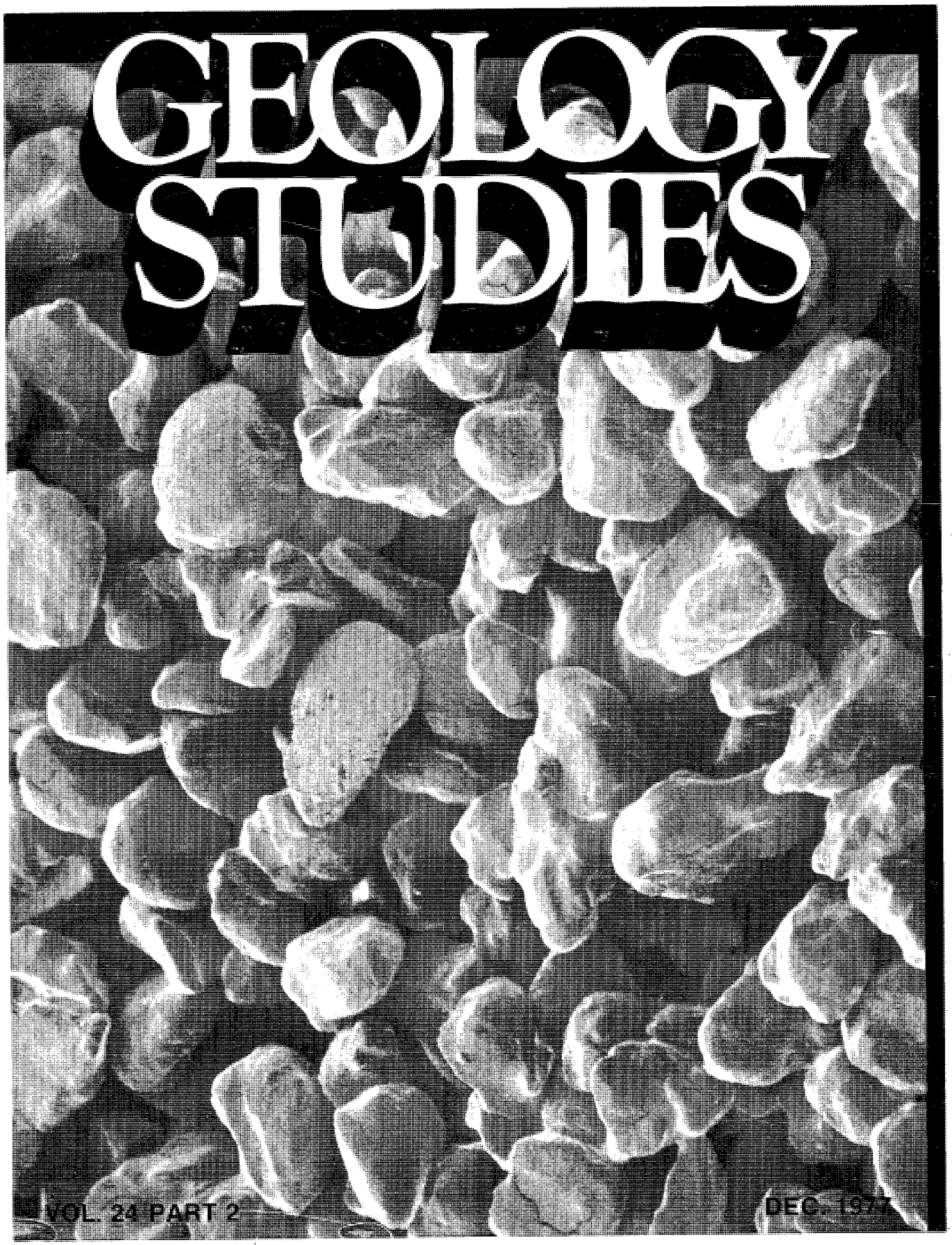
BRIGHAM YOUNG UNIVERSITY

GEOLOGY STUDIES



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A New Species of *Arroyocrinus* (Inadunata) from the Park City Formation (Upper Permian) of Utah

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ABSTRACT.–A single well-preserved cup with a rigid tegmen, or anal sac, preserving a single axillary first primibrach in C ray is described as *Arroyocrinus stokesi,* n. sp. The species is from the Franson Member, Park City Formation, Upper Permian exposed in Dry Creek Canyon, Wasatch Mountains, northeast of Salt Lake City, Utah. This is the first Permian crinoid to be described from Utah. *Arroyocrinus* was previously reported from only a single locality in Nevada. Close resemblances of both species of *Arroyocrinus* to *Texacrinus* suggest that the former should be classed with the Texacrinidae rather than with the Ampelocrinidae.

