

FOUR NEW GENERA OF CAMERATE CRINOIDS FROM THE DEVONIAN.

EDWIN KIRK.¹

ABSTRACT. Two genera, *Pithocrinus* and *Cadiscocrinus*, are proposed with new American species as types. *Pithocrinus* is also represented in the Devonian of France and Spain. *Ambicoocrinus* and *Griphocrinus* are proposed for the reception of described species. A species from the Devonian of France is referred to *Griphocrinus*.

PITHOCRINUS, new genus.

Genotype.—*Pithocrinus cooperi*, new species.

Theca. Composed of heavy plates forming a competent structure. Above average size for batocrinoids of this time, excepting such genera as *Megistocrinus* and *Gennaeocrinus*. Dorsal cup cupuliform. Tegmen convex to moderately elevated, composed of many relatively small plates. In *P. cooperi* some of the plates of the tegmen are relatively large and bear subspinous processes. Anal tube stout, subcentral. Plates of the dorsal cup convex to tumid or tuberculate.

BB. Three. Relatively small, subequal. Commonly produced into a distinct flaring triparite petaloid rim.

Radial series. *RR* large, followed by two *IBrr*. In four-rami rays there are one or two *IIBrr*. In these rays there are usually two *IIIBr* incorporated in the cup. When but two rami are borne, there are usually three *IIBrr* incorporated in the cup.

Interbrachial series. In the *post IR* the anal is about equal in size to the *RR*. It supports the customary three batocrinoid plates. These are large, and at this level the *post IR* has its greatest width. Distad the *post IR* narrows and is composed of smaller plates, somewhat irregularly arranged.

In the other interradii the first interbrachial is large, supporting two smaller plates. Distad the interradius narrows rapidly. In the two-rami rays there are two small *iIIBrr* in linear series. In the four-rami rays there are one or two *iIIBrr* separating the two pairs of arms.

Arms. The arms are unknown, but were exceptionally stout for a crinoid of this size. In two species there are four rami

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to each ray. In the other forms there are four rami in the *r* and *l post* and *ant RR* and two in the *r* and *l ant RR*. In the *l post R* of the holotype of *P. waliszewskii* the usual four is reduced to three by suppression of one-half of one division in the secundibrach series.

Stratigraphic and geographic distribution.—*Pithocrinus* is known only in the Middle Devonian of Michigan and Spain.

Relationships.—Lacking the arms, one has difficulty placing *Pithocrinus*. Probably if the arms were preserved one would have the same trouble. Superficially the genus resembles a *Megistocrinus* with an exsert base. The stout, subcentral anal tube, the smaller number of *IIBrr*, and the lack of incorporation of the higher orders of brachials clearly differentiate *Pithocrinus* from *Megistocrinus*. For want of better placement and until more is known of the batocrinoid stocks in the Silurian and Devonian one could place the genus in the Periechocrinidae.

Remarks.—In the collections of the United States National Museum are two specimens from the Traverse group of Michigan that are referable to *Pithocrinus*. They may be conspecific, but owing to their poor preservation it has not seemed desirable to describe them. They show an interesting variant in tegminal structure from that shown by *P. cooperi* and more nearly agree with the Spanish forms. One of the specimens is from the upper Alpena in the Michigan Alkali Quarry near Alpena, Michigan. The specimen is crushed vertically, is partially exfoliated, and the remaining surface is partially covered by encrusting bryozoans. The species is larger than *P. cooperi*. The height is estimated as at least 32 millimeters and the average diameter, 40 millimeters. The tegmen is arched, but relatively low, with well-defined depressions in the interambulacral areas. The tegmen is composed of many small plates. None of these is tuberculate. There are four rami in the *r* and *l post* and *ant RR*. There are two rami in the *r* and *l ant RR*. There are well defined gaps between the arm-groups, that in the posterior interradius not being appreciably wider than the others. The other specimen is from the Traverse near Petoskey, Michigan. It is a smaller theca in a fair state of preservation other than being badly crushed.

