

OCCURRENCE OF THE CRINOID GENUS APIOCRINUS IN AMERICA

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The genus *Apiocrinus* is one of the most conspicuous of Mesozoic crinoids, hitherto known only from Europe, where it is found as a typical fossil in the upper Jurassic (Oolite) of England, France, and Switzerland. It was first described and figured by Parkinson¹ under the name "Pear Encrinite," in allusion to the pronounced pear shape of the calyx. In 1820 Schlotheim designated Parkinson's species according to the rules of binomial nomenclature as *Encrinites parkinsoni*, nearly all crinoids then being known as *Encrinites*.

In the following year J. S. Miller in his Natural History of the Crinoidea, 1821, proposed the genus *Apiocrinus* for the Parkinson fossil, to which he gave a new specific name, *A. rotundus*; this was not accepted because clearly a synonym of Schlotheim's species. Thus the name became established as *Apiocrinus* (*Apiocrinites*) *parkinsoni* (Schlotheim) for the species by which the genus is best known in collections, through specimens from the Bradford clay of England, and from various localities in England and France. The genus is abundant and widely distributed, 27 species having been described, 15 from France, 2 from England, and 10 from Switzerland and adjacent regions. The descriptions of most of them may be found in the works of D'Orbigny, Quenstedt, and De Loriol.

Apiocrinus is the type of a very distinct family which has continued from the Jurassic to the present time; and the genus itself, in its typical forms, is strongly differentiated from its fellows by the fact that the stem, which is round and without cirri, is in its upper part greatly expanded into a proximal conical enlargement continuous with the sides of the calyx, so that there is no line of demarcation between them. Its characters in detail are well shown in the figures of *A. parkinsoni* in Zittel-Eastman's Text-book of

¹ Organic Remains of a Former World, 1808, vol. 1, p. 208, pl. 16, figs. 1-8, from Bradford, near Bath, England.

Paleontology²; while the general aspect of the fossil is illustrated on page 231 by their copy of D'Orbigny's restoration, incorrect as to cirri, of his well known species, *A. roissyanus*; also in Dana's Manual of Geology.³

While remains of five other important European Mesozoic genera, *Pentacrinus*, *Isocrinus*, *Balanocrinus*, *Bourgueticrinus*, and *Marsupites*, have been identified in America, the extremely prolific *Apiocrinus* has remained until this time unrepresented in the western hemisphere. I am now able to announce its addition to the list.

In March, 1923, Mr. W. S. Adkins brought into the United States National Museum in Washington a series of fossils collected by him in the course of geological investigations for the Cia. Mexicana de Petroleo "El Aguila" on the isthmus of Tehuantepec, Mexico. Among them were a number of crinoid stem-fragments which were submitted to me for examination. Some of these were in the matrix, a pinkish limestone, and others loose. They were derived from a limestone outcrop on the east bank of the Rio Playas at a point 10.8 kilometers south and 3.9 kilometers east of the northeast corner of the Limantour property, near the junction of the rivers Playas and Potrero Nuevo. The horizon was identified by Mr. Adkins, on the strength of the other fossils, as upper Jurassic or lower Cretaceous, probably the former, which the evidence of the crinoids confirms.

The crinoid stems are in small sections, none of them containing more than eight or ten columnals. In several the joint-faces are well exposed, and inspection of them at once eliminated *Pentacrinus* and *Balanocrinus* from consideration, while it disclosed a similarity of type to the joint-faces of *Apiocrinus*, which was confirmed by the presence of a single piece containing five columnals having the characteristic expansion of the stem proximal to the calyx. This left no doubt as to the generic affinity of the fossils, thus establishing for the first time the existence of *Apiocrinus* in the rocks of the American continent. While the material is too imperfect for close specific discrimination, the occurrence is of sufficient interest paleontologically to warrant the designation of a new species, for which I propose the name—

APIOCRINUS TEHUANTEPEC, new species

There are about 20 stem-fragments, similar in appearance and evidently belonging to the same species; all are round, and without trace of cirri, the largest about 10 mm. in diameter. The tapering specimen is the most characteristic. Its five columnals have a total length of 13 mm., and during that interval it enlarges from 7 mm. to 10. The joint-face is marked by about 56 fine radiating striae

² 1913 edition, pp. 230, 231.

³ Fourth edition, p. 778.

running inward from the periphery to a smooth ring surrounding the lumen, about one-third the diameter of the columnal and flush with the adjacent surface; this is seen in several specimens, and is evidently a constant character, with perhaps some variation in relative diameter.

In the structure of the joint-face may be seen the decisive difference between this genus and *Pentacrinus*, *Isocrinus*, or *Balanocrinus*, the other forms which might be encountered in rocks of the same age. In these the joint-face is divided into five petaloid sectors differing among the genera, the first two having short crenulations at the margin of the sectors, and the last having them only at the periphery of the stem. In *Apiocrinus* there are no sectors, and the striae extend directly inward for about one-third to two-fifths the diameter of the joint, or perhaps sometimes all the way to the lumen. For convenience of comparison with the *Apiocrinus* joint-face, and also to facilitate identification of fragments that are likely to be found, I am giving characteristic figures of the other two types (pl. 1, figs. 8, 9, 10, 11). The smooth ring surrounding the lumen is a marked character in our species, occupying about one-third the diameter of the joint, probably varying in different parts of the stem; it is but little, if any, sunken below the general surface of the joint, and the striae in some cases pass over it.

