their own, but away from which both poets grew.

Greenough's religious views are set out in a coherent style, considering that they are in notebooks not meant for publication. He likes to claim a rationalist's territory but to establish a frontier of belief beyond which reason will not travel. On the one hand his geological enquiries, like those of most of his contemporaries, led him to a "directionalist" philosophy of nature, namely that the path of nature was determined by a benignly intentioned God. On the other hand, he is suspicious, because he is committed to a Baconian methodology, of arguments of design that arise directly from the study of strata, fossil evidence, volcanic action and so forth. The good geologist presents as evidence what he can observe and does not rush to make inferences about purpose from observations which are necessarily incomplete. In the "Philosophical Dictionary", Greenough spends time in demolishing the arguments for belief which were then current about the evidence of design emanating from all aspects of the physical universe. Writing after the publication of *The Bridgewater Treatises*, he criticises some of the authors for presenting arguments that are by no means conclusive: "Their contrivance has often the appearance of failure" (Greenough, G.B. UCL 29/3: 6). Because in nature there appears to be a contrivance, he says, there is no necessity to have a contriver. He goes so far as to defend the right of thinkers to be sceptics. The contemporary dread of atheists, despite the experiences of the French Revolution, is unnecessary. Many are "excellent men". Voltaire should not be condemned because his ideas were bleak and sunless. The question is whether ideas are true, not whether they are unattractive. Religion, in short, should not be based on false premises such as the ingenious arguments from design. Friends like Buckland and Whewell in *The Bridgewater Treatises* have let themselves down by not permitting their rational powers to play upon the natural world. If they had done so they might have advanced the causes they were trying to defend: "The Naturalist daily becomes more religious, the Churchman only remains in status quo" (Greenough, G. B. UCL. 29/3: 12). Finally he calls in Kant's *Anthropology* to demonstrate the ridiculousness of arguments from design, such as the idea that the weather is created to remind us

of the unpredictability of earthly life.

As a geologist writing after 1832, of course he must face the argument to which Lyell's Uniformitarianism seemed at that time to lend support: a thesis that the world was constructed to run on predictable, unchanging lines. At first, many Christian believers found in Lyell a renewed security through his presentation of an apparently well-designed creation. Greenough however did not accept Lyell's formulation in its entirety: "Change is as constant as uniformity itself. The caprice of nature is quite as remarkable as her steadiness" (Greenough, G. B. UCL 29/3: 25 and Note 4). Although, in 1805 he visited Scotland to meet Sir James Hall and James Playfair and learnt at first hand about James Hutton's theories, he did not accept a sweeping theory of "Uniformitarianism". He asserts that his observations lead him confidently to find traces of a first cause and evidence of signs of the possibility of an end. In brief, Greenough's faith in a broadly directionalist universe, a faith shared with many contemporaries (Laudan, R. 1974 :270), was accompanied by a rationalist scepticism that did not accept that every phenomenon would prove evidence of a grand sweep of destiny. His empirical studies, he claimed, led to a complex not a simple universe.

How far is Greenough's rational attack against contemporary arguments of design related to Wordsworth's beliefs? Greenough's journals remarkably illustrate a reasonably well-known episode when Coleridge differed from Wordsworth in the interpretation of design in the natural world. With Hazlitt the two poets were discussing the influence of Paley, a major exponent of "doctrines" of design. On 26 October 1803, Coleridge records this "most unpleasant dispute" when Wordsworth joined with Hazlitt in ridiculing Paley and others of the same persuasion. Coleridge was shocked: "But thou, dearest Wordsworth - and what if Ray, Durham, [sic: Derham?], Paley have carried the observation of the aptitude of things too far, too habitually into pedantry? O how many worse pedantries! how few so harmless, with so much efficient good" (Coleridge, E.H. 1895: 35). Although Coleridge feared that his dearest friend was betraying Nature, we have to reckon with the genuineness of Wordsworth's concern not to make Nature into what Greenough called a "contrivance". Wordsworth many years later was to share his opinion of the inadequacies of Paley's moral philosophy with another geologist, Sedgwick: Paley's system was "deplorably wanting in essentials" (W.L.V:708, see also Chapter Eight). A very good example of the "essentials" that a lover of Nature or a serious geologist might feel within their

very being and know through their detailed experience is also contained in the following quotation from Greenough's notebooks:

In the works of nature we see everywhere proofs of design - but not unity of design. We find variety of purpose, inconsistency, frailty-counteracting design, inconsistency, everything imperfect, everything is perishable, insufficient provisions - useless precautions (Greenough, G.B. UCL. 29/3: 93).

The natural world is a richly varied and diverse scene, not neatly arranged in order to prove God's purpose is a simple unity. The natural world has its own prolific life - an "active universe". Like the Solitary in *The Excursion*, Greenough appears to be noting the apparently chaotic and random nature of natural events, but like the Wanderer he sees "proofs of design". If, like Wordsworth, Greenough is sceptical of simplistic arguments from design, what then is the positive basis of his faith in a Divine presence?

Again the similarity with Wordsworth, and, this time, with Coleridge too, is apparent. In the *Philosophical Dictionary*, the issue of belief is squarely tackled. Greenough is courageous enough to hold a "modern" view of scripture. Scripture can not prove the existence of God, it is only a human composition. "Atheism is the creed of thinkers, Christianity of Believers" (Greenough, G. B. UCLL : 29/3:9). In that aphorism, Greenough summarizes the basis of his continuing belief. "Belief", he continues, "is an act of the mind after considering a proposition, as seeing is an act of the eye after looking at an object" (Greenough, G. B. UCL 29/3: 13). Nothing is more revealing than that comparison. The eye, a favourite starting point of philosophical arguments not merely about perception, but also about the acquisition of ideas, as I have noted in the last chapter, is used in a traditional manner, but the vitality of the process, the "act of the mind", takes us into the realm of Romanticism and ideas of the participating human condition. I am reminded at this point of Coleridge's definition of "primary imagination" in *Biographia Literaria*: "the primary imagination I hold to be the living power and prime agent of all human perception" (Coleridge, S. T. 1985: 313). Greenough shared Coleridge and Wordsworth's view of "an active mind" of man. The influence of German idealists is strong, as it is likely to be from his student experiences and subsequent reading. Statements like, "there is a great difference between knowing a thing and being aware that you know it" identify the influence of Kant. I shall return to his theories of mind a little later, but at this point wish only to illustrate that Greenough was confident in the act

of will necessary for belief, the stage beyond mere understanding. "I have the same reason to believe in God as in Gravitation - neither of which I understand" (Greenough, G. B. UCL. 29/3:6).

Greenough's rationalism is never far away. Thus in another passage in the same notebook, again with overtones of Victorian confidence in progress and the steady evolution of institutions, he predicts that history shows an improvement in religious belief from the worship of stones and animals to Christianity and thence through Catholicism to Protestantism. "Since then deism has gained ground and could no doubt in our days become general if men were allowed to declare themselves". This is of course a different termination to a line of historical development than Wordsworth would have chosen. The Church of England with its historic inheritance was to Wordsworth, and to Coleridge in a different, more complicated way, the proper conclusion of a process of evolution.

Greenough is not disturbed about Anglicanism, but he is correspondingly cool in applying the light of reason onto details of doctrine, particularly the doctrine of the Trinity: "If a man sees double, he is thought drunk, if treble, orthodox" (Greenough, G. B. UCL. 29/3: 57). An up-to-date follower of German history and biblical criticism, he is happy to demote miracles by rational means, such as explaining the crossing of the Red Sea by the occurrence of abnormal tides. His wide reading of travel literature suggested to him that there may be world-wide myths which are markedly close to the stories accepted as doctrine in Christian religion. Greenough would prefer to see the progressive clarification of such mysteries. Jesus Christ he interprets as the instigator of new, more rational and more democratic ways of human behaviour. In a note on the Sabbath supported by a careful collection of quotations from the New Testament, he presents this opinion: "Christianity is a religion without priests, sacrifices or ceremonies" (Greenough, G. B. UCL 29/3: 56).

How much of these radical and even iconoclastic arguments would have been acceptable to Coleridge, never mind to Wordsworth? It is only when the reader reconsiders the attitudes of the two poets in their years of collaboration in the period from 1798 to 1810 that some reconciliation of Greenough's views with theirs may be attempted. Greenough's rejection of the doctrine of the Trinity is easy to handle if Coleridge's Unitarianism is remembered, although Coleridge takes an important step towards recognising the orthodox doctrine in

his later years. The younger Wordsworth too was not a traditionalist observer of religious forms, certainly not before the family's translation to relative prosperity in Rydal Mount. There is even one brief note from Greenough on the Atonement which echoes Wordsworth's own dislike of that doctrine (Prickett, S. 1976). Greenough dissolves what is to him this dated concept simply by tracing it as a primitive doctrine amongst Cherokee tribes and in travellers' accounts of life in Tonga and Melanesia. At heart, Greenough's religion is evolutionary, confidently based on the expanding nature of human thought. It led him to a vision of a religion based on an interpretation of nature, which, again, is not in discord with Wordsworth's themes even as late as *The Excursion's* publication. Greenough wrote:

The force of revealed religion must become less and less as time advances because the chances of its adulteration become greater - the force of natural religion on the contrary must always be on the increase, because as knowledge advances man becomes more and more qualified to interpret nature correctly (Greenough, G. B. UCL 29/3: 60)

It would be foolish, however, to suggest that either Wordsworth or Coleridge, after they had reached early middle-age, could have accepted Greenough's views on organised religion. If there is an influence from the two poets on Greenough's religious beliefs, it is specifically from the younger Coleridge, that is to say from Coleridge the Unitarian, and the fascinated reader of Hartley's philosophy. Of course, as the previous biographical paragraphs of this chapter have indicated, this was exactly the Coleridge that Greenough knew best rather than the older philosopher and theoretician. The attitudes which Greenough held so continuously were, however, well known to Wordsworth in his younger years. Indeed it is possible to go beyond a cautious estimate of influence and suggest a considerable degree of match between the beliefs of all three men if not for all the decades of their lives. Did this set of beliefs rest upon a commonly held framework of political or of social theory or was it supported by a shared psychology? I shall consider each field of knowledge in turn.

Greenough and the origins of society.

The Greenough collection in the University College, London, Library includes a substantially completed notebook with the title "Introduction to politics". This has the appearance of being a reasonably well prepared textbook of

politics, quite closely corrected in ink and in pencil. Like most of Greenough's notes, it was never published. Whether it was the fruit of experience in the House of Commons of pre-Reform Bill times or the conclusions gathered from his many political acquaintances, some of whom were powerful men of affairs, is hard to say. What does emerge from a reading of this unfinished text is how closely it coincides with the political theorists of the end of one century and the opening of the next. Again, not only is the intellectual ancestry of Greenough's political and social beliefs of the same eighteenth-century origin as were his religious beliefs, it is not dissimilar to the intellectual sources which led to the social doctrines of Coleridge and Wordsworth. Their libraries were so alike! Again, the poets changed their views more than Greenough, at least as far as we can judge of the geologist's opinions from one partially completed, unpublished text.

The obituary of Greenough in the *Literary Gazette* described him as a "liberal" and the Dictionary of National Biography as a "Utilitarian". As a Utilitarian, Greenough is closer to Mill than to Bentham, again perhaps indicating for my purpose, a step closer to the influence of Wordsworth, which John Stuart Mill so freely acknowledged in his *Autobiography*. Statements from Greenough's notebook under the heading, "Introduction to Political Science", are at first sight classic Utilitarian doctrines: "The Pursuit after pleasure is the source of all human actions and of all human individual pursuits" (Greenough, G. B. UCL 26/2:19). Society is an "invention". "The happiness of mankind could not be effected without it" (Greenough, G. B. UCL 26/2: 2). In *The Philosophical Dictionary*, Greenough elaborates a doctrine of human society based on the satisfaction of wants: "Men know nothing to stimulate them to industry but their wants, it is wise to relieve these; but folly to remove them" (Greenough, G. B. UCL 29/3: 31). This of course is a sterner political philosophy than that of most Romantics. It is the politics of measured frustration no less. Greenough is no Rousseau-like democrat. He does not believe that, in a state of Nature, all was well nor that all will be well if that innocent condition ever returned. Revolutions based on such a view were all too evidently disastrous. Man is physically weak when exposed to the brutalities of the world, and constantly at risk of his life: "Consequently in a state of nature there is no liberty. Only leashed secured by the powerful (Government) can make the miserable happy again, *sui juris*, the slave free" (Greenough, G. B. UCL 26/2: 21). Government is a "machine" but infinitely different from other machines in that it only operates by human action.

When Greenough turns in detail to the way in which the social machine is created and controlled he stands in a liberal balance between democracy and absolute rule. The prince, he judges, may still rule without being a tyrant. "The peasant in full enjoyment of national liberty may still be a peasant without dreaming of equality, having his head turned by subtleties relating to the sovereignty of the people" (Greenough, G. B. UCL 26/2: 88). It is not surprising to find that he is a gradualist in politics, chilled by the experience of France, but not unaware of harsh rule at home:

Our legislature, our government, our military all are to be subjected to a certain excellent and beneficial reform; only let us not be in too great a hurry, let us not outrun the course of nature, let us act as befits the time, for certainly the times are bad and above all let us not take men to be what they were and what some wish they may be but as they are at the present moment and as they are likely to be (Greenough, G. B. UCL 26/2: 88).

Returning to the theme of "natural man", Greenough, in the last passage and, indeed through this long notebook section called "Metapolitics", rejects the myth of the happy, noble savage. Neither as the origin nor the destination of Ideal Man is this simple image sufficient. Greenough recognises the importance of social controls and social education. He ridicules the idea that the idealised type he calls *Homo Solitarius* could reach any form of happiness or satisfactory civilization. The absence of language, he asserts, would militate against full development of the human being. He explains the evolution from primitive states to modern forms of humanity in society by a theory we might call "adapted utilitarianism". Three things help Man to be different from apes. Man struggles against pain, grasps at pleasure and, this perhaps more important than all, he has a strong motivation to be active. As in Wordsworth's psychology, the active mind of man is a pre-eminent feature of humanity, and also as in Wordsworth's social doctrine, Greenough holds to the view that the best outcome of activity is not simply a collection of individuals, a set of "*homo solitarius*", but man in community.

The society that Man creates, according to Greenough, is an ancient device. I have said above he compares society to a machine, a "most complex machine set in motion for a certain object" (Greenough, G. B. UCL 26/2: 2). Societies are, he confirms from his reading, "almost universal". Although they may vary between states where there has been an act of unity and states where

force has been the initiative for people coming together, they have this in common, that men gave up something of their free nature choosing to subject themselves to a master to achieve and maintain happiness and to advance and "heighten" their well-being. Greenough's political vision is, as seen by these passages, a very rational one, even inheriting something from a period as remote as Hobbes. On one point however he is quite clear: "There never has been a government barbarous or civilised that has thought of governing without a religion" (Greenough, G. B. UCL 26/2 : 79). The first French Republic, he confidently analyses, was a state which collapsed because it was atheist and deliberately avoided a religious foundation. The firm impression the reader receives is that, with its manifold faults, England is the best of all political societies.

Because it has an indirect connection with what might be called a "Wordsworthian social theory", a further comment on Greenough's variant of democracy is required. The Greenough geological field notebooks (of which there are few) make a special point of recording conversations with quarry men and miners, particularly in Cornwall. The tin miners of the peninsula provided him with the local names for rocks and minerals. In 1801 he typically says, "I conversed only with the common men" (Greenough, G.B. GS. 971,30). In a letter to an aunt in 1805 he praises the Scottish Highlanders he has met on his excursions. They are "hardy, generous, active, open-hearted and hospitable of quick parts and of good address." Although they are deplorably poor, "wherever I have been I have been treated with a friendliness and hospitality which at times affected me to tears" (Greenough, G.B. CUL: Box 21). Many years later in his address to the Royal Geographical Society, he again strikes a chord about the vulgar tongue. Urging geographers to become systematic in their classifications of their objects of study, particularly of landscapes, he recommends a "precise and fixed terminology" and "a good nomenclature." Unlike Whewell who, as I shall illustrate in Chapter Nine, advised his contemporaries to adopt in a systematic manner Greek and Latin nomenclature, Greenough recommends local language. The old Celtic language for physical features (ben, ken, cairn, corrie and so on) "being composed of monosyllables, is singularly applicable to the construction of an expressive and appropriate nomenclature" and avoids the variety of looser terms such as "hill" and "mountain" (Greenough, G.B. 1840: lxxii). The "aboriginal names" of a language, he argues, are usually the most "expressive" and convey the peculiar character or distinctive quality of a place or landform. Greenough by the time of this address (1840) was already deeply

involved in the study of philology and in its encouragement in places of learning. The phrase, "the language of common man", at a time when the world was opening to explorers with linguistic and anthropological interests meant more than European philological history. Phrases such as "the most peculiar character" and "distinctive feature of a place" are of course those of someone who is not trying to systematise or to simplify the world, but to enjoy its ever-widening diversity.

The previous, somewhat tangentially political, discussion on terminology serves to lead into the most revealing distinction between Greenough, Coleridge and Wordsworth. Greenough, from what we know of him, displays no genuine depth of interest in the historical roots of England and its political and religious culture except for attention to philological detail. Indeed Greenough is more of a global thinker in terms of historical influence, more of a geographer than a rooted historian of place. Consider Coleridge's attention to the roots of mediaeval and classical thinking as he prepared his literary and philosophical lectures. Consider Wordsworth's concern early in the sonnet sequences of 1802 and even more persistently in the *Ecclesiastical Sonnets* to reaffirm the unbroken line of inheritance from England's history. Both considerations reveal a depth and dimension in the two poets' work which Greenough lacks. It is indeed my conclusion that, in seeking influences, it is not to social theory that we turn for closest connections between scientist and literary figures. It is in fact in psychological theory, the theory of the mind, that the closest correspondences may be found.

"Mind and life seem inseparable" - Greenough and the life of the mind.

Greenough's psychological theory is one of a reconciliation between sterner utilitarianism and the irrational possibilities of human action. As I have said above, Greenough was closer to Mill than to Bentham in his doctrine of social theory. His notebooks record various restatements of a fundamental position in the nature of innate ideas. Man is not born rational, he asserts in the notes for a Philosophical Dictionary, but he has the capacity for reason and, like cats and magpies, has a tendency to curiosity. However, Man's curiosity, unlike that of animals, is developed because it has an "object". Like monkeys and parrots he has the power to imitate but only does so "for use" since "Industry is

the creature of want" (Greenough, G.B. UCL: 29/3). From this simple utilitarian stand he then elaborates a more complicated position. First, he must reject Locke's curt dismissal of innate ideas. Instincts, says Greenough, the field observer and student of natural life, are plainly innate. Then in a more metaphysical frame of argument he expresses a peculiar doctrine of immortality: "Both matter and mind may be imperishable tho' entering continually into new combinations" (Greenough, G. B. UCL 29/3: 46 and 52). Although the body and mind of each individual die at the same time, both enter perhaps into new forms so that, in this sense, neither of them dies. Genius has to be recognised as one of the obvious and more extreme forms of variety of human mind. It is difficult to explain such variety on rational, materialistic grounds. Perhaps different minds have different proportions of component parts. Certainly, he adds, with a further materialistic aside, great men usually have good constitutions and minds are weakened as physical ageing occurs. Acceptable though such explanations are, Greenough has to concede that mind has to be discussed separately from matter and appears to have a separate but linked existence.

The particular quality of human mind that most distinguishes it from that of animals and most clearly from inanimate objects is that it is active. I have already commented on this claim when considering Greenough's views on religious belief as an active state. Plainly the mind is not merely a receptive pad receiving sensations as they are randomly delivered. Simple accretion of experience is not useful. Greenough quotes Coleridge on experience: "Like the sternlight of a ship it illumines only the path that is past" (Greenough, G. B. UCL 29/3: 33) and he adds that experience does little to create confidence in Man but more often leads to doubt and irresolution. "Confidence only comes from the absence of disappointment", he asserts, offering us a kind of weak gratification theory!

If the mind is not a *tabula rasa* on which life's experiences have been accumulated, what is it? It is a place where powers exist of which we may not be conscious: "That I am not conscious of any power within me which occasioned my birth, my growth, the development of my faculties is no proof that there does not exist such a power within me" (Greenough, G. B. UCL 29/3 : 7). In the same notebook Greenough gives his active definition of the processes that occur within: "There is a power existing in the brain of receiving, retaining and combining with ideas, sensations communicated to it by the outward senses" (Gree-

nough, G. B. UCL 29/3: 39). This power varies between people. In some it may be dominant, in others it is suspended. Philosophically there are three elements in this theory of mental activity: sensations, ideas and the active power that puts them into a new form. What we have here is admittedly not the "active universe" of Wordsworth's fullest vision of nature and man in creative combination, but nevertheless a scheme which gives the "Mind of Man" a prominent and creative place in the scheme of things. It is possible to illustrate further his proximity to Wordsworth's view of the human mind by considering Greenough's brief comments on the continuity and unity of nature, before explaining, in the final section of this chapter, his theory of imagination.

One particular passage in the notebooks is remarkably close to Wordsworth's concept of the unified forms of landscape. Greenough distinguishes between Nature and the mind that studies it. Science, he says, consists in making distinctions, whereas nature makes none - all is unity. In Nature there are no shapes or demarcations, everything passes away by almost imperceptible gradation. "Science is not a picture of nature" (Greenough, G. B. UCL 29/3: 47). It is the scientific mind, pursuing truth, that makes distinctions and separates nature into its parts. However, scientific activity is organised not only to divide nature into conjectural parts, it is stimulated to see the connections and the wonder of the interconnected universe:

No less true than striking is the remark of the author of a work entitled contemplations of Nature, that there is no picking up a pebble by the brook-side, but we find all nature in connexion with it (Greenough, G.B. 1819:113).

If that quotation is considered reminiscent of "the violet by a mossy stone" or the daisy and the celandine that stirred the poet to wider visions than the plants themselves, go on to consider Wordsworth's own prose descriptions of natural landscapes. In *A Guide*, Wordsworth is occupied at length in the sub-section called Miscellaneous Observations, (situated in various editions in different places in the text) in trying to be precise about an imprecise consideration, the best time to visit the Lakes. It is equally difficult to give clear guidance on the best order to see the lakes, the valleys and the high hills. As in the more factually descriptive sections, Wordsworth reminds the reader of the gradualness of the scenery. The spectator is "gradually conducted into its most sublime recesses" (W.P:II:239). Alternative approaches and the choice of various seasons are discussed to attempt to solve the issue. However in the final analysis it is in the

mind of the traveller that the experience will take place: "After all, it is upon the *mind* which a traveller brings along with him that his acquisitions, whether of pleasure or profit, must principally depend" (W.P. II:230). Man has the faculty to enter into the gradations of Nature. Greenough concurs, although he is less sympathetic to the Lakeland enthusiasts: "If we really thought nature beautiful, why are we always trying to improve it?" (Greenough, G.B. UCL 29/3:22).

Greenough's distinction between the unity, gradualness and interconnect-edness of nature and the human eye and mind that can make distinctions, but also appreciate the wholeness of nature, is also a Wordsworthian theme. The mind (and eye) as organisers is well illustrated by this passage from the incom-plete essay, *The Sublime and the Beautiful*:

Let me then invite the Reader to turn his eyes with me towards that cluster of Mountains at the Head of Wiindermere; it is proba-ble that they will settle ere long upon the Pikes of Langdale and the black precipice contiguous to them. If these objects be so distant that, while we look at them, they are only thought of as the crown of a comprehensive Landscape; if our minds be not perverted by false theories, unless those mountains be seen under some accidents of nature, we shall received from them a grand impression, and nothing more. But, if they be looked at from a point which has brought us so near that the mountain is almost the sole object before our eyes, yet not so near but that the whole of it is visible, we shall be impressed with a sensation of sublimity (W. Prose II: 350-351).

The active mind sifts what it receives from sight. Preconceived ideas (some from false aesthetics) may intervene in the process. Ultimately overriding sight and theory, is the discriminating, educated mind - the point of vision which is "so near...yet not so near". The landscape has been perceived with "distinctness".

"Wilful delirium under control".

The notions of mind, idea and sensation are most intriguingly seen at play in Greenough's notebooks where he considers a vital Romantic concept, the imagination. Again it is in the half-developed notes for *The Philosophical Dic-tionary* that a fruitful reference occurs:

Imagination or fancy is wilful delirium under control. With the growth of judgment it declines, as the fruit ripens the blossom falls. Delirium is nearly related to chance; it is a state of mind in which

ideas follow each other in an order that could not have been anticipated and without any apparent connexion (Greenough, G.B. UCL: 29/3 17).

The words "under control" are written slightly above the line of hand-writing as if an emendation. Now at one level, particularly by a Wordsworthian, this definition of imagination or fancy could be seen as the falling away of childhood's vision. At a more philosophical level it is an instance of Greenough's scientific doctrines of mature, empirical truth in the ascendant over feeling and immaturity. Certainly in other passages he is eager to trounce those who over-praise imagination. Sedgwick's Commemoration Sermon (see Chapter Seven) from the pulpit of Trinity College Chapel, for instance, provides Greenough with a target:

He advocates the imagination in lieu of reason, of feelings in opposition to reflexion - he prescribes in moral philos the language of demonstration and of inductive proof in politics, as mischievous and impracticable, he finds fault with Locke for discarding from his system of metaphysics the power of the imagination (Greenough, G. B. UCL 29/3:68).

Greenough continued in similar stern vein to castigate Sedgwick, as, a few pages previously in the notebook, he had chided Whewell for suggesting that moral ideas were innate. At this level we appear to be looking at a line of argument consistent and unbroken from materialist philosophers of the eighteenth century on into Benthamite Utilitarianism. If this is true, then there is very little to find in tune with Coleridge and Wordsworth's enrichment of the concept of imagination in their poems and prose works. However, the very phrase "Imagination or fancy" in Greenough's *Philosophical Dictionary* should make a reader pause, as should the colourful definition "delirium under control". It is in these moments, and they are not frequent, when Greenough has a flight of language above the systematic and plainly descriptive, that we gain an insight into his more rounded individual position. It was a position, as I have indicated earlier, sustained by a classical education. He (and contemporary poets) are likely, for instance, to have been well aware of Plato's use of "mania" to describe artistic excitement or possession by the Muses. However, the importance of the word "delirium" goes deeper than a common classical heritage. I shall try to trace some connections stimulated by the term, first in Coleridge's critical writing and then in Wordsworth's poetry.

Studies of the term "imagination" in the context of its use by Coleridge and Wordsworth have of course relied consistently either on Coleridge's own

distinction between imagination and fancy in *Biographia Literaria* or in Wordsworth's analysis in his "Preface" to the 1815 Edition or in passages in *The Prelude*. Greenough appears to be making no such distinction between imagination and fancy. He uses the terms as synonymous. Commentators on the origins of the renewal in the use of the word "imagination" in the nineteenth century have been as interested in how "imagination" transformed its almost dangerous, threatening connotation into a benign, enriching and empowering meaning. T.J. Diffey, for instance, writing on "the roots of imagination" (Prickett, S. 1981), takes the enquirer back to Locke. Locke implied that imagination was not a "real idea" attached as it were to some reality identified by sensation. It was instead a "Fantastical idea". Thus a monster with the head of a lion, feet of a cat and body of a goat would be impossible to accumulate by sensation from "Real ideas". Instead such a creature is built or composed by the process Locke called "imagination". It will be seen that imagination has at this stage already achieved two different meanings which, over a century and a half later, Romantic writers were to use freely: first a faculty to perceive something beyond "normal" reality and second the nature of what is imagined. Despite the sea change that the word underwent in the early nineteenth century, the Lockean attitude of suspicion was not totally eradicated. Part of the reason for Coleridge and Wordsworth's attention being drawn to the definition of imagination and fancy and their concern to clarify what had the surface appearance of a synonym was the lingering connotation in both words of the fantastic or the unreal.

We still, however, have to consider whether Greenough in his notebook definition of "imagination or fancy" had transferred his own opinion away from earlier judgements into the new modes of meaning. As in many intellectual matters he stands half-way between traditions, as an inheritor but also as an explorer of new conceptualizations. One word and its qualifying associations deserves particular attention in Greenough's definition. It is, of course, "delirium". There is a strikingly similar use of the word in exactly the same context in Coleridge's *Biographia Literaria*. In Chapter 4, in the first major incursion into the distinction between imagination and fancy, Coleridge identified Milton with possession of imagination. He proceeds:

To the faculty by which I had characterized Milton, we should confine the term *imagination*; while the other would be contra-distinguished as *fancy*. Now were it once fully ascertained, that this division is no less grounded in nature, than that of delirium from mania, or Otway's.

Lutes, lobsters, seas of milk and ships of amber,
from Shakespeare's.

What! have his daughters brought him to this pass?

or from the preceding apostrophe to the elements; the theory of
the fine arts, and of poetry in particular, could not, I thought, but
derive some additional and important light (Jackson, H.J. 1985:204).

Basil Willey gives this commentary on this passage and, in particular, on
the distinction between the two words, which Coleridge says is "grounded in
nature".

In delirium the mind flows forth its contents incoherently with no
unifying principle to order its sequences save the laws of associa-
tion: in mania, the mind, obsessed by a fixed idea, sees and inter-
prets all things in relation to that idea, and so has (though in
morbid form) a coordinating power. If we translate disease into
health, delirium becomes Fancy and mania Imagination (Willey,
B. 1964:21).

In Coleridge's letter to William Sotheby of September, 1802, there is an
earlier intimation of his mind working on a distinction between fancy and imagi-
nation:

In the Hebrew Poetry, you find nothing of this poor Stuff - as poor
in genuine Imagination as it is mean in Intellect - At best, it is but
Fancy or the aggregating faculty of the mind, not *Imaginatio*, or
the modifying and co-ordinating faculty (Griggs, E. L. 1956:865-
866).

Although Greenough makes no such distinction between imagination and fancy,
there is a marked similarity of this explanation of delirium and Greenough's
second sentence in the quotation that begins this section: ("nearly related to
chance, it is a state of mind in which ideas follow each other in an order that
could not have been anticipated and without any apparent connexion"). One
further detail: Greenough writes about "wilful delirium". In Chapter 13 of
Biographia Literaria, in the second well-known discussion of fancy and imagina-
tion, Coleridge distinguishes fancy as "a mode of memory emancipated from the
order of time and space", but modified by the "empirical phenomenon of the
will" (Jackson, H. J. 1985: 313). It is not easy, however, to identify at what point
Greenough acquired his own similar definition or to ascertain whether he had
read Coleridge's work or discussed it with him. All we can know at this stage is
that Jacqueline Golden's study of the watermarks of the notebook containing
The Philosophical Dictionary suggests that it was compiled later than 1813, before
the publication of *Biographia Literaria*.

To find echoes of Coleridge is perhaps understandable because of the early friendship. The connection with Wordsworth is less straight-forward. The passages in *Biographia Literaria*, after all, are expressions of Coleridge's disagreement with Wordsworth's own analytical forays into the near synonyms, perhaps most obviously set out in "The Preface" to the 1815 Edition. Returning to Greenough's definition of "wilful delirium under control", there are two interesting themes that are not without harmony if placed alongside Wordsworth's use of the word "fancy". The first is the phrase "under control". Greenough is placing an emphasis upon the overriding power of the human mind. A similar echo may be found in Wordsworth's poetry. There is a sonnet published in 1807 which begins:

How sweet it is, when mother Fancy rocks
The wayward brain, to saunter through a wood! (W.P. III: 21).

The poet is led by Fancy into an association of images which are seductive, ever-enlarging and even dangerous until control takes over: The last lines read:

...Verily I think,
Such place to me is sometimes like a dream
Or map of the whole world: thoughts, link by link,
Enter through ears and eyesight, with such gleam
Of all things, that at last in fear I shrink,
And leap at once from the delicious stream (W.P. III: 21).

A further example of an association of poetic inspiration with madness is in Book III of the *Prelude* of 1805 where Wordsworth records the richness of his inner life in the midst of an unknowing Cambridge crowd. These were early intimations of the vibrant unity of all natural things. These inspired moods could be misunderstood:

Some called it madness; such indeed it was,
If childlike fruitfulness in passing joy,
If steady moods of thoughtfulness matured
To inspiration, sort with such a name (*Prelude* 1805 III: 147-150).

"Mad Fancy" occurs in *The Excursion* (W.P. V iv: 769) in a question by the Solitary. It is also interesting to note that in Book 8 of the *Prelude* (line 584), Wordsworth uses the same epithet about fancy ("wilful fancy") as Greenough applies to delirium.

I have tried to illustrate from the short note on imagination or fancy in Greenough's notebook a man of his time attempting, as others did, a redefinition of a human faculty about which previous generations had been suspicious. Greenough's geological studies seem, at first sight, to be unrelated to this foray into aesthetic psychology, but I shall try to illustrate in the concluding section of this chapter the consistency between this discussion and Greenough's main attributes as a geologist and geographer.

Conclusion.

The last section, with its consideration of the Greenough's short but fruitful definition of imagination or fancy and the much more elaborated examination by Coleridge and Wordsworth, will, I hope, satisfactorily serve to illustrate the different settings in which these three men explored ideas. For Coleridge and Wordsworth the definition of these two key words of creative inspiration was of initial importance in establishing a new aesthetic. They inherited a terminology of critical theory but played a major part in its change and elaboration. In so doing they disseminated their analysis so that the language of criticism was renewed. Greenough may have shared with them a similar initial inspiration from classical and European philosophers, with perhaps Schiller as an early guiding light. However, his conclusions remained at a less sophisticated, unelaborated and private level, unexposed to public criticism and, as far as we know, to amendment by discussion in a wider circle. It is wrong to expect too much from comparisons like these between men who occupied very different roles in intellectual life, nevertheless the fascination is in observing where their thinking touched and where it diverged. For Greenough the divergence commenced after he and Coleridge had ceased to be in regular contact, (perhaps, at the latest, 1810). Analysis of Greenough's thought from his notebooks demonstrates that, although the two poets advanced and changed from their first sources of inspiration, Greenough's framework of thought moved on hardly at all. This remark is not intended to deny the remarkable range of intellectual interests of a very busy geologist and man of affairs, but it may focus attention on Greenough as a model or bench-mark of the point of departure taken by the poets. This final section will therefore attempt to summarize the qualities of Greenough, which may also illustrate some further points of reference in considering the intellectual journey of his contemporary, Wordsworth.

A good starting point with any thinker is to consider the nature of his or her concept of the ideal human being. One example, from Greenough's Presidential address to the Royal Geographical Society in 1840, tells the reader much about what a later generation would call his "values". Major Henry Creswicke Robinson, the explorer of Susiana (now S.W. Iran or Khuzistan) and Kurdistan was awarded the prestigious Founders' Medal. Greenough praised him thus:

In the person of this gallant officer we find united to the sterner qualification of a geographer the accomplishments of the scholar, the antiquarian and the man of taste. Familiar with all the accounts that had appeared either in ancient or modern times in regard to the region which he was about to explore, equally conversant with the dead and with living languages, observation and erudition acted reciprocally upon his mind, sometimes exciting, sometimes restraining the speed with which he pressed onwards to his conclusions. To form a just estimate of his merit we must look not only to the termination of his labours, but to the severe self-discipline he underwent lest he might not feel qualified to commence them (Greenough G.B. 1840: xlvi/xlvii)

The description of this paragon, it will be noticed, conveniently conveys to the distinguished gathering that science, exemplified by geography, was a stern mistress. Here was no narrow technical background. A nation's heroes say much about its dreams. An individual's heroes perhaps tell us also what he has read. Just as Greenough himself, and, as we shall see, other geologists of his time, were educated in a classical tradition, so was this soldier. In the light of previous sections of the chapter, perhaps it will be noticed through this small example the effect of education acting upon an active, receptive mind. Excitement has its turn "sometimes" but there is the restraining influence of the disciplined mind and the stern duty of more than adequate preparation for a difficult task (Note 6). Over all hovers the severe hand of control.

The word "control" is carefully chosen. Greenough's writing, both published and unpublished, is coloured by something more than the cold light of reason, although reason has its essential part to play. When Greenough writes about the search for truth, he is not only exploring the scientific virtue of rational analysis, he is also supporting the role of education and encouraging a resort to common-sense in the avoidance of unverifiable hypotheses. Man, he states in *The Philosophical Dictionary*, is "not born rational, but only capable of reason; a pebble is not naturally a snuff-box tho' it may be made into one" (Greenough, G.B. UCL 29/3: 51). It has to be remembered that Greenough was one of the

founding members of University College, London and his influence in the Royal Geographical Society was not least important in encouraging the spread of geographical knowledge in schools. The task of the geologist and the geographer must be to put man's capability of reason into action, checking what reason appears to tell us, by bringing matters down to earth. The scientist must not flinch from the route along which reason and practical sense lead him:

Whatever subject is brought before us it ought without fear of consequences to endeavour to find out and to establish the truth, the whole truth, and nothing but the truth (Greenough, G. B. UCL 29/3:68).

Greenough could hold such an austere belief without anxiety because his own religious faith was supported by an undisturbed foundation that whatever was discovered would not conflict with the idea of a divine First Cause. He held a common-sense view that there was much science could not discover and a good scientist should admit the limits of his knowledge.

As a geographer and early anthropologist Greenough brought to his consideration of political, religious and social ideas the perspective of a world-wide view. First, he was a cultivated man with a classical background. His commonplace books demonstrate a more than trivial interest in English poetry (Note 5). His careful listing of the myths and beliefs of other cultures was in order to hold up a comparative light on Christian doctrine. He displays the clarity of a scientist who could transcend his own national origins. Greenough, the mapmaker, is a recorder of what exists. What can be mapped can also be explained. Mysteries disappear as the hills and valley are contoured, as the strata are systematically coloured and, even more de-mystifying, as capes, bays, rivers and towns are named and entered on the map or in gazettes. Describing, naming and portraying, with as much accuracy as modern exploration and systematic observation could offer to the geographer, are features of control. The landscape is not idealized or made into a classical analogy, but portrayed as it is. Control and clarity are the two essential concepts. It is Greenough's sense of reality, of what the earth is actually like, that perhaps impresses the modern reader more than any other aspect of his work. In this respect there is more than a feeble echo of the strivings of Wordsworth to portray what he termed "the real" in "the real language of men" and in the places where "our elementary feelings exist in a state of greater simplicity and consequently may be more accurately

contemplated" (W.Prose I :124). Similarly, as I have indicated above, Wordsworth's impulse in *A Guide* to describe the Lake District unornamented by picturesque importations is akin to Greenough's life-long conviction that geology was a plain science, eliminating the fantastic and verifying what could be observed, mapped, named and described. Nevertheless, Greenough could take a long view; nothing can express this better than a hand-written note in a *Geological Scrapbook*. This was a sketch for a project to write a textbook of geology which appears not to have been fulfilled in any form except a few scattered statements, one of which is:

That there exists a mysterious connection throughout the whole of nature that we need not seek in the third heavens another and better world, but that in strict conformity with what we know of the archiology [sic] of our globe that the earth itself may survive and furnish an abode to other beings possibly more noble and intelligent (Greenough, G.B. UCL. Box 16).

These are, of course, not only statements which are aimed at reducing fruitless speculation and dissension, perhaps even in the Geological Society itself, they are also evidence of an optimistic, progressive philosophy based on a view of creation as a directional device. Greenough did not require the assurance that some of his contemporaries sought in geological Uniformitarianism. Nature, as he often noted, may be consistent in its operations but not always uniform in its manifestations. "The caprice of nature is quite as remarkable as her steadiness" (Greenough, G.B. UCL 19/34:28 and Note 4). In short, the likelihood of long, catastrophic periods was strong, although all we can observe is that such periods are themselves under a law of nature and, by virtue of that law, give way to other periods of a different geological activity. The prospect of further, major changes in the earth is not ruled out. Greenough's native optimism is not overwhelmed by such a catastrophic vision. There may be a golden age of humanity to come and he appears to welcome it.

I find in Wordsworth's writings, although accompanied there by so much else of depth and development, an emphasis which I have also found in Greenough's notebooks. Arising from their respect for the power of the human mind, both men, in their different ways, developed an intellectual tone of questioning and a seeking for verification through careful description of nature and concentration on the reality of the present world. For Wordsworth, the search reached further, into a history and a geography of a particular place - the subject of the next chapter.

**CHAPTER SIX : "THE CLOUDY STALL OF TIME":
THE RIVER DUDDON: A SERIES OF SONNETS.**

The valley of the River Duddon is one of those described by Wordsworth in *A Guide* as radiating from a central area of the Lake District. It is, however, shorter than the valleys that are graced by the famous lakes and, although Wordsworth said the main valleys spread out like "spokes of a wheel", the Duddon is a "spoke" from the hub, but it is not in any sense a main valley. Its source is somewhat obscure. Eventually many springs form a brook, which then, as Wordsworth described it in *A Guide*, swells to "a copious stream winding among fields, rocks, and mountains, and terminating its course in the sands of Duddon" (W.P.II: 172). To the geologist or the geomorphologist the River Duddon and its valley are interesting for a number of reasons. The fall from source to estuary is over a short distance. The Duddon valley from Wrynose Pass to Broughton-in-Furness can be followed in a car in less than three-quarters of an hour, driving leisurely and even stopping to admire the view. The Wordsworths seem to have taken two days to cover the journey, but with frequent stops and explorations. The distance, as a crow flies, may be short, but the fall to sea level is considerable - the Duddon has a precipitous stream path, but not at all times. The tributary streams are also short and rapid in flow. Wordsworth noted the white water and the ground bass of the river and of its contributory waters. The Duddon valley at least until Ulpha is a mountain stream in a "youthful" phase for much of its journey.

Like other northern rivers, the Derwent, Greta, Cocker, Liza, Calder and Esk, the Duddon is interesting because it appears to be a survivor over long periods of geological time and through major changes in the mountains' story. Geomorphologists have identified these rivers as examples of "superimposition" and, some have claimed, although this is more contentious, "antecedence" (See Note 1). The ancestor of the Duddon, it is hypothesized, travelled roughly the same direction for long periods of geological time, maintaining its present route despite major changes in the surface of the rocks, such as the removal by erosion of surface strata, major faulting, and the slow uplift of mountain-building phases which also produced the Alps and the world's great mountain ranges, and, more recently in geological time, the ice ages of the Quaternary period. Ancient rivers "impressed on the dome a pattern of radiating valleys and were in process of

carving them deeper and deeper into the rock" (Pearsall, W.H. and Pennington, W. 1973: 41). The outcome, particularly for the Duddon, has been a mountain valley which runs across, rather than in line with, rocks of different hardness, thus creating sections of deep cutting, alternating with sections when the river gently winds, finding no obstacles to its progress. Faults mark the structures of the surrounding highlands as well as the effects of glaciation, so in addition to the river's own dramatic erosion, there is a surrounding landscape of steep slopes and rocky outcrops. Overall this small stream occupies a wider valley than it might be said to deserve, again a feature of a glaciated landscape. This last explanation was, of course, not acknowledged for the majority of the active life of the writers recorded in this thesis.

Whatever Wordsworth knew about this geological history, he realized, in writing *A Guide* and in composing the sonnet sequence which is the main topic of this chapter, that the landscape of the Duddon valley is one of variety, and most of its interest occurs in a mountainous setting. The geological history of the Duddon valley created attractive features for the poet. It is essentially a dramatic river on a small scale, with an almost human life pattern of rest and rage, of peace and activity. The mountainous nature of most of its flow and the fact that it is relatively short and leads from the very high and desolate Wrynose Pass out to a wide, lonely estuary makes it a somewhat lonely and undisturbed valley even today. In Wordsworth's time, it had none of the major tourist routes which traversed the Lake District and it was (and is) set aside from the more popular attractions of the broad valleys graced by the major lakes. There is a mysterious problem for geologist and for poet alike in explaining the uniqueness of the Duddon Valley. I have mentioned in Chapter Two that Dorothy Wordsworth, made one of her very few comments of a geological nature, as she looked up-stream along the Swiss River Aar in the Ingrund Valley. She remembered the Duddon:

Looking backward, we had a sublime view of the river, departing from the peopled and cultivated plain into a close passage between huge rocks overlining with trees! It reminded us of the Pass of the Duddon, a miniature of this Pass, - and of my brother's sonnet: - and, if great things may follow so closely upon little, I will add that we thought with awe of those convulsions of nature by which the chasm had been formed, for the water by its own force could never have eaten its way through such a barrier (D.W.J.II: 130-131).

In noting the dominant aspect of the Duddon's scenery, she accurately identifies its challenge to early geologists, namely to explain precipitous banks and deep cuttings from the apparently puny power of a mountain stream. A theory of catastrophism would, of course, account for a ravine occupied by a small stream.

If the River Duddon is interesting to a geologist, to a biographer of Wordsworth, the stream is of continuous importance (Note 2). The poet himself noted that the Derwent and the Duddon were the two rivers associated with his childhood, the Derwent because of his birth-place and early years in Cockermouth, the Duddon because of its closeness to Hawkshead where he attended school after his mother's death. In the extensive notes dictated to Isabella Fenwick, he contributed a long account of his early visits, fishing in the headwaters with an unnamed companion. It is an appropriate account because, like the river's own journey, it describes alternate moods of excitement and lassitude. On one occasion, he fished unsuccessfully, despite high hopes based on success from similar mountain streams. Tired out, a long walk from home, he had to be carried exhausted for the last miles by his companion. The Duddon was therefore, "the stream which for many years I never thought of without recollections of disappointment or distress" (W.P.III: 504). There is a similarly strange, disturbing association with the river many years later, indeed long after the publication of the sonnet sequence. Mary Wordsworth became separated from a walking party and, despite standing on a prominent steep hill by the roadway, she was not noticed by her companions, causing her husband, then an old man, distress (W.P.III: 250). For the purpose of this thesis, the sonnet sequence is important in establishing a pathway of issues which are to continue from the middle years into the poems of the later years. These issues are relevant to the search for a correlation between geological ideas and Wordsworth's concentration on the landscape of his home district. After a brief consideration of the structure and context of the series of sonnets, I shall consider the issues raised by the poems which are relevant to the geological debate of his time. These issues are the evocative problems of time (principally the Deluge and biological extinction), the theme of reconciliation of nature and humanity, and the focus of attention on the actual landscape features in a particular landscape.

The Structure of the Sonnet Sequence: The Duddon as a Poetic Guide.

There are distinctive aspects of the sonnet sequence itself and the collection in which it was first published which repay attention and help to increase the enjoyment of reading. That pleasure is enhanced, and modern barriers against the appreciation of the sonnets reduced, if Wordsworth's own guidance about their composition is followed. They are a linked series and they are intended to be read as a sequence, even though a minority of the sonnets was composed at an earlier period (Note 3). Mary Wordsworth, writing to her sister, Sara, in December 1818, described the poet sleeping from "sheer exhaustion" after writing twenty-one sonnets on the River Duddon. She added, "they all together compose one poem" (Moorman, M 1965 II: 373). Her description should be taken seriously not least because it is exactly the phrase used by the poet himself in his own notes to the poem (W.P.III: 508). As I hope to indicate there is a planned shape to the sequence attuned to the varied journey of the river itself providing periods of briskness alternating with quiet reflections. The overall pattern can only be appreciated if the reader avoids studying each sonnet on its own. The linkages between sonnets are important too and obviously firmly under the poet's control. Wordsworth was always conscious of the way his poems appeared in the company of other poems in a collection. The 1820 publication is an interesting example of his care in collecting together related works. Not all poems in the 1820 collection, however, are to be regarded at this level of interconnection. He took an opportunity to publish earlier poems. The most significant of these is "Vaudracour and Julia", with its personal association of young love and a child born out of wedlock. The narrative poem appeared later in the 1850 edition of *The Prelude*. By far the most interesting poems in respect of the themes of time, of extinction, and of renewal are the three odes, "1817", "Composed upon an evening of extraordinary splendour and beauty" and "The Pass of Kirkstone". I have already referred to the last-named ode in Chapter Two, and I shall comment on the other two odes in due course.

Perhaps more significant for the present thesis is the publication of two long pieces of prose in the 1820 Collection: "A Topographical Description" which ends the volume and the "Memoir to Robert Walker" which immediately follows "The River Duddon: a Series of Sonnets". "A Topographical Description" was seriously intended to relate to the sonnets which open the collection. A modern critic, L.M. Johnson (1973), says "The River Duddon requires *A Guide* for a

sense of aesthetic completion in the same way, but for the opposite reason, that "the Waste Land" benefits from the notes appended to it" (Johnson, L.M. 1973: 122). We may presume that the poet was keen to integrate his topographical guide with his poetic creation, because he was conscious of its distinctive features as a guide for "discriminating minds". Equally important is the other prose element of the collection, the long memoir to the Priest of Seathwaite Chapel, the Reverend Robert ("Wonderful") Walker. Walker emerges from the sensitively written prose paragraphs and from the sonnet about the chapel, as a latter day Chaucerian, simple priest. His humility and his devotion to the rural poor should not hide from us that Wordsworth presents for our imagination a priest who was also a scholar and something of a natural philosopher: "He was skilled in fossils and plants; a constant observer of the stars and winds: the atmosphere was his delight" (W.P.III: 521). The links between this revered figure and the Solitary and the Pastor in *The Excursion* are clear, but they also create echoes of the Virgilian poet who retreats from urban pleasure into the retirement of rural life.

I have claimed above that the series is planned and co-ordinated. It is interesting that few critics have considered the construction and its purposes (See however Wilcox S. C. 1954 and Johnson L. M. 1973). Pinion says the sonnets "have little coherence or continuity" (Pinion, F.E. 1984: 225). The neglect of the sequence as a sequence may be because more attention has been given to individual sonnets, rather than to the sequence as one continuous poem. The "After-Thought" (Sonnet xxxiv), for instance, has received the accolade of inclusion in anthologies of nineteenth-century poetry, and it is indeed a well-made sonnet that deserves wider consideration (See, for example, Hartman, G. 1977:335). It is, however, only one element in the series, which, as a series, deserves closer scrutiny.

I find Wordsworth's attention controlled by the actual stages of the river's journey. For instance in the middle section of the sequence, where Johnson (1973) has suggested a concentration on the human and a parting from the theme of the river, there is I believe a physical explanation for the narrative moving away from the river. The explanation is the geological structure of the river at this point. In Sonnet xii, the poet notes the Duddon's "deep-worn channel", inspiring fanciful thoughts of a strange, drowned world. His Muse is enjoined to turn from these sights and from "toys of fancy thickly set." There is a

practical reason for the poet turning his footsteps to the open fields, because to follow the river into its deep gorge is not possible. Herbert Rix, the Victorian enthusiast for relating the geography of the Lake District to Wordsworth's poems, notes, "the channel is so deep and confined that the stream cannot be seen from the road, and this is the first time since leaving the source that the Duddon is lost to sight. It is this fact which gives rise to the concluding lines of the sonnet" (Knight, 1896 VI: 242). Similarly the relatively long sequence, from Sonnet xxiv to xxix appears to be concerned with matters unconnected with the river, but, again, the pause in narrative movement is not a digression but a period of rest for both poet and river ("Mid-noon is past; - upon the sultry mead/No zephyr breathes, no cloud its shadow throws"). Again, in sonnet xxx, the River Duddon is said to wind through "a rough copse", while the poet chooses "to saunter o'er the grassy plain". The reason for the parting is simple, - difficulty of access.

If we remain close to the actuality of the river and its journey, other consistencies emerge. There are a number of time-cycles at work in this poem. The diurnal movement of the earth is one of them. The place of the noon-day heat has been noted in the previous paragraph. Sonnet i hails the infant stream in "morning light". By Sonnet xix it is the busy time of noon, moving on into the restful afternoon of Sonnet xxiv. By the time the river flows by the Kirk of Ulpha, evening has come. The first image of that sonnet is of the evening star and the musing poet in the "wave-washed Churchyard" will "mark the summits hoar/Of distant moon-lit mountains faintly shine" (W.P.III: 261). If there is a unity of a single day, there is also the unity of the river's life-cycle parallel to the life of the poet. The springs of the Duddon are, of course, its "birth-place" in the first sonnet. Immediately in the second sonnet the Duddon is addressed as "Child of the clouds" whose cradle is decorated by "thy handmaid Frost". In Sonnet iv it is a "cradle nursling" still. By Sonnet v the Duddon is gaining independent status and it is called by its name. As it progresses, the river grows. In Sonnet ix ("the Stepping Stones") it is "a Brook of loud and stately march". By Sonnet xix it is "Lordly Duddon" and it has earned the full title of "pleasant River" by Sonnet xxx. There is a third cycle of time - the early sonnets are sonnets of Spring (Sonnet v - the cottage children in "endless May") and Summer, Sonnet xiii is in June, but then there is a threat of Winter. The "hoar" summits of Sonnet xxxi have already had their comment. These seasonal and daily patterns of time, of course, have their parallel in the personal cycles of the poet.

The final verses, endorsed when the sequence is closed by the "After-Thought", relate to the ending of life. The image of the river sweeping into that "receptacle vast" where it loses its identity, or rather merges it with other waters, is a model or an emblem for the poet in his inevitable voyage to Eternity.

...to advance like Thee;
Prepared, in peace of heart, in calm of mind
And soul, to mingle with Eternity! (W.P.III: 260).

It is of course possible to read and enjoy the sonnet sequence "considered as one poem" and to appreciate the patterns without knowledge of the literary tradition in which the series was composed. That tradition creates another unifying bond between the sonnets. Wordsworth's own notes refer to them as part of a "loco-descriptive" tradition which included John Dyer, and William Crowe. Aubin, in his thorough study of the topographical tradition in the eighteenth century, concludes his chapter on river poems with high praise indeed: "The greatest river-poem of all is Wordsworth's River Duddon (1820) in the form of a series of sonnets" (Aubin, R.A. 1936: 241). The loco-descriptive tradition itself depended on a much older poetry of excursive discussion in verse. Wordsworth makes this explicit. The first sonnet in the Duddon sequence invokes the springs praised by Horace. This mountain stream even in its infancy could be the inspiration of the lyres of the great classical poets. Even earlier in the dedication, the historical mood is set with its commitment to domestic virtues.

Ah! not for emerald fields alone,
With ambient streams more pure and bright
Than fabled Cytherea's zone
Glittering before the Thunderer's sight.
Is to my heart of hearts endeared
The ground where we were born and reared!
(W.P.III: 245)

The characters of classical rural landscape appear from time to time in the sequence. In Sonnet x, in a striking image, "The frolic loves" applaud the homely romance of the Stepping Stones. The Muse of poetry is once more involved in Sonnet xii, "Hints for the fancy", and a "tutelary" guardian is imagined in the rocky clefts described in Sonnet xv. "The old inventive poets", Wordsworth says, might have given the title, Elysium, to the Duddon in its calmer stretches. The same sonnet xx, compares the wilder stretches of the river to a "Bacchanal, from rock to rock/Tossing her frantic thyrsus wide and high" (W.P.III: 254).

The sources of reading which feed the imagery of the sequences are not wholly classical. The sense of a literary, historical past from classical times is combined with the legacy of Wordsworth's reading from travel writers to generate one of the dominant tones of the poems in this sequence. A similar tone is also distinguishable in the three major odes published with these sonnets. The images of a long historical development are born out of the successive phases in the river's progress to the sea. In the infant, early phase the poet recalls a pre-historic time "Thousands of years before the silent air/Was pierced by whizzing shaft of hunter keen!" (W.P.III: 247). Sonnet viii's first line, "What aspect bore the Man who roved or fled", introduces again pre-historic man. More clearly, moving on into times of human folk tales, in Sonnet xi, there is the legend of the baby stolen by elves. A new strain of reference introduces a geographical as well as an historical context in Sonnet xiii, which, again, presents pre-human nature "By wasteful steel unsmitten". In this sonnet, the reference is to the interior of Ontario, a fruit of Wordsworth's travel reading. In Sonnet xvi, "American Tradition", the poet's reading of American exploration again is used to present a South American myth of the deluge, a device to which I shall refer in a later section of this chapter. It is likely that Humboldt's travel accounts were used for this episode. Immediately the next sonnet returns the location to early British history, because the river's journey is now close to Hardknott Pass, with its Roman and Pre-Roman or "Druid" remains. Immediately, in a manner with which readers of the later poems (See Chapter Eight) will become familiar, the historical context is moved into the history of the Christian Church. Here we are shown an example, of the incumbent of Seathwaite Chapel, who is compared with Chaucer's faithful poor priest.

