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A New Occurrence of the Inadunate Crinoid Genus *Microcaracrinus*

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A crown of the rare crinoid genus *Microcaracrinus* is reported for the first time from Oklahoma as *M. pratti* n. sp. It is from a northern extension of the Avant Formation exposed in Washington County, Oklahoma. Discussion of possible affinities of the genus is included.
INDEX DESCRIPTORS: Crinoidea, Staphylocrinidae, *Microcaracrinus, M. pratti;* Ramona, Washington County, Oklahoma; Avant Formation, Missourian, Upper Pennsylvanian.

The purpose of this study is to report a well preserved crown of *Microcaracrinus* from a northern extension of the Avant Formation, Missouri Series, Upper Pennsylvanian and to consider the present status of the genus. The crown was obtained from Dr. and Mrs. Wm. H. Pratt of Bartlesville, Oklahoma and was collected from west of Ramona, Washington County, Oklahoma in SE¼ SE¼ NE¼ sec. 25, T.24N, R.12E. (fig. 1). The exposure happens to be the same as that from which I collected my first crinoids in about 1935 and which produced some of the material described in my first paper (Strimple, 1938). The following species have been found in calcareous shale just above the two Avant limestone stringers at the exposure: *Erisocrinus typus, Delocrinus subhemisphericus, Apographiocrinus arcuatus, Endelocrinus* sp., *Stellarocrinus virgilensis,* and *Isoallagecrinus* sp. *Exoriocrinus ramonaensis* is from the less fossiliferous shale a few feet below the upper limestone stringer and *Aesiocrinus detrusus* is from a few feet above the same thin limestone which is mainly a plant bearing shale. *Microcaracrinus pratti* n. sp. was found in the shale below the top stringer which also contains some productid brachiopods. The two corals *Neokonickophyllum heckeli* and *N. strimplei* are from the largely covered massive limestone build-up at the top of the locality.

Microcaracrinus is represented by stalked small species with rather delicate uniserial arms and ranges from Atokan to Lower Permian. Conversely the older genus *Staphylocrinus* has unusually thick cup plates and arms and lacks a stem. They both are currently assigned to the family *Staphylocrinidae.* It is of course possible that *Microcaracrinus* might represent an end member of the lineage but existing evidence indicates the probability of alternative relationships as will be discussed in the systematic portion of this study.

SYSTEMATIC PALEONTOLOGY

Class CRINOIDEA Miller
Subclass INADUNATA Wachsmuth & Springer
Order CLADIDA Moore & Laudon
Suborder POTERIOCRININA Jaekel
Superfamily TEXACRINACEA Strimple
Family STAPHYLOCRINIDAE Moore & Strimple
Genus MICROCARACRINUS Strimple & Watkins, 1969
Type species. *Microcaracrinus delicatus* Strimple & Watkins, 1969.

Description

(After Moore, Strimple and Lane, 1978, p. T747) Crown tall slender. Cup shallow, bowl-shaped, with narrow basal concavity; infrabasals small, confined to basal concavity; large basals tangent to basal plane of cup; large radials wider than high, articular facets filling distal face of radials; 3 anals, radianal in posterior position, anal X and right tube plate above with confluent distal surfaces. Anal sac short, sharply looped. Arms slender, uniserial, with well rounded exteriors, not abutting, pinnules stout; first branching on primibrachs 1 in all rays and a second branching higher, a third bifurcation may take place in some inner half-rays only (exotomous). Column transversely round.