In the Springer collection there is a well-preserved theca that apparently represents a new species of *Pithocrinus*. This specimen is from the Devonian of Colle, Spain. The dorsal cup is very like that of *P. cooperi* in shape. The tegmen is

highly arched. As in *P. intrastigmatus* there are four rami in each of the rays. All the plates of the dorsal cup are tubercular, and in addition there is an obscure granular to vermicular ornamentation. Some of the plates of the tegmen bear small spinous processes.

PITHOCRINUS COOPERI, new species.

Plate 1, Figs. 4-7.

There are two specimens of this species. The larger specimen, the holotype, is a well-preserved, uncrushed theca. The smaller specimen is equally well-preserved, but a portion of the dorsal cup and tegmen constituting about one-fourth the bulk of the specimen is broken off. Both specimens are partially silicified.

The holotype has a height to the base of the anal tube of 39 millimeters and an average diameter of about 35 millimeters. The height of the dorsal cup is approximately 22 millimeters. The shape of the cup and tegmen may readily be seen in the figure. The anal tube is broken off, but was stout. It is subcentral in position. The plates of the theca are thick. In the smaller specimen the plates of the dorsal cup are tumid. In the older specimen the plates of the dorsal cup have a marked convexity. In the case of the larger plates each has a well-defined central protuberance. In both specimens many of the plates of the tegmen are produced into short, heavy processes. These processes are naturally more strongly developed in the larger individual.

The basals stand out sharply and in basal view have a petaloid appearance. The primibrachs have the usual sequence. In the *r* and *l post RR* the series are thrown out of vertical alignment by crowding of the plates of the posterior interradius.

In the *r* and *l ant RR* there are two large fixed *IIBrr* in each half of the ray. In these rays but two free rami are borne. In the other three rays there is a single *IIBr* in each half of the ray, which is axillary. Each axillary supports two *IIBrr*, the first being larger than the second. The *r* and *l post* and *ant RR* thus bear four free rami. In the younger specimen there is close spacing of the arm bases within a ray, but a clearly defined gap as between the arm groups of adjacent rays. The gap in the posterior interradius is somewhat

wider than that between the arm groups of the other rays. In the older specimen the gaps have closed, and there is practically no difference in spacing as between the arm bases within the ray groups and those of contiguous rays. In this specimen in the *post IR* a small portion of the periphery is broken off, but it would appear here that there is a noticeable gap. The interradial areas are relatively small, with the exception of the posterior. In the *post IR* the anal is followed by the customary three plates of the batocrinoid sequence. All these are large, the laterals being somewhat larger than the median plate. The *post IR* is at its widest at this level. In the succeeding row the two central plates are the largest, flanked by one plate on the left and two irregularly placed, small plates on the right. Distad the rows of irregularly defined plates decrease in size and number. In the other interradii the first interbrachial is large, followed by two smaller plates. Distad the area narrows rapidly and is filled by a few much smaller, irregularly disposed plates. There are one or two *iIBrr* both in the two-rami rays and between the pairs of brachial groups in the four-rami rays.

Judging by the arm bases, the rami were unusually stout for a camerate crinoid of this size.

Horizon and locality.—The specimens were collected by G. Arthur Cooper from the upper Alpena limestone (Traverse group) in the Michigan Alkali Quarry near Alpena, Michigan. More definitely, they were found in the uppermost beds of the formation between the coral reefs.

Types.—The holotype and paratype are in the collections of the United States National Museum; holotype No. 111627; paratype, No. 111628.

Pithocrinus waliszewskii (Oehlert), new combination.

Megistocrinus waliszewskii Oehlert 1896, p. 818, Pl. 26, Figs. 1-4.

Devonian. Santa Lucia, Leon Province, Spain. (Middle Devonian.)