Historical traditions of a more secular kind are awakened in the second, local story in Sonnet xxii, "Tradition", the rural tale of a "love-lorn Maid" tempted to drown in the still waters of one of the Duddon's quieter reaches. Sonnet xxvii, about a ruined noble house with a vanished line of warriors, again employs a traditional tale, belonging to Rydal Hall, according to notes by Isabella Fenwick (W.P.III: 505). By contrast the peaceful history of a Quaker burial ground (Sonnet xxix) receives tribute from the wind and from the chanting river's torrents. One more departure from English history is ventured in the sonnet (xxx) where the poet diverts from the river to visit the Kirk of Ulpha, but merely to provide two images of relief and rest, one from an Arabian palm-tree's shade

and the other from an Indian tree that shields from the heat. The mixture of myth, legend, folk-lore and images from travellers' tales extends the context of this set of poems based on a relatively short and seemingly insignificant river. The diminutive Duddon is enlarged by the array of historical and geographical references. Long after the first publication, Wordsworth remembers with Isabella Fenwick, the spirit in which the sequence was composed and his comment indicates the reverence in which he held this domestic stream:

It is with the little River Duddon, as it is with most other rivers, Ganges and Nile not excepted, - many springs might claim the honour of being its head (W.P.III: 504).

One more dimension must be recorded in considering the unifying, descriptive structure of this sequence of sonnets. It is the personal reverberation for Wordsworth of a set of poems relating to a stream. In his later notes on the poems, he is clear that he was aware of his own individual history in relation to the River Duddon, not only in the sense of what we have already recorded, the autobiographical echoes from childhood onwards, but also because he was undertaking a distinguished subject. This topic was Coleridge's claimed territory, as Wordsworth carefully acknowledged in his later commentary. Coleridge had discussed with the Wordsworth a project to prepare a major philosophical poem, "The Brook", constructed around the history of a river. Wordsworth is at pains not to claim that he had annexed his friend's subject, but, on the contrary, he wished to persuade him still to pursue the task: "May I not venture, then, to hope that instead of being a hindrance, by anticipation of any part of the subject these Sonnets may remind Mr Coleridge of his own more comprehensive design, and induce him to fulfil it?" (W.P.III: 503). The sonnet sequence is in short, a public poem in a tradition appropriate for major poets of the past and, potentially, for a major poet of the present. Modern readers may have to hold that elevated tradition in mind, as they grapple with the sequence and perhaps find it lacking in personal statements. We must be careful in dealing with such a poem not to assume that it is the poetry of a confessional, private tone. Other critics (such as Wesling, D. 1970 and Noyes, R. 1973: 187) have commented on the moral tone of this sonnet sequence, but my view is that this series is the medium for the discussion of public matters. With this in mind, I shall turn next to the set of issues gathering around the dimension of Time, which had such an important meaning for geologist and poet alike.

The Deluge: the beginning of Time?

The Duddon sonnets refer directly to the Biblical Deluge in Sonnets xv and xvi ("From this deep chasm" and "American Tradition"). The choice of this moment in the river's journey for a brief excursion into the origin of the earth is not arbitrary. Within less than a mile up-river from Seathwaite the mountain stream ceases to meander over a broad valley and enters a short, but dramatic phase. Deep-cut gullies divide the river which pours in small waterfalls and rapids through every channel which can take the onward rush of white water. I visited this stretch in early summer at a time of low water, but even then there was an impressive cascade for perhaps a quarter of a mile. Deep clefts in the drier rocks indicate where the river pours at full flood. To the geologists, as I have already indicated in this chapter, there is evidence here of a river surviving changes in geological history. Most striking of all is that this foaming, noisy passage is itself in a wider, but still relatively contained valley between two high crags, Wallow-barrow Crag and the Pen. It was this pair of high rocks of which Dorothy Wordsworth was reminded during the 1820 journey into Alpine scenery, which I have already quoted.

The two linked sonnets, xv and xvi are poetic explanations of one of the dramatic features of this stretch of the river and of the precipitous sides and columnar structure of Wallow-barrow Crag. The poet raises a question: was the niche-life rock surface made by man, perhaps in a time of pre-Christian worship in order to hold a statue, or was it a remnant of a geological catastrophe?

...abruptly cast
Into rude shape by fire, with roaring blast
Tempestuously let loose from central caves?
Or fashioned by the turbulence of waves
Then, when o'er highest hills the Deluge pass'd? (W.P.III: 252).

It would be an unwise geologist who made simple deductions from this passage about Wordsworth's knowledge of doctrines of the origin of the earth. The notion of "central caves" which hold the earth's volcanic powers was put forward by followers of Burnet when they explained the cataclysmic ending of the simple landscape of the primitive earth. Equally, however, more orthodox readings of the Bible would find examples of apocalyptic action by fire associated with God's displeasure at the sinfulness of humanity; the direst witness of such wrath being, of course, the Noachian Deluge. A totally different explanation, Wernerian

theory, also admitted volcanic action in localized settings, with, of course a major explanation of the landscape, "fashioned by the turbulence of waves". Next there is an assumption in this passage from Sonnet xv, which would be acceptable to a religious fundamentalist, that the greatest inundations covered the highest peaks, an assumption not shared by all diluvialists. More important than trying to fit these poetic questions to geological theory, we should note that the passage in Sonnet xv actually and grammatically poses questions: three to be precise: "Was it by mortals sculptured?," "or abruptly cast ...?," "or fashioned by the turbulence of waves?" The questions provide a rhetorical link with the next sonnet.

Sonnet xvi tackles the questions by proposing an alternative explanation, taken directly from Humboldt's South American journey. The opening lines are: "Such fruitless questions may not long beguile/Or plague the fancy..." (W.P.III: 252). This opening is similar to an injunction in *A Guide* about the eventual silting of the lakes: "But checking these intrusive calculations..." (W.Prose II: 182). The sonnet proposes a different explanation of the rock niches - or does it? In fact what Wordsworth established is a possibility of an explanation no more reliable than the Bible's. Humboldt's narrative of the Orinoco Indians' version of the Deluge proposed a surviving Noah-like community of Fathers who rode out the "Inundation wide and deep" and carved their nation's story above the surface of the waters. This primitive anecdote in its turn provokes a linking association with the early history of England at this very point as we turn to the next sonnet. This part of the river near Seathwaite Chapel is overlooked by Hardknot Pass famous for its Roman military remains (Sonnet xvii "Return"). The raven's cry heard by the modern traveller is from the same species associated with Ancient Rome. In this seventeenth sonnet the sequence has begun to move away from a pre-historic and mythical past to the early Roman settlement and to historic, documented evidence. Then, in a rapid sweep of time, Wordsworth takes the reader in Sonnet xviii, "Seathwaite Chapel", to the near-present. The Christian leader, Robert Walker, whose ministry was completed here, presented a model of dedication and vocation. From a Biblical reference to God's Punishment, through a mythic disaster and then on to a pagan past, the sonnet's scene has moved by association to the reconciled present day.

A central view of this thesis is that Wordsworth's "scientific theories" must not be reduced to over-simple statements supported by rapid reading of poetic "evidence". In pursuit of this argument, this is the right moment to consider other references to the Biblical Deluge within the collection of poems of 1820. None will reveal a simple uncomplicated belief in the Biblical story, but the poems do indicate that for Wordsworth, as for the geologists of his time, it was possible to retain a form of belief in a deluge and, more important, for the sake of veracity with the Biblical account, a trust in the covenant between God and a human representative, Noah, which established an ultimately benign destiny for the race.

Perhaps the most interesting allusion to the Flood, because it may reveal some adjustment by Wordsworth in the light of scientific discovery, is the poem "To the same" (second ode to Lycoris), one form of which was published in 1820. The poet seeks the shade of "yon wild cave":

Long as the heat shall rage, let that dim cave
Protect us, there deciphering as we may
Diluvian records; or the sighs of Earth
Interpreting; or counting for old Time
His minutes, by reiterated drops (W.P. IV: 97: 32-36).

This passage has all the appearance of a direct, topical reference to the contemporary theories of the geologists, particularly those of the Professor of Geology of the University of Oxford. William Buckland had espoused the cause of diluvialism publically in an inaugural address at Oxford, published in 1820 as *Vindiciae Geologicae*. This well-circulated text was in the nature of an apology for the activity of geology as well as a gentle introduction to the work of French geologists such as Cuvier and Brogniart. As Cannon (1964) and Marston (1984) and others have commented, science and religion had developed a firm partnership in England. Dean Buckland was a dominant leader in that strong combination. Like Robert Jameson, who introduced Cuvier's work in translation to a wide public, Buckland rejected Huttonian theory and advocated "a revitalized notion, that the Flood was responsible for all recent landscape features and particularly the formation of valleys and "glacial" deposits. The diluvialists became scientific" (Chorley, R. et.al. 1964: 112). Almost immediately, experience and field-work seemed to grace the theory with the practical confirmation of finds of fossil remains of the Deluge. Buckland explored caves in Kirkdale and Paviland and announced that he had found

animals whose bones were "all destroyed together by the waters of the same inundation which produced the deposits of loam and gravel in which they are embedded" (Buckland, W. 1823: 184). Mysteriously there were no human bones. Like Cuvier, he explained away this problem with a simple assertion that human beings "had not established themselves in those countries where the animal remains under consideration have hitherto been found, in the period preceding the grand inundation by which they were destroyed" (Buckland, W. 1823: 231). In essence he both adapted and adopted Cuvier's theories. He transformed "Cuvier's localized past revolution into a unique universal deluge" (Rudwick, M. 1976: 135).

The above account may therefore add some weight to Wordsworth's own terminology - "deciphering as we may/Diluvian records". The story is more complicated however because of the apparent lack of match of dates and the discovery of textual alterations in the poem. There is, first of all, evidence of a very early version of this ode, in a draft as early as 1801, but without the verse to which we have paid attention. De Selincourt and Darbishire date the version of the poem in their edition as composed in 1817 and published in 1820, three years too early for Buckland's Kirkdale Cave hyenas to have become well known. However more recent research by Ketcham (:251) examines the sequence leading to the finally published form, with the extract quoted above inserted in 1827. Therefore there is a possibility of Wordsworth acquiring information about Buckland's discoveries before his final amendment. Wordsworth's interest in strange phenomena was, like many travellers of his generation, always excited by caves. In a period of intense speculation by the geologists, in 1841, he visited the Kirkdale caves with Edward Quillinan (W.W.L.IV: 92). Rupke, points out that in the early nineteenth century caves were not minor oddities of scenery but "primordial features, present since the birth of this earth as a planet, providing essential information as to the manner of its origin" (Rupke, N. 1990: 242).

Some balance of view should however be applied before speleology is added to Wordsworth's many interests. In the 1819 edition of his poems, including "Peter Bell," there are three sonnets "suggested by Mr W. Westall's views of the caves etc. in Yorkshire". These might, at first sight, suggest another occasion for speculation on the Flood. In fact the allusions are wholly mythical or classical. He refers to waters "within the marble belt/Of central earth", - not a theory espoused by practising geologists. Malham Cove, the *locus classicus* for

limestone geomorphology, inspired him to ask if giants had scooped out "this semicirque profound" and to suggest that perhaps they were the same agents who had constructed the Giants Causeway. Gordale Scar again is a stimulus for a classical image:

 thou may'st perceive
The local Deity, with oozy hair
And mineral crown, beside his jagged urn
Recumbent (Ketcham: 277-278).

The only direct connection with geology of these near-contemporary poems to the River Duddon sonnets is a strange coincidence. Mr Westall, whose drawings provided the origin of the three sonnets, was the brother-in-law of Adam Sedgwick (Ward, J.C. 1877: 154).

Rupke makes a large claim for the effect of cave discoveries on the artist: "Men like Wordsworth and Constable, for example, were significantly influenced by geology" (Rupke, N. 1983: 75). I find difficulty with "significantly". The evidence for Wordsworth's belief in diluvialism is, in my view, not overwhelming. Like many of his geological contemporaries, he may have been able to carry easily a degree of ambiguity about the Biblical Flood. If the geologists of the period before the 1830s, when Lyell's work became popular, had achieved a comfortable compromise of beliefs including the Biblical Flood as well as stratigraphical and palaeontological hypotheses, then it is not illogical to expect that intellectuals who read the journals and kept up with contemporary debates on religion might also achieve a similar compromise with which it was easy to live (See Gillispie C. 1951). I have commented already on the likely sources of Wordsworth's knowledge of scientific discovery through the journals of the first two or three decades of the century. Buckland's discoveries were well reported in them. Furthermore he was a visitor to Rydal Mount (R.M.V.: 28 and 91). It is reasonable to conjecture that Wordsworth was well informed in such matters. The mere fact of knowledge of an intellectual system of explanation is, as this thesis should illustrate frequently, no guarantee either of its absorption into a belief system or of its value to the poet's art. The Flood occupies a place in the Duddon sonnets and in the poems published with them or close to them in time, but it takes no more prominent place than mythic theories or classical allusion. In many ways, Wordsworth is calmly absorbing a contemporary excitement and giving it its proper place in the poetic scheme of things, no greater and perhaps

even somewhat less than other explanations that have satisfied the human mind over many years. In the following chapter, I shall consider a major geologist and friend of Wordsworth, Adam Sedgwick, who also had to reconcile his faith with conflicting evidence about diluvial action. Both men also faced a perhaps more challenging phenomenon associated with "deep time" demanding an explanation - the issue of extinction of species.

The World Before Mankind.

Chapter Two provided examples from *A Guide* of Wordsworth's awareness of a longer period of natural life than mankind's own history. There we find references first to a landscape in to which man the hunter makes his first appearance and second to animals that no longer exist. *A Guide* offers a simple non-geological description. Wordsworth asks the reader to imagine a landscape without people when, quoting Thomas West's *The Antiquities of Furness*, "the bellum inter omnia maintained the balance of nature in the empire of the beasts" (W. Prose II: 194). This edenic state was interrupted:

when the aboriginal colonists of the Celtic tribes were first driven or drawn towards it, and became joint tenants with the wolf, the boar, the wild bull, the red deer, and the leigh; a gigantic species of deer which has been long extinct, while inaccessible crags were occupied by the falcon, the raven, and the eagle. The inner parts were too secluded, and of too little value, to participate much of the benefit of Roman manners (W. Prose II: 194-195).

Remoteness protected the mountains, at least from the Romans and perhaps from Celtic tribes, although Wordsworth does not actually say that the Celtic people existed before the idyllically "balanced" natural landscape. What that landscape represents can be seen from this last imaginative paragraph and the one preceding it which I quoted in Chapter Two. The imagination can recreate nature in harmony, richly populated by animals and birds, some of which are no longer part of our experience. This last feature, an acknowledgement of extinction, inevitably conflicts with patterns of plenitude. Wordsworth addresses this issue partly in the Duddon sonnet sequence and partly in two of the odes published with it.

A sense of a landscape that existed before human occupation, even today, is discernable in the upper reaches of the River Duddon. A modern visitor to the

Duddon Valley, travelling from Little Langdale over Wrynose Pass by a metalled road and following the valley from the topmost point of the Pass can not fail to be struck by the difference between this valley and the better-known and perhaps even more striking scenic areas of the Southern Lakes. There is an immediate sensation of remoteness at Wrynose Pass. The human scale is limited and development restricted. Whereas Grasmere, Rydal Water and even Great Langdale are well-visited and relatively populated with tourist accommodation, many farms and, in the last-named place, remnants of quarrying, wide stretches of the col of Wrynose Pass and then the gentle slopes and open pastures around Cockly Beck before the constricted passage of the river at Seathwaite are notably short of human dwellings. If this is true today, and even taking into account post-nineteenth-century rural depopulation, it must have been especially so in Wordsworth's time. He could compare the well-known and the least-known areas of the Lake District. The Duddon Valley's atmosphere of an undisturbed landscape may have suggested to him a time before human habitation. Only the most remote regions, such as the Pass of Kirkstone, could claim the same attention as a landscape of timelessness. Extinction is a natural association for this kind of landscape. The vanished, natural past before human occupation, as well as the vanished Celtic and Roman worlds, is imaginatively revived in this collection of poems.

I have already made a few comments about the extension of the dimension of time through myth and classical legend. In the sonnet sequence these images enlarge the valley's life to a period at the edge of human time, but Wordsworth presses beyond that frontier. There are direct representations of the Duddon before the first hunters arrived. As early as Sonnet ii the uppermost high levels of peaty, wild grassland and exposed rocks where the Duddon's many springs arise, are seen as once the habitat for:

Those mighty forests, once the bison's screen,
Where stalked the huge deer to his shaggy lair
Through paths and alleys roofed with darkest green;
Thousands of years before the silent air
Was pierced by whizzing shaft of hunter keen! (W.P.III: 246-247).

Wordsworth's own note of 1820 explains that the deer "is the Leigh, a gigantic species long since extinct" (W.P.III: 246). Canon Rawnsley in the nineteenth-century, the indefatigable researcher into the locations of Wordsworth's poems, noted that there were fragments of birch-trees exposed by the stream, giving

evidence of former forests (Knight: 1896: 232).

After five sonnets describing the blissful harmony of wind , trees, bees and small birds, with children at play at Cockley Beck, the peaceful scene is again intruded upon by a figure of the first human intruder in Sonnet viii: "What aspect bore the Man who roved or fled,/First of his tribe, to this dark dell - (W.P.III: 249). A little further in "Open Prospect" Sonnet xiii, the undisturbed pre-human landscape appears again, but in another place at another time:

But when bleak winds roar
Through the stiff lance-like shoots of pollard ash,
Dread swell of sound! loud as the gusts that lash
The matted forests of Ontario's shore
By wasteful steel unsmitten (W.P.III: 251).

This non-human distant landscape is immediately balanced in the final lines of the sonnet by the actuality of the human scene gathering around "the warm hearth" with the laughing "generous household" of Donnerdale people. I have already commented on the most primitive reference of all, on the flood, in Sonnets xv which follows almost immediately.

These brief references to the older world before humanity emerged and before extinction took place are met in a different form in the odes that were published in the same volume as the sonnet sequence. I have already elaborated in Chapter Two on "Ode: The Pass of Kirkstone" with its opposition of natural external forms and the transitory powers of human armies, but it is instructive to put alongside that substantial ode the briefer, final poem in the sonnet sequence, "After-Thought":

I see what was, and is, and will abide:
Still glides the Stream, and shall for every glide;
The Form remains, the Function never dies;
While we, the brave, the mighty, and the wise,
We Men, who in our morn of youth defied
The elements, must vanish; - be it so! (W.P.III: 261).

In a sense the sonnets and this "Ode: The Pass of Kirkstone" may be about a world that is past, the world of triumphant Roman armies or the arrogant warriors of remote castles, but they also celebrate an ever-present natural world,

depleted though it is by extinction. There is a continuity with the pre-historic past, filtered through the poet's memory.

The "Ode: Composed upon an evening of extraordinary splendour and beauty", written in the summer of 1817 and perhaps completed at the end of that year (Ketcham: 258), also links the remote Edenic past, the poet's youth, and the present. The extraordinarily beautiful evening is not a transitory moment's glimpse of beauty - "But 'tis endued with power to stay." It seems to originate in a blissful time when angels sang in perfect harmony linking earth and heaven. Their perfect song could not, however, be more moving in its effect on the poet than the present evening scene: "This silent spectacle - the gleam -/The shadow - and the peace supreme" (Ketcham: 258). The theme in the second verse paragraph is again that of linking past and present, heaven and earth within a patriotic context, a typical notion in Wordsworth's later poetry:

From worlds not quickened by the sun
A portion of the gift is won;
An intermingling of Heaven's pomp is spread
On ground which British shepherds tread! (Ketcham: 259).

If we omit the third verse printed in the 1820 (River Duddon edition) and pass straight to the third verse of the Ode as it appeared, according to Ketcham, in the Dove Cottage manuscript of 1817, the time linkages are more striking. These visions "from some celestial urn" (Ketcham: 257), were the colour of the poet's own morning, of his "blissful infancy". They restore him, at least temporarily, rejoicing in a "second birth", then the "Night approaches with her shades". A powerful association for any reader of Wordsworth must be the echoes of the "Ode: Intimations of Immortality". For the reader of the later poems, the interest of this ode of 1817 is in its published association with the River Duddon sequence of 1820, depicting the permanence of the landscape, a kind of immortality overriding extinction and change.

Immortality was in the poet's mind in a companion ode in the 1820 River Duddon publication, sometimes called "The Vernal Ode", or "Ode, 1817". Wordsworth himself directs the reader to its theme in his dictated note to Isabella Fenwick. This poem was "Composed to place in view the immortality of succession where immortality is denied as far as we know, to the individual creature" (Ketcham: 544). This is clearly a theme of some importance to those

beginning to feel anxiety about the evidence of extinction in palaeontological studies, but we should concentrate here on what the poet selects to convey immortality. The first images are again classical. Like the previously considered ode, the angelic is evoked. A landscape of perfection is praised, it is the perfect abode for angels, one of whom has descended to earth. The poem is in fact the song of this imagined figure, appearing not in reality, but "in presence of that spiritual eye/That aids or supersedes our grosser sight" (Ketcham: 237). This is a country of the eternal and the inextinguishable. In the text of 1819, it continues, the stars are "free from semblance of decline". However, in a much later emendation of 1832/1836 there is a new element introduced - even the stars may be subject to decay. In this later, amended version, the stars may fade and be extinguished, as contemporary astronomy tells, but the Divine intention is to send out through their successors tokens and images of perpetual peace:

What if those bright fires
Shine subject to decay
Sons haply of extinguished sires,
Themselves to lose their light or pass away
Like clouds before the wind
Be thanks poured out to Him whose hand bestows,
Nightly, on human kind
That image of endurance and repose (Ketcham: 238).

Eternity is now internal, through the eye of the beholder. This poem, amended in Wordsworth's old age, clearly had a long time-span in mind, as long as the death and renewal of stars, but the Almighty's benevolence to humanity makes use of these vestiges, even of these, the longest traces of extinction.

As the ode proceeds, the theme moves from greatest to smaller things. Survival is the eventual theme of this ode, in the humble shape of the bee. The bee's murmur to the drowsy ear of the poet-angel:

A slender sound, yet hoary time
Doth, to the *Soul* exalt it with the chime
Of all his years; - a company
Of ages coming, ages gone;
Nations from before them sweeping
Regions in destruction steeping; (Ketcham: 240).

The humming bee and its primitive origins complete the ode. The bee's ancestry is traced to a time of earthly bliss, perhaps even "Thy sting was needless then, perchance unknown" (Ketcham: 241). Angels and men mixed familiarly and

there was a "universal heaven" combining earth and stars in a pre-lapsarian serenity. This idyllic scene may be of a long-lost Eden, but the present-day scene is in England and the angel of the opening lines has descended to play his golden harp in a very earthly spot, within an English landscape (The angel himself is compared to a firm old British castle tower). The reality of the English landscape in an April evening provides the setting for the play of fancy on the "spiritual eye" of the poet. Immortality as a theme returns in the final lines, this time about the poet's own soul. "Though yet confined to earth", the poet's soul "Rejoices in a second birth". Although the final line threatens extinction ("And night approaches with her shades."), the poet has been re-born in this very present world. Extinction and decline are not ignored, but the living present triumphs because it has two vital sources for survival: the actual English landscape and the receptive and creative soul of the poet.

Trickett has noted: "Here in "The Vernal Ode" the creatures are singled out with an extraordinary sense of the history of the kind" (Trickett, R. 1990: 48). Jonathan Wordsworth expresses the same feeling of the contact between spirit and reality, when he writes "the clinging to the palpable of which Coleridge complained is often a saving grace of this later Christian poetry" (Wordsworth, J. 1982: 35). It is this connection between the spiritual timeless and the present actuality, which may be extinguished in one form but returns in another, that makes a further elaboration of the themes of duration and decay, which I have traced in the poetry and prose of the decade preceding the publication of the Duddon sonnets and their accompanying odes.

To return to the Duddon Sonnet sequence is to endorse this sense of continuing creation. One of Wordsworth's few humorous notes added to his poems says, inadvertently perhaps, much about the special landscape that reaches back, contains remnants of the extinct, but also stretches forward. Concerning the dramatic phase of the River Duddon near Seathwaite, Wordsworth notes:

The chaotic aspect of the scene is well marked by the expression of a stranger, who strolled out while dinner was preparing, and at his return, being asked by his host, "What way had he been wandering?" replied, "As far as it is finished!" (W.P.III: 510).

This anecdote reminds us that the Duddon represents a valley partly out of time. It is, however, also grounded in the present, a point to which I wish to return at the end of this chapter.

One other aspect of the River Duddon and its mysteriously unified valley deserves attention. This is the benignly ruled direction of the created world, a topic which will be raised in the next chapter about Wordsworth's closest geological friend. There is a presiding sense of reconciliation throughout the sonnet sequence. The overall pattern of the collection from Dedication to "After-Thought" is a framework for the theme of time, but, although time is deeper than human history, the purpose of the sequence is to reassure that there is continuity from non-human past to human present - "The Form remains, the Function never dies". This divine contract with humanity is not like God's with Noah, a promise of undisturbed plenitude and harmony until the apocalypse. Wordsworth's intimation of the world order is a reconciliation between human tradition and a law-governed physical world. In the dedication of the sonnets, he celebrates a pact of concord, which includes both forms of control:

Hail, ancient Manners! sure defence,
Where they survive, of wholesome laws;
Remnants of love whose modest sense
Thus into narrow room withdraws;
Hail, Usages of pristine mould,
And ye that guard them, Mountains old! (W.P.III: 245).

The human party to the contractual order established in the world is never absent in the sonnet sequence. Furthermore, as I shall note later, it is domestically confined "into narrow rooms": the traditional Christmas minstrels of the dedication, the children safely playing at Cockley Beck, youth and age at the Stepping Stones, the shepherds and their families, Wonderful Walker's vocation and the folk-tales associated with the Duddon. Nature's part in the balance is ultimately benign and reconciled, but stands apart as a guide in a position of authority. The Duddon itself can be angry and violent, a force with its own, far from domestic imperatives. Sonnet xiii, "Open Prospect", portrays "angry Duddon sweeping by" the hamlet where people have withdrawn to share companionship with each other "when bleak winds roar/Through the stiff lance-like shoots of pollard ash/Dread swell of sound!" (W.P.III: 251). At Seathwaite, the river, to use the poet's own phrase, changes its "temper" and becomes Bacchanalian in its wild excitement. Then, further down-stream at that symbol

of human continuity and peace, the Kirk of Ulpha, the unseen river "gently roars".

The separateness of the river with its own powers and moods, does not mean it is never an agent of peace and stability. The river too is both reconciled and a reconciler. The upland springs amidst the bleakest and most severe mountain passes are protected by the "thy handmaid Frost" and the "whistling Blast" that destroyed the mighty pre-historic forest "guards" the infant Duddon (W.P.III: 246). Despite the inauspicious origins in the high fells, the river itself is a creator of harmony and a benign worshipper of Nature:

Yet thou thyself hast round thee shed a gleam
Of brilliant moss, instinct with freshness rare;
Prompt offering to thy Foster-mother, Earth! (W.P.III: 247).

By Cockley Beck there is a reciprocity of care. The alders, the ash trees, and the birches have created a shelter for the river's channel which, in its turn has tempted human dwellings to be built safely "mid sheltering pines" (W.P.III: 248). The stream progresses giving to the landscape, feeding the flowers (Sonnet vi) which, in their turn, refresh the bees and small birds. By Sonnet viii the stream's benign purpose is clearly revealed. Whatever it witnessed of pagan rites, its function "was to heal and to restore/ to soothe and cleanse, not madden and pollute" (W.P.II: 249). This is no pagan stream embodying a grotesque god. Its healing function is directed towards nature itself as well as to the works and culture of humanity. Man may do the river harm - the sheep-washing in Sonnet xxiii pollutes the stream and the noise destroys the peace of the valley, but "the stains are fugitive" (W.P.III: 256). The Duddon blesses nature itself: When there is drought the Duddon's function is healing. Its voice is soothing and practical:

whose murmur musical
Announces to the thirsty fields a boon
Dewy and fresh, till showers again shall fall (W.P.III: 254).

This sonnet sequence presents a cyclic, ultimately non-catastrophic view of nature, but not absolutely rejecting extinction or catastrophe, for there are the far-off echoes of a time when the Deluge may have altered the whole world (and the word "may" is important). The sequence is an affirmation that the processes of Nature are ultimately renewing and long-lasting. The accord of Nature and divine purpose would find a ready ear in a scientific community prepared to

explore the great forces of nature, but confident that their enquiries would lead them to conclusions about ultimate truth and Divine intention, and would confirm their traditional beliefs.

The Domestic Virtues.

If nature, in the form of the river is benign, what are the human qualities supported by this irenic stream? The human focus of the sonnet sequence, as the quotation from the dedication indicated, is one of "a narrow room". These sonnets are the indicators of domestic virtues, qualities gradually dominating the verse of Wordsworth's middle and later years. In one sense, this is no major change of attention from earlier commendations of the appropriate scale for human virtue. From "Michael", "The Ruined Cottage", the domestic scenes of "Ode: Intimations of Immortality" to the Pastor's family idealized in *The Excursion*, there is a commitment to the human affections particularly in the essential rural family secured by a freehold tradition. The Duddon Sonnets sequence endorses these virtues. The historic past with its battles and bloodshed may be heroic, but the Duddon's timeless journey is not created to serve merely as a memorial to a warlike past. This small river remembers and scorns "power usurped" (W.P.III: 259), but the burden of the sonnets is in the praise of small-scale domestic harmony.

One group of sonnets - and it is a useful strategy to take the sonnets in groups - illustrates this tendency to turn from a violent public past, however rich a source of inspiration it may have been for earlier poets. Sonnet xxviii is the occasion for the poet continuing on his way after noon-time idleness. The fresh start is in itself a matter of trust and commitment like the qualities that underlie human bonds:

Glad meetings, tender partings, that upstay
The drooping mind of absence, by vows sworn
In his pure presence near the trysting thorn -
I thanked the Leader of my onward way (W.P.III: 258).

The next immediate stimulus is the distant sight of a ruined castle, which can still be glimpsed from the roadside about a mile up-stream from Ulpha Kirk: "No record tells of lance opposed to lance" (W.P.III: 258). This is small-scale episode of local history that has gone by unrecorded. Tribute is paid to the

nameless heroes by the wind and by the torrents of the river. The Duddon's burden is not the praise of the colourful past, its purpose is the restoration of "lawful sway". The restoration of law is reinforced in the following Sonnet xxx, "Who swerves from innocence, who makes divorce/Of that serene companion - a good name" (W.P.III: 259). This sonnet is ostensibly established to justify the traveller-poet departing temporarily from the broadly meandering river in order to keep to the road that leads directly to the Kirk of Ulpha. Its effect is, however, much more than the drawing of a traveller's map. It is a sonnet about trust and friendship and renewal of ties. This sequence within a sequence ends with Sonnet xxxi, which praises the Kirk of Ulpha, with its pastoral graves and its detachment from the "unseen River" and from the broad-sweeping vista of "distant moon-lit mountains" (W.P.III:260).

The virtues in this sequence are domestic qualities of control and restraint. One of the most memorable images in the sequence, a striking figure applied to a personification of what could be judged as a fundamentally Wordsworthian theme, the memory, illustrates this aspect of the middle to late years. In Sonnet xxi, the poet remembers past visits to the Duddon. Even this personal stimulus is low key: "A whisper from the heart/That told of days long past" (W.P.III:255). The light by which he now remembers the past is "tranquil"; joys may start into new being but they are "smothered", yet there is action in the language that describes memory:

From her unworthy seat, the cloudy stall
Of Time, breaks forth triumphant Memory;
Her glistening tresses bound, yet light and free
As golden locks of birch, that rise and fall
On gales that breathe too gently to recal
Aught of the fading year's inclemency! (W.P.III:255).

Wordsworth's horse of memory is restrained in two ways in its breaking forth from the past. Its "glistening tresses" are bound. The winds of the simile, which greet the freed spirit of memory, are gentle reminders, incapable of evoking the fears of the winter to come. After all, this sonnet is not exclusively about past visits to the Duddon. It is a poem of the present ("once more do we unite"), a domestic, restrained present, but one that is joyous in its own way. Is it fortuitous that after this sonnet of emotions recollected and recreated, that the following sonnet in the sequence, Sonnet xxii, is about the drowned girl of a traditional tale who perished by excess of feeling? Immediately, the opening

lines of the next sonnet xxiii, dismiss "sad thoughts" and transfer the scene to the boisterous and mundane human work of sheep-washing.

Rachel Trickett writing about the language of the later poems and, in the following quotation specifically referring to the later narrative poems, illustrates a similar concern with everyday matters:

...a domestication of the heart and soul, a new simplicity and tenderness which saw in the world about him not "unknown modes of being" but familiar presences intimately understood, day to day existences, with all the dignity of the old characters and figures encountered in what Pater has called that "strange, passionate, pastoral world" of the early Wordsworth (Trickett, R. 1990: 50).

I can not disagree with this judgement of the tone of the later poems, on the contrary I find it strikingly confirmed in "The River Duddon: a Series of Sonnets". There is, however, one more aspect of "familiar presences". The Duddon Sonnets are about a known place and an actuality that is more closely associated with a particular stretch of landscape than almost anything else that Wordsworth wrote previously. Various components of *The Prelude* (the Alpine experiences, the location of childhood incidents, the ascent of Snowdon) are identifiable by places on a map. *The Excursion*, as I tried to explain in Chapter Four, follows a route which may be located in the Langdales, Blea Tarn, and in Grasmere vale, with the last-named peregrination somewhat rearranged for dramatic effect. The Duddon Sonnets however depend for their movement upon each actual stretch of the river from source to sea. We find a double rooting of the poem in the landscape. The river and the surrounding crags and hills are in sequence, place by place, the finger-posts of the poetic journey. The history of the valley provides the second set of guide-lines for the path of the sonnet sequence. The river and the rocks have two histories - a geological and a human history. These two histories of this unique landscape create a form of immortality. The poet too, who has recreated the river and its story by his sonnet sequence, also has a form of eternal life. Like the river's own final journey into Duddon Sands, the ending for the poet, in "After-thought", is in a vaster scheme. The individual has been taken up into a grander design, echoing a Miltonic line: "We feel that we are greater than we know" (W.P.III: 261). Individuality is, however, not entirely lost. For the poet "something from our hands" may "live, and act, and serve the future hour". For the River Duddon there is its distinct and individual history. The reader can "walk" the Duddon

valley step by step. It is not a river in the mind, but an actual place -" the Form remains, the Function never dies".

In the years that followed the 1820 publication, the closely observed localities of the English countryside became a significant feature of one mode of English poetry. One thinks of John Clare's poems, describing a small restricted patch of the Northamptonshire countryside so closely that later readers can identify actual fields (see Grainger, M. and Chandler, J. 1988). Hardy's poems also come to mind. As anyone who has followed the love poems about his Cornish experiences knows, they are remarkably close to the present-day map of Cornish roads and village names. In that tradition, and even more so because of his Lakeland inspiration, is Norman Nicholson, whose own poem "To the River Duddon" is created out of the landscape lived in and written about by his predecessor (Nicholson, N. 1944: 16-17, Note 4). Wordsworth, in these later poems, seized on the actual, present and past, and created security. In the next chapter, I shall turn to a geologist from a younger generation of geologists than Hutton or Greenough, who also sought in actual experience confirmation of faith and support for confidence in the Divine direction of the world.

CHAPTER SEVEN : THE POETIC GEOLOGIST "SCHOOLED BY NATURE": ADAM SEDGWICK AND WILLIAM WORDSWORTH.

In 1847, the eminent geologist, the Reverend Professor Adam Sedgwick, recovering from a period of ill-health in Bath, enjoyed a chance encounter with a dear, old friend: "I have been interrupted nearly two hours, very pleasantly by Mr Wordsworth. I hope to spend the greater part of tomorrow in his company" (Clark, J. and Hughes, T.M. 1890 II: 122). We know nothing about their discussion. Although we appear to know more about what they discussed when they met in the Lake District about twenty-five years previously, we are not really much better off for reliable information. We can only rely, for the most part, on chance references in letters, with their clear expressions of affection and evidence of undoubted warmth, if we wish to recreate a meeting of minds. One important source, rich in the way geology was presented to the poet, is Sedgwick's series of "letters" on the geology of the Lake District published with the sixth edition (1842) of Wordsworth's *A Guide* (Sedgwick, A. 1842). When the task was completed in a later edition, Sedgwick ended with an eloquent tribute to three departed Lakeland men: John Dalton, Robert Southey and William Wordsworth. Two years later, on visiting the poet's grave, he recalled what the poet meant to him as a geologist and as a friend. It is this meaning that this chapter attempts to explore.

In many but not all ways, Wordsworth and Sedgwick were similar in origin and by education. Sedgwick was born and raised in Dent in the Yorkshire Dales. He too attended a good local grammar school, before going away to Sedburgh School at the age of sixteen. One passage from his unpublished attempt at an autobiography is Wordsworthian in its description of a country boy's life. We have to remember that, although the geologist might not have read *The Prelude* before he wrote this passage, he might well have known many of Wordsworth's shorter poems which paint an idyllic child-life of a similar kind:

One of my early employments in a half holiday, when nutting in Dent woods was, as I well remember, collecting the conspicuous fossils of the mountain limestone... I almost lived out of doors. At fourteen years old I was trusted with a gun and coursed over the heathy moors the whole autumn day. I was a fisherman too at this age and was particularly careful to obtain the exact feathers from the smaller birds which were considered the most killing flies for trout grayling... Nor, though I ought to confess it with some

reluctance - save that I never had an unworthy selfish thought in the matter beyond the joy of sport - was I quite free from the crime of poaching snares for rabbits, hares, pheasants. But to this day I like to hear the click of the fowling piece and as I pass a mountain burn can I scarcely help speculating in what holes the trout lie (C.U.L. A.S.: Add 7652: 15-19).

In the same fragment of autobiography Sedgwick is proud to identify his ancestry with the "statesmen" of the Yorkshire Dales, "Yeomen living on their own property". Like Wordsworth's family before bereavement and debt dispersed the children, the Sedgwicks were independent Northerners. He noted that a rural childhood implied no separation from cultural life, claiming that his father had met Samuel Johnson and Christopher Smart (Note 1).

The development of the friendship between the two men did not spring directly from a common origin in the north of England, although it may have encouraged the affinity to grow. It has been long recognized that they met in the 1820s and continued to correspond. Because in the histories of science the facts of their acquaintance and its origins are not fully elaborated, this chapter begins with a brief documentation of the origins of their knowledge of each other.

"The happiest summers of my life".

The first recorded meetings between the poet and the geologist in the early 1820s appear to have laid firm foundations for a life-time's friendship, but they were preceded by the reputation of the Lake Poets. Although Sedgwick visited the Lake District on three occasions, in 1813, 1817 and 1819 (Clark, J. and Hughes T.M. 1890), he does not appear to have made the first contact with the poet before the 1820s. He had, however, met John Wilson (alias Christopher North) and he may have visited Southey. His letters tell us that he was fully aware of the "Lake poets". In a letter of 1827 to Miss Isabella Sedgwick, he mentions meeting Crabb Robinson in 1811 at the home of Thomas Clarkson, who was well known to the Wordsworths. Mr and Mrs Clarkson, he records, told him about Wordsworth, Coleridge, Southey and Lamb: "I afterwards became acquainted with the Lake poets and I honoured them much, tho' never an idolater of them" (Clark, J.W. and Hughes, T.M. 1890, II: 427). He also records some frustration at failing to meet Wordsworth in 1817.

The summers of 1822, 1823 and 1824 were devoted to major field excursions in the Lake District and it was on these excursions we are led to believe by Victorian and twentieth-century historians of science, that important discussions took place as they walked together over the hills. Sedgwick was later to write, in vigorous Victorian style about these meetings. All the evidence intriguingly is from Sedgwick, almost nothing from Wordsworth. The poet wrote to Sedgwick almost twenty years later to ask him to fulfill a promise he had made in the 1820s to write some additional geological material to add to the writer's *A Guide*. The first three "letters" were produced for the 1842 edition of *A Guide*: two more geological "letters" accompanied later editions. More attention will be paid later in this chapter to the substance of these essays on geology, but for the present purpose they reveal not only that the commitment to a specialist contribution entered into in the period between 1822 and 1824 was serious, but also that the themes the two men discussed continued to be relevant to the geologist in 1842 and onwards. Sedgwick applies a significant phrase, the "universality of nature", to his own beliefs and to Wordsworth's in the opening remarks to the first "letter". We can presume this topic was part of their earlier discourse. Some geologists, he has to admit, have closed their eyes to the loftier purposes of science: "...and this I know, is no part of your philosophy, for no one has put forth nobler views of the universality of nature's kingdom than yourself" (Sedgwick, A. 1842: f3). In correspondence he refers also to the passage in Book III of *The Excursion* where Wordsworth condemned field geologists (W.P.V iii: 173-189). Wordsworth's reply was reassuring and good humoured. He meant only to refer to mineralogists and in any case was writing through a character. We may assume at this point that *The Excursion* may have entered their discussions.

This correspondence does not produce weighty evidence about Wordsworth's and Sedgwick's exchange of ideas in the 1820s, but for one modern historian of science enough for a pleasing picture:

He [Sedgwick] loved to roam in the hills as much as did the poet himself, and he loved to have Wordsworth with him... So we have the romantic but true picture of the aged sage and the young geologist tramping over the Lake District together, the geologist quietly geologising, while the poet tried out romantic thoughts (Cannon, S.F. 1978: 8).

Since, in 1824, the poet was only fifty-four, and the geologist all of 37, it may be necessary to reduce this picture in emotional scale a little. We do not have much evidence about the frequency of their meetings during those summer months. All the evidence so far studied comes from letters and reported reminiscences of Sedgwick in his later years. They give us perhaps a tidy version of the discussions that took place over dinner, on the road to Keswick and, even more poetically, as they climbed to the high peaks. Sedgwick, as he prepared the "letters" to accompany *A Guide*, remembered, or even perhaps reconstructed, the experiences when Wordsworth joined him in:

...many a lusty excursion and delighted me (amidst the dry and sometimes almost sterile details of my own study) with the out-pourings of his manly sense, and with the beauteous and healthy images which were ever starting up within his mind during his communion with nature, and were embodied, at the moment, in his own majestic and glowing language (Clark, J.W. and Hughes, T.M. 1890 I: 249).

This rich memory is, of course, about twenty years after the events. What contemporary evidence is there for the actual meetings and their significance at the time?

The field notebooks, now kept in Cambridge University's Sedgwick Geological Museum, are a source of information, however partial. The notebooks stretch from 1819 to 1846. They are working field-notes with dates, locations and lists of angles of geological "strike", with occasional comments on mineralogy [Note 2]. The sections of the notebooks devoted to the Lake District excursions occasionally record his meetings with friends and colleagues and it is to these references that I have looked for evidence of the occasions of meeting Wordsworth on his home ground. Although Sedgwick's own statement in letters to Jonathan Otley (Ward, J.C. 1877: 154) or in the "letters" accompanying *A Guide* suggest and even state that 1822 was the first recorded meeting, the notebooks' evidence supports the first meeting in the Lake District as being in the summer of 1823. In 1822 in any case Sedgwick was working in a different section of the District a long way from Rydal and Grasmere, visiting Eskdale, Bootle, Whitehaven, St Bees, "Wastdale", the Duddon Valley and Kendal. In 1823 however, a singularly wet year ("toujours il fait mauvais temps" 14 August, 1823) he records: "dine with Mr Wordsworth" on 24 August and "breakfast with Mr Wordsworth" on 26 August, before travelling along Great Langdale Valley and returning to Rydal. After various outings to Coniston, in

"furious tempest and heavy rain", Sedgwick returned on 6 September to Grasmere to "drive with Mr Wordsworth to Keswick", from whence he walked to Bassenthwaite Lake and met "Mr and Mrs Southey". He was accompanied by Jonathan Otley at this period and, after various travels across high pikes, completed the season at Penrith, leaving for Cambridge on 23 September.

The 1824 geological season in the Lakes began earlier for Sedgwick. By 8 June he arrived in Kendal and, after riding on 10 June to Little Langdale and ascending "Wrynose", he descended to Rydal. We may conjecture that he stayed with the Wordsworths because on the 11 June he notes: "ascend with Mr Wordsworth from Rydal Mount, noting the angles of slate beds with the aid of a compass and descending to Grysdale Tarn". On the 12th he drove to Easedale and on 13th June, a Sunday he "attended Grasmere Chapel with Mr Wordsworth". The 14th June was a day of "mauvais temps" again but on the 15th he called on Mr Wordsworth and a Mrs Watson "dined them at Kendal" (corrected to "Ambleside"). The following day he and Wordsworth ascended Loughrigg Fell where he may have noted Wordsworth's philosophy, but certainly recorded "indications of dip are contradictory near Kirkstone at top of pass." The rest of June 1824 took him to Patterdale, Halstead, Shap, Bampton and Keswick where again he worked alongside Otley, but took time on 28 June to walk down to Derwent Water with Southey in order to see one of Otley's specialities, a Floating Island. That evening he dined with Southey. On 3 July, he and Otley took detailed observations of a Floating Island and confirmed "all the facts agree with Otley's observations." A little later that month, 12 July, he again dines with Southey. After a month around Skiddaw, Buttermere, Scale Force, Ennerdale and Bassenthwaite, he packed up his specimens on 5 August.

These records of contacts between Sedgwick and Wordsworth may well be incomplete. The notebooks are not personal diaries, but working records of geological observations. Nevertheless, they give some substance to the view that the two chief summer contacts between the two men were 1823 and 1824, not 1822. However they do little to answer the question whether Sedgwick had met Wordsworth in Cambridge or elsewhere previous to dining with him on 24th August 1823, although it is unlikely that he went unannounced or unprepared for supper at Rydal Mount. What is useful is the evidence in the notebooks of the intermixture of close, objective observation of stratigraphy alongside social and, at moments, architectural observations. The notebooks' main interest for

historians of geology must be their record of field techniques and the gradual development of regional geological mapping and surveying. For the purposes of my thesis, the notebooks of the early 1820s fill out the picture of particularly rich years in the development of an influential geologist of the early nineteenth century, years when happily he came to know the mature poet, his family, and his friends. These were the years of intense advancement in geology for the relatively newly initiated Professor of Geology.

At this time life-long friendships with other Lakelanders were established. In addition to the notebook references already indicated, there are a number of later letters to Jonathan Otley (See Ward, J.G., 1877). Sedgwick and Otley worked together determining technical features such as cleavage in slates and the direction of strike. The mention of Otley, whose work was known by the Wordsworths and who may have accompanied Greenough in the Lakes (See Carlyon, C.: 1836 I: 116-117 and index Volume IV 1858), should remind us that Sedgwick was not short of company on his travels. It was a time of maximum attention to the Lake District by natural scientists as well as by tourists, and sometimes the two roles coincided. As well as Sedgwick's meeting with professional guides, such as Otley and McCulloch, there were records of distinguished parties visiting the by now famous landscape. Sedgwick's Trinity College colleague, Whewell, notes seeking Sedgwick in 1824 a few days after his own party had visited the Wordsworths at Rydal Mount and the Southey's at Keswick. Sedgwick also remembered an historic meeting with John Dalton near the summit of Helvellyn, and, on a visit to the poet, Southey, he shared in "the simple intellectual pleasures of his household, and profited by his boundless stores of knowledge" (Clark, J.W. and Hughes, T.M. 1890 II: 248). These were years of richness - "the happiest days of life" (Sedgwick, A. 1842: 54), not only because Sedgwick was establishing a reputation in the growing scientific field of geology, but also because his health was improving. The ever-widening circle of stimulating friendships for this very gregarious geologist probably contributed more than any other factor to his sense of well-being.

The list of the recorded meetings between the two men after the 1820s is not continuous, although it spans a long period of their lives. We are not in the fortunate position of having letters referring to all their meetings. For instance, we do not know how many times Wordsworth met Sedgwick at Trinity College during his visit to the Master's Lodge, when Christopher Wordsworth was

Master of Trinity. The account of the Wordsworth's first visit to Christopher at Trinity in 1820 is provided by Moorman (Moorman, M. 1968 (1965) II: 327ff). It is safe to assume that Wordsworth and other Cambridge scientists met at Trinity College at intervals perhaps as early as the winter of 1820 and subsequently. In a letter written in the winter of 1830 to William Rowan Hamilton, Wordsworth records a visit of over a month to Trinity College and of meetings with the mathematician, Professor Airy, with politicians and literati; "of science I can give you no account though perhaps I may pick up something for a future letter" (W.L.V: 354-355). A similar letter of a few months later, also to William Rowan Hamilton, the Dublin scientist, confirms that he met Sedgwick ("that able man, the Geologist, Professor Sedgwick") and other Trinity scientists in Cambridge (W.L.V: 398). Wordsworth was involved in correspondence with Whewell in 1834 and, indirectly, referred to Sedgwick in respect of reforms of the University's religious regulations (W.L.V: 710 and see Chapter Nine). The poet was sufficiently in good standing to feel confident in expressing severe disagreement with the University reforms supported by Sedgwick (W.L.V: 707-708). In March, 1842 there is the necessary correspondence between Wordsworth and Sedgwick about the "letters" to accompany *A Guide* followed by occasional meetings in the last years of the poet's life.

Direct face-to-face meetings are not the only ways by which old friends keep in touch. The people with whom the geologist was familiar, and from time to time conversed frequently, coincided with many of Wordsworth's circle. I have already referred to Sedgwick's early connection with Crabb Robinson, the Clarksons and Southey in 1811. One friendship which Sedgwick shared with Wordsworth, was that of Sir Walter Scott. To Sedgwick, and to many of his contemporaries, Scott was a figure of heroic proportions. Sedgwick was one of the chief organisers of a fund to erect a memorial to Scott, a project which must have pleased Wordsworth. The form of the memorial was the project to purchase Abbotsford for the nation (see letter from Sedgwick to Roderick Murchison in 1832, C.U.L. AS, Add 7652). Sedgwick's literary interests were wide like Greenough's and he had an interest in poetry other than Wordsworth's, but he is outshone in this respect by Whewell, as we shall see in Chapter Nine (also see Note 5).

Other names in Sedgwick's letters or notebooks of people known to Wordsworth are Samuel Rogers and Hartley Coleridge, (Clark J. W. and Hughes T. M. 1890 I: 488 and see a poem by Hartley Coleridge about Sedgwick in Speakman, C. 1982: 1). One final strand in the fabric of friendship comes from a much higher social sphere. In later life Sedgwick was able to proceed on field studies from the elevated base-camp of Lowther Castle. The connection of the Lowther family with the Wordsworths' fortunes and Lowther's later patronage of the poet is well known. Similarly, but more firmly in the rich, but less elevated middle-class, is the close friendship generated by the Marshalls of Hallsteads. In that civilised Lake District home, William Rowan Hamilton, William Whewell, Sedgwick and the Wordsworths met as I shall illustrate further in Chapter Nine.

I could continue constructing specific networks of friends of the two men. What is more important to recognise is their shared presumptions and the social culture in which they both engaged. Particularly because of the Wordsworths' close connection through Christopher with Trinity College, with the University and with the complicated culture of Anglicanism, the family would have been very familiar with Sedgwick's other non-geological life, the world of the canon of Norwich Cathedral. The power of this connection arose from something which could all too easily be summarized as "spirit of the times". Walter Cannon and David Allen have identified what they call "the Cambridge Network" (Canon, W. 1964 and Allen, D.E. 1978) represented prominently by Herschel, Babbage, Peacock, Airy, Whewell and Sedgwick himself (See also Morrell, J. and Thackray, A. 1981 on "Broad Church" associations of this group). We can be reasonably certain that, although the scientific publications of this close group were probably not of detailed interest to Wordsworth, the popularisation of their work and, more important, their general stance in relation to belief and to social issues was generally well known. These thinkers were not seen to be disruptive of the world-view that the poet held, a view resting on a trust in Divine Wisdom and a modestly progressive but not revolutionary nor materialistic social philosophy. On the contrary, the Cambridge scientists were able to confirm and stabilize that world-view by their scientific endeavours. That point will be further elaborated in respect of Adam Sedgwick's work in the second half of this chapter. Before proceeding, I want to add a note about Sedgwick as a geologist. In describing what kind of geologist he was, it is possible to illuminate the major ways in which his ideas correspond with the poet's understanding of nature.

Sedgwick's career as a geologist.

To follow in detail Adam Sedgwick's "professional" career as a geologist is to trace the development of the science in what later geologists came to describe as its "golden age". Sedgwick's election to the Woodwardian Chair of Geology at Cambridge is often used to illustrate the amateurism of the subject on the grounds that, by his own admission, he knew little geology when he was nominated and subsequently elected. A moment's thought on the rate of his progress as a contributor to geological map-making and as a major stratigrapher, and his rapid professional acceptance to become, ten years after his election to the Cambridge chair, President of the Geological Society (and a professional geologist-President not an aristocrat giving a glow to the title) should make us hesitate in confirming that he knew no geology. Indeed, he attended Geological Society meetings well before his election to the Chair of Geology in 1819, and became Vice-President of the Geological Society in 1827. We know from unpublished material and from the Victorian biography that he had been fossil-collecting since childhood and that he had visited key geological areas such as copper mines at Coniston, the Furness iron mines and the lead mines at Buttermere before 1818. The notebooks already referred to for 1819 and 1820 are competent records of someone who proceeded by well-organized methods to take records. He knew for what he was looking. In addition he worked alongside experienced geologists such as Conybeare in 1820 in the South-West of England. The truth may be that an initial prejudice against the new Woodwardian Professor, because he was not a mineralogist, may have persisted through the years, even influencing the standard biography by Clark and Hughes (1890).

Perhaps of almost equal value with his appetite for the natural world of the Dales and of the hills of the Lake District was the mathematical training in his undergraduate course. Again, there is a correspondence with Wordsworth. For both men, mathematics was a study that led away from vague speculation into a close observation of detail and calculation, which enhanced appreciation as well as knowledge of the universe. As Wordsworth expressed in *The Prelude* (1805 VI: 150-157 and compare Thomas, W. K. and Ober, W. V. 1990):

...we owe the massive strength of Victorian natural history largely to a cultural accident. The natural history that now emerged was in its whole essence an Evangelical creation, and like every other aspect of life lucky enough to be assimilatable to the new preponderant mental type it swept in with an overflowing pervasiveness...In their study of nature, the Victorian middle-classes gazed out on their own image (Allen, D.E. 1978: 76).

Equally true of the character-type represented by Sedgwick is Roy Porter's summary of the climate of scientific culture: "The Enlightenment ideal of cosmopolitan stoicism gave way to passionate Romantic engagement." Porter continues by illustrating from the words of the geologist, the Reverend W.D. Conybeare in 1811. "I partake more largely of the spirit of the knight of La Mancha than of his craven squire and prefer the enterprise and adventures of geological errantry to rich castles and luxurious entertainments" (Porter, R.S. 1977: 141). Because Romanticism encouraged the love of the natural rather than the urban environment, of hills and rock faces rather than the fossil collection in cabinets, the geologists were in tune with a vast public interest. They provided for the public the possibility of excitement, albeit an innocent excitement, of making discoveries which might turn out to be as amazing as Mary Anning's fantastic fossil monsters, but without disturbing too deeply the religious faith of most of the countless amateurs who became keen collectors. Marston's study (1984) of evangelical Anglicanism and Sedgwick's affiliation to this branch of Churchmanship confirms Allen's general view.

It is important also to recognise in another sense that geology could be pursued by people in tune with poetic feelings and aspirations. Although "modern" geology in the 1820s and 1830s relied on professionals, or rather specialists, skilled in observation and systematic collection supported by accurate surveying and map-making, it also gave opportunities for larger-than-life exploration without leaving England's shores. Sedgwick could undertake on foot long "traverses" across the wildest country in the Lake District, North Wales and the South West. Stratigraphical description, one of his major contributions to geology, was a subject for Titans; mineralogy paled by comparison. In his paper, "The general structure of the Lake Mountains of the North of England, and on the great dislocation by which they have been separated from the neighbouring chains", read to the Geological Society in 1831, we can perceive and appreciate a major task being pursued by a giant in his field. There are two dimensions to Sedgwick's feats of description. One is spatial: the mapping and description of

the overall structure of a complex and often virtually inaccessible mountainous area. In this aspect of his work he produces descriptions not so distant in tone from the topographical sweep of Wordsworth's *A Guide*, but with acknowledgements to Otley's *Guide*, which, as we have noted, Wordsworth may have known. For example, Sedgwick's essay begins, like Wordsworth's with the boundaries of the region, then summarises the main subdivisions, but, of course, Sedgwick uses more technical terms:

...within these limits are found two distinct classes of rocks, all the central region being composed of crystalline unstratified rocks, irregularly associated with great formations of schist, which are subdivided (according to the system first put forward by Mr Otley of Keswick) into three well-defined groups; while on the outskirts of these older formations is a broken zone of carboniferous limestone and extensive deposits of superior (secondary) strata (Sedgwick, A. 1831: 247).