Included species

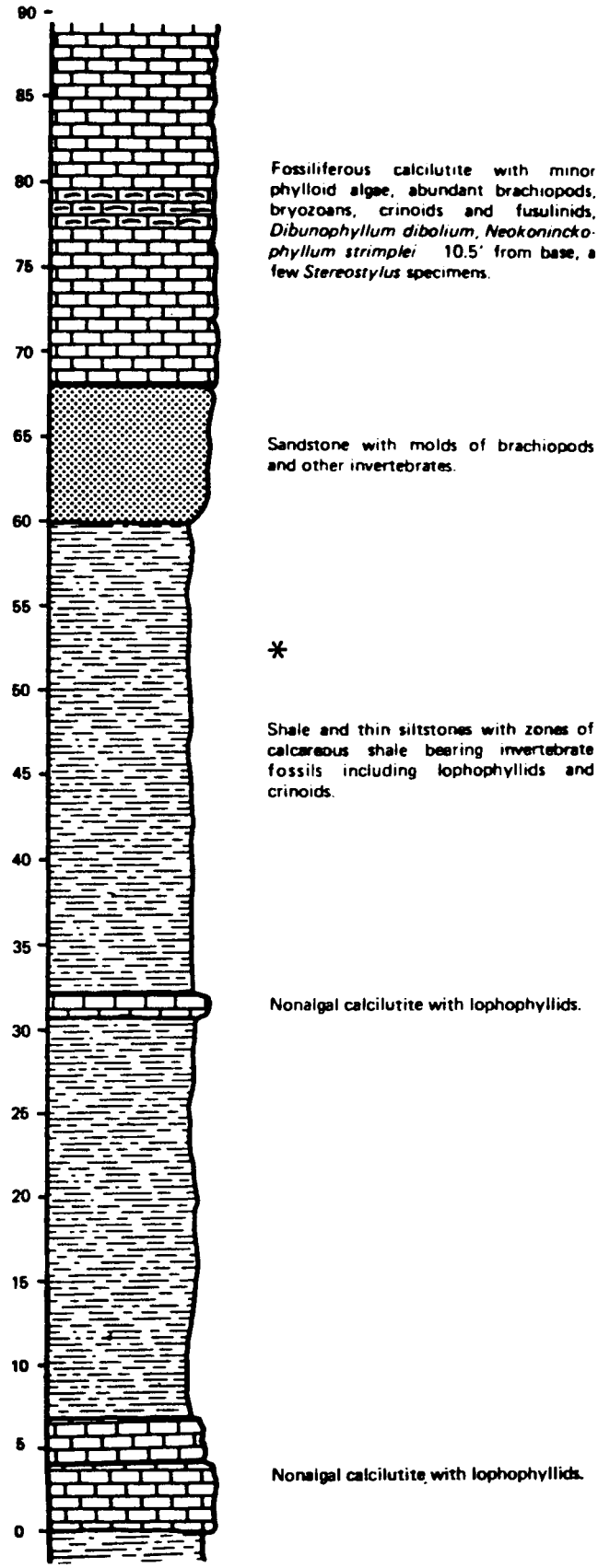
Occurrence data for all presently accepted *Microcaracrinus* are summarized below:

Taxon	*Age*	*Occurrence*
Microcaracrinus delicatus Strimple & Watkins	Atokan Desmoinesian	Coal County, Oklahoma Parker County, Texas
M. pachypinnularis (Yakovlev & Ivanov, 1956)	Kassimovskii hor., L. Missourian?	Kalinin, USSR
M. conjugulus Strimple & Moore, 1971	Missourian	Livingston County, Illinois
M. bellirugosus (Moore, 1939)	Virgilian	Lyon County, Kansas
M. colubrosus (Moore, 1939)	Wolfcampian	Butler County, Kansas
M. twenhofeli (Moore, 1939)	Wolfcampian	Riley County, Kansas
M. pratti n. sp.	Missourian	Washington County, Oklahoma

Discussion

Plummericrinus Moore & Laudon (1943) has many features which are comparable to those of *Microcaracrinus*; however, the shape of the dorsal cup is quite different. In *Plummericrinus* there is a marked difference between the lower and upper parts of the cup; the lower part is like a rounded bowl but the upper half flares outward. The distinctive differentiation is much more pronounced in the type species *P. mcguirei* (Moore, 1939) than in species like *P. erectus* Strimple (1954). The scalloped appearance in horizontal view of the cup of *P. mcguirei,* which reflects peneplenary radial articular facets, is not shared by all species of the genus. In *Microcaracrinus* the dorsal cup has a rounded bowl shape and the radial articular facets are plenary. This feature in itself does not seem to be adequate for generic distinction, but there is yet another decided difference, albeit less well known, which concerns the anal sac.

In *Microcaracrinus* the anal sac is only known for *M. colubrosus* (Moore, 1939, text-fig. 8d, pl. 7, fig. 6b); Moore, Strimple and Lane, 1978, fig 494, le, g and for *Plummericrinus* it is known for *P. erectus* Strimple (1954); Strimple and Moore (1971, pl. 10, fig. 2). The anal sac of *M. colubrosus* as reported for both the holotype and paratype is in the form of a recurved tube extending one third the height of the arms. The exterior of the loop is formed by a double series of thickened plates



that meet without intervening respiratory slits and form a channel that is bordered by two sharp, often nodose keels. Within the coil the two sides of the sac are depressed and formed of columns of thin plates with prominent slits. The anal vent is apparently low on the anterior side (Moore, 1939, p. 221, text-fig. 8d). This type of anal sac is known for *Haeretocrinus wagneri* Strimple and Moore (1971, pl. 13, fig. 1c), and *Terpnocrinus ocoyaensis* Strimple and Moore (1971, pl. 14, figs. 1a-d); Moore, Strimple and Lane (1978, fig. 419, 1f, fig. 449, 3a-c).