Apparently prior to his description of the species, Oehlert sent photographs and an excellent plaster cast of the crinoid to Wachsmuth. On the basis of this material Wachsmuth advised Oehlert not to make a genus for the reception of the species, but to refer it to *Megistocrinus*. Oehlert himself rec-

ognized the striking dissimilarity of his species to *Megistocrinus* but deferred to Wachsmuth's judgment. With the preparation of the Camerata monograph well in hand and the criteria for differentiating the genera established, it is difficult to understand Wachsmuth's decision. In any case the crinoid is unmistakably referable to the genus *Pithocrinus* here described.

Oehlert states that his figures are slightly enlarged. This is misleading. The figures are nearly one and one-half times enlarged. The specimen is somewhat crushed and distorted, but otherwise is in an excellent state of preservation. Oehlert's illustrations and descriptions are excellent.

Through compression the tegmen appears almost flat, with depressed areas in the interradial areas excepting the posterior. Normally the tegmen would be somewhat convex. There seems to have been an anal tube of moderate size. The anal tube normally would be subcentral in position. Even with the distortion, it is not far from that. The arm groups are clearly separated by narrow gaps except in the posterior interradius. Here the space is much wider than in any known species referred to the genus.

In the *l post R* there are but three rami, one ramus being suppressed in one-half the ray. In the *r post* and *ant RR* there are four rami. In the *r* and *l ant RR* there are two rami. In the four-armed *RR* there are two *IIBrr*.

The species agrees well with the other forms referred to the genus except for the width of the posterior interradius. If this is an individual of medium size, as it may well be, one would expect a narrowing of the *post IR* at the periphery in later ontogeny.

Pithocrinus intrastigmatus (Schmidt), new combination.

Saccocrinus (?) *intrastigmatus* Schmidt 1931, p. 21, Text-fig. 9, pl. 4, Figs. 5a-c, 6, 7.

Arnao limestone "Lower Devonian." Cap La Vela, Concha de Arnao, El Mugaron. Near Avilés, Prov. Asturias, Spain. (Middle Devonian.)

This species is based on three imperfect and badly preserved specimens. There can be little doubt, however, that the species is referable to *Pithocrinus*. The most interesting structural feature is that Schmidt gives a count of four rami in each ray.

Pithocrinus bifrons (Schmidt), new combination.

Megistocrinus (?) *bifrons* Schmidt 1931, p. 23, Pl. 4, Figs. 8a-c.

Arnao limestone "Lower Devonian." El Mugaron, Concha de Arnao, near Avilés, Prov. Asturias, Spain. (Middle Devonian.)

This species is based on the badly crushed basal portion of a dorsal cup. It certainly is not *Megistocrinus*, and such characters as it shows indicate *Pithocrinus* rather than any other known genus. It may even be a large individual of *P. intrastigmatus*.

CADISCOCRINUS, new genus.

Genotype.—*Cadiscocrinus southworthi*, new species.

Theca. Small, subcylindrical, typically somewhat constricted medially, and with a flattened flaring base. The basal area is deeply excavate. In basal view the basal circlet usually has a distinct pentalobate to stellate outline.

IBB. Five, forming a small disk situated at the apex of the cone formed by the invaginated proximal moieties of the *BB*.

BB. By far the largest plates in the dorsal cup. The proximal portions of the *BB* are flexed inward, giving a deeply invaginate base. In most of the forms known the *BB* are laterally produced, giving a pentalobate to stellate outline in basal view.

Radial series. The *RR* are of medium size, but appreciably smaller than the *BB*. The *IBrr* are relatively very small. Two uniserial secundibrachs may be incorporated in the cup. Distad the rami are compactly biserial. The rami are smoothly rounded dorsad, with somewhat flattened sides.

Interbrachial series. In all the interradii the proximal interbrachials rest on the truncated distal faces of the basals. In the posterior interradius the first anal plate is approximately the size of the other primary interbrachials. It supports a somewhat smaller median plate flanked on either side by two very small plates. In the third range, passing beyond the dorsal cup and forming part of the tegmen, is a median plate somewhat smaller than the median plate of the second range. In the other interradii the primary interbrachial supports two small plates in the second range. Distad the interradius narrows rapidly, and there are either no other interradials in the cup or a few very small plates.

