

## NECESSARY CHANGES IN THE NOMENCLATURE OF STARFISHES

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A number of generic names of starfishes are being incorrectly used. In view of the general acceptance of the International Code of Nomenclature there is now no valid excuse for the retention of such names as *Cribrella* Agassiz, *Palmipes* Agassiz, *Ctenaster* Perrier, *Crenaster* Perrier, *Asteropsis* Müller and Troschel, *Gymnastria* Gray, *Pentaceros* Schulze, *Patiria* Gray, and a few others listed below. The case of *Cribrella*<sup>1</sup> and of *Palmipes*<sup>2</sup> has already been argued, and need now only be mentioned in passing. *Cribrella* Agassiz, 1835, is a pure synonym of *Linckia* Nardo, 1834. *Cribella* Forbes, 1841 (not of Agassiz) is antedated by *Henricia* Gray, 1840, the correct name for the group of which *Asterias sanguinolenta* O. F. Müller is the type. *Palmipes* Agassiz, 1835, is antedated by *Anseropoda* Nardo, 1834. The fact that *Anseropoda* is of mixed derivation has no bearing on its tenability as the name of the genus of which *Asterias placenta* Pennant is type. The other cases follow.<sup>3</sup>

ANASTERIAS Perrier (Revision des Stellérides, 1875, 81), type,  
*Anasterias minuta* Per.

Leipoldt (Vettor-Pisani Asteroidea, Zeitschr. Wiss. Zool., Bd. 59, 1895, 570-571) considers *Anasterias minuta* a synonym of *Sporasterias rugispina*. Ludwig (Seesterne, Voy. S. Y. Belgica, 1903, 42) takes essentially the same view. *Anasterias*, being monotypic, thus becomes a synonym of *Sporasterias*. But Ludwig, excluding the type, retains the name for 5 species: *A. perrieri* Studer, *A. studeri* Perrier, and 3 new forms. Ludwig's genus is therefore not *Anas-*

<sup>1</sup> Bell, Ann. and Mag. Nat. Hist., ser. 6, vi, 1890, 472; Fisher, The Starfishes of the Hawaiian Islands, Bull. U. S. Fish Comm. for 1903, Part III, 1906, 1089.

<sup>2</sup> Bell, Loc. cit., vii, 1891, 233; Fisher, Loc. cit., 1088.

<sup>3</sup> It is a pleasure to acknowledge the kindness of Dr. Theodore Gill, with whom I discussed the merits of nearly all the cases mentioned in this paper. In the matter of Schulze's names Dr. L. Stejneger and Mr. H. C. Oberholser have also given helpful advice. I also wish to acknowledge the coöperation of the Librarians of the National Museum and Philadelphia Academy of Sciences.

*terias* Perrier, but is new. Being nameless, it may be called *Lysasterias*, with *Anasterias perrieri* Studer as type.

ASTEROPSIS Müller and Troschel (Archiv für Naturgeschichte, 6 Jahrg., Bd. I, Sept., 1840, 322), type, *A. carinifera* (Lamarck).

This name, which was published in 1840, and not in the System der Asteriden, 1842, as invariably quoted, has exactly the same signification as Gray's *Gymnasteria* (Dec., 1840), but is in turn antedated by *Asterope* Müller and Troschel, as explained below under *Gymnasteria*. The Archiv für Naturgeschichte appeared in 3 parts to each volume. The article "Ueber die Gattungen der Asterien (Auszug aus dem Monatsber. der König. Akad. der Wiss. Monat, April, 1840)" was very probably in the beginning of the third part, which would make the date about September, 1840. The genus is monotypic, and the name can not therefore be restricted to *Asteropsis vernicina* (Lamarck), as has been done by Perrier (Rev. Stell., 1875, 282) and authors since. *Asteropsis* is a synonym of *Asterope*, along with *Gymnasteria*. *Asteropsis vernicina* (Lamarck) Perrier becomes *Petricia vernicina*. The genus *Petricia* Gray (Proc. Zool. Soc., pt. XV, 1847, 81) has for type *P. punctata* Gray, which equals *Asterias vernicina* Lamarck.

CRENASTER Perrier (Ann. Sci. Nat. Zool., Art. 8, XIX, 1885, 71), type, *C. mollis* Per.