The second dimension of his studies, that of time, has a particular thrill to it - an aspect which, to use one of his frequent epithets, is "poetic". Both Sedgwick and Murchison contributed to geology by their exploration of what were then regarded as the oldest rocks of the earth's history. This was exploration in depth in a double sense - the deepest layers in a stratigraphical column and the deepest stretches of created time. Sedgwick robustly dealt with ancient rocks, despite their obscured story and without fear of the far-reaching implications they might reveal for understanding immense forces in the world's story. In the lecture quoted above, he concludes by saying that his task is to "comprehend the more intricate phenomena of still older periods, and to connect them with the great physical laws by which all matter is governed" (Sedgwick, A. 1831: 97).

I shall examine in more detail in a later section of this chapter the intellectual excitement he personally claimed for geologising, but it is useful at this point to note that the character of the geologist I have described, wide-ranging in territory and fearless in exploring the depths of time, is not unlike that of some of the heroic figures established in other contemporary spheres, the Noble Warrior or the Lonely Hero. Sedgwick warns his audience at the Geological Society that to present the laws of induction of geology takes "more than common powers":

They require a moral elevation; and a dignified forbearance, to free the mind from those attractive visions of ancient cosmogony, and the seductions of fanciful hypotheses, by which the history of geology has often been degraded... That which is exact in science must be circumscribed and defined; but of our labours we have no power to foresee the limits, and there is an intense and poetic interest in the very uncertainty and boundaries of our speculations (Sedgwick, A. 1831: 306 and 312)

Other writers have commented on the unity of the scientific establishment of the time. Sedgwick's geological studies and his attitude to them were certainly in tune with the major lines of development in geology of the first thirty years of the century. Like others in the 1820s and 1830s in the Geological Society, he absorbed apparently contradictory theories. Gillispie considers that Sedgwick "had absorbed Hutton's proofs of igneous origins into devoutly catastrophic interpretations" (Gillispie, C.C. 1951: 120). This is not to say that Sedgwick swam easily with the fast-flowing tide of discovery. He was not unusual in being reluctant to abandon the Wernerian hypotheses, which explained by aqueous means the major mountainous structures as well as the production of rock types. Slowly he accepted what his colleague, Whewell named Uniformitarianism, after Lyell's major publications after 1830. His "recantation" of Werner was however eventually declared in a very public manner and he made no secret of the fact that he believed he had worked in error for many years during which he had openly criticised Lyell and his rapidly growing band of followers. In the major standard biography by Clark and Hughes there is a fascinating account of this conversion culled from Sedgwick's own letters and from a comparison between his teaching in 1821 and 1832 of the Cambridge Geology syllabuses. Sedgwick claimed that two influences persuaded him to change his mind from being "eaten up with the Wernerian notions... a Wernerian slave" (Clark, J.W. and Hughes, T.M.: 1890 I: 251). One was working with William Smith identifying strata by careful analysis of their included fossils. The other was his own mathematical training and reliance on inductive observations, which helped him to avoid the danger of those who "view all things through the distorting medium of an hypothesis ... for a long time I was troubled with water on the brain, but light and heat have completely dissipated it" (Clark, J.W. and Hughes, T.M. 1890 I: 285).

The humorous comment in the last paragraph should not give an impression that he was a man given to immediate conversions. Like most of the generation before 1830 he had already adjusted with a careful assimilation of

belief and new information to findings which seemed to indicate large-scale extinctions and geological catastrophes, which may have precipitated the major changes in the structures he investigated. Of course a large part of his working life as a field geologist was accomplished before theories of continental ice-sheet glaciation were generally accepted. Sedgwick clung for some time to local catastrophic theories of erosion by the agencies of bursting dams which had held back large sections of water. These events, he hypothesised, explained the erosion of valleys now containing streams too small to have created the hollows through which they flowed. He was reluctant in his later life to accept the work of one of his former pupils on the natural selection of species and, never adopting a retiring role in controversy, he made a public stand against Darwinism, which eventually left him in a minority in Cambridge science.

Perhaps the most famous controversy in which he became engaged (certainly not one to involve Wordsworth since it occurred late in Sedgwick's own life) was the deep dispute with his former friend and colleague, Sir Roderick Murchinson. The "Cambrian-Silurian Debate" as it became known (Secord, J.A. 1986 and Hallam, A. 1989) was between two major figures in stratigraphy, representing "the principal tradition in early nineteenth-century geology" (Secord, A. 1986: 24). Secord proposes that what impelled these two former allies to take opposing sides so bitterly was the passion to name a phenomenon and the urgent search for true facts in geology which could be opposed to social forces which they deplored, such as "utilitarianism, materialism and transmutation". The eventual accord that sounded a lasting armistice in this struggle of the giants was achieved because, through public debate, chaotic description and contradiction were "tamed" by agreed nomenclature which maintained social stability in the moral sphere as well as in the stratigraphical column (Secord, J.A. 1986: 315).

Sedgwick was regarded with approbation by his peers and colleagues, despite the fact that he took sides and never dulled the edge of his argument. Posterity has not judged him as highly as his contemporaries. He was no polymath like Whewell, nor was he a persuasive innovator like Lyell. Modern commentators have recognised his value to the growing science for a number of less commanding but important reasons. One of his chief virtues, his ability as a field-worker, is not unlike the quality that Wordsworth aimed to achieve in his descriptive style in *A Guide*:

Sedgwick's geological fame rested above all on his insight into structures, an ability to visualize rock masses in three dimensions and interpret their interrelationships after only a few traverses (Secord, J.A. 1986: 57)

In visualizing the landscape in the way that Secord describes, Sedgwick required new terminology. He introduced the term "strike" into English geology from the German "streichen". In a letter to Professor Jukes, he claimed he was the first to publish articles which used the term which describes an aspect of mountain folding, "synclinal" (C.U.L.A.S, Add 7652 111). The two-fold ability - to see in a large and rounded form and to communicate his vision - is not to be underestimated in geology nor in other studies. Like his poet friend, he had a grasp, a feel for complexity and, in particular, for the essential "form" of a mountainous landscape that was never simple, and he communicated to others his scientific imagination.

Sedgwick's other achievements were perhaps organizational rather than directly scientific. Although some of his work was to correct William Smith's maps, he was one of the earliest members of the Geological Society to appreciate the major significance of Smith's work. In presenting to Smith the first Wollaston Medal of the Geological Society in 1831, he called him "The Father of English Geology", a phrase that stuck. Sedgwick's commitment as a constructor of the stratigraphical column was not unique. Secord comments that in the first half of the nineteenth century "geologists were assumed to be students of the strata" (Secord, J.A. 1986: 24). Sedgwick was, however, quick to appreciate the value of Smith's works on the close connection between fossil types and strata. No longer were the mineralogists the uncrowned rulers of matters geological. In this development of a strong and rapidly growing independence from mineralogy Sedgwick led the way. It may be that in leadership and the exercise of his political powers in the Geological Society, in the establishment of an early major museum at Cambridge (not, of course, the one now bearing his name), and in representing the growing subject nationally (even up to the level of the Royal Family), Sedgwick may have done his greatest service to the science. In brief, Sedgwick is a central figure of the establishment (in both senses of the word) of geology, as it was released and made independent from mineralogy. It was easy for Wordsworth, writing to him in the 1840s, in order to ask for the promised letters to accompany *A Guide*, to associate him with geology rather than with

those who operated the "pocket hammers" smiting "the luckless rock" in the service of mineralogy. As he wrote to Sedgwick at that time: "Geology and Mineralogy are very different things" (W.L. VII: 336-337).

Roy Porter traces the gradual eclipse of mineralogy by geology and relates the rising prestige of the latter to its potential for social and religious unity: "By the early nineteenth century, for practitioners and the general public alike, geology was assuming the image of a more popular, profound and spiritual science than mineralogy or than orthodox natural history" (Porter, R.S. 1977: 142). Direct evidence for the explicit understanding of what was happening to the relative prestige of the two sciences and Sedgwick's teaching role in the new emphasis on geology is found in a letter of 1828 from Wordsworth to William Whewell. Whewell had written to Wordsworth about Sir Uvedale Price's book on poetic metre:

Your strong impression of the dryness of the subject somewhat reminds me of a tenet of Sedgwick's who maintains sometimes that a person may be too good a mineralogist for it to be possible for him to be a good geologist. In the same way I suppose a person may be too good a writer of verses to be a good critic of versification or rather I should say a good anatomist of verse (D.C.L. Whewell Letter A/1).

Geology had ascended to a rank above mere technicality and Sedgwick had contributed to that elevation. From that prominence geology reached out to other truths.

Geology and the unity of discoverable truth.

The discussion on the relative prestige of mineralogy and geology leads to deeper implications than positions in professional league tables. One reason why geology ascended in status both inside and outside specialist scientific groups was that it seemed to support the religious and social beliefs of the wider community. Cannon makes an interesting comment, that Wordsworth's distinction between geology and mineralogy in the previously quoted correspondence with Sedgwick was between "good geology" and "foolish mineralogy" (Cannon, S.F. 1978: 8). Geology was "good geology" because it expressed the unity of the scientific establishment both within itself and with the larger, orthodox world in which it operated. Sedgwick was so very much part of this orthodoxy that it is worth illustrating his explicit commitment to it. Cannon uses

the term the "Truth Complex" to encapsulate what she feels is the basis of uniformity of belief between scientists and non-scientists in early Victorian England, but her concept is applicable also to the decade before Victoria came to the throne. Cannon means by this term that there was a commonly held view that there was only one truth and all scientific investigation led to that truth. "The early Victorians denied the possibility of even two truths, but the later Victorians had to live with many as we do" (Cannon, S.F. 1978: 3). Science, she argues, occupied "a normative role" in maintaining the "Truth Complex". The geologists were welcomed rather than rejected by both the religious and the literary worlds because they shared their values. For example, the geologists appeared to turn their backs on Continental absorptions such as detailed classification of minerals. The English geologists instead offered synthesis and organised description. These themes were partly considered in my earlier references on Wordsworth's views on "distinctness" in Chapters Three and Four.

As far as Sedgwick was concerned, scientific study and, in particular, his style of geology led to the essential truth of God's divine purpose, a conclusion he could share with Wordsworth. We should not presume, however, that there was an exact match of political and social belief underpinning that sharing of truth. In old age, Sedgwick was certainly as socially and politically conservative as the older Wordsworth. In 1869 he wrote to Lord Enniskillen: "I wish the British Isles to stand with their old Constitution of Kings, Lords, Commons all in their right places" (C.U.L. A.S. 1869. Add 7852: 19). Wordsworth would have applauded his friend's political sentiments in this respect, but they did not agree on all issues. Sedgwick's politics were not Toryism and he was a cautious but committed University Reformer.

In terms of religious belief, however, there was considerable accord between the two men. To explain, as some historians have done, Sedgwick's continuous acceptance of a religious faith only in terms of a socially cohesive group of self-supporting gentlemen-geologists is to be reductionist. Marston's doctoral study (1984) of the position Sedgwick took on Anglicanism is a useful reminder of the variety within the "Broad Church". We should attend to what Sedgwick and his fellow geologists actually wrote as they confronted the successive adjustments to their knowledge of the changing shape of the earth. Only then shall we have a more rounded picture. Unless we are prepared to understand that at each point they believed that their faith was held on scientific

grounds, we shall miss the range of their response. How was it, we should ask, that Sedgwick could continue to support the providential nature of the universe through a succession of important shifts of perspective? In 1819 like most of the scientific establishment, he accepted the Deluge as doctrine, then lived through a decade of support for catastrophism, followed by a conversion to Lyellian "actualism" and on to a major theory of glaciation.

Part of the answer to this question lies in the starting point of the Deluge. I have illustrated, through the perspective of the slightly older generation represented by Greenough, that, although the Deluge was commonly accepted as a phase of the earth's history, it was, by the nineteenth-century reasonably understood as an interpretable series of events rather than a single Biblical event. Catastrophism was tenable alongside the Bible, or rather as an interpretation of the Bible. Cuvier's researches, followed by Buckland's discoveries seemed to confirm that there was a progressive system planned by a Creator who had a clear sense of direction for the world. The change of emphasis following Lyell's great publication in 1832 might have entailed recantations, such as Sedgwick himself made, but again accommodation was made. As Gillispie says, "The decade separating *The Principles of Geology* and *The Vestiges of Creation* had been one of industry and harmony in the temple of virtue" (Gillispie, C.C. 1951: 151) and, he adds, catastrophism remained in the debate in the years following Lyell's publication, despite being temporarily vanquished as a philosophical issue. Rather than a deep division an accommodation was made. At first sight Agassiz's contentious theories of ice-sheets (a form of catastrophe of course) did not disturb belief in providence, but merely seemed to strengthen that belief. It was a publication from outside the scientific establishment not from within it, the anonymous *Vestiges of Creation* (1844), which caused most anxiety and summoned up the powerful defensive weapons of Sedgwick.

What was in so many ways a fundamentally non-scientific work created considerable apprehension in the scientific community. Why did they not simply ignore it? The answer lies in the fact that *The Vestiges of Creation* prepared the first steps towards a theory of natural selection which, instinctively or with perceptive foresight, the churchmen-geologists realised represented a genuine threat to the doctrine of Divine Providence. Sedgwick's attack on the author of *The Vestiges of Creation* was weighty. Part of it was published as an extension of a text, *A Discourse on the Studies of the University of Cambridge*, which I shall

shortly look at in a different context. The significance of the Sedgwick's serious and spirited defence lies in the importance for him of the need to argue that species were created repeatedly and successively. Chambers (later discovered to be the author of *The Vestiges of Creation*) had proposed a theory of development as an organic force, just as gravity is a force in the inorganic field. Creation, according to Chambers, was a single event and species occurred by "transmutation". This was a process of descent, not one of ascent. To Sedgwick, this theory denied the benign plan. He had already marshalled his argument in the "letters" accompanying *A Guide* in 1842. There he addressed a wider audience than the Geological Society or the British Association, but, conscious perhaps of the poet's accompanying prose, one that required magisterial reassurance about the confidence derived from his studies:

We can not believe that these successive forms of animated nature were created and destroyed by the mere impulses of a capricious will: but we do believe that they were called into being, and wisely adapted to the successive conditions of our planet, during its progress from a chaotic state till it reached the perfection in which we now find it.

...The Author of Nature, has during all periods, formed organic beings on the same great plan (Sedgwick, A. 1842: 20 and 21)

Sedgwick's trust in Divine Providence rests on the untroubled belief that scientific investigation will confirm, not deny, that belief. The earth, he claims for the general public of *A Guide*, is like a great laboratory, a place for us to note processes which observe natural laws. Although natural conditions may change - after all any students of the strata and the fossils within them must be aware of environmental revolutions - the "natural laws" are unchanged. As geology "advanced further towards exactness" we shall observe only that hitherto perplexing phenomena are seen to be operating under laws" (Sedgwick, A. 1842: 52). Gillian Beer (1983: 66) has analysed in Darwin's case the importance for the scientists of "permanently discoverable laws". Sedgwick and, as we shall see, Whewell, provide further example of this confident quest for natural truth.

As far as considerations of the function of science as a handmaiden to Faith are concerned, Sedgwick had no difficulties. Although he had long and difficult controversies with fundamentalists who saw his geology as a threat to the authority of the Bible, he remained at the end of his life as convinced as he was in 1819 of the validity of geological enquiry and of its supporting truth for a believer. In the sermon preached in Trinity College Chapel on 2 February 1873

on the Sunday after Sedgwick's death, the Reverend R. Burn concentrated on this very theme of undivided truth and confirmed that Sedgwick, despite the suspicion and dislike of many, even in the University, "fearlessly maintained that truth could never be at discord with itself". He closed his eulogy by quoting from Sedgwick's own Preface to his catalogue of fossils:

And it was my delightful task to point out, year by year, to my geological class, the wonderful manner in which the materials of the Universe were knit together by laws which proved to the understanding and heart of man, that a great living and active Power must be the creative Head of the sublime and beautiful adjustments and harmonies of the Universe...[and on rejecting Pantheism] I never could be content, while thinking of these things, to feel myself dangling in mid-air without a resting point for the sole of my foot (Burn, R. 1873: 53).

That quotation is resonant with words that might well have come from an immersion in Wordsworth's poems. The key words for Wordsworth scholars are "active" "sublime and beautiful". "Understanding and the heart of man" are equally reminiscent. The final phrase, requiring a grounding in reality, is a Wordsworthian sentiment I have touched on in other parts of this thesis, particularly at the end of Chapter Six.

Two more examples of Sedgwick's clarity of belief in a unified truth are worth quotation. They are from the geological "letters" accompanying *A Guide*, written, one might suggest, with a consciousness not only of a more general type of reader than he was accustomed to address, but also of the Wordsworthian prose they were to accompany. In concluding the third "letter" he summarises thus:

As all parts of nature, material and moral, are the offspring of one creative mind, and are wisely fitted to one another, so we believe that the discovery of every new physical truth must tend to the support of every other truth, whatever be its kind, and to the good of the human race (Sedgwick, A. 1842: 53).

Ending with Wordsworth's own phrase, "the mighty voice of the mountains", he suggests that there is an even "mightier voice" which will eventually summon all to an end and "all bonds of matter shall be cast away". Using the phrase, "medals of creation" (see Note 4), which was a favourite of his contemporaries, Sedgwick read God's creative power at work through the materials which are made available for geological study. Such an occupation is intellectually and morally safe; it "can neither lead to any false conclusions, nor offend against any religious

truths" (Sedgwick, A. 1842: 20). Even the apparently disturbing evidence of extinct organisms from fossil evidence need not disturb the faithful:

We cannot believe that these successive forms of animated nature were created and destroyed by the mere impulses of a capricious will; but we do believe that they were called into being, and wisely adapted to the successive conditions of our planet, during its progress from a chaotic state till it reached the perfection in which we now find it (Sedgwick, A. 1842: 20).

One refinement must however be made to this picture of orthodoxy. Sedgwick is as committed as any of his contemporary scientific colleagues to the dispelling of superstition. The wave of contemporary praise of Sedgwick by non-geologists and by figures of the establishment (and he received a large share of the generous tributes that were commonly issued by this warm-hearted culture) might lead a modern reader into the false belief that Sedgwick always stood for orthodox belief opposed to the humanistic traditions of scientific investigation. He is, on the contrary, almost always praised by fellow-geologists for sharply attacking religious fundamentalists, often fellows of his own cloth, who were passionate defenders of Noah's flood in the exact terms of the Old Testament. There is a long poem by William Sotheby written after the third meeting of the British Association about various members of the Geological Society. It illustrates a role for Sedgwick. Although a literary oddity, the poem illustrates Sedgwick's elevated position in the vanguard against religious fundamentalism. The verse paragraph on Sedgwick reads:

High cultured Sedgwick, claims these votive lays,
He leads where Science of celestial birth
Came down to commune with a son of earth
With Bacon dwelt, and back the enlightened sage,
Burst through the darkness of barbarous age,
Cast off the yoke that had enslaved mankind,
Scatter the schoolman's cobwebs to the wind,
Prepare the soil, uproot each noxious weed,
And step by step, sow wisdom's seed (Sotheby, W. 1834)

The poem goes on (and on!) in like vein. A modern interpretation of Sedgwick must therefore reflect that he stood for a rooted religious belief, at the same time as standing as a champion of clear-minded study of evidence. Sedgwick appears to hold this tension with little difficulty and even with a certain swagger.

Some early nineteenth-century geologists, such as the "Father", William

Smith, or at the other end of the social scale, richer upper-class researchers such as Murchison, pursued their work, produced their results and left little evidence of how they were motivated or where they found a personal accommodation between faith and science. Others like Davy, Buckland, Whewell, and Hugh Miller belong to a class of introspective scientists who openly shared their spiritual progression. Adam Sedgwick is pre-eminently one of this class, publicly justifying his studies and openly seeking to reconcile the different aspects of his life. In doing so he provides a wealth of material for the purposes of this chapter. There are three implications of a geologist's work to be culled from Sedgwick's justification of his scientific calling, which, I wish to argue, are closely related to Wordsworth's expression of the interaction of the human mind with nature. One is the methodology of geology, or to be more accurate how the ideal geologist should work, crowned by his ultimate dependence on imagination. The second is the conclusions to which the geologist is led by his studies about the "universality" of the laws of nature. The third might be called "the humanity of geology".

"Fostering dreams as wild as those of a poet's fancy": Imagination and the geologist.

Of all geologists of this time, Adam Sedgwick seems the most sensitive about accusations of aridity, dryness and dullness, all too easily levelled at those who spend their lives with rocks and stones. He apologized, in presenting his accompanying "letters" to Wordsworth's *A Guide*, that he may appear to be dry, but excused himself by proposing that his purpose was lofty - to "open the mind to the nature of the subject, and to point out the right way towards a comprehension of some of its general truths" (Sedgwick, A. 1842: 4). We know, because of these preparatory remarks to the "letters", that the author was conscious of Wordsworth's strictures about his "brethren of the hammer" included in Book III of *The Excursion*. We may presume that he had also taken on board the criticisms by the poet of those who "pore and pry" or who dissect nature in dull and lifeless servitude to analytical science. On more than one occasion, Sedgwick takes up a challenge to justify the subject and its methods and in doing so presents an argument that leads him directly into the special province of Coleridge and Wordsworth, the world of imagination.

One particularly interesting source for this line of argument is *Discourse on the Studies of the University* of 1833 with its subsequent editions. Originally delivered in a sermon to a Cambridge audience at a time of ferment about university reform, the *Discourse* was considerably rewritten and expanded to take on board a counter-attack against *Vestiges of Creation*. It is an important document about the nature of learning by an involved participant. The external world, which is available for study at the university, Sedgwick argues, proves to the student "the being of God" in a dual form: "by addressing the imagination, and by informing the reason" (Sedgwick, A. 1969: 17). Sedgwick used the example of geology to illustrate how the study of the rocks demonstrates the power of the Almighty. In this summary for the non-specialist he incidentally makes available for our own times a useful check-list of the state of a geologist's belief in the early 1830s. Not being limited by a doctrine of a few thousand years of human existence, the geologist is able to study "a long succession of monuments, each of which may have required a thousand ages for its elaboration". He is able to arrange confusing phenomena in an orderly chronological sequence and, in so pursuing his task, he discovers strange and unlooked-for changes in forms and patterns of organic life in each period. His task of exploration is only completed in the depth of time, when "types of organic life are no longer seen...He has then entered in the dark age of nature's history; and he closes the old chapter on her records" (Sedgwick, A. 1969: 22). In short, the geologist's eyes are opened to a most wonderful, inspiring story. Far from being dull, the geologist's task, so long as he is visited by both reason and imagination, can be full of excitement. In a passionate justification, which has within it the Romantic image of Prometheus, he clinches his argument with this cry:

To many minds, the forms of natural knowledge presented in the abstractions of severe science, are cold and uninviting: but, if we follow them with the light of other kindred studies, such as those I have endeavoured faintly to shadow out; we bring down the fire from heaven which at once gives them movement and animation (Sedgwick, A. 1969: 28)

In publishing documents for public use, such as this *Discourse* and the "letters", Science plainly had to be tempered and softened for non-scientific audiences. Writing to Professor Jukes of Limerick in 1842, Sedgwick gives him a piece of advice which is further evidence of his own conscious avoidance of aridity:

Don't ever try to write fine, but be quite natural, and tell us plainly what you have seen - that is the great point. Don't be afraid of vulgar phrases. They may be weeded out of the proof if necessary. Honest idiomatic English is the stuff to tell. Don't throw all the scientific matter into appendices but blend it a little with the narrative - not however too much. It might come at the end of each chapter (C.U.L. AS: 1842: Add 7652).

We have here a fascinating glimpse of "the language of the common man" applied to science. It is pre-eminently, of course, a counsel of the application of insight combined with practical wisdom or common-sense and reason, a feature I also illustrated in Greenough's work, in Chapter Five. It is reason and imagination in harness which drives the geologist. Sedgwick is as stout a defender of the processes of inductive reasoning as any of his contemporaries, as we shall see in the next section. After all he has no fears for its consequences, for he knows that the reasoning process always leads to faith. It is on these grounds that he can confidently criticise both Locke and Paley in the third part of *Discourse on the Studies of the University*. Here Sedgwick is referring to Paley's *Principles of Moral and Political Philosophy*. (See Note 3 for Sedgwick's correspondence with Wordsworth on Paley's Moral Philosophy). Sedgwick's trenchant criticism of Locke and Paley might well have come from either Coleridge's or Wordsworth's pen. Both Locke and Paley neglected the fact that the external word is "fitted to our imaginative powers" (Sedgwick, A. 1969: 18). "It is by the imagination, more perhaps than by any other faculty of the soul, that man is raised above the conditions of a beast". These powers are the "high attributes of the soul" (Sedgwick, A. 1969: 42).

There are three "powers": first, imagination applies "creative energy" to the soul, second, it helps the soul to generalise by pure reason, and third, it enables the soul to link material and immaterial things so the soul mounts "up from earth to heaven". "All that is refined in civilised life, all that is lofty in poetry or ennobling in art, flows chiefly from this one fountain" (Sedgwick, A. 1969: 42-43). It is important perhaps to identify the seat of the activity from the last-quoted passage. It is the soul, for Sedgwick is in fact dealing with three human attributes: reason, imagination and, above them all, faith. Reason, he argues, in *Discourse* is "purged, expanded and sanctified by the influence of Faith". In participating in the rational process of understanding Nature, we are taken beyond the ordinary human senses for one purpose only, to understand "the great scheme of Providence". We have already noted in Chapter Five that

Greenough also accepted the notion of an ascending scheme of intellectual activity. Here again, in a discussion around the topic of imagination, we meet an hierarchical structure or an ascending process of human development.

The intellectual roots of the idea of hierarchy of human perception from the simple sensory, up to higher states of perception and on to the moral order are perhaps in a strong English tradition initiated by Locke. So much of this ascending hierarchy of human perception (the senses, the power of reason, combined with imagination and processed through faith) is close to Wordsworth's understanding in *The Excursion* of what he explored in the assenting, excursive power of the human mind (see Note 6). It is easy to relate Sedgwick's scheme to seventeenth- and eighteenth-century's philosophical traditions or directly to Wordsworth, but Sedgwick was also using a simplified, unelaborated form of the language of many questioning theologians of his time. For instance, both Wordsworth (and Sedgwick in a much less powerful role of course) prepared the way for the exploration of faith above and beyond material, rational argument in the emerging ideas of John Henry Newman's later studies drawn together in *A Grammar of Assent* (published in 1870). Sedgwick is fully theological and yet fully scientific in the terms of his times.

These highly charged statements about the place of geology in the schema of faith are not, however, confined to popular versions of his studies, prepared for non-scientific laymen. In one of his most important papers to the Geological Society of London in 1831 at the conclusion of a long disquisition on the structure of the Lake District, he reiterates his reassurances as to where a geologist's methodology will take him. This science may be new, but it "has supplied materials of thought for intellects the most robust, and results to satisfy imagination the most ardent" (Sedgwick, A. 1831 a):211). Unlike other "exact sciences", geology is unlikely to lead to precision because it is so complex in its enquiries. In this dilemma lies one of its most attractive features and a further illustration of its imaginative powers:

That which is exact in science, must be circumscribed and defined, but of our labours we have no power to foresee the limits and there is an intense and poetic interest in the very uncertainty and boundlessness of our speculation (Sedgwick, A. 1831 a):212)

Reason, then, takes the ardent student of geology to the boundaries of experience. There are, beyond those frontiers, areas that are properly the

domain of religious belief but not of empirical study. Sedgwick appears to have been able to live comfortably with this division of experience in a way which later Victorian scientists would not. He was not alone amongst contemporary geologists in believing in a Divine order of circumstances, but, more confidently and robustly than Lyell for instance, he was able to accept and indeed to state with conviction and authority that there were areas of human experience approachable only by faith rather than by the detailed study of fossils or of the most ancient rocks.

There were three sectors of belief where, he stated at various times, it was not possible for geology to proceed or to shed further light. The first area was the origin of the universe which, he says on more than one occasion, began with the primal "creative act". On the one hand, Sedgwick proposed for geology an ever-growing area of knowledge, on the other, he doubted whether it would ever grow to give evidence of the First Cause. In his second Presidential Address to the Geological Society in 1831, Sedgwick uses the figure of the confident new geologist, no longer kept at the door of "Nature's temple", but "allowed to pass within and to be so far a partaker of her mysteries, as to see with his intellectual eye both the past and the future" (Sedgwick, A. 1831(b): 300). However, the qualification of "so far" is important. It is at those times, and they were frequent, when Sedgwick engaged in controversies with the fundamentalists of the Church of England, that we see how he defined the limits of inductive science in relation to religious belief. In 1844, after the public controversy stimulated by the conservative William Cockburn, Dean of York, at the British Association Meeting at York, Sedgwick continued in correspondence the already heated discussions. He told a correspondent that the first creation "out of nothing" was so far removed from human life as to be utterly out of the reach of his mental conception: "After the first wave of creation there is a pause of vast and unknown length, and here I would place the periods of our old geological formations, not revealed because out of the scope of revelation". After a long pause the work of "actual present creation now begins" (Clark, J.W. and Hughes, T.M. 1890 II: 79).

The second sector of belief in which geological methods do not become involved concerns the more recent geological period when mankind was created. Here Sedgwick is at his most elusive. He simply side-steps the rapidly growing evidence of the evolution of organic life, although he did not find it difficult to

accept the evidence of the extinction of species. Extinction was, in brief, part of God's plan. Again, in entering into controversy, Sedgwick reveals where he has drawn the boundaries of his discipline. I have referred to his vigorous attack on *Vestiges of the Natural History of Creation*. Sedgwick used the re-publication of his *Discourse on the Studies of the University* to publish an opposition to *Vestiges* and to any scheme which, in his view, destroyed human faith in a benign Divine design. In letters to Lyell and in *Discourse* he reluctantly admitted that progressive changes of certain forms occurred as they adapted to changed climatic conditions, but insisted that the Divine Creative act was the sole origin of new species. The unacceptable alternative was a blind law of succession. As we have noted earlier, as an old man he refused to accept Darwin's theory of Natural Selection. Sedgwick's greatest fear, generated by the growing support for Darwin, was that science was being diverted from supporting the providential in the world. Geology is linked with morality: "Tis the crown and glory of inorganic science that it *does* through *final causes*, link material to moral." The breaking of this link, by theories such as Darwin's, would not be regrettable solely for epistemological reasons, it would damage the nature of humanity "and sink the human race into a lower grade of degradation than any into which it has fallen since its written records tell us of its history" (Clark, J.W. and Hughes T.M. 1890 II: 357-358). What matters about the argument I present at this point is not the smoke and fury of old controversies. What is important is conveyed by the clause "in organic science...does link material to moral" in the quotation above. Geology does not produce moral laws, but it leads to the point where moral laws can be perceived and studied by philosophers. This delimitation of the sphere of geological methods of observation to generating material laws was no disappointment, for Sedgwick felt that the area granted to geology was wide and deep enough to occupy geologists with the solving of mysteries for generations to come.

The third area of non-geological belief is associated with those of the two previous paragraphs. Sedgwick is enough of a traditionalist to believe an order for the end of the world which will operate by laws which are not the material laws of the present world. Similarly, he finds it possible to accept a different order for the origins of life. In a particularly interesting observation, he offers an explanation for the beginning of individual human life. In 1850 he had returned again to the fray with the Dean of York, publishing, in an expanded preface to *Discourse on the Studies of the University*, additional material to fuel the contro-

versy. This new material contains the remarkable statement: "before the creation of all worlds, there was an archetype of nature (dead as well as living, past as well as present) in the prescient mind of God" (Clarke, J.W. and Hughes, T.M. 1890 II: 191). This outright commitment to a non-material form of life could be explained perhaps by Sedgwick being forced to take up in his declining years a sequence of bitterly held defensive positions. However, if it is read with reference back to the first edition of *Discourse* it is not such a strange statement. In that first edition we come across perhaps the most Wordsworthian statement of all. Could it be that the "Ode: Intimations of Immortality" was in Sedgwick's mind as he tackled and rejected the philosophical notion of Mind coming to life as a "tabula rasa":

Naked he comes from his mother's womb, endowed with limbs and senses indeed, well fitted to the material world, yet powerless from want of use; and as far as knowledge, his soul is one unvaried blank, yet has this blank been already touched by a celestial hand, and when plunged in the colours which surround it, it takes not its tinge from accident but design, and comes forth covered with a glorious pattern (Sedgwick, A. 1969: 46)

This remarkable passage illustrates the dual mental framework of reason and imagination of which Sedgwick made use in his arguments for Divine providence. As we have seen, Greenough also admitted a scheme of imaginative mental activity as well as a Baconian Methodology. We shall see later how Whewell tackles the delimitation of inductive processes, but, for the moment, it is worth noting how closely Sedgwick, perhaps one of the most active public figures of the new science, led his specialist colleagues and the general public to accept a wider sphere of understanding creation than his own science provided. At the same time he claimed that his science led the way to the frontiers of that different territory which transcended even geological time.

The "universality of nature's kingdom".

It is important to keep a balance in the study of Sedgwick's theories of how a geologist and a believer can exist in the same person. For the most part, despite the weight of evidence for non-material forms of knowledge in the quotations put forward in the last paragraphs, Sedgwick was positively committed to what he often referred to as "patient investigation... learning to reject every consequence not warranted by direct physical evidence" (Sedgwick, A. 1969: 105). As a colleague and friend of Whewell who, as we shall see in

Chapter Nine, published extremely influential studies on scientific method, Sedgwick was certainly aware of the way in which scientists argued for their distinctive approach to experience, or what we would now call their "methodology". Sedgwick is very clear about the importance of scientific procedures based on the inductive process, but equally clear, as he stoutly declared in his 1830 Presidential Address as on many other occasions, that truth discovered in this manner would not disturb the scientist's faith. Indeed it is obvious that Sedgwick had a very satisfactory personal scheme of understanding. His own geological studies plainly confirmed that scientific procedures led to higher and higher matters, although they might commence in routine systems (Note 6).

The starting point of the geologist's procedure is the "great laboratory" of the earth itself, as he calls it in the third "letter" to *A Guide*. As we discover more about the phenomena through more and more exactness of study we are reassured that mechanical laws that are produced from the evidence will explain what may now be mysteries. One of the best contexts in which the process of study of phenomena and the formation of laws by induction is demonstrated in *Discourse on the Studies of the University*. Sedgwick produces a prestigious exemplar. He gives his readers a rapid study of the processes of induction, deduction and synthesis in that most reliable, seminal, scientific source, Newton's *Optics*. Sedgwick then proposed a hierarchical and harmonious interrelationship of material laws. Every portion of matter however small is governed by its own laws. On the next superior layer are the laws which govern the relationship between one natural thing and another. Above all these are ultimate dominant laws: "all are the harmonious results of dominant laws" (Sedgwick, A. 1969: 13). The geologist's process leads the student on to discover the knitting together of these physical operations.

The images of "knitting" or of "binding" are favoured by Sedgwick. In his preface to his *Catalogue of Fossils* he referred to "the wonderful manner in which the materials of the universe were knit together by laws" (Burn, R. 1873: 10). Similarly, in the preparatory remarks to Wordsworth in the first "letter" attached to *A Guide*, Sedgwick speaks of the laws by which Nature "binds into union the different portions of her kingdom" (Sedgwick, A.S. 1842: f3). Having considered similar matters in the chapter on Greenough, we shall have a further opportunity to examine the early nineteenth-century's understanding of scientific induction

and of the meaning of "laws" when we turn to look at Whewell's work as a philosopher of science. At this point it is worth noting that the process leads onwards and upwards. Indeed it has only one direction, and, as Sedgwick said in *A Discourse*, the result of that most elevated conclusion of learning is "harmonious". Now "harmony" is an interesting word for Sedgwick to choose and it is a word he selects on a number of occasions. It not only implies Divine order, but, as in the above passages, carries an aesthetic implication, a dimension which I have already indicated is never distant from his commitment to science. More interesting still for its connection with Wordsworth is the link between the highest hierarchical level of of learning and "universality" in the great scheme of Providence.

As I have indicated in the opening pages of this chapter, "Universality" was the very word that Sedgwick used to summon up his conversations with the poet in those important summer meetings in the early 1820s. Geology, he wrote in the first "letter" accompanying *A Guide*, can only be rejected at this well-developed stage of its progress as a science by those who shut their eyes to the light of natural science, "and this I know, is no part of your philosophy, for no one has put forth nobler views of the universality of nature's Kingdom than yourself" (Sedgwick, A. 1842: f3). He proceeds to elaborate the process of abstraction reaching to a conclusion of universality: "All nature bears the imprint of one great Creative Mind and all parts of knowledge are, therefore, of one kindred and family" (Sedgwick, A. 1842: f3). Proof that the theme of the "universal" is not exclusively introduced as a "poetical" term appropriate for popular texts is found in an earlier specialist work, his Presidential Address to the Geological Society of February 1830. Expressing, not for the last time, severe criticisms of those who attempted to delay or even to terminate the development of geology because it appeared not to be reconciled with Scripture (on this occasion in the shape of Doctor Ure's *New Systems of Geology*), Sedgwick affirms that truths never war against each other. New discoveries will give us "a larger insight into the universal harmonies of nature" (Clark, J.W. and Hughes, T.M. 1890 I: 362). "We follow this law into its remotest consequences, and we find it terminating in beauty and harmony and order" (Sedgwick, A. 1969: 13).

The relationship of these leading statements to Wordsworth's own writing on order and harmony, particularly in the period of the publication of *The*

Excursion and in subsequent poems such as "The River Duddon: a Series of Sonnets" is clear. The concepts as used by the poet have been examined in previous chapters. Wordsworth's view of the world which operates within a system of Divine order may accord with the material world, the basic laboratory in which the geologist finds his professional purpose, but how does the poet's equally powerful vision of a rapidly changing and shifting world appear to the scientist? How do the landscapes of clouds, winds and deceptive reflections feel to those whose observations are grounded in fixed, unvarying laws? Of course the geologists dealt with change at a level different from the immediate. Sedgwick believed, with many of his geologist contemporaries, that the earth had seen many catastrophes. As a stratigrapher (although we should remember that this appellation was not in use until later in his life), he was acutely conscious that an explanation was required for such phenomena as strata, evidently produced in very different climatic circumstances, superimposed on each other with an immediate transition from one type to another rather than with evidence of gradual transition. Similarly it was important to explain long-term changes such as the extinction of species or the massive structural phenomena such as Alpine folding as well as the occurrence of contemporary earthquakes and large-scale eruptions of volcanic activities. However, although like his contemporaries in the 1820s he sought catastrophic explanations, Sedgwick was not a simple catastrophist. He was convinced of one fundamental uniformity of nature: that the laws affecting the present shape of the earth have always been in operation since the first cause. As late as 1849, in a letter to that doughty defender of religious belief, Hugh Miller, Sedgwick acknowledges that there have been breaks in the sequence of uniform law: "animal creations are not now going on, as Lyell seems to think probable. I have made this one of the limbs of an analogical argument in favour of Christianity" (Clark, J.W. and Hughes, T.M. 1890 II: 161). He regarded the present shape and structure of the world as, in one important sense, the culminating point of the geological process, for "man is the last of the existing order of things". Sedgwick is, in short, no Huttonian agnostic about the beginning and end of creation. He held a conventional religious doctrine that, when the Creator deemed it appropriate, the present scheme would end. At that moment, the "universality", the existing together of Nature would cease. As he expressed in the third "letter" to accompany *A Guide*, using again an image of unity: "all bonds of matter shall be cast away, and there shall begin the reign of knowledge and universal love" (Sedgwick, A. 1842: 54).

The geologist and humanity.

One final connection between the poet's world and that of the geologist is found in Sedgwick's understanding of the human significance of geology. From the point of view of the modern interpretation of the relationship between science, technology and the industrial revolution, there is strikingly little economic or instrumental argument in Sedgwick's writings which justify the study of geology. The function of science is to elevate the human spirit. His justification uses a significant metaphor of the family:

She is a handmaid of those toiling for the good of fellow man...claims kindred with offspring of exact knowledge and lends no vulgar help to loftiest investigations of human thought (Sedgwick A. 1942: f3)

Readers of Wordsworth's "Preface" to the second edition of *Lyrical Ballads* will recall the metaphor used by Wordsworth when he looked forward to the remote possibility of science becoming "a genuine inmate of the household of man" (W.Prose I: 141). Sedgwick continues even more specifically to define the human rather than the economic end of this study "as it tends to elevate the mind of man", giving him a higher conception of his capacities and duties, and a better power in following them "to their proper end".

The twentieth century's close identification of science with technology and economic growth was not uniformly regarded as an obvious relationship even in the early nineteenth century, despite the fact that those decades witnessed what was possible the most vigorous period of invention in the nation's history. When, in 1819, Sedgwick established with other Cambridge tutors a "society for scientific communication" it was not based upon encouraging the growth of the national economy. Its very title, the Cambridge Philosophical Society, indicates its roots in an older tradition of learning. The first rule of the Society was "That this Society be instituted for the purpose of promoting Scientific Enquiries, and of facilitating the communication of facts connected with the advancement of Philosophy". At its first meeting the words "and Natural History" were appended. (Clark, J.W. and Hughes, T.M. I: 207), further endorsing an English tradition of learning, largely for its own sake, related to the enlargement of the human mind and to its improvement.

Sedgwick was as careful as any of his contemporaries to separate moral matters from scientific exploration of material facts and to struggle to make clear in which domain he was writing. Nevertheless, as I have said above, the scientific and the moral met at the frontiers of science. With his usual vigorous spirit, he frequently entered into controversy with those who feared the most from geologising. In these defensive arguments, and in other more serene contexts, such as the geological "letters", he always demonstrates a passionate interest in the human condition and a conviction that scientific enquiry is conducive to the elevation of human life in both a moral and a spiritual sense. In "*Preface*" to the second edition of *Lyrical Ballads*, Wordsworth foresaw science which could become a noble adjunct to human progress. He could find no more convinced disciple for this doctrine than Adam Sedgwick. Passage after passage, some of which we have already quoted in a different context, justify geology as a way of extending the consciousness of mankind and awakening it to the mind of the Creator.

Geology was to Sedgwick a favoured science because it put the scientist in direct communion with the created world. In his sketch for an autobiography, the aged geologist expresses thanks "that I was taught early to love the face of nature - sky, sea, stars, mountains, valleys, brooks and trees, that I have spent so much of my life in direct communion with nature which is the reflection of the power, wisdom and goodness of God (C.U.L. AS. Add 7652: 121). Significantly, he continues in an ethical vein, he gives thanks that this benefit was not selfishly enjoyed but enabled him to have "deeper sympathy with my fellow creatures of every grade". The journey of science had led him to a love of humanity through the study of nature. Although Sedgwick may have know something of *The Prelude* through his conversations with Wordsworth, he is unlikely to have realized how close this journey corresponded with the account the poet gives in Book Twelve of *The Prelude* of 1805 of his own development through the intensive study of nature to a wide-embracing love of humanity. Sedgwick's phrase, "fellow creatures of every grade" is also a bond between scientist and poet, a sharing of social sympathies.

One more example will add another item of Wordsworthian values to this catalogue of the close intellectual sympathies of the two men. Stimulated no doubt by his friend, the poet-reader to whom the "letters" added to *A Guide* were addressed, Sedgwick warmly pens a prose hymn to the power of the mountains,

acknowledging Wordsworth's own phrase "The mighty voice of the mountains". In the conclusion to the "third" letter he writes of "Liberty's chosen music" found in the mountains (Sedgwick, A. 1842: 54). Geologists struggle with raw objects of study, but in the mountains their spirits and strength are renewed "as the earth's touch did of old to the giant's body". Science and poetry are united in the great natural setting of the Lake District, and the geologist, when reflecting on his labours, can feel as strongly about his endeavours as any literary person. For Sedgwick there is no opposition between these two types of thinker.

This was the geologist, more perhaps than all others of his time, who could claim for geology the territory of imagination. Sedgwick justified his researches on the basis that geology's still untapped knowledge led to "fostering dreams as wild as those of a poet's fancy" (Sedgwick, A. 1842: 54). There is some evidence, I have asserted in this chapter, that the poet he had in mind was the one whose company he had enjoyed and whose influence he had absorbed for at least thirty years. Secord notes a comment from a student after a lecture: "He is indeed a grand living example of the truth of Wordsworth's philosophy... He has been schooled by Nature into a divine old man" (Secord, J.A. 1986: 265). If it is true that Wordsworth's poetry and Wordsworth's friendship had educated the geologist even in his mature years, what of the older poet and his progress of understanding of the world as his own life progresses? It is to this question that I next turn, considering the poetry he produced after the age of fifty, when he was on close terms with the two geologists considered in the second half of this thesis.

CHAPTER EIGHT : THE LATER POEMS OF WORDSWORTH: THE ENOBLING IMPULSE

To write about "the later poems of Wordsworth", namely those composed after 1820, is a formidable task whatever the nature of the enquiry being pursued. It is not only that the period from 1820 to the poet's death in 1850 covers many years of poetic production, during which there were significant publications of collections of new material. One must also recollect that this was a fruitful period for the revision of *The Prelude*. This was not the only time, of course, when the Wordsworth household engaged in editing and re-issuing of poems. As Gill has reminded critical readers who seek an authoritative edition of the poems of Wordsworth, "A very odd situation, however, currently exists" (Gill, S.: 1972). More confusing still for chronological purposes, by 1815 there began the process of publishing re-grouped new and old poems, under titles such as "Poems of the Affections" or "Poems of the Imagination". Reading the sequence in the way that the poet wanted the sequence read is a strange experience. It is like walking on stepping stones from different periods with one's guide determined to mask the chronology, and hence the messages, of the rocks forming the route.

In this chapter I shall concentrate on the three collections or, to use Wordsworth's own term, "memorials" of journeys: *Memorials of a Tour on the Continent, 1820*, *The Itinerary Poems of 1833* or *Poems Composed or Suggested during a Tour in the Summer of 1833*, *Memorials of a Tour in Italy, 1837*, together with *The Ecclesiastical Sonnets, in Series* and a few relevant poems from other groupings. After a brief review of the chance references in these works to geology. I shall consider aspects of Wordsworth's mature framework of understanding the landscape of Europe and of his own county in the way that a geologist would comprehend.

Traces of Geology.

There is little information in the later poems to aid the pursuit of references and hints of geological interest. Perhaps it could be proved that there is more evidence of mineralogical knowledge than in Wordsworth's earlier life. We have seen in *A Guide* that Wordsworth was familiar with a few geological

terms, for instance that he and Dorothy would apply the term "granite", rather vaguely, but no more vaguely, than most non-specialist travellers to hard rocks of alpine areas. "Limestone" (see Note 1) and "free-stone" were used with familiarity in *A Guide*. In *The River Duddon: a Sequence of Sonnets*, we have seen instances of Wordsworth's close observation of the landscape that would have equally interested a geologist. The poems written after 1820 therefore do not mark an abrupt departure into the description and identification of rocks. However, Wordsworth's perceptions of physical features do continue in the later poems. He was always keen to give the precise quality of an aspect of nature, even of something as lifeless as a stone. An example is found in the poem, "The Black Stones of Iona" in *The Itinerary Poems of 1833*, where Wordsworth does not resist making a correction of accuracy as the stones "were at that time, as now, in colour grey" (W.P.IV: 43). There is furthermore a note about the stones by the poet attached to the poem, but typically it does not elaborate a scientific fact, but a literary source, Martin's *Description of the Western Islands of Scotland* of 1703. Typically, the poet has turned to a traveller's tale for inspiration, but we have to remind ourselves that these accounts are often not in lieu of scientific authority, but an alternative to them and an ordered source of geographical information.

There is also a faint flavour of evidence in a poem to which I have already paid attention in Chapter Two, "Desultory Stanzas upon receiving the preceding sheets from the press". This was composed in 1822 as a final element of "*Memorials of a Tour on the Continent, 1820*". Wordsworth wrote about "the interior Alps" and the "airy bridge" his Fancy had wrought: "Arch that *here* rests upon the granite ridge/Of Monte Rosa - *there* on frailer stone/Of secondary birth, the Jung-Frau's cone" (W.P.III: 199). The same location is alluded to in *The Ecclesiastical Sonnets*: "The Alpine Mount, that takes its name/From roseate hues". In the earlier instance, I have already commented on the possible root in Wernerian geology. In the second, there is a distancing from matters of geology in the poet's note: "Some say that Monte Rosa takes its name from a belt of rock at its summit - a very unpoetical and scarcely a probable supposition" (W.P.III: 573).

Other examples, and they are admittedly small in scale, are found in *Itinerary Poems of 1833*. He identifies the rock, limestone, in "Nun's Well, Brigham" (Note 1). Similarly, in the poem, "Flowers on top of the pillars" in the

sequence of poems about the cave of Staffa, he writes an informed note:

Upon the head of the columns which form the front of the cave,
rests a body of decomposed basaltic matter, which was richly
decorated with that large bright flower, the ox-eyed daisy (W.P.IV:
407).

Turning from matters mineralogical to theories of the earth, the later poems are again tantalisingly short on clues to Wordsworth's scientific convictions at this stage. As I have said in other sections of this thesis, to look for clues in this way is, in any case, to undertake a very minor expedition as a component of the reader's journey into the mind of the poet. There are some traces however and, few though they are, they should be documented. For example, there are specific references to the Flood and to related phenomena. A typical instance occurs in *The Ecclesiastical Sonnets in Series*, Part 1, number III, "Trepidation of the Druids". The passage runs:

Screams round the Arch-druid's brow the sea-mew - white
As Menai's foam ...
Slowly the cormorant aims her heavy flight,
Portending ruin to each baleful rite
That, in the lapse of ages, hath crept o'er
Diluvian truths, and patriarchal lore (W.P.III:342-343).

The footnote appended by Wordsworth at a later date explains the reference to the sea-mew: "This waterfowl was among the Druids, an emblem of the traditions, connected with the Deluge that made an important part of this mystery". (W.P.III: 342). Who can tell from this passage whether the Deluge is the myth of the punishment of Druid's heresy, or the poet's explanation of the present landscape in terms of a Wernerian "flood", or the Biblical Deluge before the Druids appeared. Perhaps much more significant is the echo of Thomas Gray's poem "The Bard" about the legend of the slaughter of the Druids (See Note 2).

In *Memorials of a Tour on the Continent, 1820* there is another baffling reference to the Flood in the "Desultory Stanzas" already referred to:

Where Mortal never breathed I dare to sit
Among the interior Alps, gigantic crew,
Who triumphed o'er diluvian power! and yet
What are they but a wreck and residue,
Whose only business is to perish! - true
To which sad course, these wrinkled Sons of Time
Labour their proper greatness to subdue;
Speaking of death alone, beneath a clime

Labour their proper greatness to subdue;
Speaking of death alone, beneath a clime
Where life and rapture flow in plenitude sublime (W.P.III: 199).

Did the Alps "triumph o'er" the Deluge because it never covered their highest peaks? Is this Huttonian or Wernerian? Does it imply that the land emerged through the diluvial oceans by the agencies of vast heat and pressure after eons of slow formation or is it the mountain tops etched by submarine erosion and now drained from the great Flood's all-enveloping cover? Adam Sedgwick in the first "letter" accompanying *A Guide* describes mountains in the former sense:

"Mountains are simply the highest point of elevation, marking the places where subterraneous forces have pushed upwards with greater intensity or met with least resistance" (Sedgwick, A. 1842: 9)

These "wrinkled Sons of Time" seem to present a Huttonian landscape scarred by the attrition of destructive forces, but Werner too would equally have accepted that erosion continues after the latest withdrawal of the waters. The word "plenitude" is, however, from neither geologist, but from the linguistic register of Thomas Burnet or from eighteenth-century deists.

A similar conundrum is raised by the sequence of two poems in *The Itinerary Poems of 1833* on Ailsa Crag, the island rock in the Firth of Clyde (see also Note 3). Here is an apparently clear reference to a geological process:

Since risen from ocean, ocean to defy,
Appeared the Crag of Ailsa, ne'er did morn
With gleaming lights more gracefully adorn
His sides, or wreath with mist his forehead high (W.P.IV: 36)

Yet there is at heart an ambiguity in the phrase, "from ocean". Does it mean "out of" or is its meaning a recovery from the Deluge, with then perhaps more power in the assertive image of "to defy"? In truth, of course, Wordsworth, in these late poems was not writing a scientific encyclopaedia in verse. He is no more Erasmus Darwin in his later verse than in his early years.

Despite the dearth of geological connection, these later poems are determinedly topographical. The three considerable sequences, *Memorials of a Tour on the Continent, 1820*, *The Itinerary Poems of 1833* and *Memorials of a Tour in Italy 1837* are all based on actual, geographical tours as well as being journeys of the mind. In other less obvious sequences also Wordsworth fastens on an actual location. In the *Ecclesiastical Sonnets*, the mental tour of the history of

the Christian Church in Europe, becomes close to a physical excursion, encompassing the Jungfrau, the Falls of the Rhine near Schaffhausen, and the broader River Rhine after the Falls. Not all the poetry is exclusively European of course. Sometimes a deliberate comparison with Britain is made as in *A Guide*. In the collected *Poems of the Imagination* there is a poem, published in 1842, which opens with the line, "Lyre! though such power do in thy magic live" (W.P.II: 221). According to Wordsworth's comment to Isabella Fenwick this poem was based not only on his memories of the clear beauty of the Rydal torrent compared with the grander rivers of Europe, but also on "intense observation" (W.P.II: 473). That intensity of observation produced the following vivid description which contained a term of some interest to a student of river erosion ("the slope-channel") at the same time as employing the image of a veil hiding the truth, a favourite figure of contemporary geologists:

Or note (translucent summer's happiest chance!)
 In the slope-channel floored with pebbles bright,
 Stones of all hues, gem emulous of gem,
 So vivid that they take from keenest sight
 The liquid veil that seeks not to hide them (W.P.II:222)

One feature of these later poems is their occupation with the alternation of the real and the imagined. This is a continuing emphasis of the poet as I tried to indicate in the previous chapters, but in these later poems there is a concentration on what is actually present and a concern to make a distinction between the product of imagination and the actuality. It is almost as if the older poet is anxious not to abuse the reader's confidence in the veracity of the poet's task. This peculiar quality is illustrated in four sonnets in *The Itinerary Poems of 1833* describing the poet's visit to the Cave of Staffa, as popular a location for tourists seeking Gothic atmosphere as it was for geologists studying cave formation and structural jointing. The first of the sonnets is about the human barrier that comes between the poet and the intensity of feeling generated by the famous cave. The visiting crowds of tourists with their noise and movement are a distraction; the poet wishes to stand alone absorbing the feeling of the place. In doing so he makes a common enough comparison in a place whose rocks have often been described as columns of a cathedral:

...the effect
 Of those proportions where the almighty hand
 That made the worlds, the sovereign Architect,
 Has deigned to work as if with human Art! (W.P.IV: 40)

The distinction drawn is between the man-made construction and Divine operations working in a different plane, but, of course, the lines above suggest that in Fingal's Cave the divine is the true creator. The next sonnet (xxix) immediately develops the notion of different levels of law:

Thanks for the lessons of this spot - fit school
For the presumptuous thoughts that would assign
Mechanic laws to agency divine;
And, measuring heaven by earth, would overrule
Infinite Power (W.P.IV: 40-41)

A faithful geologist such as Sedgwick would also have recognized the distinction between mechanic laws (which geology and the sciences could generate from their observations) and divine agencies working by other means. The poet avoids the "presumptuous thoughts" that merge these two worlds and the sonnet ends with an octet praising the powerful material force of the ocean that has created the majestic pillars and the sculpted roof. What, Wordsworth next asks, is the place of the non-material presences in this famed spot? Sonnet xxx reminds us of previous generations and their belief in the heroic figure of Fingal. Our link with this mythic past is two-fold, through our eyes seeing the shapes in the gloom of the cave and through our imagination which reaches back into the human past. "Why keep *we* else the instincts whose dread law/Ruled here of yore" (W.P.IV: 41). The residual "instinct" enabled us to imagine, in the shadows of the cave, figures of a Bard or of a chief, but, of course, such a response is self-conscious. The watcher in the cave is aware of the human faculty which he is exercising.

