

Bulletin of the Mizunami Fossil Museum, vol. 51, no. 1, p. 1–4, 3 figs.

©2024, Mizunami Fossil Museum

Manuscript accepted on March 27, 2024; online published on May 17, 2024

<http://zoobank.org/urn:lsid:zoobank.org:pub:8B2E6FAA-A7FD-412B-85B6-AF67F30C2F72>

Crinoids from slates in the type area of the Devonian, south-west England

Stephen K. Donovan¹⁾, Ben Dixon²⁾, and Fiona E. Fearnhead³⁾

1) Clifton, Swinton, Greater Manchester, M27 8SD, UK

< SKennethDono@gmail.com >

2) Angela Marmont Centre for UK Biodiversity, The Natural History Museum, Cromwell Road, London, SW7 5BD, UK

< b.dixon@nhm.ac.uk >

3) Deceased

Abstract

Identifiable crinoids are rare in the Devonian of the South Devon Basin, south-west England (UK). Hitherto, only two taxa have been described, both in open nomenclature, namely *Ctenocrinus?* spp. (Lower Devonian) and a twenty-armed camerate sp. indet. (Upper Devonian). A new collection, labelled ‘Lower Devonian’ and ‘unidentified crinoid stems’, is described here in slates from Trevone, near Padstow, north Cornwall. Three out of seven specimens are orthoconic nautiloids, not echinoderms. The crinoid gen. et sp. indet. is represented by pluricolumnals; there are no disarticulated ossicles, suggesting that burial was rapid. Some specimens on the largest slab are parallel, likely due to current-induced orientation. Autotomy may have released the crowns due to an environmental disturbance, leaving the columns to be buried locally.

Key words: pluricolumnals, preservation, pyritization, nautiloids, South Devon Basin, Trevoise Slate Formation

1. Introduction

The lead authors of this contribution have been engaged in examining the undescribed collections of the late Dr Fiona Fearnhead (Donovan, 2023). Fiona was an energetic field geologist with a research interest in mid-Palaeozoic crinoids, particularly of the British Isles (e.g. Donovan and Fearnhead, 2014–2021; Fearnhead et al., 2020) and Morocco. Among the undescribed materials are the few specimens documented herein. We do not believe these to have been collected by Fiona, because the only labels are not written in her hand (Fig. 1). A number written on one label, 349, shows that these specimens were part of a collection donated to the Angela

Marmont Centre of the Natural History Museum, London, by Queen Mary College, University of London (QMC), circa 2014.

Terminology of the morphology of the crinoid endoskeleton follows Webster (1974), Ubaghs (1978), Fearnhead (2008), and Ausich and Donovan (2023). All specimens are in the collections of the Natural History Museum, London (NHMUK).

2. Locality and horizon

The more informative of the two labels states: “UNIDENTIFIED CRINOID STEMS. L[owe]R DEVONIAN. TREVONE. N. CORNWALL” (Fig. 1, lower).

Similar data are written on the reverse of NHMUK QMC 349A, adding that Trevone is near Padstow.

This site was not listed by Arkell et al. (1954; but see Leveridge, 2011, fig. 27); indeed, no Devonian site is included therein from this county. It is likely from the Trevoise Slate Formation (upper Givetian to mid-Frasnian; Leveridge, 2011, fig. 3); orthoconic nautiloids are recorded from this unit, but not crinoids (Leveridge, 2011, p. 659). Donovan and Fearnhead (2021, table 6) recognized a moderate diversity of Lower Devonian crinoids from south-west England (Cornwall and Devonshire). Both lithologically (rock) and taphonomically (fossils), the specimens in the present collection are reminiscent of other slates and phyllites with pyritized fossils of the South Devon Basin (Leveridge, 2011; Leveridge and Shail, 2011), such as the Inglebourne slates near Totnes, south Devon (Lower Devonian) and the Upper Devonian Delabole slates (Donovan and Fearnhead, 2021, p. 65).

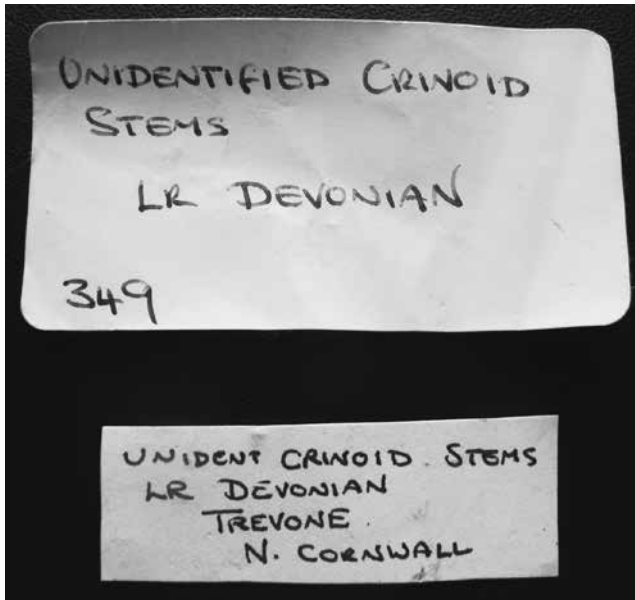


Fig. 1. Specimen labels supplying essentially identical information. The hand writing is not that of Dr Fiona Fearnhead. The original determination was only partly incorrect; three of the specimens are cephalopods.