This name is invalidated by *Crenaster* d'Orbigny (Prodrome de Paléontologie, t. i., 1850, 240), a synonym of *Astropecten* Gray. *Crenaster* Perrier is very doubtfully distinct from *Dytaster* Sladen. The only difference is the absence of pedicellariæ in *Crenaster*. The same character has been unsuccessfully used by Perrier in attempting to distinguish *Pontaster* from *Cheiraster*.

Ctenaster Perrier (Bull. Mus. Comp. Zool., IX, 1881, 18), type, *Ctenaster spectabilis* Per.

L. Agassiz, in the Memoirs Soc. Scientif. Neuchâtel, I, 1835, 192, used *Ctenaster* as a substitute name for *Asterina* Nardo, 1834. Its status corresponds to that of *Cribrella*. This prior use of *Ctenaster* ("Once a synonym, always a synonym") leaves Perrier's genus without a name. It may be called *Latmaster*, the type and only known species being *Ctenaster spectabilis* Perrier.

DIPLASTERIAS Perrier (Compt. Rend., CVI, No. 11, 1888, 765; Mission Scientif. du Cap Horn, VI, Zoologie, Echinodermes, 1891, 77), type, *Asterias sulcifera* (Perrier), first species.

In the first citation the name is mentioned so casually that it must in all probability be disregarded as a *nomen nudum*. Perrier, in an appendix on page 160 of the second reference, gives precedence to Sladen's *Cosmasterias* (type, *Asterias sulcifera*), which was published while Perrier's paper was in press. Thus Perrier relegated his own genus to synonymy. The group was a very artificial one, and, strictly speaking, was not coextensive with *Cosmasterias*. But by reason of its type the name, at least, can be restricted to a definite aggregation of species, namely, the *Cosmasterias* of Sladen. This name, however, is long antedated by *Pisaster* Müller and Troschel,<sup>1</sup> type, *Asterias ochracea* Brandt. I have examined *Asterias sulcifera* (Perrier), and find that it is a *Pisaster*, as indicated by the peculiar large pedicellariæ and numerous rows of actinal intermediate plates. *Podasterias* Perrier (type, *Diplasterias lütkeni* Per.<sup>2</sup>) also seems to be typical *Pisaster*, making a third synonym. Since Perrier himself repudiated *Diplasterias*, the name should then and there have died a painless death. Kœhler, however, has resurrected it for two new species in his report on the echinoderms of the Expedition Antarctique Française (1906, and again in *Zoologischer Anzeiger*, Sept. 17, 1907, 141. This use of the name is incorrect.

GONIODON Perrier (Expéditions Scientifique du Travailleur et du Talisman, Echinodermes, 1894, 244), type, *Pentagonaster dilatatus* Perrier.

This name is antedated, and therefore invalidated, by *Goniodon* C. L. Herrick, Denison Univ. Scientif. Laboratories, Bull. III (April), 1888, 4; type, *G. ohioensis*, a mollusc. *Goniodon* Perrier may be called *Diplodontias*.

<sup>1</sup>Archiv f. Naturgesch. 6 Jahrg., Bd. 1, 1840, 367; System der Asteriden, 1842, 20. Type *Asteracanthion margaritifera* M. & T. (= *Asterias ochracea* Brandt). This name was used by Prof. L. Agassiz on display labels in the Museum of Comparative Zoölogy, Cambridge. The reference, in A. Agassiz's "North American Starfishes," to the genus *Pisaster* "as recognized by Professor Agassiz" probably refers to these labels, as I find nothing in the latter's writings bearing on the subject.

<sup>2</sup>In Proc. Bost. Soc. Nat. Hist., VIII, 1861, 265, Stimpson described from the Coast of Oregon *Asterias lütkenii*, which is a *Pisaster*, thus antedating Perrier's name.

GYMNASTERIA Gray (Ann. and Mag. Nat. Hist., VI, Dec., 1840, 278), type, *Gymnasteria spinosa* Gray=*Asterias carinifera* Lamarck.

