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XXXIII.—*Descriptions of several new Genera and Species of Crinoidea.* By THOMAS AUSTIN, Esq., and THOMAS AUSTIN, Jun., Civil Engineer.

In deference to the recommendation of the British Association for the Advancement of Science, we have endeavoured, in establishing our new genera and species, to adhere as closely as possible to the rules which have been sanctioned by that body; and though we have experienced considerable difficulty in extricating some groups from the confusion in which they were involved, we trust on the whole that our labours will be found to be in accordance with the liberal and enlightened views propounded by the Committee appointed to report on the means of rescuing the nomenclature of Zoology from the almost inextricable confusion it has fallen into.

Family POTERIOCRINIDÆ, *Austin*,

containing the following genera: *Poteriocrinites*, *Cladocrinites*, and *Synbathocrinites*.

Genus *Poteriocrinites*, Miller.

The generic characters defined by its founder.

Sp. *P. dudleyensis*, *Austin*, sp.

Definition.—The plates surrounding the body agree in number and arrangement with the generic character. The upper series or ray-bearing plates are abruptly truncated on their superior edges, which are excavated and have central ridges for the articulation of the rays. These ridges extend the whole width of the plates. The unique specimen examined somewhat resembles *P. granulosus* in figure, but the dorso-central plates are less dilated; and it differs from that species in the absence of granulæ, all the plates being quite smooth. Column and rays unknown.

This is the only instance in which the genus *Poteriocrinites* has been met with in other strata than the carboniferous limestone. The specimen is in the cabinet of J. Johnson, Esq.

P. isacobus, *Austin*, sp.

Def.—The plates surrounding the body accord in number and arrangement with the generic type. Main rays five, each composed of a single joint. These are succeeded by others until the last series amount to forty. Each subdivision, like the main rays, is composed of a single joint. Column unknown.

This is an exceedingly minute species, from which circumstance we had given it the specific name *minimus* in our pro-

posed list of *Crinoidea*, which appeared in No. 63 of the 'Annals and Magazine of Natural History'; but as this term came within the objection pointed out by the British Association, we have not hesitated in proposing one less objectionable, and perhaps more characteristic.

P. radiatus, Austin, sp.

Def.—Dorso-central plates (pelvis) much elongated, with several highly raised narrow ridges which run across the sutures, and uniting with similar ridges on the adjoining plates form series of triangles around the body. Ray-bearing plates broad, with nearly circular excavations for the insertion of the rays. Column and rays unknown.

P. rostratus, Austin, sp.

Def.—The plates forming the cup of this species are identical in number and arrangement with the generic type. The upper portion is elongated into a proboscis or oral tube, situated centrally, of considerable length, and covered with plates which are ornamented with reticulating ridges. The proboscis terminates at its apex with several tooth-like plates. Main rays five, once subdivided, making ten. Tentacula somewhat distant from each other. Column composed of large and small joints alternately.

P. quinquangularis, Austin, sp.

Def.—Dorso-central plates more conical than in the generic type. Proboscis elongated, with elevated ridges crossing the plates transversely. Main rays five, with one or more subdivisions. Column quinquangular near its attachment to the body, but gradually becoming circular as it recedes from that point.

P. plicatus, Austin, sp.

Def.—Form and arrangement of the body-plates coincide with the generic type. Five broad, elevated, strongly defined ridges or folds run upwards from the dorso-central plates, through the first series of perisomic plates: when near the upper edges of these plates the ridges divide and branch outwards at an angle of about 45°, terminating at the base of the rays, and forming a figure approaching to the letter Y. A similar ridge then crosses from each horn of the letter, and terminates also at the base of the rays. Rays unknown, but their points of attachment are nearly circular, with a central ridge. Column circular, slightly enlarging at its attachment to the dorso-central plates.

P.? *dactyloides*, Austin, sp.

Def.—The perisomic plates appear to coincide with the generic character of *Poteriocrinites*. Rays five and undivided. The ray-joints are long near the body, but go on gradually diminishing in size to their terminations. The proboscis shows the reticulated structure peculiar to *Poteriocrinites*. This species appears to be small.