One of the noticeable patterns of these later poems, as I shall try to demonstrate, is the sequence of questioning followed by reassurance throughout a series of poems, a series which has been carefully assembled to modulate the reader's feelings. It is therefore important to follow through from one poem or sonnet to the next, the modulation of confidence. In the last poem of the four Staffa Cave Sonnets, following those discussed above, Wordsworth contrasts persistence and loss. The flowers growing above the cave mouth have survived both the storms that have carved the caves and the people of the past who believed their heroic myths. The Wordsworthian tension of duration and decay is immediately followed more explicitly in the three following sonnets about Iona.

On to Iona! - What can she afford
To us save matter for a thoughtful sigh,
Heaved over ruin with stability
In urgent contrast? (W.P.IV: 42)

In the Staff and Iona sequence, once more legend has again appeared in close association with a dramatic geological feature, as was the case in *The River Duddon: A Sequence of Sonnets*. Here, as in the sonnets of 1820, Wordsworth uses myth and legend, not as a fanciful explanation of phenomena for the amusement of the educated, but to contrast with "mechanic laws" as if to illustrate that the power of human imagination still has room to play alongside more mechanical, but, in their own sphere, admissible explanations.

There is one more aspect of Wordsworth's use of legend and myth which was present in *The River Duddon: a Sequence of Sonnets*, but which emerges more strongly and swells to become a marked feature of the later poems. These later sonnets and short poems take their heroic figures from a wider context than classical myths and travellers' tales, although these too appear. The new figures in Wordsworth's landscape are from English history. They include the Druids, the ancient Britons and the English Kings and Queens. Wordsworth has become very conscious of a nation whose landscapes, like its monuments, are a continuing inheritance. This theme will be returned to, from a different point of view, in the following paragraphs.

So far the argument about these later collections has been that they reveal only the faintest traces of geological interest, merely minute prints and impressions rather than bold strata of thought, containing clearly identifiable vestiges on which anything more substantial than conjecture can be reasonably based. Three important tendencies or consistent patterns of writing do however emerge with implications for interpreting Wordsworth's understanding of issues which, in their own sphere, were being energetically pursued by contemporary geologists. The first is the consciousness of history and, in particular, the historical and political role of England. The second is the continuing reaffirmation of moral values in a scientific age, and the third is the persistent image of the stream, with the ambiguities surrounding clarity and rationality. Throughout these three aspects of the later poems, I claim to note a pattern of questioning followed by reassurance, which was of significance for the geologists who turned to Wordsworth for sustenance.

The reassurance of "the Land".

The patterns in the later poems have something to say to us about the poet and the landscape in which he lived, but also about the nation from which he set out on his expeditions and about the history of Europe. These later collections reveal less about the Lake District itself than about the wider and wider ranges of geographical experience that Wordsworth and members of his family experienced right into old age. Journeys into the Alps, up and down the Rhine, visits to the antiquities of Italy, across France, to Scotland and across the Irish Sea to the Isle of Man provided a rich source of poetic inspiration. A reader coming to them without knowledge of the poet's earlier writing might be forgiven for classifying this writer as an itinerant poet or an urban man with an urge to escape city life by visiting and feeling the excitement of both the cultured and the wilder places of Europe. Of course, there are carefully placed nostalgic pieces, thoughts from abroad, praising home and the modest streams flowing into Rydal Water, but the overall effect, when isolated from the main corpus of the poet's work and when added to by the not infrequent references to the literature of travel in the Americas and elsewhere, is of a restless imagination. Yet the precisely opposite message appears to be intended. The poet uses these "foreign" settings as vehicles of reassurance and a framework for the domestic values of hope, modest behaviour and strong national pride. For the modern reader, these benefits of travel may be the unexplored paradox of the later poems. In our time, we perhaps regard an outcome of travel as a broader mind rather than as a narrowing to traditional, homely concerns. The later Wordsworth, however, felt committed to a prophetic role. He saw his prophecy in a political as well as a moral form and that political message increasingly became bound with a vision of England's past, where he believed that political surety could be maintained, and where the origins of freedom lay.

The most obvious context for an analysis of Wordsworth's espousal of England's role as leader of the nations is the sequence *The Ecclesiastical Sonnets in Series*. The poems are at one level a potted history, if by "potted" we mean planted out into neat containers. The sequence divides into sections or eras of time, from the Druids through the Middle Ages, with their heresies carefully enumerated, on into the troubled seventeenth century and the emergence of the Laudian compromise, through to the poet's own times. As history in verse, it is fairly uninspiring stuff, except to the dedicated devotee of the genre. There is

however another level of interest related to what I can only designate by an almost non-English, unfamiliar term, "the Land", an intermixture of place and history. There is an interesting deliberate pattern of the continuing unbroken thread of natural identity running through the snapshot sequences of history. In the first place it is important to note the actual title, "the series". As with the *River Duddon: A Sequence of Sonnets*, Wordsworth intends that the sequence should be read as one continuous poem. A prominent linking image of a stream binds the sequence together.

The series begins with an acknowledgement both literary and biographical, a reference to the Duddon:

I, who accompanied with faithful pace
Cerulean Duddon from its cloud-fed spring,
And loved with spirit ruled by his to sing
Of mountain-quiet and boon nature's grace (W.P.III 341)

The poet now seeks a new stream "The source/Of a HOLY RIVER, on whose banks are found/Sweet pastoral flowers." In the fifth sonnet the image of the moving stream swells. "The growing Rill" marks the growing strand of Christianity. Although the fountain-head may be obscure, the river runs true through Roman times. In the Dark Ages, only "some melancholy streams" preserve the tradition by retaining their names. The reconversion of the land takes place and the gospel is "heard near fresh streams", The Saxon anchorite in Sonnet xxii is pictured in his idyllic cell near a brook, a waterfall and a "translucent pool". So the poetic sequence begins with a sense of continuous movement, of advance, but, like the actual streams of the Lake District described in *A Guide*, there are not direct flows or straight progressions. Sometimes the course of history is obscure and there are circuitous routes and even phases of reversal.

In the second part of the series, the same alternation is also conveyed by the image of a river. The Sonnet, "The Rhine near Schaffhausen", provides a strong picture of disturbance generated by religious torment and persecution. In the next poem, on "The Troubles of Charles the First", the metaphor of a quiet stretch of a deep river is introduced, then contrasted with violent stretches of a river's life. Part Three of the series consciously raises the image again for the sake of continuity: "Down a swift Stream, thus far, a bold design/ Have we pursued" (W.P.III: 390). The poet compares the journey taken by his poems through history with travellers on the Rhine passing by the varied scenes along

its banks. The concluding poem completes the theme of the opening sonnet, again with the image of the river: "Look forth! that Stream behold" (W.P.III: 407). The river's progress to the sea in this case is not to an extinction but to the fulfilment of "the eternal City". I shall return again at the end of this Chapter to the image of flowing water in the context of clarity and the paradox that translucence may deceive. For the moment I draw attention to the power of duration of the River Rhine with its forward movement and sense of ever-flowing continuity. The history of civilisation, particularly of Christendom, is like the river, moving, changing and essentially a European phenomena. The Rhine becomes a symbol of stability and it never ceases to be the major European river.

I have emphasised the patterning of the sequence of poems of this series, not merely because there is a geographical allusion threaded through the sequence of poems, which is gathered together and brought to an elevated conclusion, but because I believe the relationship of land, history and reassurance are persistent themes of the later poems. I shall argue later that this relationship was also a part of the framework of thought of Wordsworth's geological friends. Further evidence of this argument of a close relationship of history, land and moral leadership of the nation is now needed. It can be found not only in the sequence of success and failure in *The Ecclesiastical Sonnets*, but also in the other sonnet sequences and travel series published after 1820. These itinerary series are not merely poetic log-books of the geographical sequence of the actual journey, although they are that too. They are deliberate arrangements of question and answer, of fear and assertion.

A good example of the wave-like structure of the later poems is provided by *The Itinerary Poems of 1833* (W.P.IV: 20-54). The sequence was published in 1835, ostensibly as an account of a tour through the North of England and into Scotland with Henry Crabb Robinson and John Wordsworth. We shall see later that some of the poems of the collection, such as the relatively long "Stanzas suggested in a steam boat of Saint Bees" have been quoted as evidence of Wordsworth's changed attitude to science in his old age (Cannon, S.F. 1978). My own view is that the series is a more profound literary document than a record of the poet's absorption of contemporary scientific facts. The series demonstrates a careful modulation of moods or tones through the stimulus of place. The poet identifies notable features of scenery: the Nun's Well at Brigham, St Bees Head, the Isle of Man and its coastal features, Ailsa Crag and

in the next two sonnets which praise the noble families of Lowther Castle with their traditional glory and ancient honour. Rooted in a place though threatened by "the democratic torrent", the English tradition is offered to the reader and reassurance flows again. "The Land" is both geographical and historical - a physical and human inheritance.

Attitudes to the scientific spirit.

The sonnets of Long Meg following the welcome to the canals, viaducts and railways, neatly introduce for me the second striking feature of the poems composed after 1820, an approach, although a cautious and wary approach, to scientific advancement and technological development. Although there is ample evidence of the poet's confidence in the superiority of art and of nature over man's scientific endeavours, a flat rejection of scientific attitudes after 1820 is not the whole story. It may well be that Wordsworth's late but qualified response reflects the wider circle of his scientific acquaintances from 1820 onwards as well as his own accommodation to and recognition of the burgeoning technology taking place in the last thirty years of his life. Examples are necessary to illustrate this mixed and tentative acceptance of science.

One of the poems in the earliest sequence, *Memorials of a Tour of the Continent, 1820* gives a flavour of the poetic check to the confidence of science. The poem is "The Eclipse of the Sun, 1820". It is a good example of the poet's alternation of sensations in a single poem which, as I have tried to demonstrate is found in other places in the sequencing of short poems or sonnets. Wordsworth opens this poem with an admission that the moment of the eclipse is being claimed by science: "High on her speculative tower/Stood Science waiting for the hour". Science, however, is out- paced by the poet's "Fancy" which flies to imagine the effect of the eclipse on the pinnacles of Milan Cathedral. The poet's own anxiety is high. His mind turns to his own Lakeland home at this moment of darkening. In the conclusion however there is a traditional late-Wordsworthian reassurance of a greater power. At that moment of the reversal of night and day, his questions on the safety of his home can not be answered, but already the Italian scene is returning to normality:

I ask in vain - and know far less
If sickness, sorrow, or distress
Have spared my Dwelling to this hour;
Sad blindness! but ordained to prove
Our faith in Heaven's unfailing love
And all-controlling power (W.P.III: 186)

Science may have watched from "her speculative tower", but faith in Divine love and omnipotence has restored the town, and the gardens "their lustre re-assume".

The later set of travel sequences, *The Itinerary Poems of 1833*, reveals more elaborate examples of a begrudging admission of scientific and technological activity. Since this sequence has had previous critical attention in a study of the history of science, it is worth pausing to explain what has been said from that field of study about particular poems. Cannon, W. (1964) and Cannon S.F. (1978) identify the poem, "Stanzas off St Bees" as a signal of Wordsworth's revision of the role of science and its admission into what they regarded as acceptable status. It is, I believe, too simple to suggest that these later poems were the result of an acquaintance with the "Cambridge Network", or of a friendship with William Rowan Hamilton. Although the poet and his scientific friends may well have shared a common "Truth Complex", as the Cannons have argued, the origin of what they shared goes back much further in literary history and in the history of philosophy than contemporary social cohesion or an academic ideology of early Victorianism. As indicated in earlier chapters of this thesis, I believe there is evidence that Wordsworth's accommodation to scientific thought was not in the nature of a late "conversion" - to use Susan Cannon's own term. Similarly, geologists such as Hutton, Greenough, Sedgwick, and, as we shall see in the next chapter, Whewell, were well versed in the literary inheritance that was also Wordsworth's. These points apart, I believe that the St Bees poem indicates a more complex, even an ambiguous, attitude to science than the Cannons suggest. The literary context of the poem has to be taken into consideration as well as the faint indication of scientific interest.

The record of Wordsworth's commentary on this poem to Isabella Fenwick, not for the first time, has to be taken seriously. There he claimed that the form of the poem was modelled on a similar work by Charlotte Smith. The importance of the form, relative to the content, with its repeated chorus-like final line

of each stanza ("...of St Bees") certainly makes it of equal interest to the literary historian as to the scientist. The last stanza is worth quoting in full because it again draws a comment from the poet himself which is literary and philosophical rather than an attempt at scientific thought. The poet is writing about the recent stage of the history of the headland, when a school, St Bees College, was founded there:

Alas! The Genius of our age, from Schools
Less humble, draws her lessons, aims, and rules.
To Prowess guided by her insight keen
Matter and Spirit are as one Machine;
Boastful Idolatress of formal skill
She in her own would merge the eternal will:
Better, if Reason's triumphs match with these,
Her flight before the bold credulities
That furthered the first teaching of St. Bees (W.P.IV: 30)

Wordsworth's own footnote refers the reader to a similar passage in "The Ecclesiastical Sketches" (presumably *The Ecclesiastical Sonnets*) and, significantly for a point I wish to make later, to the "seventh part" of *The Excursion*. The passage in *The Excursion* is from Book VIII where the travelling friends consider the grave of the "courteous knight".

...The vast Frame
Of social nature changes evermore
Her organs and her members, with decay
Restless, and restless generation, powers
And functions dying and produced at need,-
And by this law the mighty whole subsists:
With an ascent and progress in the main
(P.W.V: vii: 999-1005)

These comments from the poet himself (or more accurately from a character in the poem) surely indicate not an accommodation with science as such but with the notion of the gradual improvement of mankind within a vast scheme of divine protection. The opening of the poem about St Bees Head does indeed consider the ease of travelling by the technology of steam-power which drives the boat, but there is even then a cautious warning that the mechanical triumphs "Depress the hour" (P.W.IV: 25). There are superior laws above the mechanical.

This theme of a benign law-controlled universe, which science can improve on but not replace, continues in the following poems and on through the whole sequence. The three sonnets that follow the St Bees stanzas are written as if on the sea journey from Cumberland to the Isle of Man. The subject is however

firmly based in Cumberland with a passage about the simple Cumberland shepherd's store of weather-lore, which then stimulates a sequence on naive knowledge and Reason. Just as in *The Excursion* the Narrator reminds the Wanderer of the innocent and uneducated and the value of their child-like perception taught directly by Nature, so the poet reminds us of the shepherd, "untaught Philosopher", who looks out from the Lake District's hills over to the clouds massing around the Isle of Man and bases his non-scientific theories of their origin in myths. One such fable, which the shepherd confidently passes on to his children, is that whenever sea-borne wanderers threaten the Cumbrian coast, the mist comes down to confuse them. The poet's comment, like that on the historical St Bees' monastery and school, is:

O Fancy, what an age was *that* for song!
That age, when not by *laws* inanimate,
As men believed, the waters were impelled,
The air controlled, the stars their courses held;
But element and orb on *acts* did wait
Of *Powers* endued with visible form, instinct
With will, and to their work by passion linked (W.P.IV: 31)

This is only half in admiration for, just as in the poem about St Bees, Wordsworth ultimately rejects the local superstitions no matter how beguilingly antiquarian they were. In the next sonnet (XIV) he feels he has to recommend a formal bow to Progress. Would we go back "hide/Truths whose thick veil Science has drawn aside?" "No" is his reply and, in any case, there is always a "gulf of mystery" which only Faith can cross. Adam Sedgwick also recognised a frontier across which Science and Reason could not penetrate.

The image of the veil that hides mysteries is, as I have already indicated, a frequent figure of speech related to the activities of contemporary science at the beginning of the nineteenth century. Certainly the longer poem on St Bees and the sonnets linked to it reveal an awareness of science, but also a delimitation of its field of power. The full effect of the argument is felt, not by examining each poem or sonnet for statements of approval for science, but by reading the sequences as a system of statement, qualification and restatement. In other words the reader must attend to the placing of statements in the literary context of a collection, within which are carefully placed poems. The subsequence of poems about St. Bees has to be read with the sequences that follow. So the Cave of Staffa set of sonnets, already mentioned because of their play upon what is fancied and what is truly perceived must be read with attention

through to Sonnet XLII, which is about scientific progress. This last sonnet is itself immediately qualified by the careful positioning of the next poem with its ominous memories of pre-historical rites, "Long Meg".

Cannons study of Science and Culture also refers, as evidence of Wordsworth's late acceptance of science, to the three poems in *Memorials of a Tour in Italy, 1837* relating them to the "new history" of Niebuhr (Sonnets IV, V and VI), W.P. III: 213-214). My own view of these poems and the sonnet that precedes them is almost the reverse of the interpretation by the Cannons. Certainly the poems show knowledge of the careful "scientific historical method" of Niebuhr, but their tone is one of regret not of acceptance. Indeed the last two lines of Sonnet IV, written "in allusion to Niebuhr, and other modern historians" is one of the clearest of Wordsworth's statements about the higher powers of non-rational assent over inductive reasoning:

One solace yet remains for us who came
Into this world in days when story lacked
Severe research, that in our hearts we know
How, for exciting youth's heroic flame,
Assent is power, belief the soul of fact (W.P.III: 213)

The final sequence of travel series, *Memorials of a Tour in Italy, 1837* has its fair share of admiration for the "non-life sciences". Here, in "Musings near Aquapendente", is a qualification of the gains that science has brought in the long processes of flowing Time:

...The Stream
Has to our generation brought and brings
Innumerable gains, yet we, who now
Walk in the light of day, pertain full surely
To a chilled age, most pitifully shut out
From that which *is* and actuates, by forms,
Abstractions, and by lifeless fact to fact
Minutely linked with diligence uninspired,
Unrectified, unguided, unsustained,
By godlike insight. To this fate is doomed
Science, wide-spread and spreading still as be
Her conquests, in the world of sense made known
(W.P.III: 211)

How can modern Man redress the lost balance? What is necessary? The poet seeks an answer to "what we need" a few lines further on. His response to the question is important because in one brief phrase, Wordsworth explains so much - about the inadequacy of dull and lifeless sciences, about "prying and probing",

but even more about the insistent historical quest:

By gross Utilities enslaved we need
More of ennobling impulse from the past,
If to the future aught of good must come
Sounder and therefore holier than the ends
Which in the giddiness of self-applause,
We covet as supreme (W.P.III:212)

The key phrase "ennobling impulse from the past" has of course memories of the young Wordsworth ("one impulse from a vernal wood") but "ennobling" and "from the past" marks this as a poem of his later years. Suddenly into place falls the long section from what is effectively three books of *The Excursion* devoted to the mountain graveyard. There the friends devote themselves to the impulses, the voices of the churchyard past. We can now also understand the urgency in *The Ecclesiastical Sonnets* to seek for a pattern in Christian history. The iteration of historical and pre-historical references in other sonnet sequences also becomes more than a conventional historical decoration. Many of the long historical poems of the later years (such as "The White Doe of Rylstone", "The Egyptian Maid", "The Russian Fugitive") are, of course understandable at a superficial level in the context of the age's absorption with mediaeval trappings. They make, however, even more sense in the light of the older poet's placing, in opposition to mechanical utility, an ennobling impulse derived from an unbroken historical tradition. Of course, the opposition of utility and traditional feeling is not a simple, arithmetical calculation with the past triumphing by weight of years over the modern, mundane and practical. There is tension and a lingering admiration for the achievements of the scientist. In more than one way Wordsworth welcomes science. At one level, he presents an eighteenth-century self dismissing superstition with Reason, at another he warmly greets the power of the new discoveries, at yet another, he warns against placing too great a trust in science.

A few more comments on poems of the later years, such as "Stanzas suggested in a steam-boat off St Bees Head", may serve to reinforce the view that the older Wordsworth can accept change and modern notions but sees his role to offer to the new experience a richer way of living. The older poet is not evincing a change of heart or change of basic beliefs. What he has to say in 1830 could have been illustrated in 1813 by *The Excursion* with its presentation of a grander vision than the Solitary has ever known. Nor are the poems of his later

years with their mixed values disconnected from a much earlier vision. As in his youth, some external circumstance (a view, a favourite scene, a new or old landscape) can fire him to repeat in a new way the opposition between materialistic, detailed, scientific analysis, closely tied to utility, and the assenting power of imagination. The potential of humanity remains important, hence "the ennobling impulse". The fact that in 1833 he still feels he has to repeat the opposition of utility and assent might confirm that internally he still struggles with the problem which will not go away. The scientific spirit is perpetually resurgent. It demands a form of respect, even though it has to be tapped down again wherever it appears.

There is a late sonnet of 1838 "To the Planet, Venus, upon its approximating (as an Evening Star) to the Earth, January, 1838" which illustrates Wordsworth's continuing scepticism, yet the irony is that the subject that inspired him is quasi-scientific. Twice before he had felt drawn to write about astronomical matters, particularly the eclipse - in the eclipse of July, 1833 as he approaches Ailsa Craig and earlier in *The Memorials of a Tour on the Continent*, "The eclipse of the sun, 1820." Eclipses or an exceptional event in planetary orbit serve to remind the poet of the contact between Nature and the power of knowledge that modern men of Science possess. On the occasion of writing about the path of Venus, Wordsworth does not take the obvious approach of contrasting the massive powers of Nature with the puny powers of humanity. Instead he asks a moral question:

...True is it Nature hides
Her treasures less and less. - Man now presides
In power, where once he trembled in his weakness;
Knowledge advances with gigantic strides;
But are we aught enriched in love and meekness?
Aught dost thou see, bright Star! of pure and wise
More than in humbler times graced human story (W.P.III: 59-60)

In 1845 the word "knowledge" was changed to "Science". Here is the acknowledgement of the growth of human power, but with the prophetic reservation that it may not act for good. Wordsworth is still observant in the decade of the 1830s of the moral worth of scientific knowledge. In a strange contrast, in a poem of 1835, "The Egyptian Maid, or the Romance of the Water-Lily", an Arthurian legend, he contrasts Merlin's somewhat inimical powers with modern science:

Now, though a Mechanist, whose skill
Shames the degenerate grasp of modern science,
Grave Merlin (and belike the more
For practising occult and perilous lore)
Was subject to a freakish will
That sapped good thoughts or scared them with defiance (W.P.III: 232)

Merlin's power is overcome by the benign Nina, whose sheer goodness changes the evil he has wrought through his "perilous love". The story, for my purpose, is less important than the single epithet "degenerate". Wordsworth continues to be the prophetic pilot for humanity, steering it away from unrelieved knowledge and redressing balances by a message of moral vision and alternative ways of knowing. Wordsworth's concern in these late poems is to warn his readers (and his friends, the scientists) that what their researches may present as truth may deceive or, at least, give a partial understanding. Seeing fully and clearly, the issue of clarity, again emerges, as it did in earlier years with the notion of "distinctness". I shall now attempt to trace in the later poems the idea of seeing clearly through an important Wordsworthian image.

The still repose, the liquid lapse serene".

The third area of interest revealed by the later poems, in relation to Wordsworth and the geologists, arises from the exploration of mountain streams and waterfalls. These items of the landscape are clearly not new features of his poetry; they are perennial, "Wordsworthian" elements of a landscape. I have already drawn attention to the image of the river in the sequence *The Ecclesiastical Sonnets*. What is noteworthy in the later poems is the ambiguity of the poet's use of the image of a stream. Sometimes there is a "distinctness" of vision, the clarity of a mountain stream through which the river-bed stones can be sharply seen. At other times, the still, clear water reflects reality and, in doing so, displays a seductive unreality. Sound and sight, the murmur and the glimpse of falling threads of water over a precipitous rock face may combine to create a harmonious setting for the itinerant poet. At other times the stream may appear to be stationary or "lapsed", while the ear confirms otherwise. Wordsworth continued to turn to the stream, as in earlier poems, for images of human life, either individually or in history, but in his later works there is a more complex sense of time. The stream's life is longer, the stretch of history and pre-history likewise is more attenuated and, like the river, circuitous and indirect in its flow.

One of the most intriguing words in connection with the many signals conveyed by the mountain stream is "lapse". This was the term used in the Duddon Sonnets with the adjectives that almost construct a paradox: "the liquid lapse serene" (W.P.III: 254). As early as *The Prelude* of 1805 there is a moment when falling water presents an illusion of stasis. At the highly charged moment of crossing the Alps Wordsworth writes of "the stationary blasts of waterfalls" (*Prelude* 1805 VI: 558). In *The Excursion* Book III the same word, "lapse", as used in the Duddon Sonnet, is applied to the waterfall in the upland plateau where the friends debate "Despondency" and the natural world provides the Wanderer with many circumstances to justify optimism. The isolated, sheltered space is still, except for the waterfall which both moves and yet appears motionless:

... high or low appeared no trace
Of motion, save the water that descended,
Diffused adown that barrier of steep rock,
And softly creeping like a breath of air,
Such as is sometimes seen, and hardly seen,
To brush the still breast of a crystal lake (W.P.V iii: 68-73)

The Wanderer takes over from the Narrator the praise of this spot and he describes the falling water devoid of its sound: "Voiceless the stream descends into the gulf/With timid lapse" (W.P.V iii: 92-93). As I have indicated in Chapter Four, the editors, de Selincourt and Darbishire, suggest that here there is an echo from Milton's *Paradise Lost* (viii: 263): "Liquid lapse of murmuring streams".

The theme of an apparent pause in the flow of a waterfall continues in the later works in a long poem in *Memorials of a Tour in Italy*, 1837. The work that opens the collection of twenty-eight poems, based on an excursion with Crabb Robinson to Rome and the Italian Lakes, is about a place whose name is also a description of its chief physical feature: "Musings near Aquapendente April, 1837". Gill sadly comments on this poem "Wordsworth's most characteristic voice in blank verse is heard for the last time (Gill, S. 1981: 406). The significance of the place is many layered for Wordsworth. The golden brooms growing early in the Apennines reminds him of his own Lakeland broom and, by association, of the Lakeland peaks of Seat Sandal and Helvellyn. There is another, human source of nostalgia. Two other great literary figures have connections with the place visited by the poet, Tasso and Sir Walter Scott. In widening circles of association, the poet's mind moves to Genoa and to mediaeval Pisa, then to the classical writers who found their

peace and their inspiration in Italy, Horace and Vigil. Typical of these later poetic sequences, there is a link between the classical past and the Christian martyrs and apostles of first-century Rome. Wordsworth then introduces the figure of the stream for his next "movement" of association:

Time flows - nor winds,
Nor stagnates, nor precipitates his course,
 ...The Stream
Has to our generation brought and brings
Innumerable gains (W.P.III: 211: 315-316 and 321-323)

The contrast with the noble figures of the past and the modern "chilled age" is highlighted and out of the comparison is generated the sentiment: "More of ennobling impulse from the past" which I have already noted. The poem ends with a return to the actualities of the present, the evocative broom and the significant world of sound and sight: "murmur issuing from yon prudent flood" (W.P.III: 212: 370). The falling stream has been the occasion for a reverie which has extended the poet's vision in space and time and, most significantly, is the recreation of a historical past against which the modern can be measured. The poem then moves forward: "Let us now/Rise, and tomorrow greet magnificent Rome" (W.P.III: 212: 371-372). The falling water has acted as a symbol of the mind's power to suspend space and time, a form of lapse from normal frames and references of time:

Yon snow-white torrent-fall, plumb down it drops
Yet ever hangs or seems to hang in air (W.P.III: 203: 10-11)

In the same collection, there is another evocative fall of water with direct literary association: This poem, the eighteenth in this Memorial collection, is called "At Vallombrosa" and it has powerful associations for Wordsworth because of Milton. Wordsworth quotes from *Paradise Lost* in the dedication and directly addresses "that holiest of Bards" in the body of the poem. Again, the opening image that releases the imagination is a contrast of quietness and turmoil, of movement and restful flow:

 ...and the Flood,
That lulled me asleep, bids me listen once more
Its murmur how soft! as it falls down the steep (W.P.III: 223)

The poem closes not with a return to the natural image of falling water, but to the image of a human artefact: "the Fountain whence Time and Eternity flow" (W.P.III: 225). Immediately following this poem, the sequence of poems moves to Florence to consider another great figure in the history of poetry, Dante, and then

to the two great painters - Raphael and Michael Angelo.

Passing from the dramatic fall of waters that is in fact not true movement, but a lulling, hypnotic break in time, to consider flowing water's other qualities, of clarity and translucence, we can see in the later poems a further poetic ambivalence. In considering the Duddon Sonnets in Chapter Six, I draw attention to the Sonnet, "Tradition". This was the folk-tale, half-told rather than fully concluded, of the "love-lorn Maid" who drowns reaching for the perfect rose reflected in the deep pool. I noted also how the sonnet which follows "Tradition" puts aside "sad thoughts" and passes on to the mundane activities of sheep-shearing. In the later poems also, clear water is not always what it seems. The River Rhine makes its appearance in the later poems, briefly in *Memorials of a Tour on the Continent*, 1820 and again in *Ecclesiastical Sonnets* of 1821. In the last-named collection, as I briefly mentioned earlier in this chapter, the Rhine is used as an elaborate analogy with the reign of Charles the First which changed from political content to revolutionary rage. The river like the State has only an illusion of stillness. Like the Jungfrau where "men below/Wonder that aught of aspect so serene"/Can link with desolation" (W.P.III: 282-383), the river appears "at a little distance" to be calm, but the reality is soon very different:

...but on they go
Fretting and whitening, keener and more keen;
Till madness seizes on the whole wide Flood,
Turned to a fearful Thing whose nostrils breathe
Blasts of tempestuous smoke (W.P.III: 383)

Eventually the Rhine is returned to again in the concluding sonnet of the series, but it is then progressing out of its obscure condition to a transformed clarity:

Look forth! - that Stream behold,
THAT STREAM upon whose bosom we have passed
Floating at ease while nations have effaced
Nations, and Death has gathered to his fold
Long lines of mighty Kings - look forth, my Soul!
(Nor in this vision be thou slow to trust)
The living Waters, less and less by guilt
Stained and polluted, brighten as they roll,
Till they have reached the eternal City (W.P.III: 407)

Clarity and turbulence, peace and strife are strangely mixed in these later poems. I have already commented on the poem, "Musings near Aquapendente; April 1837", on its shifting moods of repose and anxiety, sadness and nostalgia for home, together with a commitment to the power of the poet. In the same sequence

there is a sonnet, "Near the Lake of Thrasyrene", which also opposes peace and disturbance and, in so doing, employs emotions associated with the stream that flows in an historic place. This was the location of the battle between Rome and Carthage. The river, aptly named Sanguinetto, once flowed with blood but now is a "sweet stream! as crystal pure" (W.P.III: 217): the cleaned river stands for the eradication of an evil past. Immediately afterwards in the thirteenth sonnet, the memories of bloodshed are invoked. Wordsworth, despite his earlier creation of a purified place, raises a haunting by the chief and the men who perished in the famous battle. Calmness and clarity are once again revised and qualified. Still, clear water is, as it were, muddied by violence.

The Itinerary Poems of 1833, based on the journey to the Isle of Man, provide another example of the alternation of clarity and turbulence. In the nineteenth poem, "By the seashore, Isle of Man", the poet praises the clarity of the sea.

Why stand we gazing on the sparkling Brine,
With wonder smit by its transparency,
And all-enraptured with its purity? -
Because the unstained, the clear, the crystalline,
Have ever in them something of benign;
Whether in gem, in water, or in sky (W.P.IV: 32).

There is a falseness in the benignity however. The sea is not as divinely pure as it appears, for "Temptation centres in the liquid calm". "We" are fascinated and tempted to plunge in, "...revelling in long embrace with thee". The next sonnet illustrates the effect of surrendering to that temptation. It is the story of a young man who, mistaking clarity for shallowness, had to be saved from drowning. Incidentally, the note in de Selincourt's edition tells us that the poet's son, William, saved the youth's life, probably in 1828. The point is not, however, biographical. A moral lesson is preached. The youth, being innocent, knew nothing of human deception. His action in stepping into seductive purity is only recovered by divine intervention: "He survives to bless/The Power that saved him in his strange distress" (W.P.IV: 33).

The sonnets immediately following this fable take the moral traveller into deeper channels than those of the young man's story. Sonnet XVIII begins again with the sea. The poet asks if the home of a recluse in the Isle of Man was a retreat from "Grief that devouring waves has caused" or from guilt. This and the next two sonnets dwell on the subject of withdrawal and the quest for a refuge where there is

comfort from Nature's gifts. The poems that follow appear at first sight to be a major change of direction: two sonnets on Tynwald Hill and, arising from it, on England as a defender of liberty. In fact the association between the alternate moods of stillness, then violence and melancholy and finally a sense of security in the political/historical destiny of the homeland is a regular pattern. The moral dilemma of, on the one hand, the attraction of clarity and, on the other, the rejection of simplicity is, for a time at least in these poems, resolved by a greater power, the tradition and continuity of England as a defence against the anarchy of Europe. Politically, clarity can be deceptive. Ideas from continental sources had produced deceptive clarity, but they sired eventual chaos: "When Europe prostrate lay" (W.P.IV: 36).

The alternating shifts of vision are indeed a continuity from the "spots of time" in *The Prelude* and in other early poems and are indirectly related to themes connected with description in *A Guide* (See Chapter Two and Note 4 to this Chapter). They are continued in a new way in the later poems. The image of still, or, more accurately, apparently still water is a vital continuous symbol important for the reader to grasp in understanding the later Wordsworth and his ambiguous relationship to the findings of science. It is, I have suggested, only when the reader looks at the context of a set of poems or, in a longer ode or narrative, the patterning of an image through the verses of a single poem, that the poet's own interpretation of his experience of a natural world (which for some appears to be increasingly under the ordered perception of science) can be appreciated. Wordsworth is a self-conscious poet in the sense of setting out a statement with a reference point in Nature and then questioning himself as to its significance, even when the natural "message" might well be thought direct, clear and obvious ("the obstinate questioning of sense and outward things"). My suggestion is that this poetic questioning is often contained as much in the sequencing and repetition of images as in the statement of fact in the poem. It is conveyed as much, in short, by structure as by description. I have found the same pattern in *The Excursion* and I am convinced that *The Excursion* holds the key to the long period of productive literary life that followed it. The third Book of *The Excursion*, for instance, could be pursued through the alternating images of the paths that are not clear ("the strait passage of encumbered ground" (W.P.V iii: 36), the place set apart with strange images of rocks like ships or an altar, the waterfall ambiguously moving and the "inverted" scene of the sky above the friends. The conflicting physical images are, of course, resolved eventually but only after the long visit to the heritage of the past

- the graveyard.

The universality of nature: the doctrine of immortality.

In a relatively short collection of late poems, *Yarrow Revisited, and Other Poems* published in 1835, there is one sonnet which typifies much of Wordsworth's attitudes to the universality of nature. It is the fifth poem in the sequence, entitled "Composed in Roslin Chapel, during a storm". The poet shelters in an ancient chapel listening to the sound of the wind. His eyes are attracted by some weeds growing inside the stones, the animate and the inanimate combined in a place set apart for faith:

From what bank
Came those live herbs? by what hand were they sown?
Where dew falls not, where rain-drops seem unknown?
Yet in the Temple they a friendly niche
Share with their sculptured fellows, that, green-grown,
Copy their beauty more and more, and preach,
Though mute, of all things blending into one (W.P.III: 267)

The source of the incident was, as so often, his sister, Dorothy Wordsworth, on this occasion her journal of the Scottish tour of 1803. The sentiment is, however, close to other examples in the later poetry as instances of what Sedgwick called "universality", but its particular setting in this poem in a religious, historical building is indicative of the entwined issues that I wish to explore in this section.

The later poems, I have argued, have a literary consistency with the poems of the middle years but a developing, stronger, persistent theme is religious belief and its roots in English history. If *The Excursion* proposes that the answer to the doubter's depression lies in accepting the benign nature of the caring Almighty, the later poems could be said to do more than propose, they insist on that view. God is a far-seeing, kind deity who protects all his creation and that creation is not restricted to human or even to animate beings. The unity of the inanimate and animate worlds which the early poems were to explore and to rejoice in is now more confidently asserted because it rests under God's overarching care. In this respect Wordsworth makes an important philosophical statement about the extent of the Creator's beneficence, in contrast to persuasive and popular writings of Christian apologists such as Paley. I wish to demonstrate how Wordsworth presents the unity of the inanimate and animate, yet distances both from the human condition. The

later poems do illustrate a separation between human and non-human spheres, yet their inter-connection is never abandoned. As Fitzgerald has noted: "by degrees, and certainly by 1805, the perceiving mind and the object it contemplated separated into a dualism, whereby the human mind appears ontologically different from and superior to nature" (Fitzgerald, J.M.P. 1984: 18).

One theological difficulty which obstructs a belief in the total unity of all nature, human, animate and inanimate, is the doctrine of immortality. Immortality in traditional Christian doctrine has been promised to human beings. On the contrary, the inanimate world of mountains, oceans and valleys has been regarded as long-lasting but temporary until the will of God closes the account and ends his creation. There is scattered evidence in the later poems of Wordsworth's belief in the ending of the physical world. An example, which was explicitly didactic, headed by a prose "argument", is "On the Power of Sound" (composed 1828 and published in 1835):

A Voice to Light gave Being;
To Time, and Man his earth-born chronicler;
A Voice shall finish doubt and dim foreseeing,
And sweep away life's visionary stir;
The trumpet (we, intoxicate with pride,
Arm at its blast for deadly wars)
To archangelic lips applied,
The grave shall open, quench the stars (W.P.II: 330).

How far an apocalypse was any more confidently an article of faith for intellectuals in 1820 than a belief in the actuality of the Flood is difficult to say. As we saw in the chapter on Hutton's geological work, in the scientific world there appeared to be a truce about the debate on the finitude of the physical world ("No vestige of a beginning, no prospect of an end"). In the later poetry Wordsworth is careful to state an orthodox case, when he has to do so, about the end of the world. As for his thoughts on the beginning of things, he is satisfied to put forward the myths of Greece or of the American Indians for his readers' entertainment, if not for their doctrinal requirements. However, in one area of the doctrine of immortality Wordsworth is clearly orthodox, defining the difference between human and other animate beings. This definition kept open the possibility of a form of eternity for the non-human. In so doing he reflected either inadvertently or deliberately a contentious area of thought about evolution amongst contemporary palaeontologists.

In the twenty-fourth sonnet of "Memorials of a Tour in Italy, 1837", "In Lombardy", there is an affecting scene depicting a labourer in a mulberry garden.

The old man bends under his load of mulberry leaves. The silk worm spins at her ease, the old man serving "as her slave". Both will "pass into new being" but the old man can have hopes of endless bliss and glory, whereas the worm "Transfigured, sinks into a hopeless grave" (W.P.III: 228). Proffitt (1982) has argued that Wordsworth in the later poems has turned away from "redemptive" views of immortality to more generalised statements of universal rather than individual immortality. This is an interesting point of view, but I have some reservations about its overall applicability. In the first place, I have not found any abandonment of a belief in individual human immortality in the later poems. Wordsworth's statement to Isabella Fenwick about "The Vernal Ode" of 1817 (See Chapter Six), that the poem was "to place in view the immortality of succession where immortality is denied, as far as we know to the individual creature" (W.P. II: 523), suggests to me that there are two classes of immortality - individual for humanity and a different, perhaps generalised, future for the non-human world. In respect of the subject of human immortality, it is illuminating to consider how his close friends were able to discuss individual loss with the poet. On 10 August, 1847 Adam Sedgwick wrote to Wordsworth after the death of Dora Wordsworth: "I know there is one topic of consolation, and one only, I dare to touch upon - your daughter is now in Angel in Heaven - no man who has the hopes of a Christian can doubt this for a single moment" (DCL:AS). The sympathy might appear to us to be conventional, but we have no reason to believe that Wordsworth, in his seventy-seventh year found it unacceptable theologically.

The unorthodox, understanding of death in "We are Seven" was many years previous. The sentiment of "We are Seven", with the strange child's trust in present continuity remained, but not for loved individual people, but for the vaster non-human world. One passage from "The primrose of the rock", published in 1835, demonstrates Wordsworth's continuing wish to celebrate the blessing of a Divine providence which applied to all non-human nature, animate and inanimate, despite the annual repetition of death:

Close clings to earth the living rock,
Though threatening still to fall;
The earth is constant to her sphere;
And God upholds them all;
So blooms this lonely Plant, nor dreads
Her annual funeral (W.P.II: 303).

Wordsworth's sense of the inclusiveness of Divine goodwill in passages such as this

may give too easy an impression of his optimism for the natural world. Certainly Wordsworth provided others with hope and reassurance. Recent studies (Hassler, D.M. 1984 and Proffitt, E. 1982) of the influence of Wordsworth's poetry on his near-contemporaries have tended to concentrate on the reassurance that it gave to those coping with the threat of Lyellian geology, hotly followed by Darwinian biology. In the case of Adam Sedgwick and, as the next chapter attempts to show, William Whewell, there is no doubt that men in the inner circle of access to new scientific discovery found his verse reassuring. As Rachel Trickett summarizes, many Victorians found the "hortatory mode" of their Laureate "confiding, advising, consoling" (Trickett, R. 1990: 51). All this is true, but we should not be misled by Victorian confidence. I have tried to illustrate that Wordsworth's poetic statements of faith, particularly in the sequences of sonnets or poems, betrays a rhythmic variation of confidence, a qualified cycle of statement, doubt and then a return of assertion. In the specific area of doctrine about the non-human animate and the inanimate Wordsworth was hardly orthodox, nor always unambiguously optimistic. He wanted to believe that "rocks and stones and trees" had been granted a form of eternity, because "the earth is constant to her sphere."

The British geologists of the first thirty years (or even forty years of the century, for the long-term theological implications of Lyell's work were slow to be explored) also faced an intellectual problems with the notion of immortality. Their discussion was, however, conducted in another language than theology, the language of extinction of species. I have illustrated in the previous chapter, Sedgwick's vehement rejection of Chambers' *Vestiges of Creation*. It will be remembered that, at the heart of Sedgwick's determined attack on Chambers' hypothesis of "transmutation" of species, was a commitment to the belief that there is a balance in nature guided by Divine providence. Some forms may have become extinct, but paleontology, it could be argued, shows no real evidence of major disturbances in the "balance of nature". It is not merely the "balance of nature" in itself that demonstrated God's providence to Sedgwick, but the fact that the balance implied and maintained a continuity of species. Such a continuity is one exemplification of "the immortality of succession" in Wordsworth's phrase about "The Vernal Ode".

Sedgwick's battle with the author of *Vestiges of Creation* is only one of the struggle for which he took up arms. One other engagement was with Utilitarianism and with a satellite philosopher, William Paley. Wordsworth and Sedgwick were

on common ground here, and the issue on which they were united was another aspect of "universality", for Paley is notably a writer who rigorously separates the animate and the inanimate (See Note 5). The question of happiness or the greatest "good" of the species is raised by this study of non-human animate and inanimate worlds. A brief comment on Wordsworth's views on this aspect of the non-human world will complete the point I wish to make. In *The Excursion*, the Wanderer finds a reassuring gift of abundant happiness in the natural world, a world where the mole is content with "her darksome walk in the cold ground", where gregarious animals live together for "participation of delight" as much as for protection:

What other spirit can it be that prompts
The gilded summer flies to mix and weave
Their sports together in the solar beam,
Or in the gloom of twilight hum their joy? (W.P.V. iv: 445-448)

The joy amongst animals and birds is celebrated in this passage, but the real interest lies in the way that the Wanderer's hymn of praise continues:

And over all, in that ethereal vault,
Is the mute company of changeful clouds;
Bright apparition, suddenly put forth,
The rainbow smiling on the faded storm;
The mild assemblage of the stormy heavens;
And the great sun, earth's universal lord! (W.P.V. iv: 460-465)

The vast, inanimate world of nature is also graced by God's plenitude of joy; it is not reduced to a lower status but is part of a universal and interrelated creation. I have, in Chapter Four, commented on the distinctive quality that Wordsworth brought to the description of natural objects. I have argued also, and will further illustrate in the next chapter, that the poet's elevation of the material world, of mountain, clouds, rivers and lakes, was profoundly satisfying to men who devoted their intellect to rocks, strata and the shape of hills and valleys. Sedgwick's own term, "poetic", about geology, to which attention was drawn in Chapter Seven, says so much. Always sensitive to the charge of "aridity", the geologists found a poet who wrote about the very places where they did their field-work and, more important, admitted that actual landscape into the company of created phenomena which found the highest, most complex expression in the human form and mind. Whereas for a long period previously "landscape" had been the property of the sophisticated and aesthetic, it was no longer exclusive. It became the province for the minds of the natural philosophers, as indeed shortly it became every man and woman's property and inspiration. Wordsworth was, for the many who engaged in different

intellectual pursuits in that landscape, their Laureate.

It is on that note, of Wordsworth's standing as a major poetic figure, for a wide scientific as well as a popular audience, by reason of the later poems, in addition to what had at first been an interest of a cultivated minority in the poems before 1810, that I want to end this chapter. It is difficult to enter into the attitudes of people like Greenough, Sedgwick, Whewell and their peers. One simple (over-simple) explanation for their enthusiasm for Wordsworth is that they found a poet who supported their social and intellectual domination. Another view, which also has all the clarity of twentieth-century hindsight, is that Wordsworth satisfied the conscience of an Anglican-dominated geological establishment, while its teaching members continued the explorations of the message of the rocks, which eventually signalled the end of religious belief. Neither of these interpretations can help us to comprehend the strong emotional bonds that related men like Sedgwick and Whewell to Wordsworth. I have suggested here one important correspondence. The landscape they studied was elevated and thereby their studies were elevated. That word gives a clue to one other dimension of Wordsworth's attractiveness to the geologists.

Sedgwick used the word "elevated" in his introduction to the "letters" accompanying *A Guide* when he asserted that he agreed with Wordsworth that natural science is only truly good "as it tends to elevate the mind of men" (Sedgwick, A. 1842: f3). There was more than intellectual elevation, however. Wordsworth was the inspirer of moral standards. Writing to the poet in 1847 Sedgwick said of the poet's "vast intellectual treasury":

...how happy must you be in having your poetical memory unsullied by the recollection of one single line written by yourself, which ministers to evil, or was fit to raise a blush on a modest women's cheek (DCL.A.S.).

This moral tone the geologists could and did find in the Wordsworth of *Lyrical Ballads* and the 1807 poems, and certainly it was endorsed by their readings of *The Excursion*. Susan Cannon honestly admits a modern historian's difficulty: "Why young Englishmen like Sedgwick, Darwin and Ruskin were impressed by *The Excursion* is still a mystery to me but they were" (Cannon, S.F. 1978: 8). The mystery is solvable if we remember the geologists' quest for a spirit in this pursuit, which Sedgwick called in his first "letter" accompanying *A Guide*, "the will to soar above the material things around them...the power of rising to the contemplation of

those laws by which Nature binds into union the different portions of her Kingdom" (Sedgwick A. 1842: f3).

The later poems after *The Excursion* added two extra qualities to make them secure in the affections of a wide-range of readers in the 1820s and of the early Victorians. The linking of the history of Europe, and specifically of Britain, with the landscape in which the drama of history had been enacted, and the providence that, he assured his readers, underlay both history and location was a particularly appealing connection for geologists. They were, it will be remembered, representative of a new science, particularly conscious of the need to establish themselves in the hierarchy of long-established studies such as astronomy, history, mathematics, chemistry and physics. One strong card that the geologists held and dealt with determination was the close connection of geology, archeology and history. The next chapter will consider a geologist who gave weighty consideration to geology's place in the spectrum of intellectual activities.

The second aspect of the later poems which I have emphasised in this chapter is their tone of quiet reassurance after questioning and disturbance. Other critics have commented on the tone of this final period of writing. John Jones (1954) describes the best work as "products of baptized imagination". Geoffrey Hartman puts the point thus: "The later poems often require from us something close to a suppression of the image of creativity as "burning bright" or full of glitter and communicated strife...can we say there is a blessing in the gentle breeze?" (Hartman, G. 1987: 89). Rachel Trickett also notes the almost domestic nature of the later poems, and, although I can not accept that the later poetry of the landscape, the rivers and waterfalls is without mystery, I agree that there is a change of tone with appeal to the new generation of readers in the uncertain European peace after 1815:

A domestication of the heart and soul, a new simplicity and tenderness which saw in the world about him not "unknown modes of being" but familiar presences, intimately understood day-to-day existences, with all the dignity of the old characters and figures encountered in what Pater called that "strange, passionate, pastoral world" of the early Wordsworth (Trickett, R. 1990: 50).

The geologist who is the subject of the next chapter met Wordsworth at a number of levels, in academic circles, and in socially elevated surroundings, but it was also out of common domestic and tender associations that their friendship ripened.

**CHAPTER NINE : THE CONVERSATION OF ANIMATED FRIENDS:
WILLIAM WORDSWORTH AND WILLIAM WHEWELL.**

It has always been my wish that, as far and as long as men might know anything of me by my writings, they should hear of me along with the friends with whom I have lived, whom I have loved and by whose conversation I have been animated to hope that I too might add something to the literature of our country (Whewell, 1967 (1847): iii).

To move from reading Adam Sedgwick to William Whewell is like first visiting a great house, then moving on to a palace or mansion of intellect. If Sedgwick demonstrates the wide range of interests of a nineteenth-century scientist, then Whewell is the "all-rounder" on an even vaster scale. In the context of studies of Wordsworth the chief interest inevitably must be in Whewell's major works on the history and nature of scientific activity and on moral philosophy, but a full picture of the man would include his work as a theologian, a philosopher, a writer on Gothic architecture, on philology, on European law, and on university education. He was also an administrator of distinction in the University of Cambridge, planning and managing a considerable expansion programme. Isaac Todhunter, the academic biographer of Whewell, quotes no less an eminent scientist than Sir John Herschel as extolling the amount and variety of Whewell's knowledge "never in the same interval of time accumulated by any man" (Todhunter, I: 1). In the twentieth century, Whewell's reputation as a philosopher of science has been in eclipse. It has been difficult to appreciate his stature amongst his contemporaries until recently. The publication in 1991 of two studies on Whewell has effected a reappraisal of his value not only to his colleagues but also for our own understanding of the history of knowledge (See Fisch, M. 1991 and Fisch, M. and Schaffer, S. ed. 1991).

The comparison between Sedgwick and Whewell is put sharply by another friend of Wordsworth, Sir William Rowan Hamilton: "While Sedgwick has undoubtedly a more poetical imagination than Whewell, I sometimes doubt whether he has not also an equally comprehensive intellect" (Graves, II: 209). As well as admitting the truth of the intellectual comparison, I shall illustrate later that Whewell, far more than Sedgwick, engaged in literary criticism in his letters, as well as writing verse. As early as 1814, he won a university prize for a poem on the subject of Boadicea. However, it is principally in terms of acade-

mic reputation that he outshines Sedgwick. He became Master of their College, after Christopher Wordsworth's retirement, and he was twice Vice-Chancellor of the University. He was elected for a term as President of the British Association and he served as a President of the Geological Society of London. In Europe, he was highly respected, particularly for his major work on tides. Pinnacle of pinnacles, the Queen and the Royal Consort favoured his college and university with visits during his period of tenure. Despite all these distinctions, he never lost the friendship of Adam Sedgwick, although they were not always of one mind on university reforms or national politics.

Whewell was a faithful friend over most of his life to his early undergraduate colleagues. Two of them, Hugh James Rose and Julius Hare (later Archdeacon of Lewes) were regular correspondents with him. More pertinent to this study, they were both known to Wordsworth. Julius Hare and his brother, Augustus, were warm admirers of the poet. They met Wordsworth first at Trinity College Master's Lodge (Distad, N. M. 1979: 89). Julius dedicated their joint *Guesses at Truth by Two Brothers* to him (Gill, 1989: 489). Not all the meetings of this circle were in Cambridge. With Thomas Arnold, Captain Thomas Hamilton, and a brother of the geologist, Professor Buckland, Julius Hare and William Wordsworth ascended Helvellyn in 1832 (W.L. V ii: 546). Hugh James Rose appears to have met Wordsworth at Trinity College, Cambridge, but there is also a reference in the poet's letter of 13 March, 1837 to Wordsworth meeting him in the Strand. The contacts between Wordsworth and Whewell's intimate friends are easy to trace and the continuity of the friendship patterns survived time, distance and, although many of the Cambridge dons were liberals, politics.

Whewell's own circle of friendship was wider than long-lasting undergraduate friends. It included more central figures of the scientific establishment. Two who were known to Wordsworth were John Herschel and George Airy. Walter Cannon has demonstrated the close family ties between members of "the Cambridge Network" (Cannon, W. 1964 and see also Note 2). The strength of affection between these very active talented men is testified to by the many warm letters passing between them. Life-long relationships were not damaged by the occasional plain admonition, awarded usually to Whewell for his autocratic temper. The tone of Wordsworth's letters to Whewell was, however, never less than polite and considerately warm, although on subjects such as university reform they had little to share. Wordsworth is always the seer, the elder visio-

nary to whom even the masterful Whewell deferred, at least in writing. Their correspondence is one source which reveals the range of influential people with whom they were both involved. This particular network of English intellectual society was geographically located not in one place, but in three: Cambridge, London and the Lake District. In addition to this circuit of meeting places, the friendship group relied for its continuing energy on a shared literary heritage with its highest respect reserved for poetry, on a framework of belief about the nature of intellectual activity, and, ultimately, on a bedrock of trust in the distinctive, lofty quality of the human mind. I shall claim that Whewell and Wordsworth, through each of these aspects, shared the same cultural environment and I shall develop each of the themes in the following paragraphs.

"A nest of brothers and sisters dividing the Lake District among them" (Todhunter II: 366-367).

This quotation comes from a late period of Whewell's life and refers specifically to his wife's relatives scattered through Westmorland and Cumberland. It is, however, a good banner to fly at the head of a section devoted to the importance of the Lake District and to one particular family, the Marshalls, who lived there and who materially affected both Whewell and Wordsworth. Whewell, like Wordsworth and Sedgwick (and indeed like many successful scholars who went to Cambridge in the early years of the century), came from the northern counties. He was born in Lancaster. After a demonstration of early talent in mathematics, he was sent to a Westmorland grammar school at Heversham, not unlike Wordsworth's own school. Again like the poet, his mother died when he was young. At Heversham his classical studies and mathematics developed considerably. He was taught for a period by the blind scientist and mathematician, John Gough, who is mentioned in Book VII of *The Excursion* (lines 482-536), and by Coleridge in *Omniana*. In October 1811, Whewell entered Trinity College, Cambridge, where he was to make his home for the rest of his life.

Whewell returned to Lancashire for a number of family occasions and, as his fame grew, for civic functions and local ceremonies to celebrate his achievements. His earliest excursions to the north were, however, scientific in purpose. Specifically they were to join Sedgwick and to add to his own experience of fieldwork in mineralogy and geology. It was during this period in the early 1820s that he met Wordsworth on his home ground. These were not, however, chance

encounters. By 1820, Christopher Wordsworth had been appointed Master of Trinity and Whewell was already looking forward to meeting the famous brother. On 1 July, 1820 he wrote to Hare about the vacant mastership:

The general opinion gives it to Wordsworth. If this turn out so, he shall invite his brother here and you shall come and meet him, and we will be the most poetical and psychological college in the universe though certainly some of us are bad material for such an edifice (Todhunter II: 37).

The combination of poetry and psychology is significant. Whewell already identified Wordsworth with thought processes as well as passages of imaginative writing. Whewell's anticipation was rewarded quickly because, by the autumn, William and Mary Wordsworth had visited their brother and his college on the return from their European tour. It was therefore not remarkable that the Cambridge man called at Rydal Mount the following summer as the field-work season commenced. In September, 1821, he dined with the poet in his Lake District home.

This first visit impressed Whewell in an unexpected way. It was not so much the poetical that he found attractive, but the intellectual. He found someone who, to his surprise, talked his own language. Soon after the visit, he wrote to a friend:

I was with Wordsworth part of two days and was very much gratified with his company. The only thing to complain is that he is not half as Wordsworthian as his admirers, and I am more and more puzzled that a man of his acuteness and good sense should write poems with white rabbits and wagon drivers for their heroes. I have since seen him here on an expedition somewhere or other among the hills, which he has great propensity for climbing whenever he can get a fine day (Douglas: 67 and Note 1).