In studying the prolific crinoid fauna from the LaSalle Limestone (Missourian), Livingston County, Illinois it appeared to me that *M. conjugulus* might represent a youthful stage of *Plummericrinus erectus* or to at least be closely related. For this reason *Microcaracrinus* was referred to the family Pachylocrinidae (Strimple and Moore, 1971, p. 16). With recovery of additional material it was discovered that *M. conjugulus* was very rare whereas the larger *Plummericrinus erectus* was relatively common. No specimens were recovered that could be construed as intermediate between the two species (or genera). Moore, and Strimple (1973, p. 31) referred *Microcaracrinus* to the family Staphylocrinidae based primarily on general morphology of the cup. The anal sac is unknown for representatives of the family Staphylocrinidae Moore and Strimple (1973) with the exception of *Microcaracrinus* therefore it is not possible to verify real relationships although some genera, including *Microcaracrinus* should only questionably be included in the family. In my opinion the family Staphylocrinidae as presently construed is polyphyletic.

Plummericrinus erectus has a long essentially unlooped anal sac, extending nearly the full height of the arms. Additional materials allow a more comprehensive understanding of the sac, which is quite different from that of *Microcaracrinus colubrosus*. In *P. erectus* there are two uniserial series of slightly thickened plates one on each side of the anal tube and bordering three or four rows of plates of the posterior and in the anterior. Lateral sides of the thickened plates bear slits which meet with slits on the adjoining rows of thin plates but the thin plates meet without intervening respiratory slits. The distal termination of the anal sac has not been observed. It appears that *Microcaracrinus*, *Haeretocrinus* and *Terpnocrinus* may be closely related and that *Plummericrinus* is no more than distantly aligned with them.

MICROCARACRINUS PRATTI Strimple, new species
Figures 2 a, b

Diagnosis

Arms have moderately long, linear brachials which do not constrict in midsection but do retain a faint keel.

Description

Cup low bowl-shaped with narrow basal invagination; infrabasals missing but proximal portions of large basals are flexed into basal plane; radials large, wider than high, articular facets fill distal surfaces of radials; three anal plates with radianal in posterior position and anal X and small, right tube plate above. Arms slender, do not abut, pinnules prominent; primibrachs 1 axillary in all rays, elongated with those of B and E rays considerable shorter than in A, C and D rays, second branching on secundibrachs 4 or commonly 5, a third bifurcation is present in one inner half-ray on tertibrach 10. Anal sac unknown.

Figure 1. *Graphic column of the northern extension of the Avant Formation (middle and upper Wann Formation), roadcut on north side of winding east-west road, approximately 3 miles west of Ramona, Oklahoma, in SE, SE, NE sec. 25, T.24N, R.12E. (after Cocke & Strimple, 1973). (*) Asterisk indicates approximate horizon from which* M. pratti *was collected.*

Figure 2. Microcaracrinus pratti *n. sp., holotype SUI 44921. A. B ray view, X3.7. B. Drawing of D ray view of cup made with the aid of a camera lucida, X6.*

The crown is 18.7 mm long; B radial plate 2.9 mm wide, 1.9 mm long; basal plate 1.8 mm wide, 1.6 mm long.

Discussion

M. pratti is most like *M. colubrosus,* however the latter species has pronounced pits marking the angles of the cup plates and has somewhat shorter non-axillary brachials which are sharply keeled. *M. bellirugosus* is most readily differentiated by its pronounced surface ornamentation consisting of sharp crested ridges and pustules. *M. pachypinnularis* has very stout, distinctive appearing pinnules and mid-sections of brachials are constricted. The adsutural areas of brachials in *M. conjugulus* are expanded, as they are in *M. delicatus,* and non-axillary brachials are slightly staggered, giving a sinuous appearance to the arms. *M. twenhofeli* has short primibrachs 1 and brachials are decidedly keeled.

Name

Patronomic *pratti* for Dr. and Mrs. Wm. H. Pratt.

Occurrence

Avant Formation, Missourian, Upper Pennsylvanian; road cut in hill about 3 miles (5.4 km) due west of Ramona, SE, SE, NE sec. 25, T24N., R. 12E., Washington County, Oklahoma.

Holotype

SUI 44921, Geology Department Repository, The University of Iowa, Iowa City.

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