Genus *Cladocrinites**.

This genus includes the species which Mr. Phillips named provisionally *Isocrinites*, but as Von Meyer had previously founded a genus of that name, composed of quite a distinct suite of fossils, we have ventured to remove the so-called *Isocrinites* of Mr. Phillips into our proposed new genus.

Generic definition.—Dorso-central plates five?, resembling a tumid supra-columnar joint. First series of perisomic plates (costals) five; second series or ray-bearing plates five: all these plates are remarkably short in comparison with the length and size of the rays. Column generally enlarging at its junction with the body, and apparently devoid of auxiliary side-arms.

C. Egertoni, Phill. sp.

The specific definition has already been given by Mr. Phillips; we however differ in opinion with respect to the portion of the fossil which is to be considered as the body and which the rays. We consider all the joints above the second series of perisomic plates as belonging to the rays. Mr. Phillips, on the contrary, counts the rays only as commencing at the cuneiform joints.

C. nobilis, Phill. sp.

Mr. Phillips included this beautiful species amongst the genus *Poteriocrinites*?

C. tuberculatus, Mill. sp.

Miller described this Crinite as a *Cyathocrinite*, to which genus it does not belong.

C. longidactylus, Austin.

Def.—The perisomic plates conform to the generic type. The five main rays are each composed of two joints only, from which proceed two secondary rays; these again subdivide, the inner branches extending a considerable distance before the last bifurcation takes place; but the outer branches divide at about half the distance that the inner rays do. The total

* From *klados*, a branch.

divisions amount to forty. The rays are remarkably long in proportion to the size of the body. Column circular.

C. brevidactylus, Austin.

The plates forming the cup agree with the typical character. The rays are shorter and less numerous than in the preceding species. Main rays five, divisions amounting to twenty or more. Column circular, and varying in different stages of growth.

C. pentagonus, Austin.

Def.—The perisomic plates answer to the typical character. Main rays five, subdivisions fourteen. Proboscis or oral tube large and central, and covered with five vertical bands of plates. Rays fourteen? Column: upper portion pentagonal, gradually becoming circular and moniliform.

C. macrodactylus, Phill. sp.

Family ENCRINIDÆ, Austin,

contains the genera *Encrinites*, Mill.; *Eucalyptocrinites*, *Cupressocrinites*, Goldf., and *Euryocrinites*, Phill.

Family PENTACRINIDÆ.

P. rotundus, Austin, sp.

Def.—The only portion of this species known is a columnar fragment, which differs from all other *Pentacrinites* in being circular, but it still retains the peculiar generic character, in the stellated crenulations on the articulating facets of the columnar joints. These pentapetalous figures are more dilated, to suit the circular form of the joints, than in others of the genus.

Family MARSUPIOCRINIDÆ,

consisting of *Marsupiocrinites* and *Crotalocrinites*.

Genus *Crotalocrinites**.

Def.—Dorso-central plates five; first series of perisomic plates five; second series five. On the latter are a series of wedge-shaped plates which bear the rays: the exact number of these plates is unascertained. Column with a pentapetalous perforation.

C. rugosus, Miller, sp.

Def.—The plates surrounding the body agree with the generic character. Rays numerous, probably amounting to one hundred. Column composed of thin joints articulating into each other by radiating striæ. The columnar canal is penta-

* From *krotalon*, a bell.

petalous. The rays are remarkably small in proportion to the size of the animal.

Miller has fallen into such important errors respecting this Crinite, that it is difficult to believe the fossil he describes to be identical with this which we are now describing; but having access to the specimens he founded the species on, and comparing them with others, we cannot doubt their identity.

Miller placed it with his genus *Cyathocrinites* as *C. rugosus*. The plates he erroneously described as scapulars with a single excavation for the articulation of the arm-joints have no excavation whatever, for there is a regular series of wedge-shaped plates resting on them, and from which the rays, amounting to nearly one hundred, proceed.

Family PLATYCRINIDÆ,

containing the genera *Platycrinites*, *Cyathocrinites*, and *Caryocrinites*.