Many other visits to the Lake District, either for social or field-work reasons, followed in subsequent years. In June 1823, as I noted in Chapter Seven, there is a reference to planning to meet Sedgwick who was "geologising in the Lakes". Sedgwick's notebooks do not confirm that this meeting took place. In 1824, however, as I have illustrated in the same chapter on Sedgwick's work in the Lake District, there is clear evidence of more contacts of poet, stratigrapher and Whewell. Both Wordsworth from Rydal and Southey from Keswick were able to direct Whewell where to find Sedgwick, who was busy with his hammer "at the

back of Skiddaw". Whewell stayed with his college friend for three energetic days collecting minerals, finally leaving him somewhere between Penrith and Carlisle. Other visits in this period may have occurred but have not been recorded.

In the 1830s the friendship with Wordsworth had become very firm and was cemented by links with other mutual acquaintances. On 21 August, 1834, on the way to Scotland, Whewell called on the poet and took time to sail with him on Windermere (Douglas: 189). The previous year Sedgwick and Whewell had carried out a geological study of Charnwood Forest in Leicestershire. This is an interesting area even for modern geologists since it is a denuded outlier of older rocks within the younger Midlands Plain. For literary purposes, it is an even more interesting location, being close to Coleorton where Sir George Beaumont, Wordsworth's patron had lived. It is conceivable that the contact with the wealthy family was made through Wordsworth and his sister (W.L. III: 494). The connection between Whewell and Coleridge in the early 1830s has been noted by Fisch (1991) and Schaffer (1991). Whewell corresponded with his friends about a memorial prize to commemorate Coleridge after Coleridge's death in 1834.

Mention of the Beaumonts usefully links with the Marshall family. With Wordsworth, the Beaumonts visited this Lake District and Yorkshire family who had a major effect on Whewell's life. They were the Marshalls who through marriage, were closely linked with the Wordsworths' early life and continued to be closely associated through the middle and later years. I do not know if this connection has been remarked on in any detail previously, but it is a very good example of the unified social environment (generally noted by Gaull 1979, Rudwick 1976, Porter 1977 in their different approaches to early nineteenth-century geology). On 12 October, 1841 William Whewell married Cordelia Marshall, daughter of John Marshall, a wealthy linen manufacturer, who had been a Member of Parliament for Leeds in 1832. More significantly their large "holiday homes", where Marshall's wife and family spent much of the year, were first at Ullswater at Watermillock and then at Hallsteads by Coniston-water. It was from this last Lakeland retreat that Whewell was married. Stair Douglas and Isaac Todhunter, the major biographers of Whewell, are somewhat coy about how Whewell came to know his bride-to-be. Discretion on such matters shaped the Victorian spirit of biography. However, curiosity about the marriage is justifiable because it reveals the closeness of the Wordsworths to this middle-class family.

John Marshall, Whewell's father-in-law, married Jane Pollard of Halifax. Now, Jane Pollard is the earliest known correspondent of Dorothy Wordsworth and remained a friend and intimate letter-writer for as long as Dorothy was capable of writing letters. They had met at Halifax when Dorothy was living with her grandmother. Their exchange continued to be warm and even sisterly in character. It is to Jane Marshall that Dorothy writes about the arrangements for William's marriage and, years later, expresses her heart-rending account of the death of the Wordsworths' daughter, Catherine. William met John Marshall as early as 1800 and they walked round Rydal and Grasmere with John Wordsworth, and had then dined with Coleridge at Keswick - "My brothers quite took to him" (W.L.I:300). Dorothy spent time looking out for property for the Marshalls when they wanted to buy a home in the Lake District. It had to be a house large enough for a growing family, in a scenic area. The Marshalls' decision to live in the Lake District made the bond between Dorothy and Jane tighter and the families visited and widened the circle of friends to whom they introduced each other. Jane Marshall eventually gave Dorothy an allowance of money. Only a gift from someone so close would have been acceptable to the independent Dorothy Wordsworth.

As the years passed, newly developed friendships ensued. William Wordsworth himself became a welcomed visitor at Hallsteads on Coniston and occasionally corresponded with Mr Marshall. Dora Wordsworth became a close friend of the Marshall daughters. In 1829, Wordsworth was accompanied by John Marshall and his son, James, to Ireland. As the Marshalls prospered, they also acquired a town house in London, 41, Upper Grosvenor Street, where the Wordsworths and Dora stayed for long periods when they were in town. According to the partial record of Wordsworth's pocket notebook, the poet dined or had breakfast on eight occasions with John Marshall at 41 Upper Grosvenor Street within the period 14 May to 8 June, 1839. This period also included a visit to Cambridge (Healey, G. H. 1942). Hallsteads and Grosvenor Square may have represented contrasting aspects of the well-to-do in their leisure hours, but both places provided a busy social life, in which the Wordsworths and their friends shared. In October 1838, William Rowan Hamilton, the Dublin Astronomer and protégé of William Wordsworth, stayed at Hallsteads and was moved to compose a sonnet on the experience of "the Elysian fields of Lowther". Whewell must have been there also, because, in a letter to Hamilton, Sedgwick jocularly

mentions the incident:

Whewell told me a good story of your fit of inspiration on the banks of Ullswater which did not work in unison with Mr Marshall's spit and smoke jack (Graves, II:209 and Note 3).

Whewell, according to Fisch (1991) was something of a patron to the younger Irish mathematician. Fisch asserts that Whewell met Hamilton first in 1832, after a visit to Coleridge, and that both Coleridge and Hamilton in different ways introduced Whewell to German philosophy (Fisch, M. 1991:64). It was in this milieu that Whewell found his future wife, but I cannot confirm that he met the Marshalls directly because of the Wordsworths. James Marshall may have met Whewell at the Geological Society in London, of which they were both members. It is obvious that, in visiting Hallsteads, Whewell was circulating in a bright, encouraging, intellectual atmosphere with which Wordsworth frequently engaged. The Lake District, at least for this social group, was no rural retreat. It attracted a group of people who, although their purpose was to make a pilgrimage to the hills or to satisfy a collector's or a scientist's curiosity or even to worship at Rydal Mount, also brought with them the news and ideas of Oxford, Cambridge and London's great houses. Indeed, the Lake District became an intellectual centre by early Victorian times, with as rich a gathering of educated and influential writers and artists within a short carriage ride of each other as could be found outside London. A small but interesting point is that a number of this "set" were also members of the Geological Society. The names of Julius Hare, William, Arthur and James Marshall and Thomas Arnold appear in Greenough's lists of Geological Society members (CUL GBG).

The Poetic Scientist: "A lake poet among towns and cities" (Todhunter, II: 32).

Poetry remained a serious occupation throughout Whewell's life. At the age of seventeen, he wrote to his younger brother with advice on composition and metre. In his later years, his interest was undiminished:

I agree with you that the love of natural scenery lasts undiminished better than most other pleasures; but I am not yet weary of poetry, only rather fastidious, and I suppose this is what you are. I have however, of late found a new way of enjoying poetry by reading it to my wife every evening which at any rate prevents its putting me to sleep (Todhunter, II: 319).

Becker (1991) gives a false impression that Whewell's interest in writing poetry was assumed in later life. My reading of Whewell's work is that critical fastidiousness about poetry was not a late acquisition. Indeed, his first approach as a young man to Wordsworth's verse was cautious and even superior. In July 1817 in correspondence with Hugh James Rose, Whewell takes issue with one of Rose's heroes, Samuel Taylor Coleridge, and in doing so reveals his reservations about Wordsworth. Whewell had read the recently published *Biographia Literaria* with attention to Coleridge's criticism of Wordsworth's theory of poetic language. Whewell's own opinion, freely expressed to Rose, the committed Lakeland enthusiast, is that the theoretical elements are only a small part of the whole value of the poems. These undesirable components (his "prosaic style, his puerility, his mystical and inflated language and his attachment to pedlars, his deification of children et cetera") however, have an effect on the whole:

...nevertheless it has always appeared to me so woven and matted in with the rest as to give a tinge to the whole mass; it was in consequence of that, that I never entirely got over the repulsion I felt to Wordsworth, for there were so many passages, obviously favourites of the poet, where I could not feel any sympathy with him, when I appeared to have (Douglas :28-29).

He continues with an argument of self-reassurance. If Coleridge's own criticisms of Wordsworth's theories of language are correct, then Whewell's poetic tastes are reconfirmed, for the Lake Poets and their following do not mark a revolution in English poetry, "but a little furbishing and beautification (as the churchwardens call it) of the parish church. Just get rid of the stale epithets and the stale personifications and one or two other errors that have crept in, and all our poets will turn out to be good poets" (Douglas: 29). The *Biographia Literaria* therefore relieves Whewell's mind. Pope, one of his firm poetic heroes, can continue to be unreservedly admired and admitted into the top rank of poets for admiration. Coleridge's own theoretical statements on the nature of poetry in general are not so pleasing to the young don: "they are, as before, muddy with their own turbulence. I can make nothing of them." Nevertheless, *Biographia Literaria* has done its job well, for at this time Whewell resolves to send for a book of Wordsworth's poetry.

In August of the same year, 1817, he takes up literary criticism again with Rose and reveals clearly that Wordsworth has now become as important to him as Pope, but not for "theoretical" reasons:

...if you think it inconsistent to admire both Wordsworth and Pope, you will do me the favour to believe that it may nevertheless be my case: nay, more, that I may admire one or the other, or neither according to the state of the barometer (Douglas: 32).

So, in the years before meeting the poet, Whewell read and enjoyed the poems of Wordsworth - but with reservations. To a different Lake Poet enthusiast, Julian Hare, he commented on the "solemn bleat of *The Excursion*", (yet in 1824 he gave a copy to his sister, Martha). What then made Whewell look forward with excitement when he heard of the appointment of Christopher Wordsworth to the Mastership of Trinity College with the consequence that he might meet the poet at Trinity College social occasions?

The answer to the shift of view is, of course, that Whewell selected from *The Excursion* and from earlier works of Wordsworth the kind of poetry that he and a growing number of friends and acquaintances wished to read. Their interest in the theories of composition as expressed in the "Preface" to *Lyrical Ballads*, was minimal. Whewell writes to Rose in 1817: "What has a poet to do with theory? Let him mind his business, or it will be the worse for him." However, understanding grew of the true meaning of the voice of the great poet of Nature, particularly by the new generation of young Cambridge dons, as their own conversion to the appreciation of the natural landscape became confirmed. As Whewell and the poet began to know and to appreciate each other's mind, the scientist's commitment to poetry became even firmer. As I commented earlier in this chapter, there was a strange sense of disappointment as the mystery of the great poetic figure dissipated, but the reality of the man in his native setting became stronger and more influential. In 1822, writing to Reverend H. Wilkinson, Headmaster of Sedbergh School, Whewell can still be critical of his new friend's production. His sonnets in particular:

...aggravate his faults and they concentrate his harshness of expression and his determination to dwell upon feelings which are very sincere and vivid in himself... Since I saw him I think I admire his beauties as much as ever, but I have lost that mysterious respect with which I used to look at his faults with a sort of suspicion that there might be something in them (Douglas: 77).

At this time, Whewell had recently read or re-read the "Ode: Intimations of Immortality" and found it difficult to discover any Wordsworthians who could explain "the strange stanza in the ode which in other respects I admire as you

do". Although Whewell is his own man, selecting from what he likes in poetry, he is without doubt a cultivated literary man appreciating the technique of the poems, despite his reservations about their "faults". From this time on, as their friendship developed, his correspondence with friends (at least as far as this is revealed in the two major biographies) no longer expressed criticism of Wordsworth's theories. Indeed, by 1828, he wrote to the poet for advice on aesthetic matters in connection with Uvedale Price's book on metre (W.L. IV: 681). In later life, the Edgeworths (friends of Sir William Rowan Hamilton) said to Whewell that Wordsworth was "only fit for the nursery." His loyal response was a confident rebuke: "Well, I should be glad to go into the nursery with him" (Douglas: 32). The conversion was complete. There were, in the end, no critical reservations.

Perhaps the best way to illustrate the developing influence of Wordsworth's poetic themes on the scientist is to compare two excerpts from Whewell's correspondence. The first is in August 1821 when he writes to Jones that he intends to take "a regular Cockney tour" to the Lakes. The tone is gently mocking. He knows the traditional cultural attitudes to pack in his baggage, although he fully intends to participate in the fashion:

You have no idea of the variety of uses to which I shall turn a mountain. After perhaps sketching it from the bottom, I shall climb to the top and measure its height by the barometer, knock off a piece of rock with a geological hammer to see what it is made of, and then evolve some quotations from Wordsworth into the still air above it. He has got some passages when he has tumbled the names of those hills together till his verses sound like the roaring of the sea or like a conjuration which would call the spirits of them from their dens (Todhunter, II :43 and Note 1).

This, despite its light touch, is a carefully constructed piece of writing. "Evolve" is used in the technical sense of "to give off, to emit as vapours" (OED and see also Gillian Beer's parallel interest in the word "evolution", Beer, G. 1983: 14-15). Wordsworth uses the word in a letter to Lady Beaumont in 1810 about his favourite image of a suspended cloud-borne "station" in *A Guide*: "by evolving truly and distinctly the appearance from another" (W.L.II:404). The sensation, not the poetic theory, the mountain and the field-work taken lightly and without pomposity, that is the early style of Whewell's feeling for the mountains of his childhood years. Compare this with the older man and his strength of feeling for those mountains. The occasion is his speech at Lancaster in the summer of 1842

when he was guest of honour at a dinner in his home town:

The early scenes of youth - the castle towers - the waters of the Lune - have haunted me when absent, and have been a source of especial pleasure to me when present. My heart has leaped up when I revisited them, with a delight wholly different from that which other scenes, not devoid of enjoyment, have brought to me. We owe to the early years of our boyhood, influences which remain with us through all the years of succeeding life. The poet, Wordsworth, with whom I have within the last few days had the advantage of associating, says:

The child is father to the man
and I could wish my days to be
Bound each to each by natural piety.

So I feel that the boy is indeed the father of the man - that the early sympathies he may enjoy - the love of poetry among school-fellows - the facilities he meets with in the persecution of his favourite studies and pursuits - that these have more power than when his nature is more matured and his mind more expanded. His must be a hard nature indeed who does not feel this "natural piety" on reverting to the scenes of his boyhood. I feel it with joy every week of my life (Douglas: 267 - 268).

To add to this episode one further quotation is only to drive home the poetical source. In a letter of September of the same year from Hallsteads he writes to his sister:

Since my return here I have had some grand long mountain walks with William Marshall and with Mr Wordsworth while he was here. I am now beginning of know this neighbourhood pretty well, and shall be able to walk on the sides of Helvellyn in imagination, when I am confined in body to the level banks of the sluggish Cam (Douglas: 273).

It is not only that there are echoes of sentiments directly from the poetry of Wordsworth, such as the theme of childhood's extra "facilities" and the expression of "emotion recollected in tranquility". The language used - "scenes of youth", "haunted me", "My heart has leaped up", "the early sympathies", "confined in body" - is so directly influenced by Wordsworth's poetry that it is hard not to believe a paraphrase is being attempted. Perhaps even more haunting are grammatical constructions with a Wordsworthian tone, such as the negatives "not devoid of enjoyment" or "who does not feel".

These last quotations belonged to the highly-charged emotional years of his marriage to Cordelia Marshall. At this time, poetry, and that of one poet in

particular, assumed a special, personal significance, but the record of his own creative writing goes back before his marriage and is continuous beyond it. I have said already that Whewell wrote verse as a young man and indeed earned a University prize for it. There are other instances of continuing interest in making his own verse despite the heavy weight of administration and scientific writing (see Note 5). He is not unusual amongst writers of his time in directing verse to young ladies. In 1826 he composed a long ballad called "The Spinning Maiden's Cross" based on an Austrian folk-tale for the birthday of a young girl in Lady Malcolm's family (Douglas: 115). In 1832, he addressed a more formidable feminine subject, a sonnet to Mrs Somerville on her scientific work, *Mechanism of the Heavens*. Most courageous of all, he composed and delivered a sonnet to Dora Wordsworth, containing, diplomatically, generous praise to her father. Then in 1841, Mrs Douglas related, he composed a poem on his wife's "chain of hair".

If these were conventional activities for a literary-minded gentleman, however busy, there were other more serious poetic commitments. Whewell was passionately interested in metre and rhythm in poetry and music. In *The Philosophy of the Inductive Sciences*, in Book 2, chapter VIII on the fundamental idea of time, there are long passages on poetic rhythm. Whewell quotes examples in Latin and English to justify his theories. Later in the explication of the so-called "secondary Mechanical Sciences", he similarly uses poetry to illustrate the theory of waves. Poetry is, however, more than a mere illustration, although in common with other scientific writers of his time he uses "tags" from classical and contemporary authorities with freedom. Gillian Beer has noted that the early Victorian scientists claimed an authority from poetry: "thus they claimed congruity with poetry, perceived as the authoritative utterance within current language " (Beer, G. 1990:83). This is as true of Whewell as of any scientist of the time, but he is doubly involved in the authority of poetry, because of his personal interest in the technique of verse-writing. In November, 1845, Whewell corresponded with Julius Hare on the possibility of gaining public attention for "a fair hearing for English hexameters". Previously, in 1840, he had published and circulated privately "The Isle of Sirens", a long poem in hexameters (Todhunter, (i): 126). He translated Goethe and Schiller and attempted to retain the principle of their metre. In this intellectually demanding exercise he is not alone. At the same time, he was corresponding on the subject of translation with Sir John Herschel, who had himself translated Schiller's *Spaziergang*.

These serious engagements with the craft of poetry are, however, not the most telling indication of the continuation of the poet hidden within the scientist. Shortly after his wife's death on 18 December, 1855, he composed a sequence of long elegies. One was inspired, for instance, by a painting by Horace Vernet, representing the Angel of Death carrying away a wife from her husband. In the same cultural environment in which "In Memoriam" was written, perhaps this elegaic sequence is not surprising, and indeed the tone of verses, such as "The Monument" is Tennysonian:

There the body is laid, away from the din of the city,
There in the Place of the Tombs. Such is our burial use.
Stand on every side memorials of neighbours departed;
Modestly there on the ground lies the memorial of her (Douglas:
581).

Not all the themes are so redolent of Victorian funerals. Earlier in the same poem there is a Wordsworthian ring as Whewell is reminded of the Marshall's Lake District home "in the lap of Helvellyn".

...that happy mansion of Hallsteads
Lies on the rocky shore, scatters its shrubberies around
There around it swell the heathy summits of mountains,
Yew-crag, Hallen, and Place, Swarth-fell and Catchedicum,
There opes Kirkstone Pass, and Patterdale shines in its valley,
There leaps Aira's Stream into the beautiful dell
O how oft in those happiest days of growing affection,
Roamed we the bank of the lake, clomb we the breast of the hill!
Every turn of the shore, every crag of the hill-side
Lives in my memory yet; gleams to the eye of the mind (Douglas
583).

It is not perhaps remarkable that a well-read man should pick up the cadence and the vocabulary of classical tradition and contemporary poets, but it is striking that this sequence of elegies is a sustained composition by a man heavily weighed down by grief added to an awesome load of teaching, writing and administration. Poetry was a serious matter for this and other scientists, not a light relief.

The origin of this poetic seriousness is too often claimed to be mysteriously meteorological with the frequent use of dead metaphors such as "cultural atmosphere" or "climate of the times". Undoubtedly, Whewell, Sedgwick, Rose,

Herschel, Hare and their circle of friends were sons of the Romantic period inheriting the achievements of what a few years previously had been revolutions in literary taste. For this group these previously radical literary productions had, by the 1820s, become accepted modes of thought and sentiment. As Charles Lyell's letters reveal, the conversations in the houses of the rich patrons of the arts were about religion, and contemporary literary figures. When Whewell was in London he participated. Lyell records one such social occasion in 1837 when Whewell was present with Samuel Rogers and other literary men. As well as listening to Whewell giving opinions on Scott, Trollope and Harriet Martineau, they discussed more mundane matters - Wordsworth's income from writing poetry (Lyell, 1881, II:34). There is, however, at least in Whewell's case, a more identifiable and traditional source of poetic interest, a source which he shared with Wordsworth. Both poet and scientist, although Whewell was twenty-four years younger, were educated in the same classical tradition. Furthermore, they continued to read from Greek and Latin literature through their adult lives. The Latin poets in particular provided Whewell with an additional authority for the laws generated from scientific observations. This continuing thread of learning emerged first in a respect for poetic expression and second, often in a bizarre manner, in a fascination with new words and with a language for science.

Poetic "tags" from Pinder, Virgil, Lucretius, Nonnus Dionysus, and Lucan are used to head the chapters of *The History of the Inductive Sciences*, as well as short passages from Spenser, Milton, Pope and Wordsworth. One of the best examples directly using three lines from "Tintern Abbey" occurs (slightly misquoted) in *The Philosophy of the Inductive Sciences*, where Wordsworth is not directly acknowledged but is called "a philosophical poet" (Note 6). The conventional use of these passages elevates the tone of the scientific theory or history that follows. The scientist in his prose account claims a continuity with the voices of the past. There is therefore a conscious verification of modern scientific work by the classical poets. Gillian Beer relates this authority to a paternal sanction: "not only the mother-tongue but the father-tongue shaped the dominant educational ideology" (Beer, G. 1990: 83). In 1836, Whewell wrote to John Herschel, taking issue with him about the value of the study of ancient languages in the education of the young:

For I am fully persuaded that the study of Greek and Latin authors, in the original mode of presenting themselves, can never cease to be an essential part of the liberal education of the present age...[Men will never become] independent of the history and antiquities of literature. The process of seeking and finding groups and reasons for assumptions, rules and methods is always the peculiar character of a liberal education and a study of literary antiquity supplies this (Todhunter, II:233).

If Whewell clearly saw a never-diminishing relationship between science and classical, and therefore literary, sources, his clarity was not dulled about the distinction between poetry and science. He knows there are two separate discourses, but they are interrelated, whereas some of his contemporaries were prepared to merge the distinction without conscience. In an interesting exchange with Julius Hare, Whewell had argued that Hare adopted the philosophy of certain writers because he admired their poetry. "Hare replied, emphasising every word, 'But poetry is philosophy, philosophy is poetry'" (Prickett, S. 1976: 259).

The second firm thread of connection with the literature of the past is Whewell's interest in, even fascination with, scientific terminology, a quality which was widely acknowledged by his peers. This topic has received scholarly attention from Schaffer (1991: 201-231). In 1834, Michael Faraday wrote to Whewell for advice on nomenclature for his discoveries in electricity and Whewell could claim credit from that exchange for the scientific terms "anode" and "cathode". Lyell and he had similar exchanges resulting in permanent additions to geological language. Sometimes however, the advice was, perhaps fortunately, disregarded as the passage referred to in Chapter Two reveals: "As to your luviality I hope you will not adopt such a beastly compound as protoalluvium which is wrong at both ends. I cannot imagine, how ever alluvion got its termination. Primalluvium would be tolerable" (Todhunter, II:112). At the same period, about 1831, he recommends to Lyell "good-looking English words" such as "ridgeway" and "daleway" (for the summit of a ridge between two parallel valleys) and it will be remembered from Chapter Five, that Greenough pursued the same linguistic line. For Whewell, however, the weight of support is from classical courses, on which he obviously becomes an English expert. Both *The History of the Inductive Sciences* and *The Philosophy of the Inductive Sciences*

contain long sections of guidance on nomenclature for technical matters. Whewell acknowledges that advance in the paths of scientific truth depends upon observation and the process of induction, but also progress is assisted by a third partner, the logical use of technical terms. A further elaboration of the good practice of using classical roots for modern scientific nomenclature is a long section of *The Novum Organon Renovatum* of 1858, with a particularly interesting set of examples from the development of terms in geology. Lyell, always conscious of the importance of the link between geology and linguistics (see Rudwick, M.J.S. 1979: 68), required new terms to surmount the problem of the unsatisfactory variety of terminology left in the wake of Werner's theories. The term "transition" rocks (between "primary" and "secondary") had been pragmatically introduced to modify simple Wernerism. Lyell turned to Whewell for advice and so introduced the term "hypogene" for "nether-formed" rocks. These in their turn were subdivided into unstratified or plutonic rocks and stratified hypogenes or metamorphics. "Hypogene" has largely disappeared but "plutonic" and "metamorphic" remain in the language of geology. Whewell would have argued that their strength was in their continuity with previous nomenclature in the history of science and in the assurance provided by their Greek and Latin derivations.

Whewell's interest in deploying his classical learning, it should be noted, did not always lead to public affirmation. In Sedgwick's own copy of the first edition of *The Philosophy of the Inductive Sciences*, Whewell had suggested, "We need very much a name to describe the cultivator of science in general. I should incline to call him a Scientist, thus we might say that as an Artist is a Musician, Painter or Poet, a Scientist is a Mathematician, Physicist or Naturalist" (Sedgwick's own copy of Whewell, 1840:cxiii). Sedgwick's marginal note begins with exclamation marks and goes on: "better die of this want than bestialize our tongue by such barbarisms". In this case, Whewell's language was victorious. The debate about the term "scientist" was a relatively long-standing one. At the British Association Meetings at York, Oxford and Cambridge in the first three years of the 1830s, the issue was debated. No less a philosopher than Coleridge participated according to Whewell (Whewell, W. 1834: 59). Whatever befell this and other linguistic endeavours, it is probably true that, in the words of Lyell after the influential review by Whewell of *Principals of Geology* in *The British Critic*, "part of the history of geology" had been formed (Todhunter, II:109).

A life-long personal involvement in composition, a common grounding in the classics and a fascination with language and its derivation help to account for Whewell's dwelling in the same domain as the poet. There is one further major sharing of values which we should bear in mind in thinking about the influence of poetry. It is the place of poetry in the scale of intellectual values. To Whewell, the most intellectual of the scientists, poetry stood on a very high pinnacle indeed, and correspondingly the status of poet was accorded great value. Even at a simple, practical level of broadening the base of knowledge, poetry and imaginative literature as a whole was regarded as most important for self-development. In a letter to his sister, Martha, in 1821, he specifically recommends a course of fiction "for those with a retired life". Such works enable the reader to understand, in a manner that could not conceivably occur by any other means, the "principles and feelings which appear in human affairs, and the manners of different classes of society." A year later, writing to his sister, Ann, he recommends the writing of Maria Edgeworth and, in so doing, makes a fundamentally Romantic judgement about the range of human experience: "I can never believe that the imagination, the fancy, the taste of man, would have been so exquisitely constituted as they are, if it could be a duty not to exercise them" (Douglas: 69 and 72-73).

As Whewell engages year by year with a justification for and an explanation of the scientist's task, he becomes more explicit about the place of poetry in the order of man's best activities. It is accorded a distinctly lofty station, but for procedural reasons, a place separated from science in the hierarchy. This is well illustrated by a long passage in the tenth book of *The Philosophy of the Inductive Sciences*. I shall not quote the whole argument because I shall need to return to it again in the paragraphs ahead for a different reason. As on other occasions, it stems from an agreement with Cuvier's statement that the geologist is "an antiquary of a new order". The geologist and the antiquary are both readers of a text provided for us to understand the richness of Divine Creation. The geologist's endeavours belong to a range of studies including the human experiences of "Government, Law, Poetry, Art"; however, in *The Philosophy* Whewell feels he must remain faithful to his original aim, to examine only material things. Nevertheless we are shown a vision:

...we now perceive that there are therefore several large provinces of speculation which concern subjects belonging to man's immaterial nature, and which are governed by the same laws as sciences altogether physical. It is not our business here to dwell on the prospects which our philosophy thus opens to our contemplation; but we may allow ourselves in this last stage of our pilgrimage among the foundations of the physical sciences, to be cheered and animated by the ray that thus beams upon us, however dimly from a higher and brighter region (Whewell, 1967 (1847): 642).

To explain how poetry and its related human arts, together with political institutions, are put so high in the landscape of man's achievements and why they are said to dwell in a brighter region, I shall have to turn to the major life-work of Whewell, where, in historical and methodological terms, he pursued human intellectual activity into the realm of morality. If we follow him on this quest, we shall understand better his common intellectual and emotional companionship with Wordsworth.

Man is "the Interpreter of Nature, Science the right interpretation" (Whewell, 1858:5).

One of the major preoccupations in the dialogue between Coleridge and Wordsworth was the relationship of inner and outer reality. To the student of that poetic debate, Whewell's system of scientific discovery is not all that foreign. He too was concerned to give a satisfactory explanation to the same question that occupies the poets: is Man's mind fitted for Nature or Nature for Man's mind? Whewell's major philosophical exercise was carried out over decades (see Fisch, M. 1991 and Becker, M. W. 1991). It was a unified programme of preparation for writing a major history of science, a project he largely achieved. The outcome was a series of long philosophical texts, followed by an attempt to provide a new, modern version of Bacon's *Novum Organon* ("an organ to enable man to construct scientific truth"). Whewell's main tenets became more and more refined by approaching problems from different angles, historical, logical and psychological, but, in essence, the major texts prepared over thirty years and elaborated by frequent revisions with up-dated scientific facts, convey what were to him the same two basic foundations of science. The first foundation was that the experience of the objective world must be methodically processed by the power of the human mind, using as its chief process induction. The second foundation of Whewell's work was that scientific achievements were progressive,

but historical. The experience of past seekers after knowledge was not to be discarded, however much we have evidence of an advancement in science.

One of the chief interests for anyone seeking out Whewell's approximation to or sympathy with the thinking of Wordsworth must lie in the place Whewell gave to imagination in his scheme of inductive thinking. Whewell's life work was devoted to erecting a secure framework for a scientific establishment that had to avoid two intellectually disastrous rocks, disastrous that is for British intellectuals. On the one other hand, there was the spectre of cold reason, particularly of French materialism and, at home, of Utilitarianism. On the other hand there was fundamentalism - revealed religion rejecting the rationalising power of the human mind. Another aspect of that rock of irrationalism on which science might founder was the spinning of unsupported theories (for instance about the origin of the earth), unrelated to empirical observation and verification. Against this pair of disasters, Whewell and his contemporaries had to emphasize the value of studying objectively and creating hypotheses in a disciplined, orderly way by inductive processes. We have seen in Chapter Five the energy that Greenough and some of the early founders of the Geological Society put into "Baconian method" (Rachel Laudan (1974 and 1977)). I have also described in Chapter Seven, Sedgwick's insistence on rational processes to defend both enquiry and orthodoxy against irrational schemes such as those of Chambers. To Whewell, there is no doubt that reason must be deployed in the investigation of the world of objective phenomena. However, he was always sharply aware of the need to avoid a mechanical Baconian methodology. Yeo comments on Whewell's wish to avoid too great an emphasis on empiricism:

His subsequent major works on the history and philosophy of science were a continuation of his earlier defence of the claims of theory, and can be read as an extended indication of the role of hypotheses and imagination in scientific thought (Yeo, R.R., 1986:270).

In an earlier article, Yeo wrote succinctly that "Whewell attempted to repudiate empiricist philosophy without sacrificing the empirical dimension of physical science" (Yeo, R.R. 1979:511). It is in this careful steering between the two whirlpools of materialism and irrationalism that Whewell achieved considerable success and admiration in his own time. For us, this balancing act presents a compatibility with the views of his close friend, Wordsworth. Before turning to

how this is exemplified in the special field of geology, I wish to elaborate how Whewell explained the intellectual route which he prescribed for the scientists of his time.

As with the other university scientists of his time, Whewell was what we would call a "pure scientist", not a technologist. His major work on tidal systems of the world may have provided some practical and relevant information for seafarers but, in the event, the processes were the other way round: he used information from the mariners of the world to provide him with the material for his theory of tidal changes. Similarly, he invented and carried with him to appropriate locations an anemometer, but this instrument was for recording not for predicting weather patterns. As he remarks in a letter to Rowan Hamilton in 1835: "I should think myself a goose, if I were to be tempted to give practical men my advice about railroads and fisheries" (Todhunter II: 209). In *The History of the Inductive Sciences*, he is ready to admit that the mediaeval period was one of considerable activity in the Arts but not in Science. In this context, Whewell meant by "Art" the practical arts: or, as we would use the term, the "technologies". The great inventions of mediaeval times "may in their operation have changed the face of the world, but in the history of the principles of the sciences to which they belong, they may be omitted without being missed" (Whewell, 1957 (1840): 255). In more recent times, despite the considerable advances in invented machines, there was, to Whewell, little evidence of a growth in the general appreciation of scientific truths. Watt's invention was an exception because the steam engine came from "a steady apprehension of an atmological doctrine" (Whewell, 1857 (1940): 255). The "beautiful manufactures" of early Victorian England, such as porcelain, steel and glass, were however not the product of scientific thought. "Art is the parent, not the progeny of science" (Whewell, 1857 (1840): 253).

Science may rely upon experience but it is not merely the experience of the present. Scientific discovery is a continuous process, it is the "heir of a vast patrimony... Our species from the time of its creation has been travelling onwards in the pursuit of truth ..." (Whewell, 1857 (1840): 3). Previous ages may have made errors in their explanations, but nothing which was then done is now useless or inessential, although a former theory will be likely to be less outstanding to modern scientists because of new discoveries. Whewell is keen to avoid a scientific culture which assumes the repeated, rapid overthrow of previous scien-

tific beliefs. Whereas, in the twentieth century, we are comfortable with titles such as *The Structure of Scientific Revolutions* (Kuhn 1970), Whewell, perhaps fully aware of political implications, is at pains to argue that "what might appear as a succession of revolutions" is in reality "a series of developments" (Whewell, 1857 (1840): 8). Even the language of past science becomes part of the continuous development of truths and, like a medal of gold, is "a treasure as well as a token." However, there are undoubtedly moments of great change in the development of each science. To Fisch, Whewell's *History* was fundamentally *catastrophic* - scientific progress is achieved, it is stated, in unanticipated creative leaps - a far cry from the piecemeal uniformitarianism of Lyell and Darwin" (Fisch, M. 1991: 137). Whewell designates the phases through which scientific progress occurs. The preliminary period before a moment of change he calls a Prelude. The moment of rapid expansion or even reversal of old truths is an Epoch, after which there is always a Sequel. There were periods when the Sequel lasted so long as to seem almost stationary. In such times, and the mediaeval period was one, men proceeded to state truths from accepted principles rather observing facts followed by general principles. Deduction, not induction, is the mark of such an age and its progress in scientific endeavour is negligible.

To Whewell the primary scientific process is induction. By "induction", he meant the process of generating statements of truth from observed experience: the doctrines of the sciences "are obtained by a common process of collecting general truths from particular observed facts, which process is termed *Induction*" (Whewell, 1967 (1847): 2). From the start of the major work *The Philosophy of the Inductive Sciences*, Whewell opines that these are truths which we can find by contemplating the world within as well as the world without. Experience is not limited to what we can see or hear or feel. However, in this text he established limits, confining his analysis to the study of the external, material world, reserving for a later, perhaps ultimate, study, a science of morality. I shall soon return to that particular quest, but for this moment I note that by "experience" of the material world Whewell means much more than Locke intended. Indeed, he specifically rejects the limitation of what we can know from our five senses. Perception is an active involvement: "The mind is in some ways passive as well as active" (Whewell, 1967 (1847): 26). Whewell's statement about an active potential of the human mind is akin to Coleridge's view of the power of the human mind. It is also close in sympathy with the Wordsworthian excitement of the

poet at the moment of perception of Nature, when there is an energetic involvement of the subject and object. It is therefore interesting to note that in the opening pages of *The Philosophy of the Inductive Sciences*, where Whewell elaborates on the theme of ideas being "moulded, combined, and interpreted by mental acts", he quotes "a philosophical poet" (Whewell 1967 (1847):26). The philosophical poet is Wordsworth; the poem is "Lines written a few miles above Tintern Abbey" (see Note 6).

It is at an early point in the major work on induction that Whewell introduces the word "Idea" to "express that element supplied by the mind itself, which must be combined with Sensation in order to produce knowledge" (Whewell, 1967 (1847): 29). Ideas are not Platonic, waiting passively behind substance; they are created by human mental action: "For us, ideas are not objects of thought but laws of thought" (Whewell, 1967 (1847): 29). Ideas are progressive, for just as the general may be produced from particular experience, so there can be a movement onwards from general to more general. It can be readily appreciated that, with the benefit of this expanding facility, the human mind is admirably adapted to scientific activity. In the *Bridgewater Treatise*, where his task was to construct an argument justifying a belief in the power and wisdom of the Almighty, he endorses the essential rightness of scientific activity. Exact and profound study of Nature endorses for the student of science the vague and unformed but natural impression that there is a "creating and presiding Intelligence". However, Whewell steps back from Paleyan Natural Theology: "It is far from our purpose to represent natural religion as of itself sufficient for our support and guidance; or to underrate the manner in which our views of the Lord of the Universe have been much more, perhaps, than we are sometimes aware, illustrated and confirmed by lights drawn from revelation" (Whewell, 1834: 252).

Whewell is no eighteenth-century deist, with an orderly world-in-waiting, ready to be opened up for discovery solely by the application of human reason. Belief rests on guidance both by Reason and Revelation. However, there is a further elaboration to be made. The notion of the "Idea" which involved the human mind in the act of recognition of a Divine Law was an important addition to discussions of the nature of the advancement of knowledge, for it introduced the self-conscious activity of "understanding". "Laws of thought" are different, from mechanical laws, but just as discoverable. Science is thus not a cold,

analytical activity dealing with a mechanical universe. In *The Bridgewater Treatise*, Whewell quotes the evidence from the biographies of older scientists such as Kepler, Galileo, Pascal, Boyle, and Newton, as well as from scientists he has himself known. At the instant when each one saw "a law emerging from the mass of previously unconnected things" he experienced a moment of belief in Divine beneficence. The reader's mind inevitably flashes to the Wordsworthian "spots of time". Whatever the literary connection, Whewell is distilling from his great scientific predecessors a moment of truth, which was important enough for these thinkers to record it with joy and thanksgiving. These vivid moments recorded from the discoveries of the geniuses of the past endorsed the quality of life of the nineteenth-century followers of the scientific professions at a time when there were many adverse criticisms of the paths pursued by their curiosity. It is instances like this when Whewell extolls the energy and zest for learning of past figures of science, that one can appreciate Cantor's recent statement that Whewell can be understood "in terms of two opposing historiographical traditions - one rationalist, the other romantic" (Cantor, G. 1991: 85).

Wordsworth's poem "Stargazers" was one example amongst many criticisms of scientific endeavour that Whewell's scientific contemporaries had to face. Reading today the poem's deeply disturbing condemnation of popular astronomy which, the poet says, generates a depressing, de-humanizing experience, we can appreciate why Whewell and other scientists spent as much time in justifying the uplifting nature of scientific activity as in reiterating the unity of all truth. In *The Bridgewater Treatise*, Whewell specifically engages with the emotional problems created by contemporary knowledge, particularly by superficial speculation on the vast scale of the Universe. Contrary to the depressing conclusions of the disillusioned Solitary in *The Excursion*, the effect of the researches of Whewell and his fellow scientists is to affirm God's interest in humanity, because science will "excite a desire to be able to contemplate more steadily and conceive less inadequately the scheme of his government and the operation of his power" (Whewell, 1834: 278). Although, he argues, some may think that the revelations of the telescope make us feel the Almighty's care does not stretch down to such insignificant levels as human society, there is the opposite end of the natural scale revealed by the microscope: a "teeming, rich world in the smaller paths of life":

It appears then that, if the first flash of that view of the universe which science reveals to us, does sometimes dazzle and bewilder man, a more attentive examination of the prospect by the light we thus obtain show us how unfounded is the despair of our being the objects of Divine Providence, how absurd the persuasion that we have discovered the universe to be too large for its ruler (Whewell, 1834: 288).

When Whewell referred to the great scientists at the moment of their creative act, he used a revealing choice of image. The phrase he used, "a law emerging from the mass of previously unconnected things", is important because it leads us to consider how he conceptualized the orderly, revealing nature of science. Here there are important echoes from Chapter Two of the previously considered use by Wordsworth of the term "scientific", which, it will be remembered, essentially implied orderly elaboration. More interesting still is the re-emergence in this thesis of the notion of "distinctness", also the subject of previous chapters. The word is used by Whewell in the specific context of a lesser known publication, *Two Introductory Lectures to two courses of lectures on Moral Philosophy* (Whewell: 1841). There are parallel passages in other major works, but none so directly addresses the progressive clarification created by science. Once again, experience ("action" in this context) is the origin of speculation, but the intellectual process that follows experiential learning is cumulative and ascends to a climax:

But gradually by the acting and reaction of man's practical and speculative nature upon each other the ideas unfolded from this rude and latent form, contemplated by the reason with more and more distinctness, the man ever trying to understand more and more clearly the things which he himself does, till at last since nothing that is inconsistent with itself can be fully realized, the constant effort which he makes to realize his thoughts and to understand his actions, brings the idea before him in the perfect clearness and distinctness which constitute science (Whewell, 1841: 44).

Whewell gives an example of this cumulative process. He instances the development of the scientific idea of force, unfolding from the first crude notions in Aristotle. Scientific knowledge ascends by a series of steps, a succession which leads to "distinctness of ideas". Thus in the history of geology "the period of classification" produced out of the unformed perception of the apparent chaos of natural landforms much clearer patterns such as "the general form of mountain chains, the relation of the direction and inclination of different chains to

each other, the general features of mineral veins, faults and fissures; the prevalent characters of slaty cleavage" (Whewell, 1967 (1847): 646). The last-named instance of geological clarification was, of course, one of the achievements of his friend and colleague, Adam Sedgwick. In their turn these geologically identified patterns become available for further generalized activity. Clarity and "distinctness" are progressively at work.

The last quoted passage from *The Two Introductory Lectures* contains not only the key word "distinctness" but also the equally vibrant word for a reader of early nineteenth-century philosophy, "understand". Whewell seems to propose two related intellectual processes, which when working together are most productive. One process is "realization" of thoughts which generates "the idea". The other is the human will in action ("the constant effort") trying to "understand". What the enquiring mind tries to understand appear to be "actions" or "the things which he himself does". Understanding here is distinguished from the power of the mind which systematically and progressively makes for "distinctness". There is a reminder here of Coleridge's distinction in "The essays on the principles of method" in *The Friend* between the "contemplation of reason, namely that intuition of things which raises when we possess ourselves, as one with the whole, which is substantial knowledge" and "abstract knowledge or the science of mere understanding" (Coleridge, S. T., 1818: 520-521). Both Coleridge and Whewell have passed beyond the stage of distinguishing the simple collection of data about phenomena which the ignorant might call knowledge or what Wordsworth in *The Prelude* castigated as "the monster birth/Engendered by these too industrious times" (*Prelude*, 1805: 291-292). Wordsworth there makes a simple distinction between two ways of knowing, the accumulation of "knowledge" and the wider "knowledge" derived from a richer experience.

Stallknecht finds in Wordsworth's poems after 1805 a "Kantian aspect" (Stallknecht, N. P. 1958: 209). Certainly, the influence of Kant can be traced in the writings of Whewell and in other contemporary geologists who ventured into philosophical theory either privately or publicly. Like Greenough (chiefly in his private notebooks) or Sedgwick in *Discourse in the Studies of the University*, Whewell distinguishes a more complex activity of the human mind than had formerly been the burden of the word "Reason". Gradually it became important to define kinds of intellectual activity, in the way that Kant defined a type of

"Pure Reason". Whewell in a work produced from a set of lectures called *The Elements of Morality including Polity* (Whewell: 1845) took his fellow English intellectuals to task for not making clear the application of words like "reason" and "understanding" to human thought processes:

The Reason and the Understanding have not been steadily distinguished by English writers. To understand anything is to apprehend it according to certain assumed ideas and rules...(Whewell, 1845 I: 5).

Reasoning, he continues, may, of course, be required for understanding. For example, we may have to reason upon mechanical principles in order to understand a machine. The same distinction between understanding and reasoning became important for the generation of geologists that succeeded the early founders of the Geological Society. To Laudan, the new spirit released geology from a restriction:

"Geology in English did not begin to flourish until a younger generation of geologists argued for a more liberal methodology and put it into practice" (Laudan, R. 1977: 537).

The mere recording of collected material was an essential first step, but only a way of preparing hypotheses about the detailed formation of the earth. The geologists who were Whewell's and Sedgwick's contemporaries were fully aware of the movement of thought in Germany (particularly of the Natural Philosophers) just as much as their predecessors between 1810 and 1830 had been of the discoveries of the French geologists and biologists. It could be said that in the 1830s and 1840s geology was an up-to-date branch of philosophy attuned to intellectual movements well beyond the range of localized studies of rocks, strata and fossils. The new science was, at least to its exponents, a leading intellectual discipline and therefore of importance for someone like Whewell to include in his comprehensive survey of the nature and philosophy of inductive science. I shall next turn to what he had to say about geology's rank in the hierarchy of sciences.

The geologist: The "antiquary of a new order"

To return to the main scientific subject of this thesis is also to locate Whewell's methodology in one field and to enable us to look more closely at the way in which he established his hierarchy of sciences. It should perhaps have

been said at an early stage that Whewell writes both of science in the singular and the sciences in the plural. By the time of the writing of *The Philosophy of the Inductive Sciences*, distinctive sciences had evolved in European intellectual discussion as diverse and different professional academic activities. The dispersion of knowledge (or "explosion", as we would now say) is, however, not Whewell's main lesson. He admits that there had been a centrifugal dispersion of sciences but regards his own mission as one of unification, seeking out what is common between them. To achieve this task he must group the apparently individual fields of study into clusters of like activity. In the *Novum Organon Renovatum* and in Book II of *The Philosophy of the Inductive Sciences* he presents an interesting table of classification (Note 7). One column lists the "Fundamental Ideas" or conceptions of scientific activity, the next names the sciences that rely upon those fundamental ideas, and the final column proposes a group name for the collection of cognate sciences. Thus the fundamental ideas of Space, Time and Number underlie the Sciences of geometry and arithmetic, which in turn are grouped as the "pure mathematical sciences". The fundamental idea of "Historical Causation" provides the common group for geology, the distribution of plants and animals, for glossology (or philology) and for ethnography." As we shall see later, this last group he described as the "Palaetiological Sciences". According to Hodge (1991) Whewell's placing of geology on his "map" is unique to his methodology, not being supported by prior intellectual or institutional precedents. Mineralogy, the subject in which Whewell held the Chair at Cambridge in his younger years, is classified with crystallography, botany, zoology and comparative anatomy. All these were, unlike geology, glossology, ethnography and geography, "Classificatory Sciences". This distinction between mineralogy and geology and their separation into two different classes is significant for the argument that shortly will follow about the prestigious position of geology in Whewell's ascending order of sciences. Despite the fact that Whewell himself was a practitioner of mineralogy, he ranks it as a subordinate to geology. He compares the position of mineralogy in relation to geology with the antiquary who provides medals on which the philosophical historian can base his theories. Mineralogy provides: "a classification of a large proportion of the objects which Geology employs as the evidence of its statements" (Whewell, 1857 (1840): 496).

It is at this point that Whewell's standing as a geologist should be clarified. He is clearly, in terms of specialised knowledge, a mineralogist and not a

stratigrapher like Sedgwick, nor is he a palaeontologist like other members of the Geological Society, but his interests in and writing on geology are not limited to serving geology with facts from a study of crystals and minerals (see a modern summary of Whewell's geology by Ruse, 1991). With his ever-lively, ranging mind, he directly contributed to a number of studies in collaboration with geologists. The most scientific "team" in this respect is the group including George Airy, Adam Sedgwick and Whewell himself who, in the summers of 1826 and 1828 descended the Dolcoath Mine in Cornwall to determine the density of the earth at subterranean layers. The letter from Wordsworth to Whewell on this experiment is a good example, as has been mentioned previously, of the poet's amused interest in scientific research (W.L. III, i: 681-682). There were, however, more direct observations of geological matters. Whewell's correspondence in later life with Professor Forbes of Edinburgh on the subject of glacial action is the exchange of information from a well-informed observer and collector of geological information to a specialist in a sector of geology, who values Whewell's ideas and suggestions. Finally, in summarizing Whewell's technical standing as a geologist, we cannot omit the supreme accolade, his election to the Presidency of the Geological Society. His expert peers were in no doubt of his qualifications to hold that post, although in the correspondence that ensued, his own modesty shines forth (Todhunter, II: 246). Murchison and Lyell had both proposed him for the Presidency, and Sedgwick, to whom his letter of self-doubt was written, confirmed that he should let his name stand. There could be no greater support from the country's major geologists. The honour of this position is not only fed by the warmth of encouragement of eminent friends. Whewell had a considerable respect for the new science itself and it is to this elevated status of geology within his own scientific scheme that I shall now pass in order to illustrate the dynamic position of the study of geology. Hodge (1991) has summarized Whewell's placing of geology in a vivid phrase which I too can accept: "geology as a conduit to the sciences, the moral sciences, beyond the physical" (Hodge, M. J. S. 1991: 261). How does the intellectual water flow in this channel?

In Whewell's table of sciences, geology is a member of the penultimate group before Natural Theology. It is indeed in an honoured position and the reasons for its elevation is strange to modern minds used to classifying separately the sciences into the "earth sciences" and the "life sciences". Geology, the study of inanimate phenomena, paradoxically in Whewell's scheme, is placed closest to

the human sciences concerned with language and the study of cultures. Raub (1988) in his examination of Whewell's part in the debate on Chambers's *Vestiges*, suggests that the same difficulty was shared by geologists and students of language. They both had to grapple with the mystery of First Causes. This may be one reason why Whewell places geology close to linguistic studies, but I believe there was an identifiable European influence. We may start to explain why geology and the study of cultural history were related by considering the phrase of Cuvier that Whewell quotes on at least four different occasions: "the geologist is an antiquary of a new order". The analogy with the activities of the antiquary, who researches human life of the past through human artifacts, is pressed home in *The History of the Inductive Sciences*:

The organic fossils which occur in the rock, and the medals which we find in the rivers of ancient cities, are to be studied in a similar spirit and for a similar purpose. Indeed it is not always easy to know where the task of the geologist ends and that of the antiquary begins (Whewell, 1857 (1840): 398).

There is an even more vivid analogy with "human sciences" a little later in the same text when Whewell judges that geology is similar to the history of language: "English is a conglomerate of Latin words, bound together in a Saxon cement". Latin words came partly from a "parent quarry" with all their edges sharp, but they became like pebbles "obscured and shaped by rolling in a Norman or some other channel" (Whewell X 1857 (1840): 399). It is much easier to appreciate, after reading passages of this kind, how guidebooks like Wordsworth's can smoothly move from describing natural landscape in terms close to those of the geologist to describing the man-made features which we now classify as belonging to the archaeologist's realm. It is also relevant to note that the well-known passage in Book III of *The Excursion*, where the Solitary deems that the work of the botanist and the geologist is so trivial, is preceded by a lesser well-known section where the Solitary similarly denigrates the endeavours of archaeologists (W.P.V. iii: 131-136).

The bridge between geology and the human realm is, however, more than a mere methodological similarity. It is even more fundamental than the analogy between the archaeologist's and the geologist's research methods and their similar data. The argument that the "world of matter" is closer at this point to "the world of thought and feelings" is based on what, to Whewell, was the

fundamental idea underpinning geology. That idea is one of historical change which includes "the productions of Man as well as of Nature" (Whewell 1857 (1840): 401-402). For this scientific activity which embraces human as well as natural phenomena, Whewell invents a term of classification which has not survived his own life-time of enthusiasm for its value. Perhaps it is fortunate that "Palaetiology", the term generated in the next quotation, has not survived, except in studies of Whewell's work. Fisch (1991) and Hodge (1991) make an interesting play with the word in order to open up Whewell's own introduction of this new term of scientific classification:

While Palaeontology describes the beings which have lived in former ages without investigating their causes, and Aetiology treats of causes without distinguishing historical from mechanical causation, Palaetiology is a combination of the two sciences; exploring by means of the second, the phenomena presented by the first (Whewell 1967 (1847): 638).

The practice of tracing causes by studying present evidence sits reasonably comfortably of course for any geologist whose work was published after 1832, the period when Lyell captured the stage. For some geologists, such as Playfair, thirty years earlier, the teaching of Hutton had provided the same stimulus. In the years after Lyell, Whewell can look to geology with confidence for confirmation of a doctrine of the Creator's uninterrupted sequence: "The Past has been a series of events connected by this historical causation, and the Present is the last term of this series" (Whewell 1967 (1844): 655). The unquestioning acceptance by Whewell of an orthodoxy of smooth progression throughout geological time in this quotation is, however, only apparent. In practice, Whewell walks a wary line between catastrophism and actualism. Whether this sceptical, cautious position is because of his anxieties about the effect of pure Lyellism on faith in the Divine origin of the earth will be explored a little later. It may be more pertinent now to note that Whewell had the benefit of writing after Lyell's major texts had faced a sequence of informed criticisms. Even more important, he had additional evidence from reading rapidly accumulating material from two other areas of geological studies, namely researches into volcanoes and into sea-level changes, both phenomena occurring at ages which were geologically recent. He was able to hold a firm position in the debate between the two "-isms", catastrophism and actualism, that were being discussed in the Geological Society in the 1830s. Whewell judiciously accepted actualism within a long, but limited, time-span, but remained committed to catastrophism. He kept a dialogue open

with Lyell. Here are two careful statements from Whewell about the controversy. The first argues that catastrophes may well have occurred, although the data that geologists normally consider lead to opposite conclusions:

The limit of intensity being really unknown, catastrophes are just as probably as uniformity: If a volcano may repose for a thousand years, and then break out and destroy a city; why may not another volcano repose for ten thousand years, and then destroy a continent; or if not a continent, why not the whole habitable surface of the earth? (Whewell, 1967 (1847): 670).

Only a page further on, he adopts a less extreme view:

The course of things is *uniform*, to an Intelligence which can embrace the succession of several cycles, but it is *catastrophic* to the contemplation of man whose survey can only grasp a part only of one cycle (Whewell, 1967 (18847): 671).

It is pertinent for modern researchers into the knowledge base of an historical period to note this moderated position about a scientific hypothesis. When accumulating evidence of Wordsworth's, or indeed of any poet's, understanding of the geological theories of the time, we must not assume that there was a unified scientific body of knowledge of which the poet was or was not aware. What appears as confusions in the poet's thinking are not so difficult to comprehend when it is noted that the scientists themselves were changing their opinion and reserving their judgements. The dismaying contradiction of a poet holding a belief in the Flood at the same time as superficially giving evidence of knowledge of Huttonian processes, or the half-hinted at, tantalizing glimpses of some understanding of igneous activity, without a firm statement which can be produced as evidence of the source of that knowledge, are much more comprehensible when we see a senior scientist of the same age adopting a similar agnosticism. Whewell is the authoritative leader of scientific establishment, capable of standing back from joining the extremes of one camp or the other of current controversy although Ruse (1991) clearly classifies Whewell as a catastrophist. A useful source of information on Whewell's views on Lyellian actualism is the review he wrote on the *Principles of Geology* in *The British Critic*. It was clearly respectful to Lyell, but ultimately found Lyell's long time-embracing scheme unacceptable as an explanation for all phenomena at all periods of the earth's history (Whewell, 1832). More important to note than Whewell's detailed destruction of Lyell's argument, is the fact that Lyell asked him to be the reviewer. This is yet another mark, not only of Whewell's stature,

but of the fact that the scientific community encouraged debate and remained in communication with each other despite the depth of their controversies.

We can only conjecture that Wordsworth and Whewell agreed in discussion that they shared a philosophical scepticism about simplistic, comprehensive explanations of the process that produced the existing landscape, but it is reasonably safe to assume that they both shared the same serious concern about where the new science of geology might lead in matters of faith. It is therefore important to examine Whewell's justification for men of faith spending time with what might be a dangerous area of study. Whewell's *Bridgewater Treatise* is not specifically a defence of geology. Buckland undertook that specific task. Furthermore, Whewell's *Treatise* was a comparatively early text (1834), written only at the beginning of the debate on Lyell's increasingly important work and before the first implications of Charles Darwin's theories of Natural Selection were understood. However, although the *Treatise* looks back to the previous century for some of its style of defence and is even Paleyian in much of its argument, containing as it does demonstrations that the earth, the atmosphere and the "ether" are harmonious with each other and constructed for man's survival, there is also a distinctively nineteenth-century tone to the major argument. Gliserman says of Whewell's *Treatise* and its attempt to "rescue science":

I am not sure that Whewell is entirely successful in his rescues, but, more than any other science writer at this time, he gives a definite emotional hope to the negative possibility uncovered by scientific investigation (Gliserman, S. 1975: 295).