Among European species comparison may be made with *Apiocrinus elegans* (Defrance), which is of a very similar type to our species, having usually less curvature to the sides of the expanded stem than in such characteristic species as *A. parkinsoni* and *A. roissyanus*. *Apiocrinus elegans* was described by Defrance in 1819⁴ as *Astropoda*, and in 1839 was referred by D'Orbigny to *Apiocrinus*.⁵ The species is widely distributed, and occurs at many localities in France, especially in the districts of Calvados, Cote d'Or, Nièvre, etc. It has been thoroughly described and figured by De Loriol,⁶ from whom I am giving copies of his figures 1, 4, and 6 of plate 34, showing the contour of stem and calyx, and figures 4, 4b, 4c of plate 35, giving details of the joint-face.

In relative proportions of the corresponding parts there is little difference between our species and this. In the 5 columnals of ours the spread in diameter is as 1 to 1.4; in De Loriol's figures of *A. elegans* on plate 34 for the same number of columnals the spread in figure 4 is as 1 to 1.5, and in figure 6 as 1 to 1.6. The joint-face as shown by figures 4, 4c of plate 35, has a somewhat less number of striae, about 48, and a similar smooth median ring, which is relatively larger and distinctly sunken. This smooth inner ring sur-

⁴ Dict. des Sci. Nat., vol. 14, p. 468.

⁵ Hist. Nat. des Crinoides, p. 29, pl. 5, figs. 9-15.

⁶ Crinoides de la France, vol. 2, pt. 1, 1883, p. 240, pls. 34, 35.

rounding the lumen seems to be a constant feature in *Apiocrinus*, as well as in some other genera, as for instance, *Proisocrinus* A. H. Clark⁷ a Recent member of the same family. It varies from strongly marked and deeply sunken to flush with the rest of the surface. So far as can be ascertained, it seems to be most marked at the top of the stem just beneath the conical enlargement, gradually becoming less marked and finally obliterated below. The flush surface of the inner ring resembles the same structure in *Apiocrinus polyeryphus*, as shown by De Loriol on plate 36, figure 4a. In comparing the figures of De Loriol which I have copied with those of our species, it must be remembered that while the former are natural size, the latter are one and a half times enlarged.

If we had the calyx of our species greater differences might be found. In such a great distance migrational changes are likely to occur. On the other hand, there are crinoid species of intercontinental distribution, for example *Pentacrinus subangularis*, one of the best known European species, of Jurassic age, which has been found in Alaska, with characters so nearly identical that only varietal differences, if any, can be pointed out. And even among existing crinoids, although rarely, an equal extension of range may be found, as in the case of *Rhizocrinus lofotensis*, which occurs from Florida to Greenland and eastward to Norway.

⁷ Proc. U. S. Nat. Mus., vol. 38, 1910, p. 390, fig. 3.

EXPLANATION OF PLATE

APIOCRINUS TEHUANTEPEC, new species

FIG. 1. Fragment of stem containing conical enlargement proximal to the calyx, tapering for a distance of 5 columnals from 7 mm. diameter to 10 mm. $\times \frac{3}{2}$.

2 and 3. Stem fragments of larger individuals from more distal parts of the stem. $\times \frac{3}{2}$.

2a and 3a. Joint-faces of the same specimens, slightly frayed at the periphery, having about 56 striae, which extend inward for about two-fifths of the diameter to a smooth inner ring surrounding the lumen. $\times \frac{3}{2}$. Collection United States National Museum. Upper Jurassic, Isthmus of Tehuantepec, Mexico.

APIOCRINUS ELEGANS (Defrance)

Upper Jurassic, Bathoulen. Calvados, France

FIGS. 4, 4b, 4c. Joint-faces and lateral view of isolated stem fragments, showing the radiating striae, and smooth sunken inner ring. After De Loriol, Pal. France, vol. 11, pt. 1, pl. 35, figs. 4, 4b, 4c. Natural size.

5, 6, 7. Different forms of calyx and conical stem enlargement. After De Loriol, pl. 34, figs. 1, 4, 6. Natural size.

PENTACRINUS SUBANGULARIS, var. *ALASKA* Springer

Lower Jurassic. Northern Alaska

FIGS. 8, 9. Two joint-faces, showing petaloid sectors with crenellae at their margin. Natural size. Collection United States National Museum.

BALANOCRINUS MEXICANUS Springer

Upper Cretaceous. Tamaulipas, Mexico

FIG. 10. A joint-face, showing petaloid sectors with crenellae at periphery of the joint. $\times \frac{3}{2}$. Collection United States National Museum.

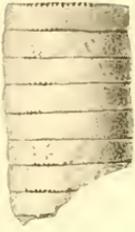
BALANOCRINUS HAITIENSIS Springer

Tertiary, Miocene. Republic of Haiti

FIG. 11. A joint-face, showing petaloid sectors, with shorter peripheral crenellae. $\times 2$. Collection United States National Museum.







2



1



3



2a



3a



4



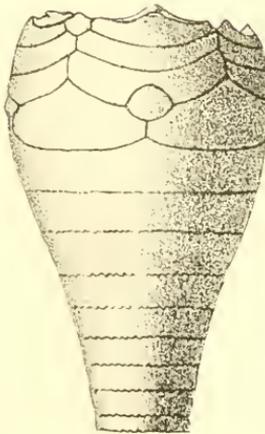
4b



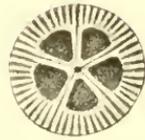
4c



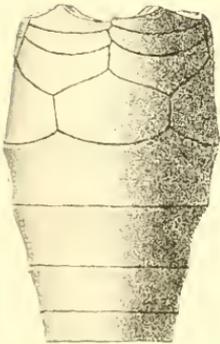
11



6



10



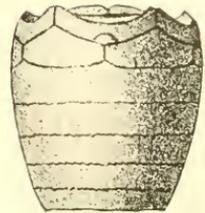
5



8



9



7

APIOCRINUS AND OTHER CRINOID GENERA

FOR EXPLANATION OF PLATE SEE PAGE 6

