# A NEW CAMERATE CRINOID FROM THE ARENIG OF SOUTH WALES

*by* STEPHEN K. DONOVAN *and* JOHN C. W. COPE

ABSTRACT. *Celtocrinus ubaghsi* gen. et sp. nov., from the Middle Arenig of Dyfed, South Wales, is only the second lower Ordovician camerate known. It is of approximately the same antiquity as the other Arenig camerate, the diplobathrid *Proexenocrinus inyoensis* Strimple and McGinnis, but the Welsh species is a monobathrid.

ALTHOUGH the first Ordovician crinoid from the British Isles was described over 140 years ago, fewer than fifty species have been recognized during the intervening period. Two species of lower Ordovician crinoids, out of a world fauna of only about twenty species (Donovan 1988), have been described from the UK. *Ramseyocrinus cambriensis* (Hicks) is well known from the Arenig of Dyfed, South Wales (Bates 1968; Donovan 1984; Cope 1988). *Aethocrinus murchisoni* Donovan is based on a pluricolumnal and a dissociated brachial from the Mytton Flags of Shropshire (Donovan 1986). A third Arenig species from the UK is described herein and is exceptional in being only the second camerate of undoubted lower Ordovician age to be recognized. The unique specimen formed part of the collections of the Department of Geology, University College of Swansea, until its importance was recognized by J.C.W.C.

## SYSTEMATIC PALAEONTOLOGY

Class CRINOIDEA J. S. Miller, 1821
Subclass CAMERATA Wachsmuth and Springer, 1881

*Remarks.* Now that Kelly (1986) has demonstrated that the primitive crinoids *Reteocrinus* E. Billings, *Colpodecrinus* Sprinkle and Kolata, and *Cleiocrinus* E. Billings are not camerates, and has produced a convincing cladistic analysis of the Class Crinoidea (in prep.), the Subclass Camerata has been redefined based on three advanced characters: pinnulation; rigid thecae having both fixed brachials and fixed interbrachials; a radial series which bifurcates at the second primibrachial and the second secundibrachial. In addition, all camerates have a holomeric stem, whereas merism seems to be a primitive condition in the inadunates (Donovan 1988). All of these camerate features are shown by the new species from Triffleton.

Order MONOBATHRIDA Moore and Laudon, 1943*a*

*Remarks.* Plates below the basal circlet, if present, are apparently hidden by the top of the column (Pl. 14, figs. 2 and 3; text-fig. 1). The diameter of the stem is only about 4·5 mm in this region. If infrabasals were present, they would have to be vanishingly minute, unless the base of the cup was strongly concave. It is therefore suggested that this species was most probably monocyclic, that is, a monobathrid. However, in any deduction regarding cup cyclicity we are cautious. The only other camerate crinoid of comparative antiquity, *Proexenocrinus inyoensis* Strimple and McGinnis, 1972, was originally considered to be a monobathrid, but has now been shown to be dicyclic, that is, a diplobathrid (Ausich 1986).