Column. The column is stout for a crinoid of this size. It is circular in section and, as seen, composed of alternate nodals and internodals. The columnals are low. The lumen is small and appears to be circular in section.

Stratigraphic and geographic distribution.—The genus at present is known in the Middle Devonian of Ontario, Michigan, and Indiana.

Relationships.—Of the older described genera *Cadiscocrinus* may be compared only with *Rhodocrinus*, as currently recognized, or *Acanthocrinus*. I have recently (1944) proposed the genus *Cribanocrinus* for the reception of a group of lower Mississippian species formerly referred to *Rhodocrinus*. *Cribanocrinus* more nearly resembles *Cadiscocrinus* than either *Rhodocrinus* or *Acanthocrinus*.

Rhodocrinus and *Acanthocrinus* are essentially alike in gross structure, and a comparison with *Rhodocrinus* will serve for both. *Rhodocrinus*, as for current usage, has a flattened or excavate base. The sides of the cup are nearly vertical, or diverge distad. The *BB* and *RR* are of moderate size. The *IBrr* are large and *IAxx* moderately so. Typically three or more *IIBrr* are incorporated in the cup, and intersecundibrachs are present. The interradian areas are large, with numerous *iBrr* that merge with the *iAmbb*. The cup is typically ornamented with a network of radiating ridges. The rami have very low uniserial *Brr* continuing distad well above the cup and to the first bifurcations. Above the first bifurcations the rami are compactly biserial. The rami are relatively small. It will readily be seen that there is little resemblance between these structures and those of *Cadiscocrinus*.

Cribanocrinus has a subglobose to urceolate or ovate theca. The maximum diameter of the cup is at about one-half its height, or lower. The minimum diameter of the cup is at the level of the arm bases. The *IBB* are small. The *BB* are large, either larger or smaller than the *RR*. The *IBrr* and *IAxx* are relatively small. The interradian fields are narrow at the base, widen distad, and then narrow again. Occasionally there is a poorly defined median row of plates in the post *IR*, but this is exceptional. The rami are uniserial below and compactly biserial above the first bifurcations.

The most obvious differences between *Cribanocrinus* and *Cadiscocrinus* are in the shape of the dorsal cup, the arm structure, and in the great size of the *BB* in *Cadiscocrinus*.

The dorsal cup of *Cadisocrinus* is subcylindrical and typically somewhat constricted medially. With the exception of the first two uniserial *IIBrr* the rami are compactly biserial. The *BB* are by far the largest plates in the cup. Typically, *Cadisocrinus* has a well-marked, median, linear series of plates in the posterior interradius.

Remarks.—There are two other undescribed species referable to *Cadisocrinus* in the Springer collection. One is from the Norway Point formation of the Traverse of Michigan. One is from Clark County, Indiana, probably from the Beechwood formation. I collected the Michigan specimen many years ago. It was found about 1 mile downstream from the old Seven Mile Dam on Thunder Bay River. The locality as well as the old Seven Mile Dam is now submerged by the impounded waters of the Norway Point Dam. This specimen is an imperfect, somewhat crushed, dorsal cup. It is undoubtedly referable to *Cadisocrinus* and does not differ greatly from the Ontario species. The species from Clark County, Indiana, is a very striking form. It is an incomplete dorsal cup, preserving the *IBB*, *BB*, four *RR*, and a few *iBrr*. The cup was low and broad, having an estimated diameter of at least 15 millimeters and a height of perhaps not much more than 9 millimeters. The plates of the cup are elaborately ornamented. High, sharp carinae pass from plate to plate, and there is a median carina on each basal, extending well down into the deep basal cone. The surfaces of the plates between the carinae are strongly papillose. All the structures preserved indicate that this specimen is referable to *Cadisocrinus*.

CADISOCRINUS SOUTHWORTHI, new species.

Plate 1, Figs. 1-3.

This species is based on two well-preserved thecas, with portions of the arms attached. The holotype is slightly crushed. The paratype, not figured, is somewhat larger and not crushed. It is, however, partially replaced and encrusted with iron, probably limonite after pyrite.