Genus *Platycrinites*, Miller.

Genus erroneously described by its founder as having a divided pelvis. On referring to Miller's own specimens it is evident the fossils we are about to describe belong to the genus *Platycrinites*, which has in reality an undivided dorso-central plate, though Miller thought otherwise. This can be demonstrated by numerous well-preserved specimens, both in our own cabinet and in other collections also.

P. mucronatus, Austin, sp.

Definition given in the first portion of our Monograph now in course of publication.

P. antheliontes, Austin, sp.

Described in our Monograph now in the press.

P. spinosus, Austin, sp.

Defined in Monograph.

P. trigintidactylus, Austin, sp.

Def.—Perisomic plates agree with the generic character, but are somewhat broader than in the typical species *levis*. Main rays and subdivisions thirty, closely tentaculated to their ends. Proboscis or oral tube long, central, and plated to its apex with rather small, smooth, hexagonal plates. Column circular at its attachment to the body, but gradually becoming elliptical as it recedes from it.

Family ACTINOCRINIDÆ, *Austin*,

contains the following genera: *Actinocrinites*, *Rhodocrinites*, *Melocrinites*, and *Tetracrinites*.

Genus *Actinocrinites*, Miller.

Described by its founder.

A. elephantinus, Austin, sp.

The perisomic plates agree with the generic type in number and arrangement, but the radiating folds or ridges which ornament them are less strongly marked and fewer in number. The plates are also smaller in proportion to the size of the animal. Proboscis or oral tube much elongated, in some specimens exceeding two inches in length. Proboscical plates hexagonal, with an elevated ridge in the centre of each, and which is surrounded by a circle of minute tubercles. Main rays and subdivisions fifty, furnished with numerous tentacula. Column circular, with two small joints intervening between those of larger size.

A. cataphractus, Austin, sp.

Def.—The plates surrounding the body agree with the typical character in number and arrangement. The proboscis or oral tube of this species presents many interesting points of structure. It is covered from its base to the apex with a set of abruptly conical plates arranged spirally. The intermediate spaces are covered with smaller plates slightly elevated in their centres. Both sets, as well as the plates between the rays and proboscis, are beautifully embossed with minute mammiform eminences. The perisomic plates radiate in single ridges. Rays thirty, furnished with long and close-set tentacula. Column: it is impossible to define the structure of the column, as no certainty exists respecting it in this or other species, for it is evident that at different seasons considerable modifications took place.

There is a strongly marked difference between this species and the *triacontadactylus*, although each possess the same number of rays. The *triacontadactylus* has its proboscis covered with exceedingly minute plates, while those of the *cataphractus* are of striking peculiarity.

A. aculeatus, Austin, sp.

Def.—Perisomic plates answer to the generic type in number and general arrangement. The radiations are less strongly marked than in some other species. Oral tube elongated and covered with minute plates, most of which are furnished with a thorn-like projection in their centres. Rays and subdivisions forty. Two rows of minute tubercles ornament the outer sides of each of the rays. Column varying according to the period of the year in which the animal died.

A. crassus, Austin, sp.

The plates surrounding the body agree with the typical character in number and arrangement, but they are comparatively broader and devoid of the radiated markings. Rays numerous, but their number unknown. Column unascertained.

A. granulatus, Austin, sp.

Def.—The perisomic plates agree in number with the generic type. The first series of plates are larger in proportion to the size than in the typical species; the upper series are also broader. The plates covering the portion above the rays are finely granulated, excepting the six plates surrounding the valvate anal pore, which are smooth. Mouth not quite central, but situated below the large dome-shaped plate which crowns the centre. Total number of rays unknown, but they were probably numerous, as indicated by their points of attachment to the body. Columnar articulation large and circular. Column unknown.

This is a highly interesting specimen as showing the valvate anus, and is supposed to be unique in that respect.

A. lavissimus, Austin, sp.

Def.—Body-plates answer to the typical character in number and arrangement, but they are comparatively larger than in any other known species. The first and second series are flat and smooth, the remainder are slightly rounded, and have faint and partial radiations. Plates covering the viscera furnished with conical projections in their centres. Divisions of the rays fifty, closely tentaculated. Column as in other species, varying at different periods of growth.

