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**A possible Laurentian volchoviid ophiocistioid from the  
Katian of southwestern Ohio**

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Manuscripts

1 **A possible Laurentian volchoviid ophiocistioid from the Katian of**  
2 **southwestern Ohio**

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12 **Running Header:** Enigmatic Katian Echinoderm

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14 The Cincinnatian (Katian) of the Cincinnati Tri-State area is widely regarded as one of the most  
15 fossiliferous sections known (Meyer and Davis, 2009). Echinoderms from these strata include  
16 well-described asteroids, crinoids, cyclocystoids, edrioasteroids, glyptocystoids, mitrates, and  
17 ophiuroids. John Pope discovered a partially articulated echinoderm in float from the Fairview  
18 Formation that does not correspond to any known Cincinnatian echinoderm. Although mentioned  
19 in Ubaghs (1966, as a presumable personal communication from Pope, 1960), Haude and  
20 Langenstrassen (1976), Reich (2001), and Reich and Haude (2004), this specimen at the  
21 Cincinnati Museum Center (CMCPIP 51316) has neither been described nor illustrated; yet,  
22 these authors attributed it to *Volchovia* Hecker, 1938 in the Class Ophiocistioidea. Questions

23 swirl around this fossil: what is its complete morphology; does it belong to *Volchovia*; whether  
24 or not it can be assigned to *Volchovia*, is it an ophiocistioid? The first step to understand this  
25 enigmatic echinoderm is to illustrate and describe the specimen, which is the objective of this  
26 note.

27 The specimen in question was collected in 1957 from the upper part of the Fairmount  
28 Member, Fairview Formation (Ordovician, Katian) in the Emming Street Quarry, Cincinnati,  
29 Ohio (this information is recorded on the specimen label). The morphologies of Cincinnati  
30 echinoderms are typically well understood, and none of these has plating similar to *Volchovia*,  
31 except perhaps CMCIP 51316. *Volchovia* is reconstructed as having a dome-shaped test with  
32 pointed marginal plates (yielding a periphery with a serrated appearance) and central plates of  
33 variable sizes and shapes. The periproct and a sutural pore between two posterior marginal plates  
34 are also present on the aboral test surface of *Volchovia* (Ubaghs, 1966, fig. 135).

35 CMCIP 51316 is an incomplete, partially articulated specimen interpreted to be  
36 approximately half of the outer rim of a specimen and thought to have been subcircular in outline  
37 (Fig. 1.2). The specimen is ~11 mm long and ~8 mm wide and has a dome-shaped test (Fig. 1.1).  
38 It is primarily formed of thin marginal plates that are of different sizes. The abaxial (outer) edge  
39 of the specimen is serrated because the outer edge of each marginal plate ends in a point (Fig.  
40 1.2, 1.3). One large plate is interpreted to be a plate from the central portion of the specimen.  
41 Perhaps much smaller polygonal plates from the central portion are present, but it is unclear  
42 whether these smaller plates belong to this specimen or if they are part of the matrix in which  
43 this specimen was buried. No evidence for a periproct or other opening is present. Different sized  
44 marginal plates distinguish this specimen from reconstructions of *Volchovia* (Hecker, 1938,  
45 1940; Ubaghs, 1966).

46 Notes from echinoderm workers who have examined this specimen express varying  
47 opinions about its systematic placement but urge its illustration. Thus, this specimen is illustrated  
48 for the first time. As noted the outer rim of plates is not identical to either *V. mobilis* Hecker,  
49 1938 or *V. norvegica* Regnéll, 1948. The marginal plates are less regular in size and shape than  
50 those in *V. norvegica*, *V. volborthi* Hecker, 1938, and *V. mobilis*. CMCIP 51316 is also smaller  
51 than specimens of *V. norvegica* (50–70 mm), *V. mobilis* (60–70 mm), and *V. volborthi* (80–90  
52 mm). Despite these differences, the morphology of CMCIP 51316 is more similar to these taxa  
53 than to any other Cincinnatian echinoderm. If this Katian specimen is a *Volchovia*, it would also  
54 be the stratigraphically youngest of the species mentioned above. *V. mobilis* (Volkhov–Kunda  
55 Baltic Stages, Estonia) is Dapingian–early Darriwilian, *V. volborthi* (Kunda Baltic Stage,  
56 Estonia) is Darriwilian, and *V. norvegica* (Lysaker Member, Huk Formation, Norway) is  
57 Darriwilian (Kröger, 2012). Furthermore, if specimen CMCIP 51316 is determined to be a  
58 *Volchovia*, it would prove to be the first definitive occurrence of this genus, and family, outside  
59 of Baltica (Lefebvre et al., 2013). Until the morphology of this unusual echinoderm is more fully  
60 understood, we cannot determine whether this enigmatic echinoderm belongs to *Volchovia*.  
61 Thus, we refer to this fossil, herein, as a volchoviid-like echinoderm.