The dorsal cup is subcylindrical, with a flat, flaring base. Medially there is a slight constriction. The basal area is deeply excavate, the *IBB* lying at the apex of a cone the wall of which is largely composed of the inwardly flexed proximal portions of the *BB*. The tegmen is unknown, being concealed

by the closely packed proximal portions of the arms. The species is small, the dorsal cup of the larger specimen having a height of 6 millimeters and an average diameter at the arm-bases of 8 millimeters. The specimen shows no juvenile characters and may be assumed to be adult.

The *IBB* are small and completely hidden by the proximal columnal. They lie at the apex of the deeply invaginated base and appear to be at approximately the level of the *IAx*. The *BB* are by far the largest plates in the cup. In the larger specimen, the paratype, a basal measures 2.6 millimeters in height by 4.6 millimeters in maximum breadth, as shown in the outer wall of the cup. The inner invaginated portion of the basal extends to a greater height. Each basal supports an interbrachial. The *BB* flare outward in a horizontal plane. In basal view each is produced into a subtriangular projection, giving the base a sharply stellate outline.

A radial in this same specimen has a height of 2.4 millimeters and a breadth of 3 millimeters. In the same series the *IBr₁* has a height of about 0.9 millimeter and a breadth of 2.5 millimeters. The *IAx* has a height of 0.9 millimeter and a breadth of 2.2 millimeters. In the paratype the first two secundibrachs in each half-ray may be considered incorporated in the cup. In the holotype only the first is incorporated. The two proximal *IIBrr* are uniserial and stout.

In one interradius of the paratype the first interbrachial has a height of 1.7 millimeters and a breadth of 2.4 millimeters. It supports two much smaller plates. This structure holds for all interradii except the posterior. In the next range there may be from one to three small plates at the level of the *IIBrr₁*. The *post IR* of the holotype shows the plates more clearly than the paratype. The primary anal plate is of approximately the size of the first interbrachials. In the median line it bears a somewhat smaller plate that is flanked on either side by a very small plate. The distal face of the second median anal plate lies at the level of the *IIBrr₂*. In the holotype the median anal of the second range supports a plate somewhat smaller than itself. This latter plate is tegminal.

As noted above, the two proximal secundibrachs are uniserial. A compactly biserial arrangement immediately follows them. The arms are stout, with rounded backs and somewhat flattened sides.

The column is proportionally large, having a diameter of

about 2.6 millimeters in its proximal portion in the holotype. The lumen is very small and seems to be circular in section. The small amount of column preserved shows alternating nodals and internodals. The columnals are low.

Horizon and locality.—Both holotype and paratype were collected by Mr. and Mrs. Charles Southworth in the Arkona shale (Hamilton) at Hungry Hollow, 2½ miles east of Arkona, Ontario, Canada. The species is named in honor of the collectors, to whose zeal and patient collecting over a period of many years we owe chiefly our knowledge of the crinoids of this area.

Types.—The types are in the Springer collection in the United States National Museum; holotype, S 4440a; paratype, S 4440b.

GRIPHOCRINUS, new genus.

Genotype.—*Rhodocrinus (Acanthocrinus) nodulosus* Hall.

Theca. Composed of heavy plates. Dorsal cup subturbinate to cupuliform. Tegmen low, composed of many small plates, incompetent. Anal opening eccentric. Anal tube unknown. If present, it was small. Plates of dorsal cup convex to tumid, with a tendency to form large median tubercles. There may be indistinct radiating ridges on the plates.

IBB. Small, but clearly visible in lateral view.

BB. Large. In some specimens all the *BB* make contact with the first interbrachials. In others a variable number of *BB* make contact.

Radial series. *RR* large, followed by two somewhat smaller *IBrr*. In adult individuals there are usually three or more *IIBrr* incorporated in the cup.