INTRODUCTION

The specimen described in the paper was discovered by a geology student and given to Dr. W. Lee Stokes, University of Utah, in about 1949. It was found in talus on the south-facing slope of Dry Creek Canyon in the Wasatch Mountains northeast of Salt Lake City almost certainly in the northeast corner of section 33, T.1 N, R.1 E, Salt Lake Base and Meridian.

The rocks exposed here belong to the upper half of the Franson Member of the Park City Formation. The entire south-facing canyon wall at this locality is very nearly a dip slope in the Franson Member with rocks of no other unit present. There are many fossils, mostly poorly preserved. The precise age is somewhat in doubt, but is certainly either late Guadalupian or early Ochoan. In any event the strata here are only a few hundred feet below the base of the Triassic and may belong near the close of Permian deposition in the region. No other Permian crinoids have yet been described from Utah; this is in stark contrast to the rich Permian crinoid fauna reported for southern Nevada by Lane and Webster (1966). Other crinoids are known to occur in the Franson Member, but cups are exceedingly rare.

Dr. Stokes kindly made the specimen available to us for description, as well as providing the information above. The species has been named *Arroyocrinus stokesi,* n. sp., in his honor.

SYSTEMATIC PALEONTOLOGY

Subclass INADUNATA Wachsmuth & Springer, 1885
Order CLADIDA Moore & Landon, 1943
Suborder POTERIOCRININA Jaekel, 1918
Superfamily TEXACRINACEA Strimple, 1961
Family TEXACRINIDAE Strimple, 1961
Genus ARROYOCRINUS Lane & Webster, 1966
Arroyocrinus stokesi, n. sp.
Figures 1, 2

Description.–Dorsal cup bowl-shaped with broad, deep basal concavity; cup plates, other than infrabasals, tumid with impressed sutures. Infrabasals small, apparently fused, extending only slightly beyond the round proximal columnal in a subhorizontal plane. Five large basals flex into the basal concavity; their proximal portions form a sizable funnellike invagination; posterior (CD) basal longer than other basals with distal end truncated for reception of a single anal plate. Five radials very large, with proximal terminations well above the basal plane of the cup; outer ligamental area well developed. Primibrachs *1* axillary, low, with rather short lateral sides, tumid. Anal sac broad, domelike, but short, composed of large rigidly united plates. Proximal columnals round, almost covering infrabasals. Deep crenellae mark the perimeter of the articular facet between columnals; lumen small, round.

Discussion.–Arroyocrinus stokesi is more advanced than *A. popenoei,* type species of the genus, in the positioning of anal plates in the CD interray. In the latter species, the radianal lies obliquely across the upper surface of CD basal with anal X and RX respectively to the left and right above. Both anal X and RX in *A. popenoei* extend above the cup summit, but proximal portions reach well below the distal edge of the cup. The lower right portion of the radianal maintains contact with BC basal. *A. stokesi* has only two anal plates in the cup, but the RX, which is much reduced in size, still maintains a narrow contact with the radianal. However, the radianal in this species is much reduced in size, has lost contact with BC basal, and has a wide diagonal contact with anal X, which plate is almost ejected from the cup.

Although arms are not preserved above the primibachs in the present specimen, it is needful to discuss them in conjunction with the disposition of the genus. Lane and Webster (1966, p. 40) were aware of the unique nature of the

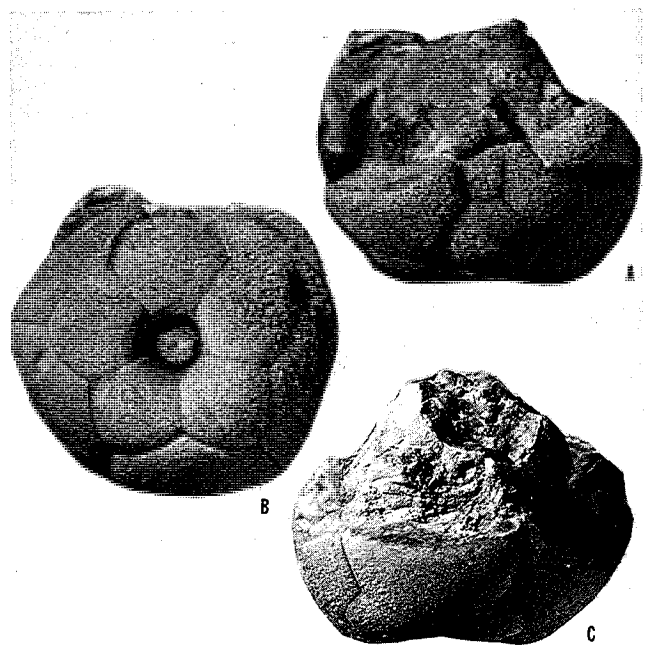

FIGURE 1.–Photographs of *Arroyocrinus stokesi* n. sp., holotype (SUI 44080) viewed from A. posterior, B. base, C. anterior, X2.7.