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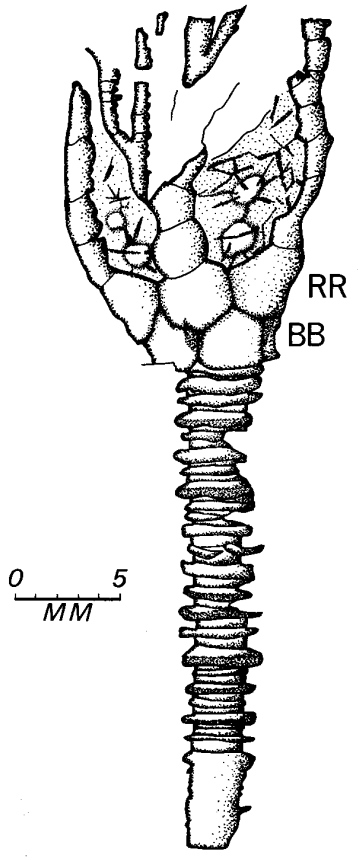
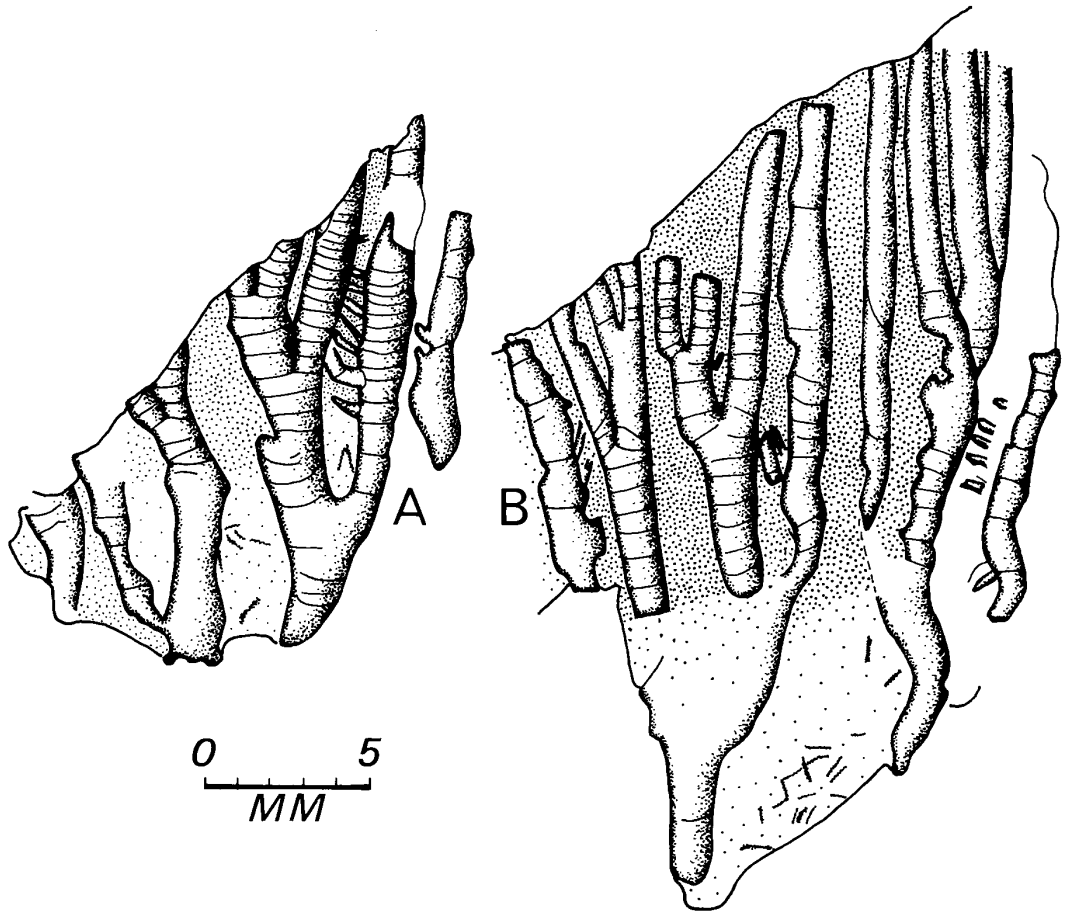
**Incertae familiae**