Interbrachial series. In the post *IR* the anal rests on *post B* on a broad face. In the second range there are three plates, followed in the third range by four or more. The median vertical row of anal plates is clearly defined, the plates gradually decreasing in size distad. The *post IR* is broad, reaching its maximum width at about the level of the *Iaxx*. In the other interradii, as noted above, all the first *iBrr* may make contact with the *BB*, or a variable number of them may do so. These interradii are considerably narrower than the *post IR*, with two plates in the second range and two or three in the

third range. There is still a fairly wide spacing at the level of the fixed brachials, however. There are a number of *iIBrr*.

Arms. The arms are relatively short, stout, with rounded backs, and branch irregularly two or more times. The arms are compactly biserial, beginning with about the third or fourth *IIBr*.

Column. The column is large, circular in section, with a large pentalobate lumen.

Stratigraphic and geographic distribution.—*Griphocrinus* at present is known in the Middle Devonian of New York, Kentucky, and France. The French horizon was given by Oehlert as Lower Devonian, but with us it would be Middle Devonian. To this day horizons in Europe are called Lower Devonian that in America we would place unequivocally in the Middle Devonian.

Relationships.—*Griphocrinus* has slight resemblance to or relationship with *Rhodocrinus*, to which it has been referred. A brief summary of the characteristics of *Rhodocrinus* are given under the description of *Cadiscocrinus*. The subturbinate cup of *Griphocrinus*, with its exsert base, and particularly the structure of the arms separate the genus from all known genera of the Rhodocrinidae. The reference of *G. halli* to *Thysanocrinus?* and the doubtful reference by Wachsmuth of the French species to *Rhapanocrinus* seem to indicate more nearly the relationships of the genus. *Griphocrinus* may, I think, be considered an end term in the line of the Dimerocrinidae or a similar stock in which the first interbrachials of the interradii, other than the posterior, have migrated wholly or in part downward between the radials and come in contact with the basals. This structure, at one time held by Carpenter and others of prime importance, can be overemphasized and must be considered in combination with other structural features and the stage in the evolution of the group. I would then temporarily place *Griphocrinus* in the Dimerocrinidae as more nearly indicating its genetic affinities.

Griphocrinus halli (Lyon), new combination.

Rhodocrinus halli Lyon 1862, p. 412, Pl. 4 Figs. 5a, b.

“Crinoid bed, lying between the Hydraulic limestone and the Blackslate: Beargrass quarries; Jefferson county, Kentucky” (= Beechwood limestone).

Rhodocrinus(?) *halli* Wachsmuth and Springer 1881, p. 212.

"This species is certainly not *Rhodocrinus* . . ." "Niagara group."

Thysanocrinus? halli Wachsmuth and Springer 1897, p. 196, Pl. 13, Figs. 9a, b.

"Niagara group?"

Dimerocrinus halli Bassler 1915, p. 439.

"Niagaran (Louisville)."

Dimerocrinus halli Springer 1926, p. 14.

"Louisville limestone."

Goldring (1924, Pl. 2, Fig. 2) figures the holotype of *G. halli* as a specimen of *G. nodulosus*. There is no mention of the specimen in the text or of the species in the synonymy. Although the two species are similar, I think they may be held distinct. If not, Lyon's species has priority.

The age assignment of "Niagaran" or "Louisville limestone" for *G. halli* is quite unjustified. Lyon (1862, p. 412) states that the species was found by Knapp "in the same beds as specimens described in this paper under Nos. 43, 44 and 49." No such numbers are shown in the text, but the only three species to which Lyon's statement could apply are "*Cyathocrinus leviculus*," "*Cyathocrinus wortheni*," and "*Actinocrinus casedayi*." For the first of these species Lyon gives the horizon and locality cited above. The horizon in modern terminology would be the Beechwood limestone of approximately Hamilton age.

Griphocrinus insculptus (Goldring), new combination.

Rhodocrinus insculptus Goldring 1935, p. 349, Pl. 25, Fig. 1.

Hamilton (Tichenor or Moscow), 2 miles east of Alden, Genesee County, New York.

Griphocrinus nodulosus (Hall), new combination.

Rhodocrinus (Acanthocrinus) nodulosus Hall 1862, p. 126.