A. longispinosus, Austin, sp.

Def.—The plates surrounding the body agree with the generic type, but the radiations are less strongly marked. The coronal plates, or those protecting the upper portion, are elongated into spines of very great length. Oral tube long and covered with minute plates. Rays forty. Column varying at different seasons.

Genus *Rhodocrinites*, Miller.

This is another genus of Miller's which requires an emended definition. He describes the dorso-central plates (pelvis) as composed of three instead of five pieces, and the first series of plates resting on them as quadrilateral, when, in fact, they are hexagonal. These mistakes were no doubt owing to the smallness of the specimens examined by Miller, which rendered them liable to be misunderstood. In consequence of

these errors Mr. Phillips has repudiated the genus altogether, and endeavoured to found a new one under the name of *Gilbertsocrinus*. We have carefully examined Miller's specimens and compared them with the species from the Yorkshire limestone which have been described by Mr. Phillips, and we are quite convinced that they are generically identical with each other; it is therefore evident that either the genus *Rhodocrinites* or the *Gilbertsocrinus* must be suppressed.

Though Miller was unquestionably wrong in his generic definition, there can be no possible doubt as to the identity of the fossils on which he founded his genus; we therefore, on mature consideration, think it just that the merit of priority should be conceded to him; and we trust that Mr. Phillips will coincide in this opinion.

If this principle is not to be recognised, every trifling error of an observer may be taken advantage of, like a flaw in an indictment, and the slightest mistake in his definitions be sufficient to annul a long-established genus. In this manner we might claim the right to rename the genus *Platycrinites* on the plea that the dorso-central plate is undivided instead of tripartite, as in Miller's generic character.

Def.—Dorso-central plates five, quadrilateral, with a small perforation at each of their inner angles, which, when the plates are united, form the pentapetalous opening into the column.

First series of plates resting on the dorso-central five, hexagonal; second series five, heptagonal; these latter support five hexagonal plates, which are succeeded by a like number of pentagonal ones. On the upper edges of each of these plates rest two lengthened hexagons, to which the ray-bearing plates are attached. Between these latter are several pentagonal and hexagonal plates.

Mr. Phillips appears to consider the pentagonal plates below the lengthened hexagons as the scapulæ or ray-bearing plates; but this we consider erroneous, as all the plates we have described as perisomic clearly envelope and form part of the body, above which the rays become distinctly developed, and were possessed of flexure, which their lower portions must have been deficient in had they been as described by Mr. Phillips.

R. costatus, Austin, sp.

Def.—Plates surrounding the body agree in number with the generic type. A strong rib or fold extends from each of the five angles of the dorso-central plates to about two-thirds the distance between those points and the rays; they then

divide, each branch ending at the base of the rays. All the perisomic plates are radiated. Abdominal plates small and mammiform. Mouth lateral. Rays forty. Columnar joints alternately thicker and thinner.

R. granulatus, Austin, sp.

Def.—Perisomic plates agree as to number and arrangement with the generic type, but instead of elevated ribs, as in the last species, the same end—strength—is attained by the superior thickness of the plates lying in the line of the rays. In consequence of this increased solidity, these plates are more elevated than the adjoining ones, the elevations being greatest in their centres. All the perisomic plates are minute, elevated, and finely granulated. Mouth lateral. Rays probably twenty. Columnar joints alternately larger and smaller.

Genus *Tetramerocrinites**, Austin.

Def.—Dorso-central plates four, pentagonal. First series of perisomic plates eight, four of which are heptagonal, and the remaining four pentagonal, alternating with each other; second series or ray-bearing plates eight, with a double excavation in each for the insertion of the ray-joints; several intervening plates occur, but the number is unknown.

T. formosus, Austin.

Def.—Little is known of this species beyond the description given in the generic definition. The unique specimen obtained of this species departs from the usual quinary type in the arrangement of its rays, which are in four groups of four each, instead of five, as is more generally observed in the *Crinoidea*. The depressions in the quadripartite dorso-central plates for the attachment of the column are small but deep. The body plates are all beautifully radiated from their centres. Column and rays unknown.