Whewell, like Sedgwick, proposes not one guide to belief but three: Reason, Revelation and Steadfast Faith. Through the *Treatise* that faith is principally demonstrated by assurances about the hidden hand of a benign and intentional God. God has given humanity the power to behave in a faithful way, aided by the two distinctly human attributes, conscience and a sense of duty. Human beings have, in short, the capacity to act other than by instinct or by some other material imperative. It is with this argument that Whewell draws closer to Wordsworth as well as to another contemporary, who debated matters of faith in a very different context, John Henry Newman. The following passage from *The History of the Inductive Sciences* uses the key word "assent", which was part of Wordsworth's and Newman's vocabulary of belief:

All that claims our assent on those higher grounds on which theology takes cognizance must claim such assent as is consistent with those grounds; that is it must require belief in respect of all that bears upon the highest relations of our being, those on which depend our duties and our hopes (Whewell 1957 (184): 485-486).

Geology, or for that matter any science, is not a player in the final game, however valuable the science's procedures may be in creating the pathway to truth. Despite this often-repeated reassurance from eminent scientists such as Davy, Sedgwick and Whewell, there were still many who were fearful of the outcome of scientific discoveries. In order to reassure anxious believers, the Bridgewater Treatises were commissioned, but Whewell made a number of other defensive moves in other publications. Whewell's fundamental defence of geology is strikingly simple. It is to dismiss the possibility of geological enquiry ever creating a problem large enough to cause concern. As early as 1838, in his Presidential address to the Geological Society, reporting on the work of the year, he recorded recent discoveries of fossil bones of monkeys from Asia and from Europe. To many, these new records of apparently extinct beings presented a threat to faith because they appeared:

...to obliterate the boundary between the present condition of the earth, tenanted by man, and the former stages through which it has passed. For my own part, I can see no such tendency. I have no belief that geology will ever be able to point to the commencement of the present order of things, as a problem which she can solve, if she is allowed to make the attempt. The gradation in form between man and other animals, a gradation which we all recognise, and which, therefore, need not startle us because it is presented under a new aspect is but a slight, and, as it appears to me, unimportant feature, in looking at the great subject of man's origin (Whewell, 1838: 641-642).

The same intellectual strategy, one of not admitting that there was a problem with geology, was adopted in his later more substantial writing. The word "gradation" as used in the above passage is one of the "fundamental ideas" of geology which he analysed in *The Philosophy of the Inductive Sciences*, and in *Novum Organon Renovatum*. Whewell recognized that "gradation" lies at the basis of Lyell's work and that no doubt can be entertained there of its value. However, the idea of a slow evolutionary passage from one physical state to another has to be treated with caution because of the partial position of the human observer trapped as he or she always must be in a vast time-scale. In *Novum Organon Renovatum* (1858: 227-228), Whewell compares theoretical geologists with the people who live in a city and see old houses demolished and

replaced. They believe the streets are continuously changing and therefore may never question how the first city came to be established. This is not only a further argument to support the possibility of periods of catastrophism beyond our comprehension, containable within the vaster canvas of uniformitarian gradation, it is also a statement about our lack of ability to perceive the original foundation of the earth, and therefore the worthlessness of attempting to enquire about ultimate signs. We may, in short, "apply the Method of Gradation in the investigation of geological causes, provided we leave the limits of the Gradation undefined" (Whewell, 1858: 228).

Geology as a science must therefore admit its limitations in not being able to see the beginning of time, although looking backwards is its prime role as a historical science. Equally, geology must concede that, although it is the study which draws closest to the study of human affairs, it cannot apply its distinctive methods on them. Moral Laws are not the same as Material Laws, despite their common authorship. Here is another cordon around the subject. If we look backwards, he argues in his *Presidential Address* to the Geological Society, we must look at all aspects of human life (facts of civilisation, art, government, writing, speech, traditions, intellectual, moral and religious institutions) "as evidence of the origin and end of man's being... Approaching near these topics the geologist may well be content to close his own volume and open one which has man's moral and religious nature for its subject" (Whewell, 1838: 642).

The last passage, from the annual public celebration of geology, is immediately followed by fulsome praise of Charles Darwin's round-the-world voyage. Darwin is awarded the additional accolade of public acclaim and, ironically in the light of future developments, of scientific orthodoxy. Whewell records that the young scientist's tutelage was by Henslow and Sedgwick. This is a statement of accreditation and reassurance to those in the Society who feared new discoveries. Whewell, like Sedgwick, is robust in the confidence that geology can override the caution of those who wish to hold the fences of faith against new discovery. Both men went further than mere reassurance. Both regarded new knowledge arising from the study of the earth as essential because they were at heart unswerving believers in progressive science. Progress is comfortable for them because it is containable, set within boundaries which are fixed and unbreachable and, because of the unity of truth, new discoveries will not breach these boundaries. So confident is Whewell about the future role of

geology, that he is prepared to say that it may even be the successor to traditional mathematics as the pre-requisite for intellectual growth. Writing to Lyell in 1863, Whewell is as radical in this context as any emerging young prophet of a new science:

...for according to my philosophy, the formation of new sciences has been accompanied by the development of new ideas in modern times; and those can never fully appreciate man's mental development who go spinning round and round the ancient starting places of geometrical and arithmetical truth. This, however, I have tried to work out in my *Philosophy of Discovery*, and may perhaps have something more to say upon it (Todhunter, II: 430).

However, a year later he was to write to Professor Forbes admitting that a reconciliation of the scientific with the religious view "is still possible but is not so striking and clear as it was" (Todhunter, II: 435). "Mr Darwin's speculations" had undoubtedly complicated matters. Whewell nevertheless retained until his death a fundamental conception that scientific knowledge could not trample in the garden of faith; its authority was limited to what it did well. In one striking phrase he summarises the limits of rational systems: "the thread of induction respecting the natural course of the world snaps in our fingers, when we try to ascertain where its beginning is" (Whewell, 1967 (1847): 708).

One final set of comments on Whewell's high regard for geology is worth making. It may redress any lingering view that Wordsworth's friend was himself or was regarded by others as one of those who are belittled as pocket-hammerers in the third book of *The Excursion*. Whewell always referred fulsomely to geology as "the delighted discoveries of our geological teachers" (Whewell, 1841: 36). The effect on the character of the scientist of a life-time's pursuit of geology earns unreserved praise. Like Sedgwick, Whewell regards the new science as ennobling. Members of the Geological Society of London, for instance "have shown that there are no talents and no endowments which may not find their fitting employment in this science." Their labours have been pursued with the great character forming qualities of "zeal, knowledge and philosophical eloquence" (Whewell, 1857 (1840): 429). One of geology's great advantages, as seen by the early nineteenth-century members of the Geological Society, was that it enabled its students to travel and to mix with different classes of society. Just as Whewell recommended to his sisters the pursuit of literature, because it widened social experience, so geology has the virtue of broadening the mind. It is hard not to be amazed at the improvements that are claimed: geology has

given its acolytes "that prompt and liberal spirit, and that open and cordial bearing, which results from intercourse with the world on a large and unfettered scale. It is not too much to say that, in our time, Practical Geology has been one of the best schools of philosophical and general culture of the mind" (Whewell, 1857 (1840): 429).

"She says nothing but she points upwards"

The rich praise awarded to geology might tend to leave the ardent geologist with the feeling that his science provided everything for all his needs. Whewell however draws a line even with this most favoured subject: "The mystery of creation is not within the range of her legitimate territory, she says nothing but she points upwards" (Whewell, 1867 (1840): 488). Geology takes the intellectual to the boundaries of experience, both moral and intellectual, but no matter how far the geological traveller pursues the journey, an impassable frontier will eventually terminate the geological method of transportation. Geology like other sciences, but with particular advantages over them, is only as "solid and certain" as long as it refers to its own facts and to its own ideas. In *The History of the Inductive Sciences*, Whewell is quite clear that there are two errors in circulation in his day. One is to seek "geological narrative in theological records", the second is to be dismayed at finding no clear and unambiguous evidence in fossils or in stratigraphy of a moment when the world begins or when humanity appeared. Geology is not theology and it is "helpless when it pronounces on subjects extraneous to itself." By this strategy, Whewell leaves room both for theological doctrine and for an activity of investigating the moral nature of man, which is separate from the methodology of the palaeological sciences.

We can understand why this philosophical demarcation of geology from theology and ethics might well have been acceptable to Wordsworth, particularly in his older, more conservative years. He had long before drawn back from a total explanation of the laws of all nature when he abandoned Godwinism. A model of science, which culminated in respect for the Creator as well as confessing a genuine humility about what it could achieve, was certainly one with which the poet could live at ease. When this scientific stance was combined with the moral benefits of the study of the landscapes as extolled by Whewell, it is easy to see why their friendship blossomed and continued undiminished, despite Whewell's eminent position as a leader of opinion amongst the followers of a

very innovative and potentially threatening scientific body.

One other element of Whewell's personal intellectual map should be completed to illuminate another bond between the poet and the scientist. Both men held a life-long interest in trying to explain the special nature of humanity and the way in which human moral nature is composed and improved. Throughout the years when he was writing his major works about the nature of inductive science in the material world, Whewell prepared his readers for a parallel work on the laws that operate in the inner world of human beings. Always involved in practical matters relating to scholarship, he was foremost in establishing the study of Moral Philosophy in Cambridge. The time had arrived to replace Paley's work as a basic undergraduate text (although Becher points out that it was in fact retained at this point and for some years afterwards: Becher. H. W. 1991: 20). Whewell had a larger vision than merely updating an undergraduate's reading. The major publication that he eventually produced, to be read in parallel with the intellectual maps of the history and principles of induction, was *The Elements of Morality including Polity* (Whewell 1845). An equally good title might well have been "The Philosophy of Law", because it is in fact a sustained argument about the way that men are controlled by conscience and also by government. Good government, he argues, produces the appropriate laws for the support of individual conscience. Significantly the dedication of this work is to Wordsworth. It opens with an expression of thanks to him for "the general privilege of his friendship". It is not, however, friendship alone which stimulated the author's activity of justifying human morality:

And there is no one to whom I could with more propriety dedicate such a work: since in your Poems, at the season of life when the mind and the heart are most wrought on by poetry, I along with many others, found a spirit of pure and comprehensive morality, operating to raise your readers above the moral temper of these times (Whewell, 1845: i).

That dedication in 1845 was, of course, a public statement of indebtedness to the, by then, grand old man of poetry. There is, however, a personal letter from Whewell to Wordsworth which gives a much deeper interpretation of indebtedness. Whewell did not record that the poet only strengthened his moral sense, he also recorded that Wordsworth played a part in his intellectual development:

One of the main objects in the remainder of my life will be to pursue such moral speculations as I have already entered upon,

and in these, if there has been anything really good, I am persuaded that I have been led to it in no small degree by the lessons which in former times I learnt from your writing to which I always ascribe a considerable portion of the formation or information of my intellectual character (D.C.L.: Wh: 14 Oct 1841).

Leaving aside the attributed effect of Wordsworth's poetry on Whewell's intellectual life as well as on his personal morality, I would like to dwell for the moment on the phrase "pure and comprehensive morality" in the first of these two quotations. In Chapter Four in connection with *The Excursion*, I have commented on Wordsworth's concern, even absorption, with the themes of conscience and of inner "laws". A typical example of the poet's reliance on law and duty to act in a "comprehensive" way, that is to say arming the good man for all eventualities, is the following passage:

O blest seclusion. When the mind admits
The law of duty; and can therefore move
Through each vicissitude of loss and gain (W.P. V iv: 1035-1037).

To Whewell, as we have seen, such moral laws are ultimately of the same divine origin as physical laws. At an early point in *The Philosophy of the Inductive Sciences* (and it is repeated in *The History of the Inductive Sciences* and in *The Elements of Morality*) he insists that the process of creating "general truths" from "particular facts" is not limited to the world which is external to human beings. Since truth is a unity in all subjects and between all subjects we may find it if "we contemplate the world within as well as the world without" (Whewell, 1967 (1847): 3). He is not foolish enough however to simplify the problem of how morality emerges by applying in detail to moral problems what he has analysed in the material sciences. *The Philosophy of Inductive Sciences* in fact may begin with a confident statement that the inductive process can be applied to the "world within" as well as to the "world without", but it ends with the more tentative prediction that "the principles of truth which we are now laboriously culling among the results of the physical sciences, may possibly find some application in those parts of knowledge towards which men most naturally look with deeper interest and more serious reverence" (Whewell, 1967 (1847): 708). In the event, despite this cautious note, when in the next five years he began to survey moral sciences, he did not attempt a transference to the realm of human behaviour of what he had discovered in scientific geological research. *The Elements of Morality* is in essence not about generating laws by inductive processes, but it is a book about how human societies make law and it is an argument that human law

has a pragmatic basis.

There is however a parallel between Whewell's demarcation of the limits of geology and the basis on which he built his study of moral laws. Both fields of study, geology and moral "science", observe the same principle. They do not explore their respective first origins. In Whewell's geology there is an assumption of a First, mysterious Cause, similarly, in his moral law, the "First Cause" is the in-built nature of Man. Whewell's idea or conception of the human mind is close to that held by the older Wordsworth. Once again they belong to the same community of ideas. Although Whewell's conception is implicit in all his writings about morality, it is most clearly expressed in a letter of 1846 to Sir John Herschel, written at the time of the publication of the major text on moral laws. This is a classic statement of opposition to Utilitarianism, with its doctrine of the pursuit of happiness:

I found my Morality, not upon something which man is to get, but on something which he is to be. He is to be truly a man: he is to conform to Rules; to Rules which recognize a common Humanity in himself and others...We must conceive that man is a moral being, and then try to see *how* he can be so (Todhunter, II: 338).

Here is the moral categorical imperative absorbed into the confidence of early Victorian England. Human Nature is distinct from Brute Nature. It is distinguished because it is at one and the same time "intellectual, moral, religious and spiritual". This uniquely "comprehensive" moral nature has its origins in something other than external circumstances. The evidence provided from fossils of the extinct species of plant and animal life may appear to demonstrate that environment controls the living being and may appear to endorse the adaptation of species to changed conditions, but an essential difference is built into the human species. Men possess "a special and indestructable germ in human nature" (Whewell, 1855: 193-194). There is, for this if for no other reason, no "gradation" between the animal and the human kingdom. They were created as separate entities. With this argument Whewell confirmed for himself and others the essential dignity of humanity. In the continuing, relatively calm waters of a time of faith, before the storm of Darwin and Huxley, it was possible to be a leader of the scientific world and to reiterate a confident affirmation of the distinctiveness of two natures, human and non-human. One contribution of confidence to that environment may have come from a poet whose major theme was the essentially superior moral nature of human beings. The evidence that

this contribution meant much to Whewell is considerable.

One of Whewell's latest works (and in its way one of the most unusual) was the long essay, *On the Plurality of Worlds*. This is a detailed argument executed in order to test, and largely to reject, theories of the possibility of other planets containing human life. At the heart of Whewell's argument throughout this text is a reaffirmation of the special relationship between God and his uniquely protected, created being. Crowe (1986) in a study called *The Extraterrestrial Life Debate* suggests that Whewell's antipathy to extraterrestrial life had its deepest roots in his grasp of the theology of Incarnation. The contrast is drawn between the noble purpose of Man and his apparently puny state, particularly in the light of astronomical discoveries and geological theories of the earth. Biological, evolutionary hypotheses had also contributed to a weakening of morale about the special nature of human beings. If the fossil record showed a gradual improvement in species, could Man also be superseded by another improved species? The dramatic advances in manufacturing and communication in the 1840s and 1850s also encouraged utopian visions of improvements beyond the historical human condition. On all these speculations Whewell pours cold water and, in doing so, uses arguments remarkably close in spirit to Wordsworth's validation in *The Excursion* of the supremacy of the human condition.

Whewell affirms that god "has found it worthy of Him to bestow upon Man His special care, though he occupies so small a portion of time, and... although he occupies so small a part of space" (Whewell, 1855: 211). The future will not produce a new species: the seemingly amazing richness of modern inventions is consistent with the intellectual and moral gifts of the present and permanent human state. Technical innovations are not precursors of a new range of beings adapted to a different environment. Whewell could hardly have known the following passages from Book VIII of *The Prelude*. Perhaps he was not even aware of the poem's existence, but the affirmation of human capability is very similar in tone. Following the description of the country fair on the lower slopes of Helvellyn, the poet celebrates the true stature of the distant people. Although the point of this quotation is to illustrate the supremacy of the human in the natural world, we should note the presence of the rocks, the streams, the clouds and the great mountain as participants in the support for humanity. The list of the watching, caring, inanimate world remained unchanged in the 1850

version of *The Prelude*:

Immense
Is the recess, the circumambient world
Magnificent, by which they are embraced.
They move about upon that soft green field;
How little they, they and their doings, seem,
Their herd and flocks about them, they themselves,
And all which they can further or obstruct -
Through utter weakness pitiably dear,
As tender infants are - and yet how great,
For all things serve them: them the morning light
Loves as it glistens on the silent rocks,
And them the silent rocks, which now from high
Look down upon them, the reposing clouds,
The lurking brooks from their invisible haunts,
And old Helvellyn, conscious of the stir,
And the blue sky that roofs their calm abode (*Prelude* 1805,viii: 48-62)

Linked with this inspiring passage are the final lines of *The Prelude* dedicated to Coleridge. Within them we find not only the flourish and the high sentiment that Whewell would have echoed, but also, because of a textual change in the 1850 test, there is a link with his own specialist language of ideas of scientific activity. Wordsworth and Coleridge are to be "Prophets of Nature" armed with a vision to speak to future generations:

A lasting inspiration, sanctified
By reason and by truth; what we have loved
Others will love, and we may teach them how:
Instruct them how the mind of man becomes
A thousand times more beautiful than the earth
On which he dwells, above this frame of things
(Which 'mid all revolutions in the hopes
And fears of men, doth still remain unchanged)
In beauty exalted, as it is itself
Of substance and of fabric more divine (*Prelude*,1805,xiii:443-452).

The significant change made in the 1850 text is in the second line of the passage above. Wordsworth changes "By reason and by truth" to "By reason, blest by faith". The three words, reason, truth and faith, are as much part of Whewell's personal, essential vocabulary as they are of Wordsworth's. We can confidently presume that the conversation of poet and philosopher on the numerous walks on the hills of Lakeland (or in Trinity College or in Upper Grosvenor Street) proceeded on a secure basis of a shared language, moderated as it undoubtedly was by differences in age and realms of activity. These memorable exchanges richly deserve the tribute of being called "the animated conversation of friends".

CHAPTER TEN: CONCLUSION

I aim in this final chapter to formulate some generalizations about the interaction and correlation of literature and geology arising from the material presented earlier. I shall begin by considering what the geologists and Wordsworth regarded as the "spirit" of the times, then attempt to summarize the reciprocal nature of influence between Wordsworth and the geologists. I shall then ask how we are to interpret the situation in the early nineteenth century without imposing a framework from our own time. Does the phrase, "the two cultures", when applied to the first half of the nineteenth century divide what was in fact at that period a unity, or conversely, does it encapsulate in a phrase a dichotomy which had already become well established? I shall conclude with remarks intended to put the balance back towards unity, at least in those fields where my enquiries have led.

The spirit of catastrophic times.

Philosophers, literary men and politicians in the last years of the eighteenth century and the early decades of the nineteenth were united in the belief that the times were momentous. Events gave them evidence that their civilized world was undergoing a period of great change. Whatever side they took on that issue, whether they resisted or encouraged the rapid movement of history, they were sensitive to momentous events and to what became a customary term, the spirit of the times. In some form or other notions of discontinuity entered the discussion of the day. John Stuart Mill writing in 1831 commented on the relative newness of this language of change in history: "The spirit of the age is in some measure a novel expression. I do not believe that it is to be met with in any work exceeding fifty years in antiquity" (McFarland T., 1987 :1). The intellectual ancestry of the phrase, either in English or in German (*Zeitgeist*) is usually traced to Herder's, *Ideas for a Philosophical History of Mankind* (1784-1791) and Kant's *A Universal History from a Cosmopolitan Point of View* (1784). However, the full development of the thesis of *Zeitgeist* by Hegel in the posthumous work of 1824, *Lectures on the Philosophy of History*, whence the term properly enters philosophic discussion, need not detain us here, because, by that time, attitudes to a revolutionary period had already been well established. In any case, the ideas that sweep through an intellectual discussion are not always descendants of philosophic theory articulated by one eminent philosopher. The sense of the

breaking of nations and of the reforming of society was painfully or joyously felt in Western Europe and in the newly-formed United States of America before the new century began. The deposition of rulers (and, for some, their execution), the sweep of armies across the continent, with states destroyed and created by conquerors, the rapid change in social conditions following agrarian and industrial innovation, the development of improved means of transport, rendering all parts of the continent open to trade and travellers - all, in the space of twenty years or less, confirmed the consciousness of great change. How this consciousness was articulated is a much more complicated story. I shall examine Wordsworth's own views of the spirit of the age after a brief examination of the geologists' interpretation of the revolutionary times in which they lived.

The geologists studied in this thesis, with many of their contemporaries, held a long perspective on the age of the earth but they were as conscious as poets and historians of change and revolution. The term "the golden age of geology" (usually attributed to Karl von Zittel in his *History of Geology and Palaeontology* of 1901) was coined in our century, but would not have been a title to be rejected by members of the Geological Society between 1807 and 1850. They regarded their emerging studies as in the vanguard of European science. I have tried to illustrate in the sections on Hutton and Greenough, the two earliest geologists to be studied in this thesis, that they welcomed the new spirit of enquiry, marking their studies off from earlier speculations and unsubstantiated conjectures on the theory of the world. Indeed, Greenough was keen to demonstrate that, by the 1830s, when new discoveries were ceasing to amaze, the exciting age of discovery for geology was already on the wane. The rapid developments of palaeontology and the increased awareness of the fossil record by stratigraphers and map-makers were constant reminders of the dramatic changes which affect the history of life. As early as the 1780s, Buffon had received wide acceptance for the idea of eras, usually interpreted as long stretches of quiescence followed by periods of rapid change. Cuvier's discoveries of remains of mammoths and his explanations for their occurrence further reminded geologists of the early part of the nineteenth century that their material could act as an analogy of social history. In popular writing about the shifts of fortune that can cause extinction and, to some theorists, adaptative responses that effectively "created" new species, there was, well before Darwin's publications, preparation for evolutionary theory, which had, to some, obvious social and political resonances. The general acceptance by the geologists studied here of a sense of progressivism and optimism, although explained in different ways, leaves the modern reader with

an impression of their confident view that there is "an ascent and progress in the main" (W.P.V viii: 1005).

I have already commented in the chapters on Greenough and Whewell on the acceptance of geology as a close cousin of history. Despite the extreme difference in time-scale between geology and human history, geologists were at one with the philosophers of history in acknowledging that there are periods of "advance" followed by long periods of quiescence. Similarly the full power of the early scientific use of the word "revolution" and its frequency of use should not be forgotten. So we see Whewell carrying this model of phases (Preludes, Inductive Epochs, and Sequels: Whewell, W. 1857(1840): 9) into his explanation of the history of intellectual ideas. The important theoretical point to note is that, although modern historians (such as Laudan R. 1974) find "continuity" to be the keyword for the early nineteenth-century geologists, because they have established between them and eighteenth-century theoreticians links which are visible to our own clear hindsight, some participants themselves saw both continuity and discontinuity, stability and change. We should not, however, imagine that all thinkers espoused revolution as inevitable, even though they had experienced it in their own social and political experience. Whewell provides an example of a parallel tendency, to seek assurances in the safe progression of life. Here the word "development" becomes a touchstone. Whewell asked his readers to seek out this quality in the confusing history of science:

... They [the succession of steps in science] consist in a long, continued advance, a series of changes, a repeated progress from one principle to another, different and often apparently contradictory...
[The history of each science] which may thus appear like a succession of revolutions, is, in reality, a series of developments (Whewell, W. 1857 (1840): 7 and 8).

These quotations are, of course, from the pen of a geologist who, as Chapter Nine has illustrated, espoused a form of Catastrophism. Once again, we should not assume that the geologists took up simple, stark positions.

It would be remiss not to return at this point to the commonly held view of our own century's historians of science that the dominant feature of nineteenth-century science was its confident belief in progress. The usual view is that the geologists, like the biologists, were mainly linear and directional in their explanations of change and succession. (See for instance Rudwick, J. 1976: 149

and Cannon, S.F. 1978). The geologists I have studied were certainly optimistic, both about their methods of discovery and about what was discovered. Science was likely always to advance onward and upward, unless thwarted by obscurantist religious or political leaders. Here again social and scientific frameworks of thought coincide. Whereas now we are sophisticated in our notion of uncertainty in science or hold the view that "progress" is a totally inapplicable word for an intellectual activity whose theories are only good enough until the next one comes along to take its place, the early nineteenth-century geologists held a more robust view. They held that patient research would steadily uncover the mysteries that lay locked in the strata, although the geologists studied in this thesis in one way or another set a boundary to the discovery of certain kinds of non-material truth. They were, of course, conscious that geological enquiry could create controversy and opposing theories. The Geological Society thrived on debate and many of these famous battles never realized a conclusion (see, for instance, Secord, J.A. 1986). However, there was a trust that, given time and careful gathering of information, truth would be unfolded. There is a describable object hidden within nature, if only we had the technique to grasp the curtain between the object and the scientist. Sir Humphry Davy's strangely circuitous essays, called *Consolations in Travel or the Last Days of a Philosopher*, use the well-worn image in a traditional way:

...in proportion as the veil becomes thinner through which he [the scientist] sees the causes of things, he will admire more and more the brightness of the divine light by which they are rendered visible (Davy, 1851: 270).

Some of the most revealing material which gives an insight into the framework of thinking of the early geologists is to be found in the publications which were intended for the wider public, works such as the opening sections of Lyell's *Principles of Geology*, Greenough's *Critical Examination of the First Principles of Geology*, Conybeare's *Outlines of the Geology of England and Wales* or the section on the Earth in *The Encyclopaedia Britannica* of 1797. An almost obligatory feature is the history of the subject before the modern era, a method of explanation which implied that the "modern" was a time of rapid improvement from a slowly emerging past. History is, in this view, inevitably a sequence of errors eventually corrected or false avenues fruitlessly explored, with perhaps a thin chain of truth that leads to more substantial knowledge (See Laudan, R. 1974: 11-14). It is when the modern reader turns to a more complicated intellect, such as Whewell's that the simple "progressive" line of development of

science becomes less clear cut. Whewell's respect for the history of science was, as we have seen in Chapter Nine, balanced by his own optimism based on a belief in the progressive development of "ideas", which enabled more complex (and better) ideas to be formulated, and in the power of individual "great scientists" and their minds. Whatever the complexity in the picture introduced by Whewell's respect for former geologists, there can be no doubt that the men of the time saw their own period as one of Whewell's "Inductive Epochs". What explanations did they (and, incidentally, do we) give for periods when rapid advance appears to be taking place in a science?

In our own time, there is grave suspicion of the notion of "advance" in any case. Even more there is, from different intellectual sources, considerable suspicion of phases of history. A radical thinker such as Foucault aims:

...most decidedly not to use the categories of cultural totalities (whether world-views, ideal types, the particular spirit of an age) in order to impose on history, despite itself, the forms of structural analysis (Foucault, M. 1972: 15 and Note 1).

Similarly Gillian Beer, addressing the issue of influence from both a literary and a scientific viewpoint finds it valuable to avoid the term *Zeitgeist* because it is "animistic", investing a complex relationship between intellectuals with a life of its own (Beer, G. 1990: 84). The problem with the notion of "spirit of the times" is that it implies something insubstantial about the way a whole generation of scientists, or any other group for that matter, is enabled to accelerate its activities in the way that previous generations had not. The geologists studied in this thesis do not offer a systematic explanation for the generative powers of the "climate" or "atmosphere" of their times, other than to state that it was a period of rapid growths and broadly "directional" for a believer in God's plan. Again, quoting Foucault, we are left with "a number of subjective means of transmission" (Gutting, G. 1989: 230). That analysis, though sharp, leaves us with no hypothesis to explain why, in the early nineteenth century, there was a consensus that geology was "advancing" and revealing truth, and also that one social group, "the geologists", emerged as an active, productive specialist branch of science with a considerable corpus of work. My own predilection is to concentrate on what the geologists themselves said was happening in their own age, however vaguely they diagnosed the events. Two features of the geologist's own conceptions emerge strongly. One is the language of revolution and fresh starts, the other is the emphasis on individual attainment and geological "genius".

The notion of "revolutions" in science has been kept alive and indeed given fresh initiatives by Kuhn's explanations of scientific change by shifts of "paradigms" (see Note 2). I have found Kuhn's hypothesis helpful in understanding the processes of revision and change in the thinking of the four geologists in this thesis. It also has the benefit of using the notion of scientific epochs. Kuhn rejects the notion that science advances by the accumulation of building blocks of ideas, which he calls "the textbook paradigm". Like the early nineteenth-century scientists, he believes there are particularly fruitful periods when new "puzzles" or questions emerge. Unlike them he concentrates on the extinction of questions which formerly held the field before a new formulation or paradigm is established, whereas they concentrated on the extinction of facts and the introduction of new information. A brief digression applying Kuhn's hypothesis may help to bring together from the earlier chapters some impressions about scientific change.

Kuhn illustrates his thesis by reference to a first phase of reaction to Newton's theories of dynamics. They were, he argues, rejected because, for a time, the questions asked by Descartes continued to define the activity of scientists. When Newton's theories were eventually accepted, the earlier questions were no longer deemed necessary. This model of change could be used as an explanation of the eventual success of Huttonian theories when Lyell had achieved a restatement of the geological processes. Burnet's or Werner's problems and the questions they attempted to answer, such as where did all the Flood's water come from and whence did it disappear, no longer needed to be asked. Old problems ceased to be problems at all. Although, as I have said, this language of paradigm revolutions is of our own day and not of theirs, it is possible to find evidence that the early nineteenth-century geologists were genuinely interested in a revolutionary doctrine of science, a true doctrine of fresh starts rather than a gradual accumulation or imperceptible evolution. This is not to argue that they were not also conscious of scientific progression. I have argued that point already in this chapter. "Change" and "progress" were the keywords for the new science. Nothing illustrates change and progress more than the British espousal of stratigraphy and its leadership of the science for more than two decades. Stratigraphy was not a mere accumulation of facts, it was an attempt to establish a sequence based on observation and logic. This new concentration in Kuhn's terms raised new questions and ceased to ask old ones. It marks a turning away from the speculative battlefields concerned with Noah's flood and Genesis. The fields are no longer fields of war at all. A

stratigraphical column can be seen in a quarry or cutting. It yields fossils for dating purposes and any gaps in the visible evidence are completed not by speculation, but by measurements and skills gained outside the philosopher's closet. Another example of the major shift in scientific attention, about which vocal participants in the rapidly changing divisions of science were very self-aware, not to say assertive, was the ascendancy of geology over mineralogy as a prestigious area of study. Again a new framework of thinking had taken over the established discourse.

A reference to "discourse" reminds us that Kuhn emphasized, as an aspect of change in scientific communities, the sharing of language. I have illustrated the importance of terminology for the geologists studied here, but there is a more important point to make: the geologists in this study in one way or another saw their discourse as being with a wide range of people. Kuhn intriguingly comments that, because of the world in which science is used, the historian of science takes on the role of "translator". This study has, I hope, illustrated that the geologists themselves bore with responsibility their own burden as "translators" to the people who could read in their own time, as well as to those who joined the Geological Society. Hutton, Greenough, Whewell and Sedgwick may have written for specialist audiences, but never exclusively. Like their successors, Lyell, Mantell, Darwin and Hugh Miller they were always conscious of a wider intellectual audience and of the requirement to communicate to an awakened reading public their discoveries in a responsible and, if possible, in a reassuring manner. Gillian Beer, writing about Darwin's language, says:

The common language of scientific prose and literary prose at this period allowed rapid movement of ideas and metaphors to take place. It is clear that in *The Origin* Darwin was writing not only to confraternity of scientists but with the assumption that his work would be readable by an educated reader (Beer, G. 1983: 46).

I shall turn to that aspect of the unity of the scientific and the literary readership in the final section of this chapter.

The second point that I have said emerges from what the geologists themselves identified about their own times and its "spirit" of advancement is the sense of geological genius. Most geologists were still working in pairs or as individual discoverers, despite the steady growth of collaborative styles of

scientific gathering and collation of information. This fact reminds us that there is a double sense of the term "the heroic age of geology". It also implied geologist heroes. These were men who completed very demanding, physically exhausting journeys. Sedgwick and Buckland perhaps are the most characteristic of this group. They returned laden with specimens from some of the toughest transects that they could find in the highlands and moors of the British Isles. The journals and records of the Geological Society present a record of great names. A discovery was personalized, a fossil or a section attributed to a discoverer, a theory acquired a human label; all are records of a highly individualized history of science. This was a period when there was still room for an individual to make an individual interpretation of geological history. In our own generation, we are apt to reduce the significance of individuals in the march of history, but in the early nineteenth century before Marx and virtually before Hegel, the individual hero of science could be fulsomely praised for changing the course of a discipline. The early founders of the Geological Society of London and the generation that succeeded Greenough and Aikin in the 1820s and 1830s, led by Sedgwick, Whewell and Murchison, were unsparing in the verbal duels in which they gleefully engaged and in the debating blows that they administered to those with whom they disagreed. The other side of the coin was a warm and uninhibited praise of the individuals who had made expeditions to uncover new areas of study or had returned from a field-trip laden with evidence that filled a gap in the record. There was no doubt in the minds of these scientists that the word "influence" was properly applied to great names. This picture of the strength of individualism must also be shaded by the support given to each giant of geology by a close associate or by a small peer group of great figures, a different but related aspect of individual influence on change in geology. Warm friendships are recorded: Hutton and Black in Edinburgh; Sedgwick and Whewell; Greenough and Buckland. Sometimes partnerships such as Sedgwick's and Murchison's swing to opposite temperatures when in dispute, but always there were networks that supported innovation and cushioned the risk of making theories and propositions. This attention to heroes and individuals in the history of science must now lead us to Wordsworth's own understanding of "influence".

"No trivial influence/On that best portion of a good man's life:" Wordsworth's own understanding of influence.

Despite the strictures of modern writers like Foucault (see Note 1) about the vagueness of a term such as "influence", I have retained it, but I hope with the intention of determining how "influence" operated and in which direction its force operated. To write about the word "influence" in relation to Wordsworth's poetry is tantamount to summarizing the poet's life in poetry and, if it is possible to think of his life in this way, outside poetry. *The Prelude* itself is an exercise about influence and it would be burdensome for reader and writer to analyse what that work says when in fact the poem says it all. The various contributions to the growth of a poet's mind, dominated by the influence of Nature (and how can one summarize that?) are the continuing themes of the "oeuvre". Difficult though it is to select one entry rather than another from the Wordsworth canon in order to make any worthwhile or even original comments, I shall attempt to draw out one or two remarks that seem to me to be pertinent eventually to the theme of influence. In order to make these few points, I shall briefly take as an example, a poem of considerable significance as well as popularity - a popularity with the geologists - *Lines Written a Few Miles above Tintern Abbey* (W.P.II:259-263).

One of the key words that Wordsworth noticeably uses in connection with the influence of Nature is "impress". It occurs twice in *Lines Written a Few Miles above Tintern Abbey*. The first is in the opening:

---- Once again
Do I behold these steep and lofty cliffs,
Which on a wild secluded scene impress
Thoughts of more deep seclusion; (W.P.II: 259: 4-7).

The second is in the concluding address to Dorothy Wordsworth:

... and this prayer I make,
Knowing that Nature never did betray
The heart that loved her; 'tis her privilege,
Through all the years of this our life, to lead
From joy to joy: for she can so inform
The mind that is within us, so impress
With quietness and beauty... (W.P.II: 262: 121-127).

It is easy to imagine that the second use of the word is weak metaphorically, with the sense of "making an impression". I believe that both instances are in fact more weightily metaphorical relying on the figure of physical pressure leaving a

mark on the object on which the pressure is applied. This poem, like so much else, is about how the mind is created, shaped, moulded. Wordsworth's image of an impress or mark is, however, more than a reference to printing on a blank page. The term is the language of the mint not of the printing-house, a more permanent figure with a lasting effect. The mind is like a minted coin or medal on which something indelible is marked.

The imagery of coins and medals arouses echoes in the writings of geologists. Earlier passages of this study contain references to the metaphor of "the medal of creation" for the raw material of the geologists' study, the fossils and the rocks. In Sedgwick's addition to *A Guide* there is another example of the figure of speech. Remembering that the passage is from a "letter" addressed to Wordsworth, the image is significant; "All nature bears the imprint of one great Creative Mind and all parts of knowledge are, therefore, of one kindred and family" (Sedgwick, 1842: 4). To continue however with Wordsworth himself, Jonathan Wordsworth (1982: 203-205) has considered the frequency of images of printing particularly in *The Prelude*. I have by no means conducted such an exhaustive survey of Wordsworth's use of the word "impress", but there are other significant moments of its use to add to the last-named critic's examples, all related to the process of influence. In *The Excursion*, Book I, the narrator describes the education in Nature of the Wanderer in terms that are continuous with the processes described in *The Prelude*:

So the foundations of his mind were laid,
In such communion, not from terror free,
While yet a child, and long before his time,
Had he perceived the presence and the power
Of greatness; and deep feelings had impressed
So vividly great objects that they lay
Upon his mind like substances, whose presence
Perplexed the bodily sense (W.P.V:i: 132-139).

This image of an impression of pressure on the mind, which was to lie in wait, as it were, until awakened, is similar to a passage in the first book of *The Prelude*:

The earth
And common face of Nature spake to me
Rememberable things,
..... yet not vain
Nor profitless, if haply they impressed
Collateral objects and appearances,
Albeit lifeless then, and doomed to sleep
Until maturer seasons called them forth
To impregnate and to elevate the mind (*Prelude* 1805:I 614-616 and 619-624).

Hillis Miller (1981) has drawn attention to another instance of "stamping" or impressing a mark. It is in the fifth book of *The Prelude*, which includes the myth-like story of the dream of the Arab with his shell and stone. The poet regrets that books and other works of Man are perishable: "Oh, why hath not the mind/Some element to stamp her image on/In nature somewhat nearer to her own?" (*Prelude* 1805 V:44-46). Similarly in the sixth book of *The Excursion*, where the Pastor gives the travellers a sequence of impromptu lessons from the lives recorded in the country graveyard, there is a further image from medals or coins, yet quickly it is turned into a simile which draws attention to the mysterious and unknown effects of deeply pressed influence. The Pastor is relating the story of a gifted woman:

...yet nothing could subdue
Her keen desire of knowledge, nor efface
Those brighter images by books imprest
Upon her memory, faithfully as stars
That occupy their places, and, though oft
Hidden by clouds, and oft bedimmed by haze,
Are not to be extinguished, nor impaired (W.P.V:vi: 699-705).

The language of pressure and stamping is the language of power. The mind is not a passive, unexplored sheet on which events and circumstances imprint an image; it is a plastic, receiving, mysterious and above all active human attribute. As Jonathan Wordsworth writes: "The objects don't get *into* the memory, *into* the mind, they lie upon it, retaining not just form but substance" (Wordsworth, J. 1982: 205). The poet's introspection in Book Eight of *The Prelude* causes him to consider humanity as well as nature and to bring them together. Again the word "influence" is used, but with "of power":

My present theme
Is to retrace the way that led me on
Through Nature to the love of human-kind;
Nor could I with such object overlook
The influence of this power which turned itself
Instinctively to human passions, things
Least understood (*Prelude* 1805 VIII: 586-592).

The power is strange, not always immediately understandable, or even of immediately perceived value, but it has a mysterious potential. In "To the Daisy" this unknown, even irrational power of influence, always ultimately benign, is simply described:

An instinct call it, a blind sense;
A happy, genial influence,
Coming one knows not how nor whence,
Nor whither going (Curtis, J.: 68)

This brief consideration of Wordsworth's selection of language to convey the processes of influence has given only a few examples of the considerable array of images he uses to convey the effect of Nature, of friends and of books in his life. How he became a poet and a man creates so intense and permanent an investigation for him that he required an array of figurative language to describe influence. In his own sphere, Wordsworth, like the geologists, was occupied with the two aspects of the times - change and progress. Through the image of "influence", which I have argued, is associated with power, there is an indelible change marked on a growing individual. It is not, however, an automatic or a necessitarian change (as Hartley's theory of associations appeared to stipulate), but an educative process, involving the human mind in an active relationship. The relationship, a progressive compound interest of growth, generated an ascending quality of human life. In the case of the geologists studied here, I attempted to demonstrate a similar, but of course, less intensely articulated, sense of ascending powers.

What are the poet's views of the way men at any particular time (and because of that particular time) are likely to be swayed or managed or influenced? We have seen how the scientists viewed the "spirit of the times". Did Wordsworth present a philosophy or theory of history which he could relate to the highly individualized theory of the scientists we have so far been considering?

Wordsworth and a "spirit was abroad".

The prose writings of Wordsworth are the most obvious quarry in which to seek evidence of whether he held a theory of history which recognized such a construct as "the spirit of the times". However, before seeking evidence in them, there is, as always, *The Prelude* to lead us into the deeper, closer considered processes of history on which the poet felt he must speak from first hand experience. The language in which Wordsworth describes the atmosphere of the times of the French Revolution is worth a few moments' consideration. In the poet's reminiscence of his first journey into France in 1790, when the French Revolution seemed to be so successful, the images are of re-birth in a season of warmth: "France standing on the top of golden hours,/And human nature

seeming born again" (*Prelude* 1805 VI: 354-355). The general mood was, again, spring-like and a scent of "benevolence and blessedness" was in the air. His travelling companions were returning from the celebrations in Paris and, again a spring-like image: "Like bees they swarmed, gaudy and gay as bees." (*Prelude* 1805 VI: 397-398). This was an experience of "the spirit of the times" and indeed Wordsworth uses the language of social movements and talks of a reawakening not only of individuals but also of nations:

Triumphant looks
Were then the common language of all eyes:
As if awaked from sleep, the nations hailed
Their great expectancy (*Prelude* 1805 VI: 684-686).

Later in Book IX when he records the individual influence of Beaupuy on his own mind, Wordsworth is even more explicit about the movement of history. The two men see a starved young girl listlessly leading a cow:

...and at that sight my friend
In agitation said, 'Tis against that
Which we are fighting, I with him believed
Devoutly that a spirit was abroad
Which could not be withstood (*Prelude* 1805 IX: 518-522).

This "spirit" was not limited in its provenance. It was not merely a power of influence on single, sensitive souls. To use that most famous ejaculation: "Bliss was it in that dawn to be alive." Everyone was influenced. Again the image is of renewal and re-birth: "The inert/Were roused, and lively natures rapt away" (*Prelude* 1805 X: 707-708).

These images of spring and renewal, of reawakening, and re-birth which are applied to a whole society emerge also in the prose works. As early as 1793 in *A Letter to the Bishop of Llandaff*, Wordsworth refers to "a period big with the fate of the human race" (W. Prose I:32). Similarly in the "Preface" to *The Borderers*, Oswald's character is assessed in the context of his time: "...the period in which he lives teems with great events, which he feels he cannot control" (W. Prose I: 78). As the years pass and Wordsworth's judgement on the effects of revolution becomes more conservative and disillusioned, the language itself shifts. What is born in fertile times may be either good or evil. One form of certainty is something akin to "spirit of the times", namely the general mood of a nation. The long document of protest, *The Convention of Cintra* of 1809, relies upon an appeal to right-thinking people of England who are aligned with the poet in being appalled at the abjectness of the treaty made with Napoleon's generals at a

particular stage of the Peninsular War. Swaab (1989) has studied *The Convention of Cintra* in detail and I agree with his conviction that the prose displays "directness and cogency ...and above all the force of the writer's passionate conviction" (Swaab, P.A. 1989: 244-245). With great fervour, Wordsworth invokes "a people" and, again, a sweeping "spirit":

But there are promptings of wisdom from the penetralia of human nature, which a people can hear, though the wisest of their practical Statesmen be deaf toward them. This authentic voice, the people of England had heard and obeyed... It was imagined that this new-born spirit of resistance, rising from the most sacred feelings of the human heart, would diffuse itself through many countries (W. Prose I: 227-228).

"The feeling of the people", argues Wordsworth, is loudly expressed when it is "possessed" either by God or the devil. The ruler must learn to distinguish "the true spirit" from the false (W. Prose I: 289-290): In a later essay supplementary to the "Preface" to the *Poems of 1815*. Wordsworth elaborates that distinction:

"--- Past and future are the wings
On whose support, harmoniously conjoined
Moves the great spirit of human knowledge ---" MS

The voice that issues from this spirit, is that Vox Populi which the Deity inspires. Foolish must he be who can mistake for this a local acclamation or a transitory outcry-transitory though it be for years, local though from a Nation (W.Prose III: 84).

It would be wrong, however, to assume that Wordsworth was in any way a believer in a pre-determined direction of History that bore along men in the flood of the "spirit of the times". In the educational text of 1809, *Reply to Mathetes*, the main argument is that, although it is possible to hold a belief in the progress of human nature toward perfection, the history of the world is like the path of a river which seems to twist, to turn, and often to flow back towards its source: "...the way to knowledge shall be long, difficult, winding, and often times returning upon itself." As an example, the hundred years after the usurpation of the throne by Henry IV were "a hurling-back of the mind of the Country." (W. Prose II: 23 and 12). Not all leaders are carried forward by the general movement of history. In *The Convention of Cintra*, Napoleon, a figure of intense dislike to Wordsworth, is described as a reactionary in his own time: "a mind, originally of ordinary constitution, lagging, in moral sentiment and knowledge, three hundred years behind the age in which it acts" (W.Prose I: 313). Nevertheless the age and its ideas lie in wait, ready to be fired. Some great leaders - and Wordsworth instances in *The Convention of Cintra* Mohamet as an

example - can sweep history forward "like a transitory wind" On the whole, there is a progress. Like the scientists Wordsworth retained a cautious optimism about the ultimately improved destiny of man; although in each separate domain of thought, such as geological processes of erosion, or historical narrative, the detail appears to lead to a melancholy tale of destruction and non-progressive balance. The Wanderer sums it up in the seventh book of *The Excursion*:

... The vast Frame
Of social nature changes evermore
Her organs and her members, with decay
Restless, and restless generation, powers
And functions dying and produced at need, -
And by this law the mighty whole subsists:
With an ascent and progress in the main;
Yet, oh! how disproportioned to the hopes
And expectations of self-flattering minds! (W.P.V: vii: 999-1007).

Again, like the scientists, Wordsworth was convinced of the power of individuals to change the course of events. Mohamet has already been instanced. The later works of Wordsworth are dominated by a concern to praise the general forward movement of England and, to an extent Europe, by certain key figures of history. If we are to look for examples of the *Zeitgeist* as it was interpreted in England in the early part of the nineteenth century, then Wordsworth's *Ecclesiastical Sonnets*, Books VI and VII of *The Excursion*, *Sonnets dedicated to Liberty and Order* or *The Essays upon Epitaphs* will provide vital source material. They are in essence a record of continuity of history with decisive moments created by outstanding individuals. We should be reminded again that the notion of the individual in history still held a strong place in philosophy. Herder's seminal work was to give the first inspiration to German poets and, in turn, fired a long line of artists to explore the significance of great and often tragic figures of the past from Schiller's *Mary Stuart*, through to Southey's *Joan of Arc*.

An important text for Wordsworth studies is Hazlitt's collection called *The Spirit of the Age*. As McFarland's study of Hazlitt, Lamb and de Quincey (1987) shows, these essays were not alone in creating a literary mode. In essence Hazlitt's essays are studies of genius and an attempt to illustrate how leadership of ideas is generated. Wordsworth's own work includes a substantial record of heroic figures. In the collection which Wordsworth himself grouped as "Poems dedicated to Independence and Liberty" the list of great men includes Napoleon, William Tell, and Hofer of Switzerland, the King of Sweden, Toussaint

l'Ouverture, Shakespeare, Milton and his parliamentary friends, Falkland, Montrose, Arminius, Palafox and John Sobieski. Later *The Ecclesiastical Sonnets* trace a line of failure and success linked with the great names in the history of the Church of England. The continuity is all. Take for instance Wordsworth's explanation of the weakness of France in the sonnet "Great Men have been among us" (W.P.III:116). France unlike England has a dearth of books and men. England can trace an unbroken line to the heroes who are stamped with the ultimate mark of liberal approval - they knew John Milton!

It is important not to over-emphasize the individualistic interpretation of history and to set it against a non-human process of historical change. In truth, the early nineteenth-century gives us examples of both modes of interpretation of change and decisive moments in history. Kant proposed as early as 1784 that Man's unsteady but inexorable progress into building a civil order was driven by a "secret plan". Later Hegel was to propose that the philosopher's task was to explore this plan:

...the natural conclusion to draw is that the philosopher is concerned with making explicit what we may call the operative idea of the culture or nation to which he belongs. He is an interpreter of the spirit of his time (die Zeitgeist) (Copleston, 968: 216).

For my purpose, three comments may be made on this manifesto of an early nineteenth-century philosopher. The first is that Wordsworth became increasingly clear that, if there was a "secret plan" of history, it was closely associated with the history of England which offered example and leadership to the world. The second is that, like the philosopher, Wordsworth saw his task, the task of the poet, as that of explaining and making explicit what was happening in his nation. Perhaps there are echoes of German idealism in the most ambitious claims of the "Preface" to the *Lyrical Ballads* of 1802.

Aristotle, I have been told, has said, that Poetry is the most philosophic of all writing: it is so: its object is truth, not individual and local, but general, and operative; not standing upon external testimony, but carried alive into the heart by passion, truth which is its own testimony, which gives competence and confidence to the tribunal to which it appeals, and receives them from the same tribunal (W.Prose I:139).

Perhaps the third point I wish to make falls into the error of pre-empting the argument I mean to assemble at the end of this chapter, but it is relevant at this

point to note that the geologists themselves had this in common with Wordsworth: they too had a sense of duty - to their science. The acceptance of the idea of "an operative idea of the culture" (Hegel) or "truth...general and operative" (Wordsworth) called for more than a passive admission of an intellectual theory of history. It was a theory that demanded individual, practical support and involvement from the geologists. They viewed their geological investigation as a quest for truth which was far from "individual and local" or individual, but "general and operative" in the improvement of the mind. Like Wordsworth, and perhaps more widely like their intellectual colleagues in European literature and science, they regarded their scientific calling as a vocation. The record of the rocks was important not for its own sake, nor, as I have tried to emphasize, was it regarded instrumentally for commercial or technological reasons, but because it was further proof of the march of the progress of humanity. The secret advance of the Divine creation not only waited to be unveiled. It was the geologist's duty to unveil it. "Geology for them [the Romantics] was not an idle diversion, interesting but remote. It was fundamental and connotative for them, and interesting because of its immense significance" (Dean, 1968:11). In summary, Wordsworth and the geologists both occupied a world of whose volatility they were acutely conscious. They were, however, as poet and geologists, not passive travellers on a fast-flowing stream of time, but active participants whose own commitment and unsparing efforts were required to make the most from their times.

I shall now try to summarize more precisely the extent of the interaction between Wordsworth and his contemporaries, the geologists, before pursuing further the similarities and even unity between poetry and geology on which I have touched in this last paragraph.

Reciprocal Influence: Geology and Wordsworth.

The previous chapters of this thesis should have indicated that Wordsworth's use of scientific, and, more precisely, geological information, was limited, contradictory and open to interpretation. To repeat what I have intended as an admonitory warning in the chapters on Wordsworth's poetry: it is a serious error to write about Wordsworth, or indeed any poet of the Romantic period, as if they were the hand-maidens of science. Erasmus Darwin's work was read by Coleridge and Wordsworth, but they did not wish to emulate it. I have considered in the introduction and in the following chapters, where there are

relevant, modern critical works that make out a case for a profound influence on the poet of geological discoveries. An example of considerable significance and a major leader in these studies is Denis Dean. His summary statement is "geology and literature were mutually influential during the Romantic period in England" (Dean, 1968:1). My conclusion is that, if the quest is for evidence of detailed knowledge of stratigraphy, palaeontology or theories of the formation of igneous or sedimentary rocks as opposed to more general impressions of geologically-related abstractions such as Time or Divine direction, then the examples are small and out of all proportion to the main thrust of the poetry.

My two main conclusions in earlier chapters, as far as the influence of knowledge of geology on Wordsworth is concerned, are that geological evidence gave him confirmation of a wide sweep of natural life in both dimensions of time and space, and second, that it supported his aim of clarity in description of landscape. The outcome was that the nature of Wordsworth's universe was vaster, more inclusive and more accurately detailed than the universe of his literary predecessors. Take again, for example, "Lines composed a few miles above Tintern Abbey". Despite what later critics have argued about the exactness (or lack of it) of the place where Wordsworth stood to view the Wye Valley, there is the initial importance of accuracy and the ordering of perception. The poet himself adds the footnote to accompany the line about the "soft inland murmur" of the waters: "the river is not affected by the tides a few miles above Tintern" (W.P.II: 259). This is, however, not an alternative in verse for a guidebook. One exact location has opened a door to a vaster scene:

... a sense sublime
Of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean and the living air,
And the blue sky, and in the mind of man:
A motion and a spirit, that impels
All thinking things, all objects of all thought,
And rolls through all things (W.P.II:262:95-102).

We may expect to find such large-scale, over-arching visions of the nature of all things in the early poetry, but it is significant that in the middle years and, from time to time in the later verse, this largeness of scale remains undiminished. It is possible to conjecture that, through the friendship of these later years with Sedgwick and Whewell (and less directly related to geology but not so remote from it with Airy, Herschel, and Hamilton), Wordsworth found confirmation in rapidly expanding geological science of a created universe which

was infinitely wider than urban or sophisticated poets of the past had imagined. In one dimension, that of the world's Time, with its tension between duration and decay, I have suggested there was a coming together of poetic and scientific preoccupations, which persisted throughout the poet's creative life. The issue of clarity, discussed in particular in the chapter on *A Guide* and in references to what I regard as the unique notion of "distinctness", has already been explored at length. Here it is only necessary to identify again this aspect of the influence of geology on Wordsworth because it is, for me, a confirmation of the poet's respect for scientific activity which is rarely acknowledged.

My main area of attention in relation to the influence of the scientists and their work on Wordsworth has, of course, been to the middle years and the later years. This concentration, although not exclusive, necessarily raises the question of whether the poet's earlier years, usually praised as the source of his most brilliant work, were influenced by different geological perceptions. Certainly the circumstances of the later years might have enabled him to be in touch with the "modern" world of geology. There were, as I have shown, personal friendships with Whewell and Sedgwick and, indirectly through them and Coleridge, knowledge of Greenough's organization of the Geological Society. Because of many visitors to the mountains and practical contacts with guides such as Otley, the world of Rydal Mount was not cut off from a wider scientific world. Turning back to the early years, the figure of Hutton would seem at first sight to be merely an influence on the period of Wordsworth's life in Alfoxden and the first years in Grasmere. It was at that time that Wordsworth may have been directly influenced by Coleridge's reading of Hutton and, perhaps there were discussions with Edinburgh intellectuals on the first journey into Scotland. However, I have also made out a case that Hutton's "appearance" in Wordsworth's work was many years later, principally in *A Guide* (although by then there was perhaps an additional source of influence, Playfair). In brief, rather than distinguishing between the influence of geology on the early and the later Wordsworth, I hope I have emphasized sufficiently my own belief in the continuity of his poetic life. One of the few disagreements I have been able to find between my own views and those of Dennis Dean is about whether the early and later years can be so cleanly distinguished in relation to geological influence. Dean concludes that Wordsworth's later years display, "an exaggerated conservatism which feared all change... [with] an underlying belief in the essentially catastrophic nature of historical change" (Dean, D. 1968: 154). I do not believe that the later poems simply raise the spectre of catastrophe. Following the principle that, in the later

poems, themes should be considered in the context of a planned sequence of poems, a more varied pattern of question and reassurance is perceived rather than a consistent commitment to catastrophism. Furthermore, the images of the Flood and of Fire are as likely to be found in early writing as in later. The poet selected the images that conveyed his intention regardless, on the whole, of geological fashions. The influence of the friendships of his middle-age and old age was more diffusely than specifically geological. Of equal importance were shared psychological, philosophical and historical views.