"Hamilton group, Ontario County, N. Y." (Approximately Tichenor horizon).

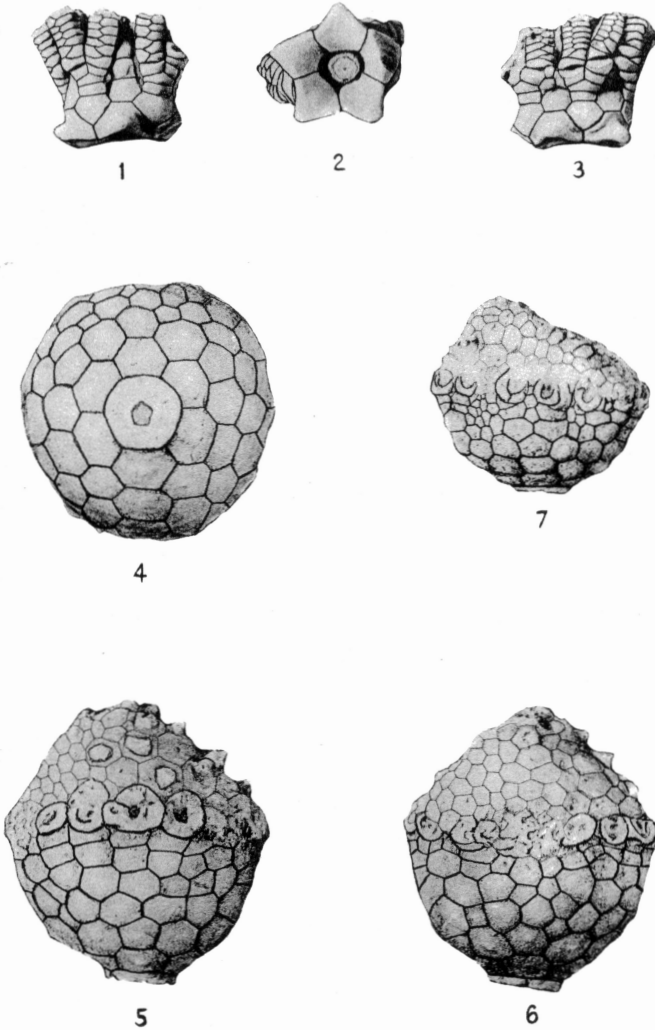
Rhodocrinus (Acanthocrinus) nodulosus Hall 1872, Pl. 1, Fig. 8.

Rhodocrinus nodulosus Wachsmuth and Springer 1881, p. 212 (386).

Rhodocrinus nodulosus Wachsmuth and Springer 1897, p. 225, Pl. 13, Fig. 8.

Rhodocrinus nodulosus Goldring 1924, p. 89, Pl. 2, Figs. 1, 3-5 (non Fig. 2 = *Griphocrinus halli* (Lyon)).

Dimerocrinites nodulosus Bassler and Moodey 1943, p. 425.



EXPLANATION OF PLATE

FIGS. 1-3. *Cadiscocrinus southworthi*, new genus and species: 1, posterior view of holotype; 2, basal view; 3, anterior view. All figures x 2.
FIGS. 4-7. *Pithocrinus cooperi*, new genus and species: 4, basal view of holotype; 5, right posterior view; 6, posterior view; 7, right posterior view of paratype. All figures natural size.

Griphocrinus wachsmuthi (Oehlert), new combination.

Raphanocrinus? wachsmuthi Oehlert 1887, p. 68, Pl. 1, Figs. 10, 11, Text-fig. on p. 69.

Sablé (Sarthe), France. "Lower Devonian," (In America the horizon would be Middle Devonian.)

On the advice of Wachsmuth, Oehlert provisionally referred this species to *Raphanocrinus*. Wachsmuth and Springer (1897, p. 259) mention the species under their discussion of the genus *Raphanocrinus* and state that "this is apparently not a typical form."