Only rare, poorly preserved crinoids have been described from this basin, their identity masked by the

effects of regional metamorphism. Multiple specimens assigned to *Ctenocrinus?* from the Lower Devonian of the Inglebourne slate quarries most likely represent more than one species (Donovan and Fearnhead, 2021, pp. 61–62, pl. 18, figs. 4–10; pl. 19, figs. 11–13). A twenty-armed camerate sp. indet. from the Upper Devonian of the Delabole area is known from two specimens (Donovan and Fearnhead, 2021, p. 62, pl. 20, figs. 1–4).

3. Systematic palaeontology

Class Crinoidea J. S. Miller, 1821

Incerti ordinis

Crinoid gen. et sp. indet.

(Figs. 2, 3)

Material: Seven specimens now deposited in the palaeontological collection of the Natural History Museum, London, NHMUK QMC 349A–G. However, three specimens, NHMUK QMC 349C, D, G, are nautiloids, not crinoids (see below).

Locality and horizon: Lower Devonian of Trevone, north Cornwall, south-east England (specimen label). South Devon Basin (Leveridge, 2011; Leveridge and Shail, 2011).

Description: [Based on NHMUK QMC 349A, B, E, F only.] Crinoids preserved as pluricolumnals only (Figs. 2, 3); no disarticulated ossicles apparent. Articular facets not seen, but columnals circular in section. Pluricolumnals mainly straight; where curved may be due to breakage or disarticulation. Latera unsculptured and planar or gently convex. Column heteromorphic, with differing columnal heights, regularly intercalated in at least some specimens, up to three orders of internodals, perhaps regularly N3231323 in NHMUK QMC 349F.

4. Discussion

“... the indifferent preservation of crinoids from the Inglebourne slate quarries ... probably masks the most diverse crinoid fauna from the Lower Devonian of south-west England” (Donovan and Fearnhead, 2021, p. 62).

Preservation of crinoids in the slates of the South Devon Basin is poor. Crinoids are almost unknown from this basin, hence the significance of the present small collection of poorly preserved specimens being described for the first time. However, three short, but robust specimens, namely NHMUK QMC 349C, D, G (not illustrated), are more likely to be orthoconic nautiloids rather than crinoids. All three are brightly pyritised with a broad diameter compared with the crinoids, tall chambers and, where seen, concave septa with a siphuncle. They form a morphologically

distinct set, but demonstrate the potential confusion where these two groups of organisms occur together in a state of inferior preservation.

It is difficult to confirm that NHMUK QMC 349A, B, E, F, represent one or more than one species of crinoid. The features that can be seen support the view of one species, but preservation is indifferent and features of the articular facet, which are commonly pivotal in separating different taxa, are not seen. Broad similarities of latus structure and lack of external sculpture support a conservative assessment as a single species.



Fig. 2. Crinoid gen. et sp. indet., NHMUK QMC 349A. This is the largest slab which preserves several pluricolumnals. Two are obviously parallel, perhaps indicative of current direction; the upper specimen is in close association with that which sweeps down to the centre and the two may be misplaced parts of the same crinoid. Scale in cm and mm.