*Remarks*. The tall, conical crown of the Triffleton species most closely resembles the calyx of two groups of primitive camerates, the monobathrid xenocrinaceans and the diplobathrid archaeocrinids (Frest *et al.* 1976, fig. 2). The Triffleton species is most probably a monobathrid (above) and is easily compared with the four known genera of xenocrinacean (Ubaghs 1978, pp. T440–T443, figs. 249 and 250; Ausich 1986 has shown that *Proexenocrinus* is a diplobathrid rhodocrinitid). Although superficially similar, the arm branching pattern of *Xenocrinus* S. A. Miller is simpler than that of the Welsh species. *X. multiramus* Ramsbottom and *X. breviformis* Brower (Brower 1974) both branch at $1Br_2$ and $2Br_2$; *X. pencillus* S. A. Miller branches only at $1Br_2$ (Ubaghs 1978, fig. 249.1); the arms of the Welsh species branch at least four times. The Triffleton species also has a stem with a circular, rather than a square, section and has a continuous circlet of radial plates which are not separated by interradial ossicles. The interbrachial plates are small and depressed in *Xenocrinus*, whereas in the Triffleton species and all other xenocrinaceans these ossicles are large and prominent. The crown architecture of *Abacocrinus* Angelin (Ubaghs 1978, fig. 249.2A) differs considerably from the new taxon and no detailed analysis is worthwhile. *Canistrocrinus* has five or six fixed secundibrachs and *Compsocrinus* has two fixed secundibrachs, branching at $2Br_2$, or does not branch further after $1Br_2$ (Ubaghs 1978, pp. T440–T441). Neither is closely similar to the Triffleton species.




TEXT-FIG. 1. *Celtocrinus ubaghsi* gen. et sp. nov., holotype, NMW 87.44G.1c. Camera lucida drawing of latex cast. BB = basal plates, RR = radial plates.




TEXT-FIG. 2. *Celtocrinus ubaghsi* gen. et sp. nov., paratypes. A, NMW 87.44G.1*a*. B, NMW 87.44G.1*b*. Camera lucida drawings of latex casts.

Apart from these differences, there are two other points of variance between these genera and the new taxon. Excepting Silurian *Abacocrinus*, all of the xenocrinaceans are of late Ordovician age, so that they are considerably younger than the Welsh species. The Triffleton species also differs from the known xenocrinaceans in that it apparently lacks an anal tube. However, this may be a preservational effect. If all four specimens preserved on the same slab were feeding in the same orientation, with the anus aimed downcurrent, then on burial all four would have approximately the same attitude. It is therefore possible that the anal tube was apparent on the (unknown) counterpart slab. Only a 'complete' crown will resolve this dilemma.

We are cautious in our classification of the Triffleton species. Without a counterpart to the holotype, we are uncertain as to the number of plates in the basal and radial circlets, and whether or not an anal series is present. The pattern of arm branching of the Triffleton specimens also differs from that of all other xenocrinaceans. While tentatively suggesting that the new species may, indeed, be a xenocrinacean, we are hesitant to postulate whether the Triffleton taxon belongs to a known or a new family. A more complete classification requires superior material.

## Genus CELTOCRINUS gen. nov.

*Type species. Celtocrinus ubaghsi* sp. nov.

*Derivation of generic name.* After the ancient inhabitants of Wales.

*Diagnosis.* Camerate crinoid with a circular, heteromorphic ?N212, holomeric proxistele. Basal plates pentagonal and slightly wider than high. Radial plates heptagonal, about as wide as high and in close contact. Basal: basal: radial and radial: radial: basal sutures depressed. Interbrachial region depressed, interbrachial plates large and radially ribbed. Arms uniserial, pinnulate, branching isotomously at the prim- and secundaxillary but heterotomously thereafter.

### *Celtocrinus ubaghsi* sp. nov.

Plate 14; text-figs. 1 and 2

1971 ?*Dendrocrinus* sp.; Bloxam in Owen *et al.*, p. 40.
1988 Monobathrid gen. et sp. nov.; Donovan, p. 235, table 18.1, text-figs. 18.2 and 18.4.

*Derivation of trivial name.* In honour of Professor Georges Ubaghs.

*Material, locality, and horizon.* Four specimens on a single slab, without counterpart, preserved as external moulds. Numbered National Museum of Wales (NMW 87.44G.1*a–d*) *c* is holotype, a partial crown with proximal stem. Paratypes *a*, *b*, *d*, all partial crowns. Other arm and stem debris is preserved on the slab. Collected from Triffleton Quarry, Dyfed, South Wales, about 10 km north of Haverfordwest (NGR SM97752426). Locality 16 of Paul (1984). Brunel Beds, Middle Arenig *sensu* Fortey in Whittington *et al.* (1984, pp. 20–21). We have been unable to relocate the precise horizon from which this specimen was derived but note that dissociated plates of Cheirocrinidae sp. A. Paul, 1984 (pp. 114–116), are common in the lower part of the section, along with a single specimen of a cyclocyclic ?crinoid columnal that is dissimilar to the stem ossicles of *C. ubaghsi* (Donovan, in press).