Family PERIECHOCRINITES†, Austin,

comprising the genera *Periechocrinites* and *Sagenocrinites*.

Genus *Periechocrinites*, Austin.

Def.—Dorso-central plates three. It is difficult to define the perisomic plates in this genus in the same manner as in other genera, because they do not occur in regular series as in *Actinocrinites*, but are regular only in the line of plates which run from the dorso-central plates to those bearing the rays. These may be considered as the principal plates, as they are

* From *tetrameres*, consisting of four parts. † From *periecho*, to surround.

more equally developed than the intervening ones, and divide the body into compartments. These series are easily distinguished by their prominence from the intermediate plates. A series of three traverse the lower portion of the body; these are succeeded by two other series of three each, which branch off at a considerable angle and form the points of attachment for the rays. Within the forks formed by these branches are groups consisting of three or more smaller and less prominent plates than those already described. In each of the compartments between the ray-bearing series is a group of several irregularly shaped hexagonal and pentagonal plates, sometimes amounting to seventeen or eighteen; in other cases the number is less, for greater irregularity is observable in this genus than in any other yet described. Rays composed of double series of joints.

P. articulatus, Austin.

The perisomic plates agree with the generic description, which has, in fact, been taken from this the typical species. Rays eighty, composed of double series of joints: the rays may really exceed the number specified above, but we have clearly seen their development up to that amount. Column circular, and subject to the same periodical changes as in other genera.

P. costatus.

The perisomic plates agree with the generic definition. Mr. Phillips has in Murchison's 'Silurian System' erroneously described this species as *Actinocrinites (moniliformis)*. To that genus it bears no resemblance either in the number or arrangement of the plates forming the calcareous framework. To bring this species within the generic character of *Actinocrinites*, it is necessary to consider the scapulæ as situated at least three series of plates below the true ray-bearing plates. It is scarcely necessary to remark, that such a method of determining species is quite unsatisfactory in every point of view, and must lead to important errors if adhered to.

Miller originally admitted it into the genus *Actinocrinites*, on the evidence of a columnar fragment; but as the form of the column possesses no peculiarity of structure sufficiently striking to warrant specific distinction, we have altogether renamed it.

P. globosus.

The number and arrangement of the perisomic plates answer to the generic type. Rays and column unknown.

Genus *Sagenocrinites**, Austin.

Def.—Dorso-central and perisomic plates unknown, as the only portions hitherto discovered are the rays and plated integument, which extends between their lower divisions in the same manner as the membranous web is stretched between the toes of many aquatic birds. The peculiar construction of these portions clearly proves them to belong to an undefined genus.

S. expansus, Phillips, sp.

Mr. Phillips has defined this species as far as the existing knowledge respecting it warranted in Murch. 'Sil. Syst.'; but he has placed it provisionally with the *Actinocrinites*, to which it in no respect appertains.

S. giganteus, Austin.

Body-plates unknown. Rays unequally developed and varying in their diameters; secondary rays composed of a double series of thin joints articulating by radiating striæ as in various columns. A plated integument connects the lower portions of the rays.

Family MEROCRINIDÆ, Austin,

contains the genera *Dimerocrinites* and *Tetramerocrinites*.

Genus *Phænicocrinites*†.

Def.—Dorso-central plates three? First series of perisomic plates, or those in the line of the rays, five; second series five; third series, or ray-bearing plates, five and cuneiform. Between these, the principal series, are several smaller plates, the number unascertained.

P. simplex, Phillips? sp.

Def.—The arrangement of the perisomic plates agrees with the generic type. Rays ten, composed of single series of joints, and furnished with plumose tentacula. The column is short as compared with *Actinocrinites*. No indication of auxiliary side-arms has been observed in this species. Base furnished with several fibres of attachment.