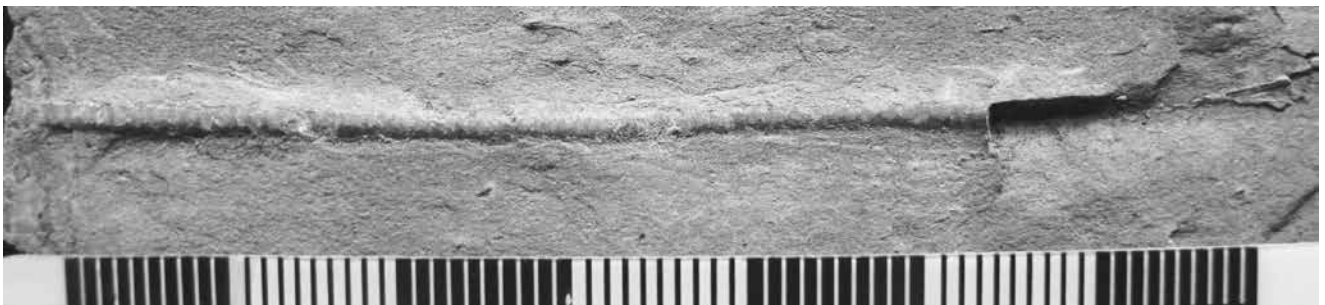


Fig. 3. Crinoid gen. et sp. indet., NHMUK QMC 349B. A single, straight pluricolumnal. Pluricolumnals on all slabs show little variation in form along their lengths, suggesting that all may represent part of the mesistele of long columns. Scale in cm and mm.

Yet these few specimens pose interesting questions regarding taphonomy. Why are crinoids only preserved as pluricolumnals, but without an attachment? Of the likely explanations, the long stems may have been released by autotomy (self-mutilation; Emson and Wilkie, 1980) when the crowns were detached in response to adverse environmental conditions (compare with Fearnhead et al., 2020). The pattern of pluricolumnals on NHMUK QMC 349A is suggestive of current-aligned (or, -induced) orientation of the two parallel specimens (Fig. 2). The specimen curving from the left to the bottom may be broken from the upper pluricolumnal, assuming collagenous ligaments to have been weakened during autotomy. The absence of disarticulated columnals may indicate that the specimens were buried rapidly with no time to disarticulate further (Donovan, 1991).

Additionally, the pluricolumnals show little variation in form along their lengths. As a general rule, albeit with numerous exceptions, the most uniform part of the crinoid column is the mesistele. The proxistele is the growing region, immediately beneath the cup; the dististele is the region of attachment and commonly shows large changes directly related to this function. This suggests that specimens of ‘Crinoid gen. et sp. indet.’, as here illustrated, may all represent the mesistele of long columns.

5. Acknowledgements

We thank our external reviewer, Dr John W. M. Jagt (Natuurhistorisch Museum Maastricht, the Netherlands), for his thought-provoking comments.

6. References

- Arkell, W. J., and 71 others. 1954. Directory of British Fossiliferous Localities. Palaeontographical Society, London.
- Ausich, W. I., and S. K. Donovan. 2023. Glossary of crinoid morphological terms. In W. I. Ausich, ed., Treatise on Invertebrate Paleontology, Part T, Revised, Volume 1, Chapter 7. University of Kansas, Lawrence. Treatise Online 167: 1–26.
- Donovan, S. K. 1991. The taphonomy of echinoderms: calcareous multielement skeletons in the marine environment. In S. K. Donovan, ed., The Processes of Fossilization. Belhaven Press. London. p. 241–269.
- Donovan, S. K. 2023. Obituary: Fiona Elizabeth Fearnhead 1957–2022. Palaeontological Association Newsletter 113: 73–74.
- Donovan, S. K., and F. E. Fearnhead. 2014–2021. The British Devonian Crinoidea (in two parts). Monograph of the Palaeontographical Society 168(643) and 174 (658, for 2020): 1–148.
- Emson, R. H., and I. C. Wilkie. 1980. Fission and autotomy in echinoderms. Oceanography and Marine Biology Annual Review 18: 155–250.
- Fearnhead, F. E. 2008. Towards a systematic standard approach to describing fossil crinoids, illustrated by the redescription of a Scottish Silurian *Pisocrinus* de Koninck. Scripta Geologica 136: 39–61.
- Fearnhead, F. E., S. K. Donovan, J. P. Botting, and L. A. Muir. 2020. A Lower Silurian (Llandovery) diplobathrid crinoid (Camerata) from mid-Wales. Geological Magazine 157: 1176–1180.
- Leveridge, B. E. 2011. The Looe, South Devon and Tavy basins: Devonian rifted passive margin successions. Proceedings of the Geologists’ Association 122: 616–717.
- Leveridge, B. E., and R. K. Shail. 2011. The marine Devonian stratigraphy of Great Britain. Proceedings of the Geologists’ Association 122: 540–567.
- Miller, J. S. 1821. A natural history of the Crinoidea or lily-shaped animals, with observations on the genera *Asteria*, *Euryale*, *Comatula* and *Marsupites*. Bryan and Company. Bristol.
- Ubahgs, G. 1978. Skeletal morphology of fossil crinoids. In R. C. Moore, and C. Teichert, eds., Treatise on Invertebrate Paleontology. Part T. Echinodermata 2(1). Geological Society of America and University of Kansas. Boulder and Lawrence. T58–T216.
- Webster, G. D. 1974. Crinoid pluricolumnal noditaxes patterns. Journal of Paleontology 48: 1283–1288.