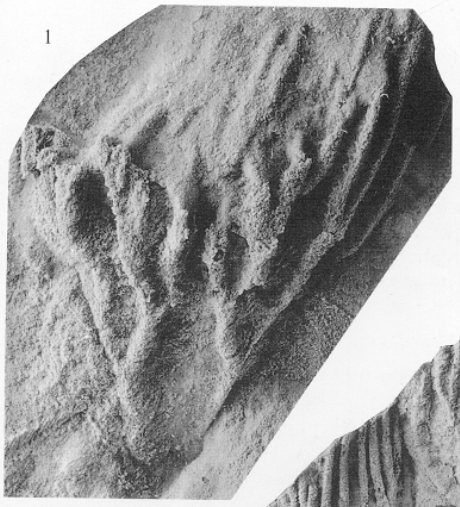
*Diagnosis.* As for the genus.

*Description.* Stem: only the holotype retains part of the proximal column. This preserved about 24 mm of the proxistele, which is heteromorphic, approximately N212. Secundinternodals have planar latera. Both nodals and priminternodals have rounded to angular epifacets. In consequence, they are both broader than secundinternodals. Nodals are taller than priminternodals. Secundinternodals about as high as priminternodals. Latera of all columnals unsculptured. Features of the articular facet, distal column, and attachment unknown. A dissociated pluricolumnal, close to specimen *a* and about 7 mm long, has a similar morphology to the proxistele of the holotype.

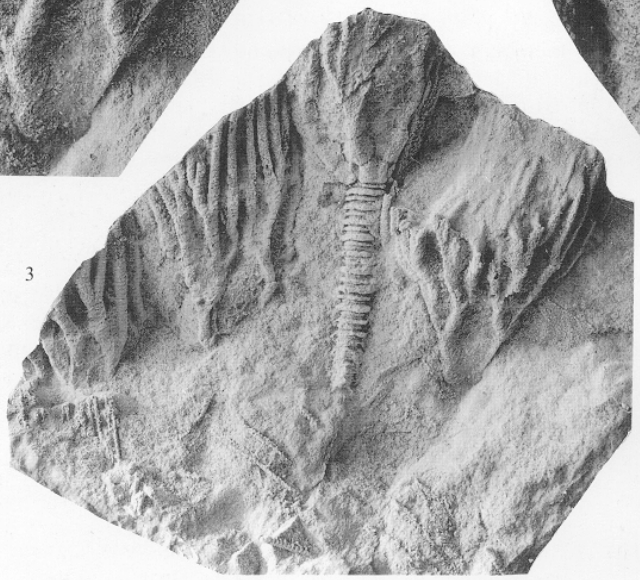
Dorsal cup: seen in the holotype (Pl. 14, figs. 2, 3, 4; text-fig. 1). Basals pentagonal, slightly wider than high. Basals unsculptured, each with two parallel ridges, one derived from each of the supported radials. Basal: basal: radial and radial: radial: basal regions depressed. Number of basal and radial plates unknown but at least three of each apparent in the holotype. Radial plates in close contact, infolded interradially but raised in a ridge radially. Radial plates about as wide as high, heptagonal, with convex, unsculptured latera. No evidence of an anal series is apparent but this may be an artefact of preservation (see above).