arms of *Arroyocrinus,* that is, their close opposition when the arms are closed and their broad short brachials. Neither characteristic is found in *Plummericrinus* (Pennsylvanian) which is chronologically the closest related genus. Other genera of Pennsylvanian age which have arms in close opposition and broad short uniserial brachials are *Texacrinus* and *Ulrichicrinus. Moapocrinus* Lane and Webster (1966), which occurs with *Arroyocrinus,* has a similar structure although the brachials are somewhat modified so that one half of each brachial is considerably higher then the other half. Short brachials are an alternative method of producing closely packed pinnules; many contemporaneous genera are biserial. *Moapocrinus* is currently considered to belong to the Cromyocrinidae.

Moore, Lane, and Strimple (1973, p. 21) assigned *Arroyocrinus* to the Ampelocrinidae. Relationship with ampelocrinids, all of which have two or more primibachs in all rays, is even more unlikely than relationship with pachylocrinids. The low cup with basal invagination, advanced anal plates (radianal in contact with D radial), together with broad, low uniserial brachials suggest close affinity with *Texacrinus* as exemplified by *Texascrinus coniformis* Strimple (1961). Hence, *Arroyocrinus* is here transferred to the Texacrinidae. Possible relationship with *Ulrichicrinus* is not entirely ruled out but from presently known evidence does not seem to be a feasible alternative. To derive *Arroyocrinus* from *Texacrinus* would involve merely reduction in arm branching and migration of the second bifurcation of the arms toward the cup. The same changes in arm structure would be required to derive *Arroyocrinus* from a genus like *Plummericrinus* or from *Ulrichicrinus ramosus* Strimple & Watkins (1969), both of the latter are of Pennsylvanian age; *Texacrinus* is more nearly contemporary to the known occurrences of *Arroyocrinus.* Additionally, this alternative would also require modification from comparatively high main arm brachials to quite narrow ones.

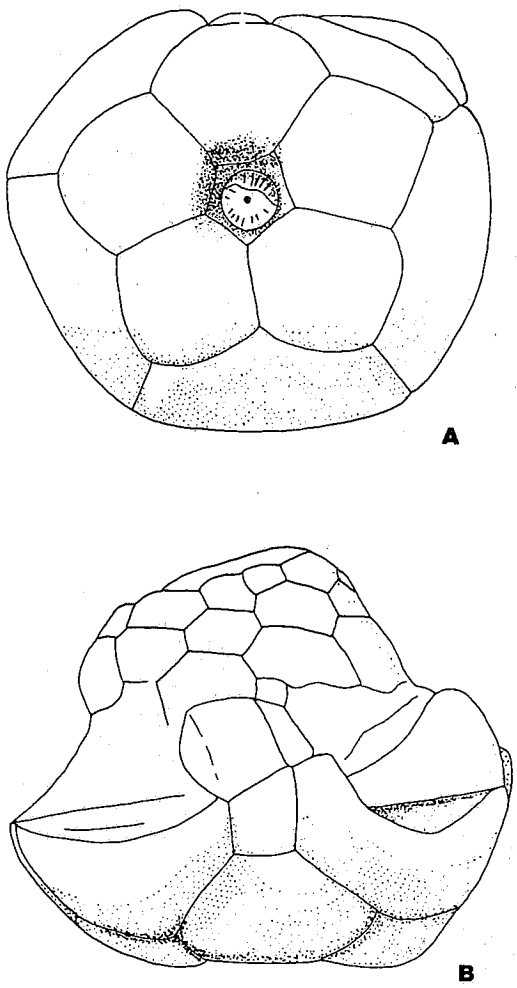

FIGURE 2.—Camera lucida drawings of holotype (SUI 44080) of *Arroyocrinus stokesi* n. sp.; a. base, b. posterior, X3.2.

Measurements of holotype in millimeters

Height of cup (anterior)	7.3
Width of cup (posteroanterior)	18.8
Width of cup (right to left)	21.0
Width of infrabasal circlet	3.4
Diameter of proximal columnal	1.4
Length of AB basal	8.2
Width of AB basal	7.3
Length of A radial	6.4
Width of A radial	11.4
Maximum length of anal plate	3.9
Minimum length of anal plate	2.3
Maximum width of anal plate	3.0

Occurrence.—Franson Member, Park City Formation, late Guadalupian or early Ochoan, Upper Permian; Dry Creek Canyon, NE corner sec. 33, T.1 N, R.1 E, northeast of Salt Lake City, Utah.

Holotype.—Reposited at the Geology Department Repository, The University of Iowa, Iowa City (SUI 44080).

ACKNOWLEDGMENTS

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