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### 63 **Acknowledgments**

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116 **Figure Caption**

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118 **Figure 1.** *Volchovia?* sp. from the Fairview Formation (Katian); CMCIP 51316, scale bars 2.5  
119 mm. **(1)** lateral view of test, marginal plates projecting out of the photograph, note domed  
120 structure of test, specimen coated with ammonium chloride; **(2)** aboral view of specimen, coated  
121 with ammonium chloride; **(3)** camera lucida drawing of preserved plating.

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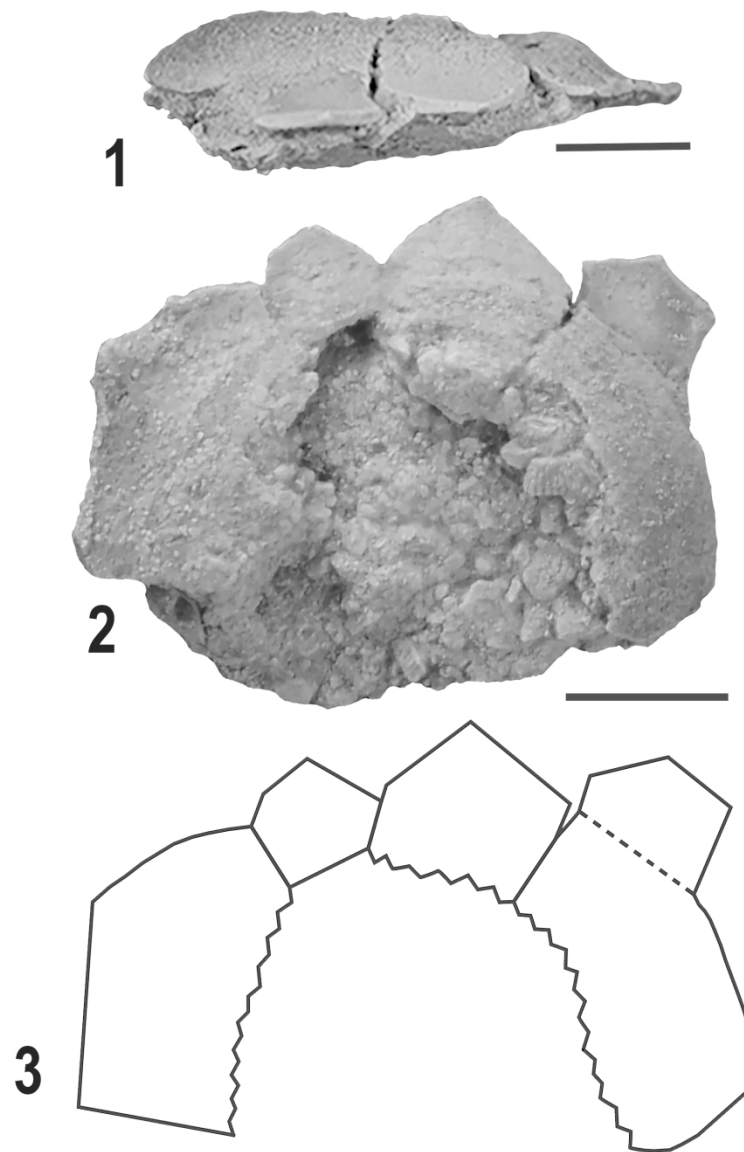


Figure 1. *Vochovia?* sp. from the Fairview Formation (Katian); CMC IP 51316, scale bars 2.5 mm. (1) lateral view of test, marginal plates projecting out of the photograph, note domed structure of test, specimen coated with ammonium chloride; (2) aboral view of specimen, coated with ammonium chloride; (3) camera lucida drawing of preserved plating