### EXPLANATION OF PLATE 14

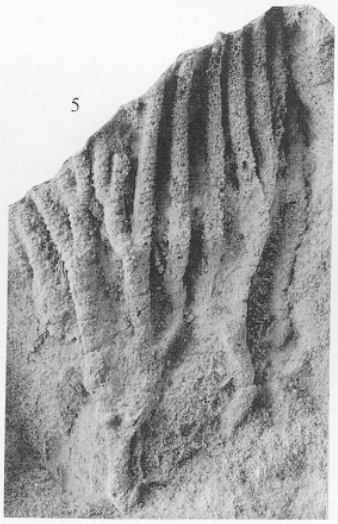
Figs. 1–6. *Celtocrinus ubaghsi* gen. et sp. nov., NMW 87.44G. 1*a–d*. Whitlandian Stage, Middle Arenig, Triffleton Quarry, Dyfed, South Wales. All latex casts whitened with ammonium chloride. 1, NMW 87.44G. 1*d*, paratype, partial crown, showing branching of arms, ×2·5. 2, NMW 87.44G. 1*c*, holotype, partial crown with proximal stem, ×3. 3, NMW 87.44G. 1*a–d*, complete specimen with four partial crowns and distal parts of arms of other specimens, ×1·25. 4, NMW 87.44G. 1*c*, holotype, enlarged view of part of dorsal cup to show details of interbrachial plates, ×5. 5, NMW 87.44G. 1*b*, paratype, partial crown displaying some interbrachial plates and pinnules on some arms, ×2·5. 6, NMW 87.44G. 1*a*, paratype, partial crown showing pinnules on arms to right of figure, ×3·5.













DONOVAN and COPE, *Celtocrinus*

Interbrachial plates (Pl. 14, figs. 2, 3, 4, 5; text-fig. 1): sutures between plates are difficult to determine but they seem to bear a sculpture of low, radiating ribs. Plates appear to be large, with a raised, elliptical, central region. Interbrachial plates are present at least to above the level of the secundaxillaries.

Arms (Pl. 14, figs. 1-3, 5, 6; text-figs. 1 and 2): arms branch isotomously at the primi- and secundaxillaries and heterotomously thereafter. Arms branch at least four times. Plate sutures often poorly preserved. Apparently two large primibrachials per arm. Secundibrachials smaller than primibrachials, two per arm branch. Branching does not appear to occur at the tertibrach level in all arm branches. Where it does occur, the tertaxillary is at about the level of $3Br_{12}$. More distal branches of the arm slender. Arms uniserial, pinnulate. Pinnules more slender than the branches of the arm. Both pinnules and brachials have planar, unsculptured latera. Adoral groove broad, U-shaped. Number of arms unknown, at least three, probably either four or five.

*Discussion.* This is only the second lower Ordovician camerate crinoid to be described and is consequently one of the oldest members of the subclass known. The other Arenig species, *Proexenocrinus inyoensis* Strimple and McGinnis, is from the trilobite zone J of D. C. Ross (Ross 1966; Ausich 1986), which is approximately equivalent to the early part of the *D. nitidus* Biozone (R. J. Ross *et al.* 1982, sheet 1). It is therefore also Middle Arenig in age. *Trichinocrinus terranovicus* Moore and Laudon, 1943*b*, was originally described as lower Ordovician (Canadian) in age but it is most probably from the Lower Llanvirn (H. B. Whittington, written comm.). This paucity of early Ordovician camerates is noteworthy because elsewhere in the Palaeozoic record camerate thecae often seem to have been more durable than inadunate cups, yet at the time of writing about eighteen species of lower Ordovician inadunates are known (Donovan 1988).

*C. ubaghsi* is only the sixth camerate crinoid known from the British Ordovician south of the Iapetus suture (*Colpodecrinus forbesi* Donovan is now recognized to be non-camerate; Kelly 1986). Three species are diplobathrid archaeocrinids of the genus *Balacrinus* Ramsbottom. *B. basilis* (M'Coy) and *B. inflatus* Donovan are both Caradoc and a third species, from the Lower Llanvirn, awaits description. Two species of *Xenocrinus*, *X.? blaenycwmensis* Donovan and *Xenocrinus*? sp. Donovan, have both tentatively been recognized from the Ashgill on the basis of dissociated columnals. The fauna is thus small and also taxonomically conservative, being limited to, at most, just three families.

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