The specimen is a fairly well-preserved theca. The description and figures show a crinoid that agrees well with *Griphocrinus*. It certainly were better placed here than under *Raphanocrinus*, to which it bears but slight relationship.

AMBICOCRINUS, new genus.

Genotype.—*Thysanocrinus arborescens* Talbot.

Ambicocrinus arborescens (Talbot), new combination.

Thysanocrinus arborescens Talbot 1905, p. 23, Pl. 1, Fig. 2, Text-fig. 1.

Coeymans (Lower Devonian), North Litchfield, New York. (Manlius-Upper Silurian(?).)

Dimerocrinus arborescens Goldring 1924, p. 83, Pl. 1, Fig. 1.

The type species has been described and figured by Talbot (1905) and Goldring (1924). Goldring has explained the difficulty in getting an adequate illustration of the type. On the whole, the figure is good, though somewhat sketchy in detail.

Ambicocrinus may be compared only to *Dimerocrinus*, *Eudimerocrinus*, and *Diamenocrinus* among described genera. In *Ambicocrinus* the plates of the dorsal cup are relatively thin, giving an incompetent structure. The plates are smooth, and there is no ridge traversing the radial series. The *IIBrr* are incorporated in the cup up to at least the third brachial. There are numerous intersecundibrachs. The rami divide one or more times above the first bifurcation and are compactly biserial. The column of *Ambicocrinus* is substellate in section.

Eudimerocrinus, as pointed out by Springer in making the genus, differs from *Dimerocrinus* only in having branching rami. In typical *Dimerocrinus* and in *Eudimerocrinus* there is a well-defined keeled ridge traversing the plates of the radial

series and passing on to the basals. The interradii typically show as somewhat depressed areas. The plates of the cup are typically moderately thick and may be very heavy. Intersecundibrachs are few in number, and the rami are seldom incorporated in the cup above the *IIBrr*₂. The column is circular in section.

Diamenocrinus has a strongly ornamented cup. The peculiar biserial arms, appearing uniserial as viewed from above, are one of the characteristic features of the genus. As in *Ambicocrinus*, the column is substellate in section, and the rami have many divisions.

Ambicocrinus may be held within the Dimerocrinidae as a matter of convenience. Substellate or pentagonal columns are a rarity among the Camerata. There is a possibility that *Ambicocrinus*, *Diamenocrinus*, and even *Thylacocrinus* may be members of a tenuous evolutionary line running parallel to the true *Dimerocrinus* stock.

Geologic distribution.—*Ambicocrinus* is known only from the prolific crinoid beds near Litchfield, Herkimer County, New York. The horizon is given as Coeymans and placed in the Lower Devonian. There is some uncertainty as to this assignment, however. The horizon may be Manlius and referable to the high Silurian. I have collected specimens of the associated *Ctenocrinus pachydactylus* in place at Schoharie, New York, and although the horizon is somewhat questionable the evidence was rather in support of a Manlius assignment.

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REFERENCE NOTE.

* It will be noted that I give the date 1862 for Lyon's paper instead of 1861, as has been given in the past.

The running date of "Dec. 1861" at the bottoms of the pages is simply an indication that these pages are part of the Proceedings of that month and do not give the date of issue. It will be noted that in the account of the meeting of December 10, 1861, Lyon's paper was presented for publication. In the Proceedings for 1862 (1863) at the meeting of February 18 (p. 20) it is stated that "Mr. Vaux, on behalf of the Committee on Proceedings, laid on the table the No. for last December." Lyon's paper should thus have the date February 1862 instead of December 1861.

U. S. NATIONAL MUSEUM,
WASHINGTON, D. C.

Correction.—In my paper "*Aphelocrinus*, a new inadunate crinoid genus from the Upper Mississippian," Amer. Jour. Sci., April 1944, there is an erroneous designation in the plate description. The new species *Aphelocrinus oweni* (p. 198) appears on the plate (Pl. 1, figs. 1-3) as *Aphelocrinus lyoni*, n. sp. The trivial name *lyoni* on the plate should be changed to *oweni*.

Edwin Kirk.