Bewell's study *Wordsworth and the Enlightenment* (1989) has provided a wealth of evidence of Wordsworth's reading of French eighteenth-century writers, a useful thesis linking European philosophy and natural science with English thought. Its value for a study of influence, and *en passant* for a working definition of influence, is that it extends the discussion into a writer's access to voices from the past as well as to those of his or her contemporaries. My thesis has argued that Wordsworth's use of "theories of the earth" was eclectic and not confined to one contemporary or one former geologist. His collection of ideas included a variety of sources from his reading of the eighteenth century, with particular interest in Burnet's theory of the earth from the seventeenth century. Again, this emphasis has been that the poet selects from theory whatever excites his imagination. I have also argued that Wordsworth gathered geological information from a diverse group of writers whose interest in geological matters was less important than other descriptive and geographical information. The chapter on *The River Duddon: a Series of Sonnets* serves as an example of Wordsworth culling from the writing of travel writers, particularly from the Americas (See also Coe, C.N. 1953). . Indeed, as I have commented earlier, the distinction between geographers and geologists was not very important for practitioners. Both George Greenough and Alexander von Humboldt illustrate the truth of that statement.

A final comment leading from reading Bewell's work is that my own argument, probably because of its concentration on the middle and later years of the poet's life, has given less weight to French intellectual influences. Perhaps because of the increasing disillusionment with ideas that fostered the Revolution and with the subsequent deterioration of the Republic, perhaps because of other developing interests in scientific ideas, Wordsworth moved away from his

original reading. One of those other influences occurred even in the early years and has been a topic of attention in this study, namely the interest of both Coleridge and Wordsworth in German thought (See Shaffer, E.S. 1974). Strikingly, this period, the 1790s and the first decade of the nineteenth century, coincides with the high point of German influence on English geology and, for the Wernerian school at least, on Scottish geology and mineralogy. Mention of the Scottish or Edinburgh sector of science should also remind us that there is a case made out in this thesis for a small stream of influence on Wordsworth from James Hutton and his interpreters, rivals to the Wernerians in the Scottish capital. These comments only reiterate that I believe it is too narrow to attribute influence to one European source, such as pre-Revolutionary encyclopaedists. Indeed, in geology itself the successive waves of European scientific discovery and theorising in the nineteenth century had to find their place alongside native British preoccupations. Although, after the Treaty of Versailles, intellectual links with France improved and communication with influential and powerful theorists such as Cuvier and Brogniart became possible, French geology was far from being accepted immediately as the mainstream interest of contemporary geologists, many of whom who found stratigraphy the crowning occupation of a field geologist. Eventually, the palaeontologists and then the glaciologists found their own place and a broader European perspective on the shaping of the earth became accepted.

Since my intention is two-fold, to summarize the flow of influence to and from the poet, I shall now pass to consider the second direction, which, I have asserted, is the stronger.

Feelings in Common: Wordsworth's Influence on the Geologists.

I hope that the individual studies of Greenough, Sedgwick, and Whewell have demonstrated a number of instances where the poet's voice can be identified in the geologist's life. It is important to begin with the more general truth that Wordsworth exercised a wide influence over many members of the scientific community. A specialized language does not appear to have been a barrier between the poet and the individual scientist. Close friends, such as the Irish mathematician, William Rowan Hamilton, or major theoreticians of mathematics and astronomy such as Airy and Herschel operated in a distinctively scientific language group, but they appear to have been more than

willing to entertain long discussions with Wordsworth. Sedgwick recorded that he looked up to Wordsworth as a philosopher and the other scientists seem to have been ever ready to enter a dialogue with him with as much respect as they gave to their own colleagues with whom they used a specialized discourse.

One of the most famous accounts of the influence of Wordsworth, on this occasion from an economic or social scientist, is in J.S. Mill's *Autobiography*, first published in 1873. It is worth repeating here because it demonstrates how one contemporary unconsciously imbibed Wordsworth's own language, a phenomenon which in this study has been most closely paralleled in the chapters on Adam Sedgwick and William Whewell. Whereas Whewell unconsciously echoes "Ode! Intimations of Immortality", Mill's language is from the "Preface" to *Lyrical Ballads* of 1802. He says that Wordsworth's poem in the two-volume edition of 1815 expressed "states of feeling, and of thought coloured by feeling, under the excitement of beauty" (Mill, J.S. 1924(1873): 125). The verse itself had seeped into the philosopher's language and, without precisely knowing how it had happened, Mill gives an explanation which tells us much about the way the geologists felt able to approach this poet. He is not, says Mill, one of the "greater poets", but instead he was "the poet of unpoetical natures, possessed of quiet and contemplative tastes" (Mill, J.S. 1924(1873): 126). Mill continues to say that those natures are precisely those which require poetic cultivation. By contrast he had found in Byron only a mirror of his own rejection of life and a consequent depression.

The geologists found in Wordsworth the feelings Mill identified. They could live with them in comfort. More than that, they could continue to be scientists as well as lovers of his verse. Again Mill has a shrewd summary:

The intensest feeling of the beauty of a cloud lighted by the setting sun, is no hindrance to my knowing that the cloud is vapour of water, subject to all the laws of vapours in a state of suspension (Mill, J.S. 1924 (1873): 129).

Of course, the minimum statement that might be made about the geologists and poetry is that poetry, though admired as a prestigious art, was little more than a refinement of civilized drawing-room life, a decorative addition about which all gentlemen knew something. Sedgwick's small literary output and Greenough's collections of romantic, amorous verse are little more in themselves than this. A

more serious view of Whewell's verse has to be taken, particularly the elegies written after his wife's early death and the labour expended on experiments with metre. My own view, however, is that something more must be added to explain the regard with which this poet and his poetry were held by the geologists.

One element of explanation is the education which the three nineteenth-century geologists and Wordsworth enjoyed. They were all educated in the classics. If they did not share with Wordsworth the same view of Milton's pinnacle position, they certainly shared a high estimation of Virgil and Horace. Sedgwick, Whewell and, at an earlier stage, Greenough, were all educated in an age before the reform of the Cambridge Tripos. With all its faults - and there were many, some of which Wordsworth himself castigated - the Cambridge curriculum of this period was built on two main pillars, mathematics and a selection of the classical poets, playwrights, philosophers and historians (Schneider, B.R. 1957). One outcome of that education was to produce men who were not schooled, at least by their undergraduate studies, into a specific role as scientist or special "species" of scientist. Although this thesis has given weight to the importance of the Geological Society of London, the institution of the university was of profound importance not only in encouraging the study of geology but also in setting that study in the context of other scholarship, particularly literary scholarship. A study, such as Porter, R.S.(1986) has achieved on the universities in seventeenth- and eighteenth-century England, should be undertaken with the early nineteenth century as its focus. It would be likely to explore two specifically unifying elements in what Cambridge offered to all, but particularly to the young graduates who competed for college fellowships. First, were opportunities to attend lectures in science and philosophy outside the prescribed courses, and second, there was a common religious adherence.

There was a unifying factor as well as intellectual generosity in the continuing hold - all notion in academic life of "a philosopher". As the new sciences grew and increased their experience of the world, it became increasingly difficult to refer to scientific activity as a philosophy of nature. New nomenclature described new routes of enquiry, and independent institutions such as the Geological Society, the Linnean Society and the Astronomical Society gradually encouraged their members to identify themselves as specialist scientists. In these early years of the century, however, it was still possible not only to belong to a number of scientific "clubs" but also to describe oneself as a "natural

philosopher". However, this unifying, cohering atmosphere did not remain long after science became more divided and specialized. In parallel, the term "philosopher", shared by poet and scientist alike, itself became specialized and confined to a newly-emerging academic profession. At least in Wordsworth's lifetime the word "philosopher" still had a general rather than specific ring to it, and the geologists themselves aspired to the title as well as applying it to "their poet".

Some writers have given a sociological explanation of the coherence of the religious adherence of the scientists and literary figures of the early nineteenth century (See for instance Walter Cannon 1964, and Susan Cannon 1978 and Susan Gliserman 1975). The common denominational affiliation of Wordsworth, Whewell and Sedgwick appears obvious to us today, but detailed studies such as Marston's on Sedgwick's beliefs (1984) give a more complex picture. There were occasions when the divisions between the men were as significant as their affinities, just as similar disagreements arose about the reform of the University. Wordsworth may have been the person whom serious young men of the University respected, but the divergent and rapidly changing views on the nature of religion from Tractarian to Evangelical make it unlikely that he appealed to all types of Churchmen. In any case, we should discuss whether his poetry had an influence rather than whether his personal visits and appearance in a University setting created a following. It was the poem's "feeling", that key word to J.S. Mill, rather than the doctrinal statements of Wordsworth that made him acceptable to a broad range of Churchmen, but also enabled him to be read by Dissenters like Greenough and by scientists as diverse in their church or faith affiliations as the Scottish geologist, Hugh Miller or Charles Darwin.

One further point about the commonly held view of a unified religious community must be made. The unity of religious belief and science was not only held, but also stoutly publicized by many individuals, for well over half a century. Sir Humphry Davy's *Consolations in Travel* (1851), and Whewell's and Sedgwick's published sermons and treatises on religion and science, provide good examples of distinguished scientists who confidently discussed advances in geological knowledge and re-affirmed, despite a sequence of changes in geological theory, their faith without hesitation. It is when the texts studied are from the successors to these formidable upholders of belief, that the reader is on the one hand aware of the robust confidence of the older men, and on the other

of the change of tone and circumspection about claims for Divine directionalism of the new generation. Edward Manier's monograph, *The Young Darwin and his Cultural Circle*, argues that, in the period 1837-1844, "neither Darwin's methodology nor the meaning of his theory can be understood outside the context of his views concerning the evolution of man and his higher powers including his moral sense and his sense of religious awe" (Manier, E. 1978: 1). However, the unity of belief was certainly differently expressed as the century progressed. Whewell and Sedgwick in their publications and Greenough in his notebooks not only write robustly that they have no fears about the consequences of geological enquiry, but also conceive it is their duty to speak out about what geologists have discovered. Younger scientific writers are noticeably more anxious about consequences. Charles Darwin may have been undisturbed in his "sense of religious awe", but he is not as sturdy a promulgator of it as were his geological predecessors (See Beer, G. 1983: 53-55 on Darwin's textual amendments). Lyell is even more interesting because he is wary from the early years of publication. He makes frequent reference to the need to be very cautious in disseminating geological knowledge. Lyell knows that his work can be accepted if he is subtle. Writing to Poulet Scrope in June 1830 about a review of the first volume of *Principles of Geology* he plans with the reviewer how they may lull the religious opposition:

I am sure you may get into the *Quarterly Review* what will free the science from Moses, for, if treated seriously, the party are quite prepared for it... A Bishop, Buckland ascertained (we suppose Sumner), gave Ure a dressing in the *British Critic and Theological Review*. They see at last the mischief and scandal brought on them by Mosaic systems.

...If we don't irritate, which I fear that we may (though mere history), we shall carry all with us. If you don't triumph over them, but compliment the liberality and candour of the present age, the bishops and the enlightened saints will join us in despising both the ancient and modern physico theologians (Lyell, Mrs. 1881 I: 268 and 271).

Sedgwick would have held no such compunctions about declaring what he saw as a truth, doughtily attacking fundamentalists against whom he carried on a perpetual campaign. This confidence in religious belief is strange to modern readers. It is so strange that it is often explained by a special ideological explanation or even adduced with something like a whiff of "conspiracy theory", as a reason for the unified, protected nature of early nineteenth-century geology, from which later scientists, like Huxley and free-thinking liberal "courageous"

spirits broke free. The truth lies in the obvious. The early geologists (even including Lyell) were believers and their geology genuinely confirmed the faith rather than troubled the world they shared with the writer of *The Excursion*, the poet who had taken on the mantle of "justifying the works of God to man".

One further social influence encouraged the acceptance of Wordsworth in the scientific community. It was the common ground of Trinity College, Cambridge after 1820. I have suggested in the previous chapters that, from 1820, with the coincidence of the return from Europe of the much more socially and economically secure Wordsworth family and the appointment of brother Christopher as Master of Trinity College, a new period of public acceptance, and with it a more prophetic poetic role, was assumed by the poet. The acceptance was perhaps ensured by Christopher's social standing, but the flow of influence was not just one way. On the one hand Wordsworth was able to maintain increasingly regular contact with leading scientists who, uniquely, were gathered in Trinity, but, on the other hand, his genius became available to them. Thus, after 1820, he was seen in Cambridge by young men such as the brothers Julius and Augustus Hare as a beacon for the conduct of their lives. In response Wordsworth admired the new seriousness of the students. Leaders of opinion became devotees of the poet and spread widely their enthusiasm for his poetry. This was the beginning of the process that was to enable scientists in the 1830s and subsequent decades to refer to the poet in their popular works as a touchstone for higher intellectual endeavour and to justify their own work by quotations from him.

It is worth attending again to the nature of what the geologists found in Wordsworth's poetry. We have seen that Sedgwick and Whewell both admired his lofty seriousness in both personal conversation and in his verse. An example from a geologist who followed in their footsteps might illustrate two things: the nature of a scientist's borrowing from poetry and its relationship to his own activities. Hugh Miller was the classic figure of a Victorian success story, a self-educated quarry worker who achieved considerable popularity in writing about geology for the general public as well as professional acceptance for such works as *The Old Red Sandstone*. His account of his own education reveals an understanding of Wordsworth's views of human development (Miller, H. 1862). In 1869 he published a set of popular lectures called *The Testimony of the Rocks*. The title was well chosen because it was a confident attempt to justify "Geology

and its bearing on the two theologies, natural and revealed" (Miller, H: 1869). The first lecture on the palaeontology and history of plants concludes with remarks on the evidence of the first appearance of bees in the Eocene period. With Divine forethought, the useful, admirable insect does not make its appearance until the last phase of creation, to which we ourselves belong. Miller seeks a poetic analogy: "There is exquisite poetry in Wordsworth's reference to the soft murmur of the vagrant bee." There is yet more to the poetic reference for:

The poet accepted the bee as a sign of high significance: the geologist also accepts her as a sign. Her entombed remains [in amber] testify to the gradual fitting up of our earth as a place of habitation for a creature destined to seek delight for the mind and for the grosser senses, and in especial marks the introduction of the stately forest trees, and the arrival of delicious flowers (Miller, H. 1869: 51).

Miller can justify geology because the facts it considers are "scarcely less poetic than the pleasing imagination of the poet regarding it" (Miller, H. 1869: 51). There is, throughout the heyday of the Geological Society from its foundation to about 1860, a consistent theme that geology is a pleasing, even aesthetic, activity. It is observable in Lyell's rhapsodies, carefully placed in his major works as in his letters. In an interesting passage in *Principles of Geology* he links his science with history, quoting the bright, contemporary star of history, Niebuhr, in the process:

Meanwhile the charm of first discovery is our own; and as we explore this magnificent field of enquiry, the sentiment of a great historian of our times may continually be present to our minds that "he who calls what has vanished back again into being enjoys a bliss like that of creativity" (Lyell, C. 1872 I.: 87).

Geology could be tackled with zest. The Wordsworthian word "joy" is not out of place when Lyell describes his undiminished vigour working on a cliff face, as late as 1852, "But I never enjoyed the reading of a marvellous chapter of the big volume more" (Lyell, Mrs. 1881 II: 181).

These last examples are similar to the attitude to poetry and to Wordsworth's poetry in particular which I have tried to demonstrate in Greenough's, Sedgwick's and Whewell's private notes and correspondence. It is ironic that the

poet whose aim was to write about ordinary men should by his poetry attract very distinguished, extraordinary men of science. On the other hand, Wordsworth is also the poet of the long view, whether it is of human life or of mountain scenery. What he tackles are subjects which appear deceptively homely and localized, like the characters in his narrative poems or lyrics, but these poems about simple, rustic characters are hardly ever confined either in their setting in a landscape or in the dimension of time. The reader is taken forward or back into eternal verities. One of the most deceptively simple poems is "The Solitary Reaper". The central character is a humble enough figure of apparently no wider significance than the circumscribed locality in which she works. However her song takes the observer-poet and the reader out in a world-wide connection:

No nightingale did ever chaunt
More welcome notes to weary bands
Of Travellers in some shady haunt,
Among Arabian sands:

The dimension of time is further expanded beyond the moment of the transient song:

Perhaps the plaintive numbers flow
For old, unhappy, far-off things,
And battles long ago (Curtis: 184-185).

This poem serves as a useful emblem for the work of the four geologists studied in this thesis. Hutton, Greenough, Sedgwick, and Whewell were men who sought in the particular (a cutting or an exposed face, a fossil for dating purposes, a section to be mapped, or a mineralogical specimen) a more general, wider range of conclusion. They all were led to large projects: the explanation of processes of erosion and deposition applicable to world-wide settings, the mapping of the Indian sub-continent, the stratigraphy of the oldest rocks in the most complex mountains of England and Wales, a world's tide-tables. All in one form or another explored the changing concept of time. These were not the small-minded "hammerers" or botanizers. Dissection was for others; they swept horizons in a grand manner, and, in so doing, recognized perhaps in Wordsworth's poetry what they themselves regarded in their own studies as "lofty" and elevated themes, yet attainable by human vision and devotion.

One World or Two?: The Poet and the "Man of science"

The claims summarized in the last paragraphs for a mental and moral resource or spring of refreshment in Wordsworth's writing for the geologists must be followed to a higher level of generality in a concluding chapter. What more can this study tell us of the reality (or is it the appearance?) of a united culture in the first half of the nineteenth century? Is it relevant to apply the notion of "two cultures" from our own times (see Snow, C.P. 1969 and the ripostes of Leavis, F.R. 1967 and Leavis, F.R. and Q.D. 1969)? This is an important question in the history of ideas, since there is a continuing presumption not only that the dichotomy between "two cultures" started with what became known to later generations as the Romantic Revolution, but also that the poets and philosophers were responsible for the schism. A recent work on scientific ideas, Nicholas Maxwell's *From Knowledge to Wisdom* (1984), repeats this interpretation of a breach in the unity of knowledge:

"It never occurred to the "philosophers" of the Enlightenment to divorce passionate concern for the inner life of man from passionate involvement with the imaginative and critical exploration of the natural world being undertaken by natural science. Romanticism created this divorce. Rousseau, Blake, Wordsworth, Keats, Tolstoy, Kafka, D.H. Lawrence and a multitude of other novelists, poets, dramatists and artists passionately pursued person-to-person understanding - exploration of the experiential world - in a way that was divorced from, if not actually hostile to, science (Maxwell, N. 1984: 265).

Even if we avoid taking up the sweeping historical simplification of this range of writers, we must weigh with care the value of the clause, "Romanticism created this divorce". Equally it is wise to try to locate the source of this allegation. What did Wordsworth actually write about the difference between the scientist and the poet? I believe that the most important statements remain in the "Preface" to *Lyrical Ballads* of 1802. In an earlier chapter, I have noted the essay by Sharrock (1962) on the extended analysis in this second version of the "Preface" and its genesis in discussions initiated by Davy's lectures on science. In the following paragraphs I wish to examine carefully a different issue: the precise nature of the two kinds of humanity which, it is often alleged, were established by the "Preface" - the poet and the scientist.

Wordsworth, in fact, makes two important distinctions in "Preface" to *Lyrical Ballads* of 1802. The first is in a footnote to the debate on the distinction between Poetry and Prose, where he notes that the true distinction should be between "Poetry and Matter of Fact, or Science" (W.Prose I: 135). It is worth noting again, as I did in Chapter III that Hutton uses the term "Matter of Fact" as well as using the phrase "Man of Science". "Matter of Fact" has a wider reference than what became known as "the sciences" and their knowledge. The second distinction in the "Preface" is more important for my argument at this point. It arises from the long argument about the appropriateness of the language for depicting "real passion" as it is used by Poets and by other men in their specialised roles. This distinction has been well and truly aired in debates about the separation of "the two cultures", but which cultures is Wordsworth in fact discussing? A quotation from "Preface" to *Lyrical Ballads* reveals that Wordsworth is not separating a literary from a scientific culture, or at least from a culture which in modern terms we would call "scientific". His intention is to identify the Poet as a distinct figure most closely related to Man seen as a whole. He describes the Poet as "under one restriction" only, whereas Man the lawyer, physician, or natural philosopher (the last, in our language, the scientist), though free from that restriction, is hindered from attaining the Poet's wide vision. Because of his concentration and narrowness, the specialist can not possess "fidelity", nor "utility" and, most important, he is separated from "the image" of reality:

Poetry is the image of man and nature. The obstacles which stand in the way of the fidelity of the Biographer and Historian, and of their consequent utility, are incalculably greater than those which are to be encountered by the Poet who comprehends the dignity of his art. The Poet writes under one restriction only, namely, the necessity of giving immediate pleasure to a human Being, possessed of that information which may be expected of him, not as a lawyer, a physician, a mariner, an astronomer, or a natural philosopher, but as a Man. Except this one restriction, there is no object standing between the Poet and the image of things; between this, and the Biographer and Historian, there are a thousand" (W. Prose I: 139).

So Wordsworth's contradistinction is not between literary culture and science but between Poet and any specialist. It is not the case that the person I have called a "specialist", and whom Wordsworth a few lines further calls a "Man of science" (with the contemporary connotation of science as knowledge), is separated from that "grand elementary principle of pleasure". The chemists or

the mathematicians in their arduous work, or the anatomists in their painful dissections share the "grand elementary principle" in extending their knowledge. The Poet, the argument continues, "converses with general nature with affections akin to those, which, through labour and length of time, the Man of science has raised up in himself, by conversing with those particular parts of nature which are the objects of his studies" (W. Prose: 140). Essentially the difference between the Man of science and the Poet is one of solitude or, conversely, of community. The Man of science works in isolation, he is "remote" from human concerns, whereas the Poet's contribution is to "the song in which all human beings join". This special, overarching, general binding together of the "vast empire of society" is not only of the present, but also "over all time." (W. Prose I: 141). It could still be argued that these passages at least sound the signal for the separation of literature (although Wordsworth actually writes of Poetry) and science; however, in considering the text closely, it is obvious that, although Wordsworth's words may have been a precipitating factor for his successors in dividing the cultures, his aim was to reconcile. He constructed a hierarchy not a division.

The essential theme of this section of "Preface" to *Lyrical Ballads* is that the difference between the two language communities should not be blurred, but should first be recognized. Eventually a day will dawn when there will be a union profitable to humanity and joyously accepted by "the most philosophic of writing". How joyfully this promise was taken up by geologists has been one of the chief lines of thought of this study. The justification of the study of geology argued by Hutton, Greenough, Sedgwick and Whewell has been that it is indeed a science which leads the geologist to an enlarged sense of the wonder at created nature, that it is a study ending in greater respect for divine purpose, and, most important for the reconciliation with the poet's vision, that the study of geology leads to an understanding of the interplay of man and nature. The last point, the human face of geology, has been argued at a number of levels. At one level, human activity has altered nature, as Hutton is quick to state and Greenough, the geographer, is keen to record and to gazeteer. At another, more intellectual level, all four geologists confirmed their faith that the truth that they have discovered, and which others after them will pursue, leads to confidence in a benign God committed to arrange the best world for humanity. Finally, all are sure that study of their vast subject is a demonstration and even more an enhancement of the powers of the human mind. Whewell's great work, devoted

to the processes of the inductive sciences, is also a text of admiration for what the mind of man in interaction with nature can achieve. In this way, geologist after geologist, could allow himself to say that his work is "poetic". The influence of Wordsworth was, in effect, to initiate a reconciliation between cultures (Note 3).

"Science in the proper sense of the word Science".

Perhaps one of the most important controls for the historian of the sciences of the early nineteenth century is to remind oneself of the terms of self-categorization that were actually in use, particularly the way that people of the time described themselves. I have commented, in the chapter on Whewell, on the relatively late introduction of the term "scientist" itself into Whewell's writing on the language of science. "Natural philosopher" was likely to be a much more commonly used term, at a level of abstraction above the special role of chemist, mineralogist, or geologist. There has been some discussion in the history of science on the persistence or otherwise of the term "natural history" in relation to the geologists of the first half of the century. Lynn Merrill (1989), for instance, builds a long thesis on the presumption that geology was considered, by many amateurs and professionals alike, as "natural history" (See also Note 4). I am not aware that Hutton, Greenough, Sedgwick or Whewell called themselves "natural historians", but I am confident that they would in different ways have described themselves and each other as philosophers. Whewell in a review article expressed the hope that the time is almost ready "when the conditions and history of the earth, so far as they are independent of the condition and history of man, are left where they ought to be in the hands of the natural philosopher" (Whewell, W. 1832: 206). Knowledge of German science played its part in the mature development of both Sedgwick and Whewell. That influence and the strengthening of learned societies expelled the remnants of "amateur" pursuits of nature. The influence of German scientific associations, David Allen (1976) claims, was powerful in the establishment of the new, vigorous scientific group, the British Association for the Advancement of Science, founded in 1831. I have referred to the key role of Whewell and Sedgwick in this organization, but Greenough and many others named in this study were involved. This was not an association of collectors or part-time natural historians.

Where, however, I can agree with Merrill (1989) is in the evidence that, although in their professional roles the geologists were suspicious about

theoretical speculation, from quite a different perspective they regarded their own work as "philosophical" in the sense of mental elevation. The study of geology was imaginative, inspiring, and ever-widening in its perspectives. Enough quotations in each chapter have been made, but it will not be amiss to remind the reader of instances of the vision at the heart of the geologist's work which created an affinity with the work of poets, and made a bridge between scientist and poet. In Sedgwick's unpublished autobiographical notes there is a prayer of thanks written towards the end of his life. It combines not only the testament of a geologist who sought in nature more than facts, and the language appropriate for feeling and "communion", it is also the witness of a man who wished to be sensitive to nature's influence on all people. His life-work is a link with humanity in a way which echoes the Wanderer's positive statements in the *The Excursion* and the Poet's task described in "Preface" to *Lyrical Ballads*. As with statements from the other geologists, Sedgwick illustrates what I have described as their ambition to use their studies as a bridge, reconciling a division between the particular and detailed and the general, imaginative and poetic:

And here I am still - in my easy chair; thankfully and hopeful. Thankful for an active and I would fain hope an useful life - thankful that I was taught early to love the face of nature - sky, sea, stars, mountains, valleys, brooks, and trees: that I have spent so much of my life in direct communion with nature, which is the reflection of the power, wisdom and goodness of God - that I have thus been enabled to draw strength for the battle of life, and a deeper sympathy with my fellow creatures of every grade... (Sedgwick, A: 1865:121).

There are many other examples that could be given of a similar bridge between scientist and poet erected by the scientists themselves. Hugh Miller in *The Testament of the Rocks* refers to a piece from Coleridge's *Aids to Reflection* where the poet says that the bee and the swallow were overshadowed by the advance of humanity:

There is fancy here; but it is that sagacious fancy; vouchsafed to only the true poet, which has so often proved the pioneer of scientific discovery and which is in reality more sober and truthful, in the midst of its apparent extravagance, than the gravest cogitations of ordinary men (Miller, H. 1869:196).

Charles Lyell, the most influential of all the early Victorian geologists, though, like Miller, from a younger generation than those who personally knew Wordsworth, frequently soared into lyrical prose about the imaginative gifts of

the geologist:

Thus, although we are mere sojourners on the surface of the planet, chained to a mere point in space, enduring but for a moment of time, the human mind is not only entitled to number worlds beyond the unassisted ken of mortal eye, but to trace the events of indefinite ages before the creation of our race, and is not even withheld from penetrating into the dark secrets of the ocean, or the interior of the solid globe, free, like the spirit which the poet described as animating the universe:

O ire per omnes
Terrasque, tractusque maris, coelumque profundus (Lyell, C.
1872:I:319/320).

If the geologists strove to throw a bridge between themselves and the world of the Poet, what of the Poet himself? Despite the scattered evidence of knowledge of geology in the later poems and despite minor exercises such as "Steam boats, Viaducts and Railways", there is no major statement in the late poems on which we can rely to take us beyond the distant promise of a role for science held out in the "Preface" to *Lyrical Ballads* and in *The Excursion*. One episode recorded at second-hand sums up Wordsworth's mature position on "the proper sense of the word Science". It is an incident which reinforces the poet's position of 1802, although it is from a much later period in Wordsworth's life, when he was visiting his scientific friend, William Rowan Hamilton. On that visit in 1829, Wordsworth read aloud from *The Excursion* and then defended "its slight reverence for science." Eliza May Hamilton, the scientist's sister, recorded the occasion (see also Batho, E.C. 1933: 30):

Science in the proper sense of the word Science, that raised the mind to the contemplation of God in works, and which was pursued with that end as its primary and great object; but as for all other science, all science which put this end out of view, all science which was a bare collection of facts for their own sake, or to be applied merely to the material uses of life, he thought it *degraded* instead of raising the species. All science which waged war with and wished to extinguish Imagination and the mind of man, and to leave it nothing of any kind but the naked knowledge of facts, was he thought much worse than useless... and of dangerous and debasing tendency (Graves, R.P. :313).

William Hamilton ventured to suggest that the intellectual faculties held equal rank with imagination. William Wordsworth "smiled kindly" at Hamilton's remark, which, after all, to him was no more penetrating or more advanced than the arguments made by Humphry Davy twenty-seven years previously, remarks

which were reported to Wordsworth by Coleridge, and which stimulated the "Preface". This small incident reveals that Wordsworth, for men like Hamilton, had become the sage to whom the scientists turned, not he to them.

The geologists considered in this thesis turned to Wordsworth, as I have indicated, for a number of reasons: for personal support, for validation of their faith in Divine providence, for encouragement in their contact with nature, for a sense of the joy in that contact. They found in his poetry an enquirer into nature as they were enquirers into nature. Wordsworth did not write geology in verse, as I have stressed on a number of occasions, but there was no doubt in their minds that he looked upon the same landscape as they did. Other poets of the past and of their own time also described landscape. Other poets, particularly of their own time, put into verse their emotions in contact with natural forces, but Wordsworth offered the geologists extra quality. They may not have expressed this quality as "seeing into the life of things", but Wordsworth, more than any of the poets, offered them, in addition to all the moral and personal supports I have indicated previously, a unique vision which made the rocks more than dead things. His vision put geology, the study of the inanimate, on the level of studies of living organisms, because he was the one poet who infused mute stones with active life:

A passage from *The Prelude* provides an instance of the power of the poet's mind to change the material world into something vibrant and alive. It will serve as an emblem for what the geologists found in him:

Twas doubtless nothing more
Than a black rock, which, wet with constant springs,
Glistened far seen from out its lurking-place
As soon as ever the declining sun
Had smitten it. Beside our cottage hearth
Sitting with open door, a hundred times
Upon this lustre have I gazed, that seemed
To have some meaning which I could not find-
And now it was a burnished shield, I fancied,
Suspended over a knight's tomb, who lay
Inglorious, buried in the dusky wood;
An entrance now into some magic cave,
Or palace for a fairy of the rock (*Prelude* 1805 VIII: 565-577).

Perhaps only another poet can express Wordsworth's deep, intuitive feeling for landscape. A poet who intimately knew the same landscape can be turned to for an expression of that rich source of understanding of the decaying, but deeply permanent world. Norman Nicholson is the poet, who also addressed the River Duddon and praised its most famous chronicler:

He knew beneath mutation of year and season
Flood and drought, frost and fire and thunder,
The frothy blossom on the rowan and the reddening of the berries,
The silt, the sand, the slagbanks and the shingle,
And the wild catastrophes of the breaking mountains,
There stands the base and root of the living rock,
Thirty thousand feet of solid Cumberland ("To the River
Duddon": Nicholson, N. 1944: 17).

Notes to Chapter One.

Note 1: Studies of the social context for geology and early nineteenth-century literature.

This study has taken account of studies of the social context of geology and early nineteenth-century such as Manier (1979), Rupke (1983), Fitzgerald, (1984), Gaull (1979 and 1988), and Merrill (1989), and I have, where appropriate, compared and contrasted my own approach with theirs. I have found more direct sympathy with studies which relate to one or two specific writers (such as Gliserman (1978) with Tennyson, Beer (1985) on Darwin, George Eliot, and Thomas Hardy, Fitzgerald, (1984) with Wordsworth and chemistry). Recently a different approach has emerged (see Bewell, 1989 and Kelley 1988) using geology, anthropology and archeology as metaphors for exploring literary criticism. These I examine in the appropriate chapters.

Note 2: The meanings of "science".

Johnson's Dictionary of 1755 gives five meanings for "science". One is the sense indicated in Chapter One of overall organized knowledge (cf. *Wissenschaft*). The Dictionary also describes "science" in the way Wordsworth used the term in his remark to Crabb Robinson, that is to say knowledge produced by being "related to precept" or principle. It is important to note that one of Johnson's meanings provides the possibility for a definition of a special, singular science, namely, "any Art or species of knowledge". Obviously the singular sense of the word developed at the expense of the universal sense of "knowledge in general". It is important to recognise, as with many aspects of the history of scientific thought, that the narrowing of "science" was not because scientists homed in on one what was "true scientific method". Such a presumption would be rewriting history by our own century's perception. A number of writers, for instance, have questioned whether there is a universal scientific method (See Shapin, S. 1982 and Miller, D.P. 1986). The fact that scientists of the first half of the century wrote detailed histories of scientific method should not be taken to be an indication that they were "getting it straight", but rather that they were facing a fragmentation of a simpler order of knowledge and wanted to control the dispersion.

An indication of the difficulty with "science" as a term at this period is Henry Crabb Robinson's anecdote of Wordsworth visiting the archeological site at Nimes. The poet said: "I am unable through ignorance to enjoy these sights... I have no science and can refer nothing to principle" (Robinson, H.C. 1872 II: 188). Here Wordsworth is using "science" in the wide sense of an orderly understanding based on principles. *The Prelude* (1805 II: 215-220 and 805-810 for example) is also a source for the use of "science" as we would use "philosophy and the social sciences."

Note 3: Wordsworth's rejection of science.

There is no clearly identified critic who first identified Wordsworth as anti-scientific, although Matthew Arnold receives blame. In fact, in passages such as the following, Arnold is saying Wordsworth is no philosopher: "His [Wordsworth's] poetry is the reality, his philosophy, so far, at least, as it may put on the form and habit of a scientific system of thought, and the more that it puts them on - is the illusion" (Arnold, M. 1973: 48). Leslie Stephen put the accusation quite starkly: "Wordsworth hates science" (Knight, W. ed. 1889: 202). Well into this century, the great divide continued to be assumed (see for example, Whitehead, A.N. 1925). The Victorians were, however, not of one mind. As early as 1854, in a talk to the Wordsworth Society by R. Spence Watson (1889), an argument was put that Wordsworth did not hate science, but merely warned against the dangers of over-specialization. Certainly Canon Rawnsley and Herbert Rix, Assistant Secretary to the Royal Society, who contributed footnotes to Professor Knight's major edition of Wordsworth's poems, sought instances of Wordsworth's eye for topography and details of natural history. I comment at a number of points on the value of Sharrock's article (1962) which revised the view of the famous passages in "Preface" to *Lyrical Ballads*, second edition, distinguishing Poet and Man of science.

The well-worn texts which indicate Wordsworth's alleged anti-scientific spirit include the following:

- a. "A Poet's Epitaph" published in 1800 with its condemnation of a philosopher as a fingering slave/One that would peep and botanize/Upon his mother's grave (W.P.IV: 66).

- b. "Stargazers" of 1807. The poet passes by a group of the curious looking through a telescope and pities the limited outcome of their pursuit: "... 'tis sure they who pry and pore/Seem to meet little gain, seem less happy than before" (W.P.II: 219-220).
- c. *The Prelude*. One amongst a number of references to false philosophies is the excerpt below which is a confession of Wordsworth's own pursuit of Godwinian science:

I took the knife in hand,
And, stopping not at parts less sensitive,
Endeavoured with my best of skill to probe
The living body of society
Even to the heart (*Prelude* 1805 X: 872-876).

- d. *The Excursion* similarly provides examples of criticism of mechanistic interpretations of nature or society, but, as I shall say in Chapter Four, some care must be taken in interpreting the role played by the speakers in Wordsworth's perambulatory debate. The passage in Book III about botanists and geologists has already been mentioned in Chapter One, but another location for an admonitory word on science is in Book IV. The speaker is the Wanderer:

...go, demand
Of mighty Nature, if 'twas ever meant
That we should pry far off yet be unraised;
That we should pore and dwindle as we pore,
Viewing all objects unremittingly
In disconnexion dead and spiritless (W.P.V: iv: 957-961).

Note 4: Sources of scientific information.

I have taken the view that travel books were also sources of scientific information, including geology. The Wordsworths also had access to journals such as *The Edinburgh Review* and *The Quarterly Review* which contained

scientific articles (See Edinburgh Review Index 1832 and Gillispie, C.C. 1951: 86-87). *The Encyclopaedia Britannica*, 7th edition of 1797, owned by the Wordsworths had a long section on theories of the Earth with a reasonably long and balanced appreciation of Hutton's theories. This volume and others were available in Lake District libraries, but, earlier than this, Coleridge and Wordsworth had access to good libraries. The University of Bristol Library has the collection of papers of the Pinney family, originally tradesmen and shipowners of Bristol. They owned the house at Racedown which William and Dorothy rented in 1795 (see Gill, S. 1989: Chapter 4). The correspondence between Wordsworth and the Pinney family is interesting because of its insight into the political radicalism of the times and Wordsworth's concern with the events which disturbed England in the wake of the French Revolution. Amongst the papers is a catalogue of books in the library at Racedown which was first compiled in May, 1793 then checked in 1794, and was therefore presumably in good order when the Wordsworths arrived and when they left. There were about four hundred and seventy books in all, the geographical works mostly dating from the end of the seventeenth and the beginning of the eighteenth century. Works that relate to this thesis in some way appear in the catalogue in the following form:

Ray's *Wisdom of God in the Works of Creation*, 1691.

Ray's *Wisdom of God*, 1714.

Well's *Geographical Grammar*, 1706.

Gordon's *Geographical Grammar*, 1704.

The Theory of the Earth, London 1697 [Thos. Burnet?].

Note 5: Michel Foucault's use of "correlation".

Foucault, in his characteristic list-making fashion, does not confine himself to defining cultural associations by the one word, "correlation". He uses it alongside others in a list. An example from *The Archeology of Knowledge* is:

The analysis of the discursive field is orientated in a quite different way; we must grasp the statement in the exact specificity of its occurrence, determine its correlations with other statements that may be connected with it, and show what other forms of statement it excludes.

Whenever one can describe, between a number of statements,

such a system of dispersion, whenever between objects, types of statement, concepts or thematic choices, one can define a regularity (an order, correlations, positions and functionings, transformations) we will say for the sake of convenience, that we are dealing with a *discursive formation* (Foucault, M. 1972: 28 and 38).

Note 6: Examples of a network of interest.

Three "snap-shot" pictures from early nineteenth-century society reveal how interconnected was the intellectual network.

Henry Crabb Robinson, one of Wordsworth's closest friends and a well tried travelling companion, attended Lyell's lectures on geology at King's College, London in 1832. He records that he "hardly understood anything" but "science teaches no beginning at least in respect of inorganic matter" (Robinson, H.C. 1872 II: 129). Here is Wordsworth's close friend recording an aspect of contemporary geology, which, as I shall try to illustrate in a later chapter, Wordsworth may well have comprehended thirty years earlier. Robinson was an indefatigable enquirer after most areas of knowledge, but his diaries reveal continuous interest in such matters as the evidence for "How came Man so late - only yesterday - into existence" (Robinson, H.C. 1872 II: 239). In 1844 he wrote to Mrs Wordsworth about his attendance at the British Association meeting at Canterbury, praising William Buckland's skill at mingling geological and archeological knowledge.

A second instance also is connected with Buckland's name, and we must remember that Buckland was a visitor to Rydal Mount. Lyell records standing in Wordsworth's garden during a visit with Buckland in 1819 (Wilson, L.G. 1972: 86). One young don attended Buckland's lectures in geology at Oxford and made a comment that was echoed in different settings by the geologists themselves. "It is, however, most entertaining and opens an amazing field to imagination and poetry" (Faber, G. 1954: 71). That enthusiastic listener at the lecture was John Henry Newman. Although Wordsworth trod a carefully orthodox path in respect of the Oxford Tractarian Movement, he was genuinely admired by men like F.W. Faber and he responded to this admiration with advice on Faber's poems (Moorman, M. II: 479-480 and see also Gill, S. 1989: 418-419).

My third and last example of the network of interest that brought geology into

the fold of what I have described as "high culture" is an account from Charles Lyell's letter to his sister on 1 September, 1839. Lyell was visiting Sir Robert Peel's home at Tamworth. Amongst the company was William Whewell. Their conversations were about the bearing of geology on scripture, but also about Wordsworth's poems. Peel showed Lyell one of his pictures, "Napoleon in St Helena" painted by Benjamin Haydon, yet another name associated with Wordsworth: "Sir Robert told me that there is an ode on it by Wordsworth which is given in *The Quarterly Review* in a late article in Waagens's "Tour of England" (Mrs Lyell 1881 II: 52). It would be difficult to find in a short incidental passage, so many associations with art, literature, politics and science.

Notes to Chapter 2.

Note 1: Adam Sedgwick and the "letters" accompanying *A Guide*.

1842 saw the publication of the first three of the five geological "letters" eventually printed with the edition of *A Guide*. Chapter Seven of this thesis is devoted to Adam Sedgwick and there I refer to the origin of the arrangement to publish the "letters". Much has been made by modern writers on the history of science (such as Dean, D.R. 1968 and Cannon, S.F. 1964) of this collaboration. Enthusiasm for the thesis that this arrangement is evidence of the conversion of Wordsworth to science should be tempered with the fact that it was not unusual for a descriptive topographical writer to employ a specialist or scientific expert to add to the core of the work. Roy Porter (1977) gives examples from Stebbing Shaw's *The History and Antiquities of Staffordshire* and from Taylor's *History and Antiquities of Harwich and Dovercourt*, from the preceding century. Wordsworth is faithful to a well established tradition. In the 1842 edition, in addition to the geological letters by Sedgwick, botanical "notices" were provided by a Mr Gough. Mr Flintoff of Keswick (who had achieved local fame with a "beautiful model of the Lake District") drew diagrams of the mountains. Sedgwick realised that, in this volume, he was fulfilling a promise to a friend. His letters to Otley suggest that he would have preferred to have written for Otley's *Guide*. This loyal contributor to Wordsworth's *Guide* was, however, conscious of his non-specialist audience. In a letter to Dr Danby of Kendal at the end of 1842, Sedgwick raised questions about a second edition:

Do you think it would be useful to add an appendix with a fuller list of fossils? Would it be worth-while to add a fourth letter giving a sketch of the Welsh rocks of the same age? But I must avoid the appearance of anything like a formal treatise (Sedgwick, A. T.C.L.).

Note 2. The Lucerne Model.

Models of mountainous regions were part of the fixed equipment of the early nineteenth-century tourist trade. Similarly models of cities could be enjoyed in a number of European countries. Charles Lyell, as a young man, inspected a panoramic view of Paris (Lyell, Mrs. Ch.3). In the Lake District there was a model at Keswick, according to a letter from Wordsworth to Lady Vane in 1836 (W.L. VI:183). Coxe's *Travels in Switzerland* (Coxe, W. 1789 and 1802) gives a

very detailed description of the model at Lucerne: its size, its composition and its accuracy. Ramond's addition to Coxe's *Travels* in 1802 noted that sight of the model enabled him to find his way without a guide to Engstelberg. It was created by an energetic Swiss surveyor, General Pfiffer (Coxe, W. 1802: 224).

General Pfiffer, though a native of Lucerne was an officer in French service. Coxe noted in 1789:

It is a model in relief; and what was finished in 1776, comprised about sixty square leagues in the cantons of Lucerne, Ziga, Berne, Uri, Schweiz and Underwalden. The model was twelve feet long, and nine and a half broad. The composition is principally a mastic of charcoal, lime, clay, a little pitch, with a thin coat of wax, and is so hard as to be trod upon without receiving the least damage. The whole is painted with different colours representing the objects as they exist in nature. It is worthy of particular observation, that not only the woods of oak, beech, pine, and other trees are distinguished; but also that the strata of the several rocks are marked; each being shaped upon the spot, and formed with granite, gravel, calcareous stone, or such other natural substances as compose the original mountains...

This model, exhibiting the most mountainous parts of Switzerland, conveys a sublime picture of immense alps piled one upon another, as if the story of the Titans were realized and they had succeeded (at least in one spot of the globe) in heaping Ossa upon Pelion and Olympus upon Ossa (Coxe, W. 1789: 253-254 and 256).

It should be remembered, in considering Wordsworth's knowledge of topography, that surveyors on mountain tops, as well as assisting in road and canal-making in valleys, were common sights. The famous surveyor, Colonel Mudge, (1762-1820) appears in one of Wordsworth's poems: "Lines written with a slate pencil, on the side of the mountain of Black Comb". He is quoted as an authority on the views from Black Comb in the section of *A Guide* entitled "Directions and Information for the Tourist" (W.Prose II:161).

Maps were an important element in the Wordsworths' travels. In the correspondence between William and Mary Wordsworth (Wordsworth, W. & M. 1982) advice is shared on the value of a good map. The catalogue of the sale of the poet's library contained a collection of maps, including Otley's very popular pocket map of the Lake District. The map that faced the title page of *A Guide* of 1835 was based on Otley's pocket map.

Note 3: The perennial issues of geology

The two persistent geological issues according to Laudan (Laudan, 1987) are either historical (the development of the earth from its earliest beginnings to its present form) or causal (the distinctive processes that produced the surface of the earth).

But many of the basic issues that were debated in the classic period are still debated today, and many of the agreements that were reached about the aim and methods of the discipline (though not about its specific theories) continue to be accepted (Laudan, R. 1987:1).

Note 4: "Alluvial".

Although the word "alluvion" according to *The Oxford English Dictionary* is first recorded as early as 1536 with a range of meanings exclusively related to the action of the sea against the shore, the word "alluvium" is recorded much later, in 1665. "Alluvium" then held the meaning of land created by the sea. However "alluvial" as used by Wordsworth is a technical geological term associated with the end of the eighteenth century and the beginning of the nineteenth. It is first recorded as an English word (in the OED) as used by Playfair in his *Illustrations of Hutton's Theory of the Earth* (Playfair, J. 1802:463). As late as 1831 William Whewell in correspondence with Lyell gives advice on variants of the words "luviality", "protoalluvium", "alluvion", and "primalluvian" (see also Chapter Nine and Todhunter, I. II:112). This perhaps indicates that "alluvial" was still something of a neologism for many as late as the 1830s. However, it is a significant word in theories of the earth because it was an extension of Werner's categorization of the geological sequence (primary, transition, tertiary). Alluvial deposits were the results of the latest processes of sedimentation in historic time. For those who registered the time sequence as pre- and post-diluvial, "alluvial" was post-diluvial sedimentation. I can not find the word used by Otley in his description of the Lake District, but it is used by William Buckland (1823) in *Reliquiae Diluvianae* as an alternative to "post-diluvial", and by Sedgwick in the "letter" accompanying *A Guide* of 1842 with the same meaning as Buckland's.

Note 5: The sources of the images in "Ode: The Pass of Kirkstone."

The sources of this first verse paragraph are interesting. There is a similarity with the passage in *A Guide* which described an excursion to the top of Scawfell. In its turn that description is taken from Dorothy Wordsworth's account in a letter of 21 October 1818 to William Johnson. I quote from the letter rather than from the text as the two versions are virtually identical:

the huge blocks and stones which cover the summit and lie in heaps all round to a great distance, like skeletons or bones of the earth not wanted at the creation and there left to be covered with never-dying lichens which the clouds and dews nourish... (W.L.III: 602).

As with her brother's image in the ode there is an apparently clear figure indicating orthodox belief in a Biblical moment of creation with remnants of destruction, a metaphor Burnet would have employed. However, there is a crucial qualification by a simile: "Like skeletons or bones". As with the rocks in the first verse paragraph of "Ode: the Pass of Kirkstone", the scattered erratics and frost-shattered boulders are something other than their material presences - they are embedded in an linguistic context of illusion and analogy.

The image of the tent is not a unique figure. In Coleridge's notebooks of 1802 and 1803, he records a view from Saddleback:

...see beneath me those precipices and ridges which from the vale of St John's appear tents - the stones burnt evidently - ascend again and again leave the precipices and tents behind me... (Coleridge, S.T. 1957 I: 784).

In 1803 on Coleridge's long excursion on foot into the Highlands of Scotland, there is another image which has resonances with the "wrinkled Egyptian monument" and the stone "tent" in the ode under consideration. Coleridge writes, as he passes through Glen Nevis, of "a glorious circumstallation of Mountains, ridges, smooth and billowy sugar loaves, triangles, Pyramids and whatever other misted shapes mountains put on the distant eye" (Coleridge, S.T. 1957 I: 1496). Wordsworth had written in 1815 a sonnet which also compared an "old Grey Stone" to a burial Chamber, sinking rock and history: "the very image framing of a Tomb,/In which some ancient Chieftain finds repose" (W.P.III: 24-25).

It is instructive to compare the images in this ode with those describing another desolate, high mountain landscape, in "Resolution and Independence" of 1802. To Dean, the famous description of the Leech Gatherer indicates Wordsworth's knowledge of geology. The old man, to Dean, is a geological phenomenon, a catastrophically created boulder-stone (Dean, D. 1968: 166). In "Resolution and Independence" the well-known and well explored images can, in my view, convey more than hints of specialised knowledge. They are doubly strange:

As a huge stone is sometimes seen to lie
Couched on the bald top of an eminence;
Wonder to all who do the same espy
By what means it could thither come, and whence;
So that it seems a thing endued with sense:
Like a Sea-beast crawled forth, which on a shelf
Of rock or sand reposeth, there to sun itself (W.P. II: 237).

This passage is more complex than a comparison between a man and a geological "erratic". Here are images of living forms applied by a simile to a rock, yet the rock is itself a figure for a living being, the Leech Gatherer. The image is many-layered.

Notes to Chapter Three.

Note 1: Hutton and Playfair.

James Hutton's work has traditionally been studied through the much more accessible work of his 'interpreter', John Playfair (Playfair, J. 1802 and 1803). The usually accepted argument of historians of geology was that Hutton's own work was unreadable, whereas Playfair was eminently clear. As recent critics have pointed out, Playfair emphasized certain features and reduced others in the transmission of his colleague's work (Gould, S.J. 1982 and 1988 (1987)). Fortunately, scholarly exploration of the archives of the Royal Society of Edinburgh by Eyles, J.M. and Eyles, W.A. has made available early forms of addresses to the Royal Society of Edinburgh which prepared the way for Hutton's text of 1795 and indicate that his theory of the earth was already well-developed by 1785 and available for discussion in both England and Scotland (See Hutton, J. 1785).

Note 2: Cabinets.

In the seventeenth and eighteenth centuries mineralogical specimens and fossils were kept in an orderly fashion in specially designed cabinets, consisting usually of shallow drawers in which small items could be displayed. A magnificent example with its specimens in the same positions as they occupied in the eighteenth century can be seen at the University of Cambridge's Sedgwick Museum. To the "new" geologists of the nineteenth-century these cabinets appeared limited in their potential, particularly for handling large fossil specimens or for displaying the results of traverses made by energetic field-workers such as Buckland, Sedgwick and Murchison. Furthermore a "cabinet" seems to have implied an out-dated "cabinet mentality", related to collecting stones and gems and to theorising rather than to empirical studies. To Wordsworth, "cabinets" stand for something boring and confusing (*The Excursion* Book VIII: 22-28). Wordsworth also uses "cabinet" in a mildly pejorative sense in the *Prelude*.

To thee, unblinded by these outward shows,
The unity of all has been revealed;
And thou wilt doubt with me, less aptly skilled
Than many are to class the cabinet

Of their sensations, and in voluble phrase
Run through the history and birth of each
As of a single independent thing (*Prelude* 1805 II: 225:231).

This passage follows lines condemning false distinctions in science (knowledge) to which the last paragraphs of this chapter refer. In Book III of *The Prelude* there is another reference to "cabinet". The poet takes a symbol of his young life in Cambridge: "Carelessly/I gazed, roving as through a cabinet/Or wide museum" until "a barren sense/Of gay confusion" is left, although something may remain in the memory (*Prelude* 1805 III: 652-669).

Note 3: Hutton's geological sites.

Despite continuing controversy as to whether Hutton was a genuine "field-geologist", there is no doubt that he made certain sites significant for modern geologists. Since 1977 there has been a movement to create Geological Review Conservation Sites, amongst which will be areas where geological history was created. Prominent in the list in 1991 are Hutton's first visited unconformity on Arran, the Jedburgh unconformity, Glen Tilt (intrusive rocks) and Hutton's section on Salisbury Crags, Edinburgh (Wimbleton, W. 1991: 23--24).

Note 4: Coleridge's marginalia.

Coleridge's copy of Hutton's *An Investigation* is in the British Museum library. Coleridge must have read only part of this volume. Many pages are uncut and marginal notes are few and not consistent. The evidence for the date of the long marginal note by Coleridge on the title page of Volume I is contained in the reference to Mrs Hazlitt's marriage, which was in 1808. Whether Coleridge had read from a different copy before 1808, or read this copy but not made the written comment until 1808, we can not yet know. Coburn, however, believes that the copy was a gift to Coleridge in the 1790s.

Note 5: Shaftesbury's Characteristicks.

This work may have been known to Hutton. It is certainly one of Wordsworth's sources of reading of eighteenth-century thinkers. Shaftesbury's *Characteristics of Men, Manners, Opinions and Times* is the title of his collected writings published in 1711. *The Moralists, a Philosophical Rhapsody* was first published in 1709 and reprinted in volume 2 of *Characteristics*. I have quoted from a later edition of 1773. The perambulatory conversation of Philocles, Palemon, and Theocles, "the Moralists", includes a range of reference to the wise ordering of the world. There are passages which provide a philosophical understanding of geological theories held by Hutton's predecessors and even by Hutton himself. Thus, on the one hand there is a view of the world as ruined, which Burnet himself might have written ("the distracted universe must be condemned to suffer infinite Calamity"), but on the other there is a "healing Cause" which maintains "the universal Order" (Shaftesbury, Lord 1773: 213). The hierarchical order of Shaftesbury's universe is more prominent than in Hutton's world picture where balance and flow are more significant than rank and linkage, but the conclusion, an economy of nature, is the same. A similar appreciation that study penetrates obvious surface perception is to be found. Shaftesbury gives an example of a traveller on a ship for the first time who is unaware of the whole plan of the vessel. He is ignorant of the importance of the independent functioning of the parts. "In this dark Case of Flesh, [he is] confined even to the Hold and meanest Station of the Vessel" (Shaftesbury, Lord. 1773: 290). Like Hutton, Shaftesbury uses the phrases "an active Mind" and "one active principle" but, like the elusive "Phantom Time" in his dialogue, Shaftesbury applies the terms to the mind of the Deity and to the Deity in action in Nature.

Notes to Chapter Four.

Note 1. The Eye and Distinctness.

There would be an interesting extension of Sykes Davies's work (1989) on Wordsworth's frequently used words if a study were to be made of his references to the human eye. One aspect of that study would be the use of the eye as an organ linking inner and outer life. It would be worth considering the change from *The Prelude* of 1805 to *The Excursion* in the attribution of power to the eye in the development of the poet's mind. I have referred in the text to the close parallel between John Ray's *Wisdom of God* and elements in *The Prelude* and *The Excursion*. There are, for instance, a number of passages describing the Wanderer's youth which relate to the eye as a passage to the soul. The young Wanderer is pictured in Book I solitary in a cave or on the "naked crags" seeing with "the power of a peculiar eye" in their fixed and steady lineaments ...an ebbing and a flowing mind" (W.P.V. i: 155-162). In youth, the Wanderer's eye is an overriding faculty ("nor did he believe, - he *saw*" W.P.V. i: 232). Age may not have "tamed the eye", but it depended for its power on the experience of childhood: "under brows/Shaggy and grey, had meanings which it brought/From years of youth" (W.P.V. i. 428-430). In a later reference to his own declining physical powers in Book IV, the Wanderer contemplates the possibilities of blindness. He will be sustained by the memory of the "visionary powers of eye and soul". (W.P.V. iv: 111). The combination of eye and soul is again significant in considering the argument I have made in the chapter about John Ray's text and Wordsworth's knowledge of it. More significant for my purpose, however, is the relationship of the eye to the topic of clarity or "distinctness", because, as I have attempted to explain, this is a concept of importance for contemporary geologists.