This is supposed to be the *Actinocrinites simplex* of Phillips, who states that "the pelvic, costal, and other plates of the body agree with Miller's technical formula of *Actinocrinites*." We cannot discover this agreement in any of the essential points, and have therefore removed it into a new genus.

Family ASTRACRINIDÆ‡,

consisting of the genera *Astracrinites* and *Aporocrinites*.

* From *agene*, a fishing-net.

† From *phoinix*, a palm-tree.

‡ From *astron*, a star.

Genus *Astrocrinites*, Austin.

Def.—Dorso-central plate quadrangular, to which four pairs of elongated plates are attached, imparting a lobed shape to the fossil. In the retiring angles at the base of the four lobes are a like number of ambulacra. Mouth central. Anus lateral.

A. tetragonus, Austin.

Def.—The plates of this species agree with the generic definition. Each of the elongated plates has two or three rows of minute tubercles around its outer margin, apparently for the attachment of spines. The ambulacra have each a double row of pores placed centrally, with marginal tubercles. Near the centre of the dorso-central plate is an oval eminence, apparently analogous to the *madreporiform tubercle* on the dorsal surface of the true Starfishes.

Genus *Sycocrinites**, Austin.

Def.—Dorso-central plates three, forming a pentagon. First series of perisomic plates five, on which rest other series of plates, answering, though larger in proportion, to the abdominal (pectoral) plates of those Crinites which possess rays. Mouth central, anal pore lateral. Column unknown.

S. clausus, Austin.

Def.—Dorso-central plates three; perisomic plates five, on which rest a second series of five plates which answer to the interscapular plates of those Crinites possessing rays; a third series of five plates close in the apex, excepting a minute central opening which is considered to be the mouth, and which was probably valvate. The anus is situated laterally at a point between the first and second series of plates. Column unknown.

S. Jacksoni, Austin.

Def.—Dorso-central plates three, forming a pentagon. Perisomic plates five. Apex closed in by five plates. Mouth central and valvate, anal pore lateral. Columnar attachment small. Column unknown.

S. anapeptamenus, Austin.

Def.—Dorso-central plates three, forming a pentagon. First series: perisomic plates five, all hexagons. The second series of plates arch over the apex, leaving a central opening which was probably protected by a plated integument. Anal pore lateral and projecting. Column unknown.

* From *sukon*, a fig.

Genus *Echinocrinus*, Agassiz.*E. spinosus*, Austin, sp.

Def.—Body conico-globose, with five double rows of ambulacral plates, and the like number of interambulacral spaces. The five pairs of avenues run from the mouth to the columnar point of attachment. The ovarian plates surround the mouth instead of the anal opening, as in the recent *Echini*, but which organ is as yet undiscovered in these fossil animals. The whole surface is covered with spines, but these are of two sorts; the one kind, though few in number, are long and furrowed longitudinally. The prominences near their bases are circular, and in their ends are cup-like excavations by which each one fits on to the tubercle in the centre of each plate. The second sort of spines are short, and are rather numerous but irregularly scattered over the plates and around the central spine. Column unknown.

E. anceps, Austin, sp.

The only part of this species yet discovered is a beautiful fragment showing the internal structure of the ambulacra and a few of the adjoining plates. On showing the specimen to Professor Agassiz some time since, he pronounced it to be the internal surface of a portion of the *E. pomum*. Though the Professor's name ranks deservedly high in science, and however presumptuous it may appear to dissent from such an authority, we are compelled in this instance to do so, for the following reasons:—the ambulacral pores of the specimen in question are much wider asunder than in the *E. pomum*, the plates themselves are much larger, and above all, are beyond comparison thinner than in the species Prof. Agassiz assigned them to.

Since Professor Agassiz saw the specimen in question, we have had many opportunities of examining the internal structure of the *E. pomum*, and we can find no resemblance whatever between the two species.

It appears to us that the name of our genus *Sycocrinites* and that of the *Echinocrinus* of Professor Agassiz require amendment, as their terminations imply affinities which do not exist.

A great majority of the new species defined in the foregoing paper were discovered and collected from the strata in which they occur by the authors.

Kingsdown, Bristol, January 18, 1843.