The Oxford English Dictionary distinguishes as Dr Johnson did between the two meanings of the word "distinctness": being separate or individual and the quality of clarity in perception or thought. The earliest use of the former meaning recorded by O.E.D. is by the Cambridge Platonist, Cudworth. He applied the term to the immortality of the soul which has "distinctness from the body". William Whewell is another source for the dictionary. In 1837 he used it in *The History of Inductive Sciences* in the phrase "absence of all scientific distinctness of thought". I cannot trace its use in poetry before Wordsworth. I am

grateful to Professor Sambrook for pointing out that both Thomson and Cowper give examples of "indistinct" and "distinction" to mean clarity or lack of it. Thomson in a passage that contributed to *The Prelude* (1805 VIII: 401) refers to the effect of autumn mist: "Indistinct on earth,/Seen through the turbid air beyond the life/Objects appear" (Thomson, J. 1972: 108: 724 - 726). Cowper in *The Task* describes the effect of snow making the streams appear to vanish "O'erwhelming all distinction" (Cowper, W. 1934: 202: 97).

A modern instance of "distinctness" is in Owen Chadwick's biography of Cardinal Newman's interpretation of the origin of faith:

As a child grows, life is found to be more than bodily comfort. There comes self-knowledge, distinctness, individuality (Chadwick, O. 1983: 27).

Johnston (1978) does not concern himself with "distinctness" but makes an interesting argument about demarcation by comparing "Home at Grasmere" with Book IV of *The Excursion*. In the early work, Johnston sees a fascination with "the line invisible, the boundary lost/That parts the image from reality". In *The Excursion*, Johnston argues:

the focus of meditation is separation, on lines and boundaries that demarcate one mode of being from another. The happy man seeks to find. "where begins/the union the participation where" (Johnston, K.R. 1978: 135-136).

My study of the idea of "distinctness" suggests that, although Wordsworth may hold a firmer idea of the value of "distinctness" of ideas by 1814, compared with earlier poems, the root of the notion in the two senses explored in this and in the previous chapter, lies in *The Prelude* of 1805 and may be explored in Coleridge's notes as early as 1802.

Note 2: Semi-Cirque.

Glacial theories of large-scale erosion by ice-sheets gained acceptance during Wordsworth's life-time, but not until the 1830s through the persistent campaigning by Louis Agassiz did they gain British support. The "semi-cirque" used by Wordsworth is an expression used to mean a circle, or in this case a half circle, but usually in the sense of an edifice such as an amphitheatre. O.E.D. quotes William Shenstone from the eighteenth century as the earliest recorded

source, with a quotation from Keats in the nineteenth century.

Note 3: The perennial literary theme of rural retreat.

The theme of withdrawal from civic affairs by seeking a rural retreat where men of intellect can discuss public affairs is as old as Virgil. A classical origin for *The Excursion* has been claimed by Paterson (1978). Wordsworth's poem develops the perennial theme of rural life, and debate, where there is discussion of the virtues of solitariness, but also of patriotism. Above all Virgil's *Georgics* is a demonstration of the human mind in action, a source obviously in sympathy with Wordsworth's aims in this preparation for *The Recluse*.

Notes to Chapter Five

Note 1:

Professor J. J. Blumenbach of Göttingen is a figure usually associated with the development of early biology, but it is worth noting, not least for its interest in determining where Coleridge received ideas about geology prior to attending Davy's lectures in London, that Blumenbach was also a significant theorist of geology. In Hallam's study of Great Geological Controversies (1989), the geological concept of fossil succession, often accredited to Cuvier and Brogniart, is attributed to Blumenbach. One of his pupils was Alexander von Humboldt. Blumenbach was a strong advocate of successive phases of extinction. He proposed a three-fold division of fossil succession, punctuated by organic "revolutions".

Note 2: Davy and Greenough.

When Greenough set about in earnest becoming a geologist after his return from Germany, he chose to visit Cornwall, perhaps because of the mining activities which laid bare rock faces and scattered mineral samples on the surface of the land. However, his contacts with Carylton also attracted him to the South-west. Certainly by 1801, he had met Humphry Davy while conducting field excursions in Cornwall. On 17 August he wrote in his journal, "called on Mr Davy whose conversation confirmed me in the favourable opinion of his talents which I had imbibed from Coleridge and Kempthorne" (Greenough, G. B. UCL. 7/4). He attended Davy's lectures in London and was soon meeting him there. In 1806 he joined Davy on a tour of Ireland to study geology and social conditions. Of course, the most important outcome of their friendship was their partnership, with a few other London geologists, in establishing a geological club which grew into the Geological Society (Woodward, H. B. 1907). The subsequent dispute between Greenough and the Royal Society, of which he was also a Fellow, eventually also involved Davy, as I have noted in the text. Although Davy returned to the Geological Society, there is no clear evidence of a return to earlier warmth of friendship. By the time Greenough was elected President, he had a much wider circle of geological and scientific acquaintances among the first wave of scientists who would cheerfully accept the name of "geologist". Men like Buckland became professional associates and friends.

Buckland also travelled with Greenough in 1813 and 1814 to the Lake District, Scotland, and along the East Coast, and, in 1816, to Italy.

Note 3 : Coleridge's preparations for the journey to Malta.

In February 1804 there are plans to proceed to Malta via Syracuse with recommendations to Lord Nelson, again inspired by Greenough. On 8 March, Coleridge wrote to Sir George Beaumont after breakfasting with Greenough. On the 13th of that month he wrote about his plans to Greenough, this time firmly concentrating on Malta rather than Sicily. On 18 March he spent the morning with Greenough. Finally, Coleridge wrote from Portsmouth to Greenough with a few last instructions about sending paintings to Cumberland (Griggs, E. L. 1986 II:1107-8). Their meetings were not all geographical. Some were about the realities of sea voyages. Greenough recommended a portable soup, a dismal sounding dried concoction of something like pemmican. More cheerfully, Greenough gave him a bottle of brandy (Coburn, K. 1957: II:880). There was intellectual refreshment from his friend too. Coleridge's Notebook of the voyage refers to his cabin containing a text of Sir Thomas Browne, as well as Haüy's *Mineralogy* referred to in the main text.

The work by Sir Thomas Browne provides a further indirect link with the Wordsworths. Greenough's foolscap common place books contain the following literary reminiscence (with Greenough's spelling of Browne's name): "The following character of Sir Thomas Brown was written on the title page of his works by S. T. Coleridge on March 10 1804 at 12 o'clock at night and I copied it a few days afterwards omitting only 2 or 3 sentences addressed to his wife which had little reference to the subject" (Greenough, G. B. UCL 29/7:77). Then follow two pages of eulogy of Sir Thomas Browne beginning "Sir Thomas Brown among my first favourites". This is, once more, one of those intriguing moments of contact between the literary and scientific characters in this narrative, for midnight on March 10 is also recorded by Coleridge in a letter, not to Sara his wife, but to Sara Hutchinson (Griggs, E. L. 1956 II:1080). From Bernards Inn, Holborn, Coleridge describes the book he is reading, *Hydriotaphia* by Browne. Griggs' editorial notes identify the text as one bought for Coleridge by Charles Lamb. On the fly-leaf, Coleridge wrote: "NB. It was on the 10th; on which day I dined and punched at Lamb's - exulted in the having procured the Hydriotaphia, and all the rest lucro [ap] posita. STC." Whether "Asra" received the volume at

this point is doubtful since, as we have seen, a copy accompanied Coleridge to Malta. Equally dubious might have been Asra's brother-in-law's reaction to letters addressed to her from Coleridge. Perhaps again the close connection with Greenough was not altogether a favourable sign for the possibility of the geologist making the acquaintance of Wordsworth.

Note 4 : 'The Caprice of Nature'.

Greenough's persistence in believing that natural forces cannot be simplified into permanent cycles of denudation and deposition may be one of the chief features which makes him stand above many of his contemporaries. The advent of theories of glaciation and of mountain orogeneses, not to mention modern theories of plate tectonics are in one sense a catastrophic view rather than a uniformitarian. There may be a further indication of Greenough's long-sightedness (albeit unwitting) in that modern studies of evolution have identified a more complex process than what is usually thought to be an obvious progression from simple to complex forms. Greenough's descriptions of nature's variety might well be echoed by modern writers on fossil evidence of evolution. Stephen Jay Gould's study of the evidence of the Burgess Shales occasions a fruitful discussion of diversity and disparity (Gould, S. J. 1990: 49) not unlike Greenough's sentences: "...we find contrariety of purpose, inconsistency, frailty - counteracting design, inconstancy, everything imperfect, insufficient provisions - useless precautions" (Greenough, G. B. UCL:29/3).

Note 5: Greenough's interest in poetry

The commonplace books held in University College, London Library are a very eclectic collection. There are two hand-written copies by Greenough of Coleridge's political poems, "Recantation" and "Fancy in Nubibus". Other pieces by Coleridge are short translations of epigrams and one rather vulgar piece which, he asserts, Coleridge told him adorned the wall of the toilet in Jesus College, Cambridge. The other poetry in Greenough's handwriting is a wide collection with English poems from Sir Walter Raleigh, Suckling through Addison, Young, Shenstone and Thomson. There are no copies of Wordsworth's poetry in the Greenough books.

Some poems may be Greenough's own. Like Whewell, Sedgwick, Davy and Herschel he composed his own verse. He translated from Greek, Latin and Italian but three or four longer pieces may be his original work. One long ballad is about the martyrdom of St Alban, another is a blank verse descriptive work on a theme of Christmas. There are conventional love ballads ("To Laura", and "The effusions of the heart"). Greenough wrote two plays. One is *Pygmalion*, which contains instructions for a stage performance. Decimus Burton, a close friend of Greenough's later years, is pencilled in the cast list, so the play may have had a domestic performance. For the geologist there is the minor interest of a character called "Stonehewer" equipped "with a hammer and a bag of specimens" (Greenough, G. B. UCL. 29/5). Whether this is a unique mention of geology in the history of drama I am not clear; I am sure it is an anachronism in the Pygmalion story! The other play is called *Griselda*. It is a dramatic poem in five acts with parts for King Arthur, the Knights of the Round Table, Guinevere and Griselda, daughter of Cedric. There is no record of a performance of this play.

Finally, in the collections of verse, there are short comic verses on geology and geologists, perhaps appropriately read at the end of one of the rum-bustious dinners that Sedgwick and Buckland seemed to enjoy. Similar verse is collected in a recent collection, called *The Poetry of Geology* (Hazen, R. M. 1982).

Note 6:

The reader of Wordsworth then and now might put the Character of the Happy Warrior alongside the image created of Major Robinson by Greenough:

Who, with a natural instinct to discern
What knowledge can perform, is diligent to learn;
Abides by this resolve, and stops not there,
But makes his moral being his prime care;
Who, doomed to go in company with Pain,
And Fear, and Bloodshed, miserable train!
Turns his necessity to glorious gain;
In face of these doth exercise a power
Which is our human nature's highest dower (W.P.W.IV: 86: 8-16).

Notes to Chapter Six.

Note 1: Superimposition and Antecedence.

Superimposition and antecedence are geological terms to explain " a drainage system which does not conform to the structural pattern of the region, although it may show local small adjustments to it" (Whitten, D. and Brooks, J. 1972: 236-237). There are two types: Superimposition is where a drainage system has eroded younger rocks which lie uncomfortably upon an older series. In course of time, the younger series will be removed, but, because the river system is well established, it will carry on eroding the older structures but will not be determined by them. The Victorian geologist, Mawe (1832-1912), was the first to use the term "superimposition" in 1866. Antecedence is a theory to explain how a river system maintains itself across a geological structure which runs across its routes. One theory is that during a prolonged period of uplift the river maintained its course, thus cutting deep into the slowly rising rocks. Classical instances usually cited are the Brahmaputra Gorge, the Rhine, and the rivers of the Nashville Dome in Tennessee. Both concepts, superimposition and antecedence, could apply to the much smaller and perhaps less dominant Duddon. What matters in the landscape is that there are stretches of rock across which a river finds its way, against all the expected "rules" of seeking structurally easy routes to travel. A river flowing in an open valley, like the Duddon above Seathwaite, within a few miles will re-assume the features of a mountain stream - fast flow, deep water with boulders and pot-holes and a narrow valley, between precipices. Some river valleys in this phase also show evidence of earlier phases of erosion, with steeper cliffs set further back from the existing river's track. Wallowbarrow Crag and the Pen are such cliffs in relation to the Duddon, giving an indication of an earlier period of valley erosion, perhaps associated with glacial systems.

These geomorphological features just described were accepted, as the dating of Mawe's work indicates, at a much later period than the writing of the Duddon Sonnets sequence. However, Chorley suggests that Hutton had given an early indication of features of superimposition in 1795, without, of course, using that term (Chorley, R. et al. 1964: 52). Dorothy Wordsworth's comment referred to in this chapter is not likely therefore to be a brilliant instance of innocent geologising, but may have been a partly-forgotten reference to something read in

an encyclopaedia or travel account. Hutton's work was, as I have said in the chapter, referred to in these sources.

Note 2: The Wordsworths' excursions to the Duddon Valley

In the years before the publication of the Sonnet sequence there were visits to the Duddon Valley. These were visits of a serious nature, in the sense that a wilder, and at times considerably rugged terrain is not an afternoon's stroll. It was always an excursion that required fore-thought and preparation. Mark Reed (1967 and 1975) lists three such journies:

- a. Between September and October, 1804 Dorothy and William visit Seathwaite and stay there.
- b. 18 and 19 September, 1808 William, Coleridge, and perhaps Sara Hutchinson, take a short tour to Yewdale including the Duddon Valley going by Walna Scar to Seathwaite.
- c. 6 September, 1811, William, Mary, with Tommy and Catharine visit Duddon Bridge. William and Mary leave the children with a nurse to go up the Duddon to Ulpha. They dine in the porch of the Kirk, then travel on to Seathwaite where they spend the night, collecting information later used in the sonnets about Reverend Robert Walker. On 7 September William and Mary walk across Walna Scar to Yewdale.

Note 3: The publication of "The River Duddon: a sequence of sonnets".

The 1820 edition of the poems including the sonnet sequence, the three odes mentioned in this chapter, "Vaudracour and Julia" the "Topographical Description" together with other poems, was almost immediately followed by a "collective edition" (Ketcham: 40) *The Miscellaneous Poems of William Wordsworth* in four volumes. The Duddon Sonnets were then reissued in a number of subsequent editions. As Gill says of the rewriting associated with the edition of new collections: "the whole body of his poetry became provisional until it had been rethought" (Gill, S. 1989: 337). The original 1820 publication of the Duddon Sonnet sequence has not yet been published with the detailed

textual care of the Cornell project, although a number of the poems published with the sonnets in 1820 are included in the Cornell edition *Shorter Poems: 1807-1820* edited by Ketcham, to which reference has been made where appropriate. The de Selincourt and Darbishire edition of the sonnet sequence has been the text used for the sonnets themselves in this chapter.

One interesting fact about the 1820 edition is the end paper where the publisher advertised the "botanical and scientific texts including:
Robert Bakewell's, *An Introduction to Mineralogy*
John Playfair, *Outlines of Natural Philosophy*
G.B. Greenough, *A Critical Examination of the First Principles of Geology*
J Mawe, *Familiar Lessons on Mineralogy and Geology*
King Coal's Levee or Geological Etiquette and the Council of Metals and Baron Basalt's Tour (A Geological Primer in Verse with a poetical Geognesy, or feasting and fighting and sundry right pleasant poems to which is added a critical dissertation on King Coal's levee addressed to the students at the University of Oxford).

Note 4: The River Duddon and actuality.

Hugh Sykes Davies makes a penetrating comparison between Wordsworth's use of the imagery of the stream and the reflection in still water and a figure used by Charles Dickens in *David Copperfield*. The chief point of this interesting comparison for me is Sykes Davies's statement:

Wordsworth's own experience thus led him to a description of the life of the mind very different from that of empirical philosophers, not only in his insistence on the actively selective powers of perception, but perhaps even more in his recognition of the far-reaching effects of memories revived, re-lived, not as passive traces of old perceptions, capable only of mechanical combination and association, but as new elements of experience, able to grow and change in their own fashion, not once, but repeatedly (Sykes Davies, H. 1986: 147).

As in the striking figure of memory in Sonnet xxi, the poet is writing about the actuality of the present for he depicts his own control of the steed of the past. Similarly, I find the actuality of the River Duddon important for Wordsworth's exploration of time. The myths of the New World, the folk-tales and legends are

all relevant, but, like the Duddon, there is the present flowing alongside the poetically recreated past, and continuing to flow.

There is a very interesting analysis of Wordsworth's conception of time as a stream in J. Beer's *Wordsworth in Time* (1979), with comparison with Pope and Cowper's uses of the figure of a stream. Beer also compares Wordsworth's image with Coleridge's use of springs as images of renewal.

Notes to Chapter Seven.

Note 1: Sedgwick's family.

Adam Sedgwick had a sister, Ann, who married a Mr Westall. This is almost certainly the Westall whose drawings of limestone caverns stimulated the composition of Wordsworth's verse of 1818. Writing to Jonathan Otley, the Lake District geologist, in 1847, Sedgwick expresses some concern that not only may he have damaged the commercial success of Otley's *Guide* by writing "letters" to Wordsworth's *A Guide* but he might also have "hurt the sale of Panoramic views by Mr Westall, my brother-in law" (Ward, J.C. 1877: 154). Westall's connections with Rydal Mount are earlier than Sedgwick's. He visited there from 1818 (Moorman, M. II 1965: 373).

Note 2: The notebooks.

Sedgwick's geological notebooks are genuine research documents faintly grubby from rain and grit from the field and the majority obviously entered up at regular intervals. There are notes made of days spent recording the log, of labelling specimens and, less frequently, of social engagements such as the visits to the Southey's or the Wordsworths. There are sketches of landforms and a technique Sedgwick encouraged in his colleagues and followers, attempts at cross-sections of landscape, with conjectures on the angle of the dip of beds. Although they contain almost wholly geological information, there are interesting notes on architecture, and even two laundry lists!

Note: 3 Wordsworth and Sedgwick's meetings and correspondence in later years.

The occasions for meetings at Trinity College, Cambridge, continued during Christopher Wordsworth's Mastership and on subsequent visits by Sedgwick to the Lake District, although his most intensive field-work was in the period 1822-1824. Sedgwick is referred to in Wordsworth's letter to Whewell about the Dolcoath Mine experiment (W.L.IV: 682-683 and also CULAS 1865: Add 7562/112). Wordsworth also asked Sedgwick and others to support Edward Quillinan in 1830 as a member of the Athenaeum (W.L.V. letter 541). Another long meeting with agreeable talk evidently took place in 1834. Sedgwick refers,

in a letter of 15 November addressed to a Mrs Alison, to the previous summer's walking tour of the Lake District and said he "talked for a day and a half with Wordsworth, who is the best talker I have the happiness of knowing, and who talked in the best fashion" (Clark, J.W. and Hughes, T.M. I: 431). In the same year he received a letter from Wordsworth referring to a discussion with Southey about William Paley's *Moral Philosophy*, an important text for the University curriculum. Sedgwick was a convinced, if cautious, reformer of the University. Wordsworth was no such thing but he appeared to agree to disagree on that subject. He was however clearly in accord with Sedgwick's poor opinion of Paley's attempt to formulate a scientific approach to morals. Sedgwick, in correspondence with Southey had been strongly opposed to Utilitarianism and to Paley's arguments which led to support of that doctrine. On 31 August 1837, Mary Wordsworth wrote to her daughter Dora mentioning a brief call at Rydal Mount and Sedgwick's intention to call at their son's vicarage (Wordsworth, M. 1958: 177).

Pursuing the direct references to Wordsworth chronologically, we next have an unexpected aesthetic judgement in Sedgwick's letter to the Reverend C. Ingle from Cambridge dated 30 January 1841. Sedgwick had noticed a large crowd skating at Whittlesea and he had subsequently visited the frozen Fenland. He continued:

Wordsworth told me he considered a dead interminable plain a sublime object. The eye of the body finds nothing to stop it, and has nothing to rest on and therefore it is that the mind's eye is upon conjuring tricks, and easily finds a beast for the poet's soul to stride over. I don't think I express the thought in his exact words, but I trust you understand all about it without any more words. One day the vision of Peterborough Cathedral seen across the hazy fen was very sublime. It seemed of supernatural magnitude, and its clustering forms were very majestic (Clark, J.W. and Hughes, T.M. 1890 II: 23 and 24).

This brief evocation of a winter landscape with its intriguing image of the conjuring trick is recognisably Burkean in its definition of sublimity and grandeur. Similarly the distinction between the bodily eye and the mind's eye is a common line of argument of earlier writers such as John Ray, as I have noted earlier. Here again therefore is a shared community of language and values between Wordsworth and Sedgwick.

There may have been more meetings at Cambridge, but there was certainly a very warm reunion in 1841. The recently discovered letters include the following, written from Hampstead:

We had a noisy departure for the Wordsworths [presumably Christopher's family] only came up, from their morning's work of making calls, after we had got into the carriage: and at the door was Professor Sedgwick waiting to see his friends and an animated greeting and parting took place - and this completed the poet's morning of fatigue (Wordsworth, M. 1958: 258).

Even after Christopher Wordsworth's retirement from the Mastership of Trinity College, Wordsworth's connections with Cambridge and therefore with Sedgwick were not broken. As Chapter Nine indicates, Wordsworth's relationship with the new Master, William Whewell, was in some ways a more cordial friendship than with his own brother. As well as the letters passing between Sedgwick and Wordsworth in the last decade of the poet's life (W.L. VII: 336-337 and 593 and D.C.L.A.S. 26 March, 1842) there was correspondence on the Laureate's ode to Prince Albert on the occasion of the Consort's visit to Cambridge and letters of sympathy about the death of Dora (Wordsworth (D.C.L.A.S.: 10 Aug 1847). This chapter began with one particular occasion when the old friends met in Bath in 1847.

The notebooks refer to Sedgwick's visits to the Lake District in 1841, 1842 and 1844. On the last excursion, Sedgwick called at Rydal Mount (W.L. VII: letter: 593). Sedgwick's 1844 expedition to the Lake District, although inevitably less vigorous than twenty years previously, still covered a wide area of landscape, from Kendal to Whinfell, Ambleside, Ulverston and Broughton, from August to October. In 1845 Sedgwick was again at Kendal and on Shap with "Mr Gough" (who also contributed scientific addenda to the 1842 edition of *A Guide*). The opportunities for a meeting with Wordsworth's Lake District neighbours, if not with the poet himself, were many.

Note 4: Medals of creation.

The cultured epithet, "medals of creation", for the objects of the geologist's investigations is, of course, not Sedgwick's own phrase. The figure of speech originates from the field of history, medals or coins being the artefacts from which the story of early history, particularly classical history, was partly derived.

The term "Medals of Creation" was the title of one of Gideon Mantell's very popular works. The equally popular *Thoughts on a Pebble* (1849) was listed in Wordsworth's library at Rydal Mount.

Note 5: Sedgwick's verse.

I have only discovered two pieces of verse in Sedgwick's own hand, both from 1833. In one of his sketchbooks (that is to say a slim booklet wider than the field notebooks, largely used for field sketches and cross-sections), Sedgwick had written on the inside cover in pencil:

Jesus permit thy gracious name to stand
As the first effect of her infant hand
And as her fingers in the sampler move
Engage her tender heart to seek thy love
With thy dear Children may she have a part
And write thy name their all [supporting?] heart.

In a smaller field notebook of 1833, again in pencil there is another piece to a young needlewoman:

The springing Fair whose gentle minds incline
To all [?] lovely innocent and fine
With admiration in your works are read
Of various textures of the twinning thread.
Let then your fingers their charming skill impart

Sedgwick advised his young nieces about what to read (the Bible, Goldsmith, Cowper and Scott) and he personally enjoyed Burns and Swift.

Note 6: The ascending order of perception.

It is quite feasible to consider that Wordsworth may have been clear where to trace one important literary inspiration for the hierarchy of the activities of the human mind. James Thomson's closing lines of "Summer" from *The Seasons* would be familiar to the poet and perhaps also to Sedgwick. Certainly Greenough (and we may make a bold guess at philosopher-geologist Hutton's knowledge of the poems) would be aware of the literary approval given by Thomson's lines which are related to Locke's *Essay concerning Human Understanding* (see Thomson, J. ed. Sambrook, J. 1987 (1972): 227). Philosophy "directs the ruling helm" and from her lofty position:

With inward view,
Thence on the ideal kingdom swift she turns
Her eye; and instant, at her powerful glance,
The obedient phantoms vanish or appear;
Compound, divide, and into order shift,
Each to his rank, from plain perception up
To the fair forms of fancy's fleeting train;
To reason then, deducing truth from truth
And notion quite abstract; where first begins
The world of spirits, action all, and life
Unfettered and unmixed:... (Thomson, J. 1987 (1972): 86: 1788-
1798.

There is, however, a limit to how far the accumulating power of human thinking can go in proving "the final issue of the works of God".

Notes to Chapter Eight.

Note 1: Limestone Scenery.

Wordsworth's description of limestone scenery, that most distinctive of landscapes directly associated with a type of rock and the manner in which it is chemically and mechanically eroded, is not confined to romantic caverns and poetic grottoes. Published contemporaneously with the poems "Malham Cove" and "Mr Westall's Views of the Caves" discussed in Chapter Six, the long ballad "Peter Bell" contains interesting observations of limestone or "karst" scenery. In that narrative, Wordsworth uses the local term, "scars" (line 227), for the cliffs of the Yorkshire dales where Peter Bell travels and meets that faithful ass beside a quarry. The landscape is as strange as his conversion:

The rocks that tower on either side
Build up a wild fantastic scene;
Temples like those among the Hindoos,
And mosques, and spires, and abbey-windows,
And castles all with ivy green! (W.P. II: 364).

Incidentally "Peter Bell" is a poem quoted by William Whewell in his review of Lyell's *Principles of Geology* in *The British Critic* in 1832 (Whewell, W. 1832: 183).

Note 2: Druids.

The literature associated with Druids interests the historian of geology because they were, in the eighteenth century, considered to be the first inheritors of the land of Britain after the Flood's waters had receded. Gray's "The Bard" has already been referred to in the chapter and is a fairly typical view of a primitive, perhaps specially gifted race which has been extinguished by "modern" forces.

Note 3: Keats and Ailsa Craig.

Keats' poem "To Ailsa Rock" was first printed in 1819. Like Wordsworth's poem, the geological interest is in the reference to the belief that it was formed below the sea. Keats is, perhaps more than Wordsworth, explicit that the rock's present form was already in shape beneath the waves, thus confirming that he wished to present the rock emerging ready-made, ejected by the force of some

"earthquake" or catastrophe:

Harken, thou craggy ocean pyramid!
Give answer from thy voice, the sea-fowls' screams!
When were thy shoulders mantled in huge streams!
When from the sun was thy broad forehead hid?
How long is it since the mighty Power bid
Thee heave to airy sleep from fathoms' dreams?
(Keats, J. 1958: 491)

Keats's poem ends with a sense of permanent slumber - "Drown'd wast thou till an earthquake made thee sleep/Another cannot wake thy giant size" (Keats, J. 1958: 491).

It is worth noting that a poem of about the same period, from the expedition Keats made through the North of England into Scotland, is also about one of Wordsworth's poetic "locations", the Isle of Staffa. Keats also found the tourism of Fingal's Cave too much. He describes "the Cathedral of the Sea" containing the ghost of Lycidas who cannot bear the visitors:

'Tis now free to stupid face,
To cutters, and to Fashion boats,
To cravats and to petticoats (Keats, J. 1958: 495).

Note 4: Clarity, obscurity and the making of maps.

One minor poem is worth adding to consideration, because it illustrates again the alternations of clarity and obscurity. It is also one of the few glimpses of Wordsworth's day-to-day awareness of the geographical activity proceeding with vigour in the Lake District. This is a poem begun perhaps as early as 1811 but published first in 1815, outside the time of the later poems under consideration in this chapter, but giving another example of the continuity of the phases of the poet's life. In the 1820 collection, gathered under the title *Inscriptions*, the sixth poem is called "Written with a slate pencil on a stone, on the side of the mountain of Black Comb". This is a poem of meteorological observation, describing the sudden changes of weather which sweep dramatically from the sea into the western facing hills of the Lake District, but it also has a human focus. It describes the dramatic effect on a "geographic Labourer" (or surveyor or map-maker) of a sudden storm. There was a moment not unlike a "spot of time" as his equipment became blacked-out.

...He made report
That once, while there he plied his studious work
Within that canvass Dwelling, suddenly
The many-coloured map before his eyes
Became invisible: for all around
Had darkness fallen - unthreatened, unproclaimed-
As if the golden day itself had been
Extinguished in a moment: total gloom,
In which he sat alone with unclosed eyes,
Upon the blinded mountain's silent top! (Ketcham: 98).

Here what had been clear has become obscure. The spread-out map, itself, a technological product of order and clarity, has been rendered invisible, while the map-maker, the clarifier, sits helpless with his eyes still open. The blindness of the observer is also the immaterial darkness of the "blinded mountain", on which he sits in silence - a powerful image of a suddenly transformed landscape.

Note 5: Paley and Utilitarianism.

How Archdeacon Paley became, after his death, a kind of Christian pillar to support Utilitarianism is a study in itself. The association between Paley and utility made by many who supported Utilitarian principles in politics or business, if not in strict philosophical terms, is illustrated by Paley's writing on general human happiness. In *The Principles of Moral and Political Philosophy* he writes that there is a rule:

that the method of coming at the will of God, concerning any action, by the light of nature, is to enquire into the tendency of that action to promote or diminish the general happiness (Paley, W. 1814: 71).

Because he is also a socially conservative thinker, he accepts that to commit an act which will make someone happy (such as killing a bad landowner, so a better successor will take over) is not morally right. It might be good in particular, but it would not be good in the general. General rules are necessary to protect society.

In this instance as in others, it is easy to see that, despite Paley's roots in eighteenth-century thought, he shared some of the attitudes of the early decades of the nineteenth century. One particular passage illustrates this for me. In the concluding section of *Natural Theology*, he wrote that he was sure that the most important "train of thinking" for a human being is to pursue:

...the phenomena of nature with a constant reference to a supreme intelligent Author. To have made this ruling, the habitual sentiment of our minds, is to have laid the foundation of everything which is religious... the charge is no less than this, that, whereas formerly God was seldom in our thoughts, we can now scarcely look upon anything without perceiving its relation to Him. The works of nature want only to be contemplated. When contemplated they leave everything in them which can astonish by greatness (Paley, W. 1818: 414-442).

This apologia is built on an understanding that a new age has dawned. Mankind has changed and the verb, "astonish" explains what has happened to create a new religious seriousness. Nature and man have entered a new, more emotional relationship. All that is necessary is to look at what God has provided in nature. It has the capacity to "astonish".

This instance from Paley is, however, not a major step in reconciling Wordsworth's system of thought with Paley's. My clause, "all that is necessary" could not be applied to Wordsworth's interaction with nature. As early as 1798 Wordsworth began to write an "Essay on Morals" of which only a fragment survives (Reed, M. 1967: 34 and W. Prose I: 101 -104). The remnant of the essay is clearly a criticism of moral systems based purely on reason. Both Godwin's writing and Paley's *Principles of Moral and Political Philosophy of 1785* are inadequate to teach good living:

Now, I know no book or system of moral philosophy written with sufficient power to melt into our affections, to incorporate itself with the blood and vital juices of our minds... (W. Prose I: 103)

Many years later Wordsworth responded to the section in Adam Sedgwick's *A Discourse on the Studies of the University* which had criticized Paley's work on a system of morals, to agree with his friend's strictures on Paley and, incidentally, revealed that they had discussed that author together (W.L. V: 708).

Paley's distinction between the animate and the inanimate, unlike Wordsworth's, is quite clear. *Natural Theology* begins with a fundamental distinction between a stone and a created object, a watch. Rocks and stones are uncomplicated. They are not "organised bodies":

"Where order is wanted, there we find it, where order is not wanted, i.e.: where, if it prevailed, it would be useless, there we do not find it... In the forms of rocks and mountains, in the lines which bound the waste of continents and its lands, in the shape of bays and promontories, no order whatever is perceived, because it would have been superfluous. No useful purpose would have arising from moulding rocks and mountains into regular folds... (Paley, W. 1818: 66).

Nothing could be more in opposition to the work of the geologists of the early nineteenth century than this statement. Oppose it to the way Wordsworth's describes the landscape of the Lake District in *A Guide*, and, again, there is a very different conception of order.

Notes on Chapter Nine.

Note 1 : Whewell's specific references to Wordsworth's poems.

The reference to "white rabbits" is mysterious. According to the Wordsworth Concordance, there is only one reference to a rabbit - in "Yarrow Revisited". "Wagon drivers" is more straightforward. "Benjamin the Waggoner" was published in 1819. Whewell may have meant that Wordsworth was noted for narratives about simple workmen. A minor problem arises in the passage by Whewell from 1821 about Wordsworth's quotations which "tumble the names of these hills together". The most likely source is the poem "To Joanna" of 1800 (W.P. II 112-114) with its deliberate evocation of the names of the Lakeland mountains. Beer, J. (1979: Chapter 5) has a sensitive analysis of this poem.

Note 2 : The Cambridge Network.

A valuable article on Whewell's "cultural exchange" with Tennyson, also a Trinity man, providing an illuminating parallel with this study, is by Susan Gliserman (1975). The discussion of an "intellectual aristocracy of the early Victorian period is most thoughtfully elaborated by Noel Annan (1985).

Note 3 : "Spit and Smokejack".

"Spit and smokejack" is a peculiar expression, but the N.E.D. helps - a smoke jack is a device for turning meat over a fire. One presumes Hamilton's oratory was interrupted by cooking noises.

Note 4: The Marshalls and their Lake District contacts.

One further connection with Hallsteads can be made in respect of power and influence. Another sister of Whewell's wife married Thomas Spring Rice, who became Chancellor of the Exchequer in Lord Melbourne's government. The Whewells and the Wordsworths met this family in London's fashionable houses. William Wordsworth corresponded with Rice (later known as Lord Mounteagle) about transferring the duties of stamp distributor to his son's responsibility. Whewell, of course, knew the Chancellor well because of his family connection. The circle included from time to time some powerful people. On its

circumference were the aristocracy, not least the Lowther family, their family seat being within easy travelling distance of Rydal and Hallsteads. Again, truth requires that we acknowledge that there were political differences but Wordsworth was able to cross those boundaries when he wished to do so. In June, 1825, he wrote to Lord Lonsdale to tell of Mr Marshall's links with the "London College Committee" (eventually University College) adding that he suspected that Henry Brougham was using it for political purposes (W.L.IV). Greenough was also a vigorous member of the foundation committee of the college. Of course, Greenough and Whewell were close associates in the Geological Society.

Returning finally to one more Lake District name, that of the Reverend Frederick Myers, the priest who conducted Whewell's wedding ceremony, we are reminded again of the relatively small world of the intellectuals, or at least of the scientists and the Church of England at the time. Myers was described by Whewell as "a thoroughly excellent person, a worthy friend of Wordsworth and Arnold" (Douglas II: 310). It was Frederick Myers who appeared at Rydal Mount in 1841 asking William Wordsworth to intervene in the domestic dispute between Kate Southey and her stepmother, Southey's second wife (Curry, K. 1965 III: 479). The family connection becomes more tangled since Myer's wife was Susan Marshall, John Marshall's youngest daughter. Myers became a familiar part of the Keswick scene. He was curate in charge of the new St John's Church, Keswick, built by a gift from his wife's family, despite the fact that the Marshalls were not Anglicans. Wordsworth described them as "dissenters and far-going Reformers" (W.L.VI: 103). Myers preached in 1846 "before the University of Cambridge" and published his sermons (Myers, F.: 1846). Whether he was quite so acceptable out at Rydal Mount is less certain. Mary Wordsworth commented in a letter to Isabella Fenwick in August, 1841: "Mr Myers was at Fox-how the other day, he did not call here, which I did not regret" (W.L. VII iv: 236).

Note 5: Whewell as a poet.

Whewell's own literary productions were not only in verse. There is a curious, unpublished attempt at "science fiction" recorded by Todhunter, which appears to be contemporary with *Of the Plurality of Worlds*. Whewell attempted a story of a visitor from the moon who searches for a lost brother somehow

descended to this earth by meteorite. The opportunity for philosophical dialogue between moon-man and an intelligent British friend is not lost.

Whewell was obviously up-to-date in fashionable reading. Todhunter records an incident which suggests that, if Whewell were alive today, he would have taken the literary weeklies:

In those pre-Tennysonian days, every person of taste in the University delighted in the works of Henry Taylor, and Professor Whewell was found engaged in the perusal of *Philip van Artevelde* with Froissart by his side - carefully comparing the modern drama with the ancient chronicle (Todhunter, I: 45).

It was Henry Taylor (1800-1886) who first introduced Isabella Fenwick to the Wordsworth family. A further indirect connection with Wordsworth is that Taylor married Theodosia Alice Spring-Rice, the daughter of Lord Monteaule, who is referred to in the chapter.

Note 6 : Whewell's use of "Lines written a few miles above Tintern Abbey".

In *The Philosophy of the Inductive Sciences*, Whewell says that "a philosophical poet" has spoken of:

All the world
Of eye and ear, both of what they half create,
And what perceive (Whewell, 1967 (1847): 26).

The correct lines from *Lines written a few miles above Tintern Abbey* are "...of all the mighty world/Of eye and ear - both what they half create,/And what perceive" (W.P. II : 262 : 105-107).

Whewell in this excerpt is writing about perception and the mind's part in creating Ideas. He continues to elaborate on "the philosophical poet's" point: "But, it is clear that though they half create, they do not wholly create. There must be an external world of colour and sound to give impressions to the eye and ear, as well as internal powers by which we perceive what is offered to our organs. The mind is in some way passive as well as active" (Whewell, 1967 (1847) : 26).

Note 7 : Table of Sciences from The Novum Organon Renovatum (1858).

Fundamental Ideas or Conceptions	Sciences	Classification
Space	Geometry	
Time		
Number	Arithmetic	Pure Mathematical
Sign	Algebra	Sciences
Limit	Differentials	
Motion	Pure Mechanism	Pure Motional
	Formal Astronomy	Sciences
Cause		
Force	Statics	
Matter	Dynamics	Mechanical
Inertia	Hydrostatics	Sciences
Fluid Pressure	Hydrodynamics	
	Physical Astronomy	
Outness		
Medium of Sensation	Acoustics	
Intensity of Qualities	Formal Optics	Secondary
Scales of Qualities	Physical Optics	Mechanical
	Thermotics	Sciences (Physics)
	Atomology	
Polarity	Electricity	Analytico-
	Magnetism	Mechanical Science
	Galvanism	(Physics)
Element (Composition)		
Chemical Affinity		
Substance (Atoms)	Chemistry	Analytical Science
Symmetry	Crystallography	Analytico-Classifi-
		catory
Likeness	Systematic Mineralogy	Sciences
Degrees of Likeness	Systematic Botany	Classificatory
	Systematic Zoology	Sciences
Natural Affinity	Comparative Anatomy	
(Vital Powers)		
Assimilation		
Irritability		
(Organisation)	Biology	Organical Sciences
Final Cause		
Instinct		
Emotion	Psychology	(Metaphysics)
Thought		
Historical Causation	Geology	
	Distribution of Plants	
	and Animals	Palaetiological
	Glossology	Sciences
	Ethnography	
First Cause	Natural Theology	

Notes to Chapter Ten.

Note 1: "Influence".

Foucault is equally critical of the literary "game" of pursuing the source of ideas:

To ransack history in order to rediscover the play of anticipations or echoes, to go right back to the first seeds or to go forward to the last traces, to reveal in a work its fidelity to tradition or its reducible uniqueness, to raise or lower its stock of originality, to say that the Port-Royal grammarians invented nothing or to discover that Cuvier had more predecessors than one thought, these are harmless enough amusement for historians who refuse to grow up (Foucault, M. 1972: 144).

I am not attempting to turn tables on Foucault by quoting Coleridge in the same vein:

Hume wrote - and the French imitated him - and we the French - and the French us - and so philosophies fly to and fro in a series of imitated Imitations - Shadows of shadows of a farthing candle placed between two looking glasses (Griggs, E.L.: 1956 I: 538).

To avoid the crushing effect of Foucault's strictures I hope in this section and indeed in the whole thesis to justify research of the kind I have undertaken by presenting a great poet who used some of the material available to all the thinkers of his time but grounded it in the reality of his own world:

Not in Utopia - subterraneous fields,
Or some secreted island, heaven knows where -
But in the very world which is the world
Of all of us, the place in which, in the end,
We find our happiness, or not at all (*Prelude*, 1805 X:723-727).

Note 2: Theories of scientific change.

Late twentieth-century explanations of scientific change (for example Kuhn, T. S., Popper, K. and more recently Lyotard, J.F. and Foucault, M.) are of interest to the historian of ideas for a number of reasons. First and principally, they save him or her from falling into the persuasive trap of accepting the framework of thought of the historians who first documented the work of early geologists or other scientists. However, the modern thinkers do not present necessarily "better" theories of science, - indeed their outcome or consequence may be relativism and a disabling "open-ness" of judgement; nevertheless there is value in putting alongside the early nineteenth-century geologists' views of the history of

their subject, our own contemporary anxieties about knowledge. In addition to Foucault's study already discussed in the chapter, one other valuable modern insight (see Lyotard, J.F. 1984) is the notion of scientific knowledge as a kind of discourse. Certainly this study of Wordsworth and the geologists he knew personally or indirectly is a study of discourse conducted between men of a common education and value-system, as I hope other chapters as well as sections of this concluding chapter confirm. A useful study which, like elements of my thesis, is cross-disciplinary is David Harvey's *The Condition of Post-Modernity* (1989), with particular interest for me in his Chapter 16 on notions of time and space in the Enlightenment and in the nineteenth century.

Note 3: The reconciliation of science and poetry.

Charles Darwin as a "field geologist" has been considered by an article by Wilding (1989). Two important studies of Darwin and the influence on him of Wordsworth have been written in the last fifteen years. The earlier is by Marilyn Gaull in 1979 (followed in 1990 by an extension of her thought from geology into Victorian astronomy). Gaull's argument leads her to the conclusion that Charles Darwin was powerfully influenced by Wordsworth, particularly because of the influence of his geological mentor, Adam Sedgwick. Darwin is portrayed as an intellectual eclectic:

To his meticulous observations of nature, his disposition for finding analogies and happy endings, Darwin assimilated the social theories of Malthus, the geology of Charles Lyell, an assortment of relevant scientific insights and Wordsworth's *Excursion* to design in *The Origin of Species* the most comprehensive creation myth of the century (Gaull, M. 1979: 34).

Gaull traces an interesting parallel between the plan of both works, *The Excursion* and *The Origin of Species*. She argues that both begin in a desolated garden and end in reconciliation. Wordsworth's contribution to Darwin was a capacity for "self-projection", which, she claims, is a characteristic of the most creative work in modern science.

Gaull's own scepticism is a difficulty in a modern appreciation of the attitude of the early Victorians to the expression of belief in books like *The Excursion*: "Our misplaced inspirations for the divine turns us into inmates separated from the children playing on the shore" (Gaull, M. 1979: 45) Her paraphrase of a section of "*Ode: Intimations of Immortality*" has two problems, the weighted word

"misplaced" and the misunderstanding about "inmates". "Inmate" is a positive word in Wordsworth's poetic vocabulary (vide: Sykes Davies, H. 1989). Inland the adult may be, but the intimations of early life are ever present to him, and his companionship and sense of belonging are vital to his sensitivity and poetic spirit. Whether these aspects are relevant to Darwin's intellectual development remains for other biographers to consider.

The second and more closely argued modern work is a study of Darwin's early notebooks written between 1837 and 1844, when the first drafts of his "species theory" was being prepared (Manier, E. 1978). Manier's thesis is more comprehensive than Gaull's in spanning writers as diverse as David Hume, Paley, and Lyell, and comparing them with Darwin and Wordsworth. Like Gaull, Manier pays attention to Darwin's language. However, unlike Gaull, he gives more credit to Darwin's insight into the themes of *The Excursion*. Manier finds evidence of Darwin's reading of *The Excursion* merely "circumstantial", but places more weight on themes to which Darwin responded: symbols of love, the human struggle with nature, the significance of chance and the importance of hope. The result of Manier's study is to present an interpretation of more complexity than Gaull's and one of importance for understanding one particular reconciliation of the "two cultures":

...the young Darwin sought no theology beyond that of Wordsworth's poetic account of the excursive quest for the meaning of life within nature itself. His metaphors, read in the cultural context, indicate that his emotional relation to the world of his theory was not one of alienation, but one of self-reflective acceptance (Manier, E. 1978: 186).

Finally, one illuminating quotation, from a member of Wordsworth's inner circle, reveals the interplay of a "worlds", in this case science and religion. Crabb Robinson uses the term "man of science" and makes a surprising analogy after reading Herschel's *Discourses on the Study of Natural History*:

I never can be a man of science, but it is something to have a disinterested love of science, and a pleasure in the progress which others make in it. This is analogous to the baptism of desire of the liberal Catholics, who give the means and possibility of salvation to those who, though not actually baptized, *desire* baptism, and would, if they could, be members of the Church in which alone salvation is to be found (Robinson, H.C. 1872 II 120).

Note 4: Natural History.

In this chapter, I have I believe correctly used David Allen's text (1978 (1976)) as a sure guide for the consideration of the changes in the role of "natural history". As early as 1794, James Hutton had begun to separate the two terms "natural history" and "natural philosophy" in *An Investigation of the Principles of Knowledge* Book III. He saw natural history as a branch of natural philosophy with the function of "the assembling together and recording matter of fact, or perceived events, with these more immediate connection, and therefore it will appear that natural history in the order of science, must precede that generalisation of our knowledge, in relation to things, which is natural philosophy" (Hutton, J. 1794 III: 37). He continues to say that the industry of natural history might not bear fruit if "proper reasoning" is not applied to its labours.

Foucault considers "natural history" in the eighteenth and early nineteenth century as "one of the sciences at the pre-historic stage" (Foucault, M. 1972: 178). Although it is true that Foucault sees a continuity (into geology for instance), he gives little evidence of what actually occurred in the process. More useful connections for the transformation of natural history into the "new sciences" are described by Porter (1977), particularly connecting natural history with Whewell's aetiological collection of sciences.

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Abbreviations in the text and bibliography

Wordsworth Sources

W.P. (followed by Volume Number): *The Poetical Works of William Wordsworth* ed. de Selincourt, E. and Darbishire, H. Five Volumes I: 1963, II: 1944, III: 1954, IV: 1970, V: 1972. Oxford, Oxford University Press.

Prose: *The Prose Works of William Wordsworth* 1974, ed. Owen, W.J.B. and Smyser, J.W. Three Volumes. Oxford, Oxford University Press.

W.L. (followed by Volume Number): *The Letters of William and Dorothy Wordsworth* general editor: Hill, A.G. Eight Volumes, 1967, 1969, 1970, 1978, 1979 (Volume IV 1821-1828 originally numbered erroneously as III). Oxford, Oxford University Press.

Prelude: William Wordsworth, *The Prelude, 1799, 1805, 1850*. 1979 ed. Wordsworth J., Abrams, M.H., Gill, S. New York and London, Norton, W.W.

Ketcham, Butler, Curtis, Darlington: editions of Cornell texts. See original sources under Wordsworth, W. a) Cornell Texts.

D.W.J.: *Journals of Dorothy Wordsworth* 1941, ed. de Selincourt, E. London, Macmillan.

Sources for geologists (abbreviations)

GBG CUL.: Cambridge University Library Collection of G.B. Greenough's paper (followed by box number or notebook number).

GBG UCL.: University College Library, London G.B. Greenough's paper (followed by box number or notebook number).

G.B.G.G.S.: Geological Society, London, G.B. Greenough collection.

D.C.L.A.S.: Dove Cottage Library, Adam Sedgwick correspondence.

C.U.L.A.S.: Cambridge University Library Sedgwick Collection (Hughes, T.M. bequest, followed by box or letter number).

T.C.A.S. or T.C.W.: Trinity College Wren Library Cambridge, Sedgwick or Whewell collection.

Douglas: Whewell's biographer: see Douglas, S. 1881.

Todhunter: Whewell's scientific biographer: Todhunter, I. 1876.

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- b) For *Prelude* and de Selincourt and Darbishire
editions see abbreviations.

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GLOSSARY OF GEOLOGICAL TERMS
used in the thesis

- Actualism:** The term commonly in use to describe Hutton's theories and, at first, Lyell's when they expounded the hypothesis that the actual processes of erosion which we now experience (water, frost, wind, and some local volcanic action) were sufficient to explain all landscape features. The term was rapidly replaced by "Uniformitarianism" coined by William Whewell to summarize Lyell's theories. (See also Marston, V.P. 1984 for a slightly more particular definition).
- Alluvial:** Present-day usage applies to the action and products of river and stream action. Hence "alluvial", a -detritus, a -fan, a -plain) and "alluvium" river-borne material when deposited.
- Antecedence:** See notes to Chapter 5.
- Basalt/Basaltic:** Finely-grained rock, dark or black in colour, often found in large sheets covering substantial areas. The columnar structure of basalt rocks produces a characteristic scenery, seen at its most dramatic on sea shores, such as Fingal's Cave, the Giants' Causeway and in Mull. Basalt is formed by igneous (volcanic) action (q.v.).
- Bowder (or Bowder Stone):** Erratic stones or boulders. They are distinctive phenomena which puzzled geologists until ice-sheet theory was accepted. Ingenious explanations were attempted (See Chorley, R.J. et. al. 1964: 197).

- Cambrian:** The term used for the earliest of the periods of the Palaeozoic Era (See Chapter 7). The terminology of the Palaeozoic era (q.v.) was debated by the early nineteenth-century geologists often with deep disputes (see Rudwick, M. 1985, Hallam, 1989 and Torrens, H. 1990).
- Catastrophism:** The overall name for a variety of theories which relied on the idea of a series of major disruptions in the history of the earth. Some catastrophists included the Biblical Deluge in their scheme of thought, but many assumed a sequence of events, including fire as well as flood, which from time to time engulfed the world. (For the impact of these theories on pictorial art see Pointon, M. 1979).
- Cirque, Corrie, Cwm:** Associated with glaciated mountains, these are hollows with a steep back wall and sides, roughly circular in shape, they often contain a tarn and the stream coming out of the tarn may leave the upland valley by a waterfall.
- Cleavage:** The splitting of crystals along planes of weakness. The effect of metamorphosis (q.v.) may be to change crystals and to encourage fractures. Slates are the most common examples. A "second cleavage may be superimposed across an original slaty cleavage" (Allaby, M. 1985: 43). Cleavage had to be distinguished from sedimentary layering in the early years of debate about Werner's theories (See Chapter 7).
- Correlation:** Defined as a procedure for identifying similar phenomena across strata, this technique is particularly important in early nineteenth-century geology. A modern explanation is useful: "This is

the technique of stratigraphical correlation which, by repeated application to many sections, enables the fragments to be pieced together so that a compound reference section of the geological column is synthesized" (Hodson, F. 1967: 1).

- Erratics:** Isolated rocks which occur in areas where their mineral composition (and often their shape) are unusual (See also Bowder Stone and Glacial Ice-Sheets).
- Geomorphology:** The term used for the study of landforms (sometimes synonymously with "physiography"). According to Chorley, it was coined by the American geologist, G.K. Gilbert (Chorley R.J. 1964: Chapter 28).
- Glacial Ice-Sheets:** Louis Agassiz receives the credit for theories of ice-sheets in the mid-1830s, but the effect of alpine glaciers and of frost-shattering and melt-water had been understood well before Agassiz's theories were understood. His distinctive approach was to propose large-scale ice-action over a landscape which appeared never to have been covered by anything other than water (if you were a Wernerian).
- Igneous Rocks:** Rocks formed by heat, made molten and then cooled, usually divided into two sub-groups: volcanic and plutonic. One of the 3 main groups of rock types (See also sedimentary and metamorphic).
- Intrusion:** (Often, Plutonic, Volcanic or Igneous intrusion). A body of igneous rocks which has been forced into existing rocks producing features such as "dykes" or "sills".

Karst (Causse-French) Scenery:

The striking scenery of limestone areas, such as gorges, underground streams, natural cave systems and deeply fissured limestone "pavements". The word "Karst" was applied in modern times from the Yugoslavian Karst district.

Metamorphic:

Rocks which have undergone changes from the solid state by heat, pressure or chemically active fluids (Whitten, D.G.A. and Brooks, J.R.: 287). The metamorphosed rock is the product of the parent rock and the metamorphic processes.

Moraine:

A feature of a glaciated landscape - "Ridges of rock debris" is a general description but they may be extensive and varied, lateral to the glacier or at its terminus.

Neptunean Theory:

Associated with Abraham Gottlob Werner, a theory that rocks and major landforms originated from aqueous solutions. (See, for instance, Chapter Three).

Palaeontology:

The study of ancient life, usually in fossils and the interpretation of their significance. The term did not come into use until 1834, replacing a term derived from the study of shells.

Palaeozoic:

This is the geological name for one era of time. It included (by the end of the "great debate" between Sedgwick and Murchison) the Cambrian, Ordovician and Silurian systems in the Lower (older) sub-era and Devonian, Carboniferous and Permian systems in the newer, upper sub-era. We now classify rocks beneath the Palaeozoic as Precambrian. In the early nineteenth century, as stated in the text, the oldest rocks were called "Primary" and this term covered

most of the strata we now call Pre-Cambrian and the Palaeozoic sub-era; although its "upper boundaries" were always in dispute.

Plutonic:

(See also "Igneous" and "Vulcanicity". A term originally applied to a mass of once-molten material beneath the earth's surface. Now in use as a division of "igneous" rocks.

**Primary or Primitive/
Secondary Transitional/
Tertiary and Flotz:**

are names to describe the major eras of geological time, proposed by Werner. "Primitive" was used by early nineteenth-century stratigraphers. Werner's divisions were Primitive, followed by Derivative and Volcanic rocks. English systems used both "Primitive" and "Primary" then "Secondary" which gave way to Mesozoic as the name of the era younger than Palaeozoic.

Schist:

Now defined as a metamorphic rock with its minerals aligned in a parallel arrangement. It splits easily (see Cleavage). It has an interesting derivation from the Greek (schism) then through Pliny into French (according to OED) and into general use. I have noted Hutton's early use of the term as well as Wordsworth's. OED gives 1793 as the earliest date, but I believe Hutton used it in 1785.

Sedimentary:

One of the three main groupings of rocks, defined by the method of formation. Sedimentaries have been laid down by water (and in some cases by wind) (See also "igneous" and "metamorphic").

Stratigraphy:

The study of stratified rocks, their sequence and the correlation of beds in different localities. A

stratigraphic column is the description of the sequence of eras and sub-eras hypothesized by stratigraphers.

- Strike:** "The direction in which a horizontal line can be drawn on a plane" (Whitten, D.G.A. and Brooks, J.R.V. 1972: 432). The strike help to determine the angle of dip of strata. Sedgwick is credited with introducing the word from the German.
- Superimposition:** See Note to Chapter Six.
- Syncline:** See Chapter 7. When strata are folded, names are required for the limbs of the down-fold (syncline) and the limbs of the upfold or dome-like shape (anticline).
- Unconformity:** Considered in detail in Chapter 3 on James Hutton. An unconformity is between beds, where there is evidence of marked change in some way (change in angle of dip, change in rock type, evidence of an interruption).
- Uniformitarianism:** See "actualism".
- Vulcanism:** The name for geologists who explain landscape features as the product of molten material from subterranean sources. Hutton was dubbed a "Vulcanist", but he should not be regarded as the sole exponent of Vulcanist theory. Werner also identified some rocks of volcanic origin which existed "at the appearance of the universal ocean and hence the sediments could be conveniently deposited directly on top of them, or were themselves chemically marine precipitates" (Chorley R.J. et. al. 1964: 43). French geologists extended Werner's work by field-work in their own country