Within the year 1840 *Asterias carinifera* Lamarck was made the type of three genera: *Asterope* Müller and Troschel, *Asteropsis* Müller and Troschel, and *Gymnasteria* Gray. The first was described in April (Monatsber. d. k. Akad. d. Wiss. Berlin, 104), the second in September (Archiv f. Naturgesch., 322), and the last in December. Müller and Troschel thought that their *Asterope* was invalidated by *Asterope* Philippi (for a crustacean), published the same year in Archiv f. Naturgeschichte, part 2, June, 186, so that they changed the name to *Asteropsis* in their article "Über die Gattungen der Asterien," published about September in the same journal, page 322. Investigation proves, however, that Philippi's name was published fully two months after that of Müller and Troschel, the evidence being a reprint of Philippi's article in the Annals and Magazine of Natural History, VI, September, 1840, 89. This translation states that it is reprinted from Wiegmann's Archiv, Part 2, June, 1840, thus fixing the date. There is no reason why *Asterope* should not replace *Gymnasteria*. The family *Gymnasteriidae* will become *Asteropidae*.

PATIRIA Gray (Ann. and Mag. Nat. Hist., VI, Dec., 1840, 290), type, *Patiria coccinea* Gray=*Asteriscus coccineus* M. and T., 1842=*Asterina coccinea* (Gray) Perrier, 1875.

*Patiria* was monotypic when described, and since its type is an *Asterina*, it naturally becomes a synonym of that genus. Gray, however, in Proc. Zool. Soc., 1847, 82, extended the genus to include *granifera*, *ocellifera*, *obtusa*, and *crassa*. Perrier, 1875, then restricted *Patiria* to *ocellifera* and *crassa*, relegating *coccinea*, *granifera*, and *obtusa* to *Asterina*. Sladen, in 1889, added a third species. It will be seen that Perrier, with his usual freedom of treatment, excluded the type from his genus *Patiria*, which is therefore not the *Patiria* of Gray. Perrier's genus may be called *Parasterina*, the type being *Patiria crassa* Gray.

PARARCHASTER Sladen (Narr. Chall. Exp., I, 1885, 610, Fig. 204), type, *P. pedicifer* Sladen.

This name is still employed by Ludwig, Köchler, and others. It is a synonym of *Benthopecten* Verrill (Amer. Journ. Sci., XXVIII, 1884, 218, footnote).

## PENTACEROS, PENTAGONASTER, and ASTROPECTEN.

Until recent years, and long after it had been agreed to abandon pre-Linnæan names, these three genera were attributed to Linck's "De Stellis Marinis," 1733. Even Ludwig, in "Die Seesterne des Mittelmeeres," 1897, followed the same course. Sladen, in 1889 ("Challenger" Asteroidea), adopted many of Linck's specific names, and the three generic names noted above. When it became evident, however, that adherence to generally accepted rules of nomenclature would be necessary, and that Linck's pre-Linnæan and non-binomial names would have to be relinquished, Schulze's booklet, "Betrachtung der Versteinerten Seesterne und ihrer Theile" (Warschau und Dresden, 1760, 58 pp., 3 plates), was hastily invoked to save *Pentaceros*<sup>1</sup> and *Astropecten*. Then *Pentagonaster* was attributed to Schulze, but the author who accomplished this commendable piece of research inconsistently overlooked *Pentadactylus* (since acceptance of that name would invalidate *Linckia*).

I recently examined for the first time, in Washington, a copy of Schulze's work, and showed it to Dr. Theodore Gill, Dr. Leonhard Stejneger, and Mr. H. C. Oberholser, all experts in matters of nomenclature. Each gave his opinion independently and emphatically that Schulze's names are not tenable.

These names are mostly derived from Linck's "De Stellis Marinis." There is no evidence that Schulze knew anything about binomial nomenclature, for he does not conform to the Linnæan system, and his so-called binomials are greatly outnumbered by single names. Both kinds are used in a specific or descriptive sense, as "Der Lederartige, *coriacea*" [=genus V, *Stella coriacea*, Linck, p. 30]. Those names in binomial form, such as *Pentagonaster regularis* and *Astropecten regularis*, are not genus and species, but are a more elaborate descriptive term, in imitation of Linck. They are really the modifying portion of a trinomial, of which the "generic" name is mentioned previously (*quinquefidæ*). Schulze has no real genera. He divides (p. 49) his starfishes into two classes, *fissæ* (=Asteroidea) and *integræ* (=Ophiuroidea). The former he subdivides into three genera (Geschlechter), according to the number of arms. In the first genus he places all which have less than five rays (*stellæ oligactæ*), and details several kinds, as der Dreistral, *Trisac-*

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<sup>1</sup> Sladen first called attention to *Pentaceros* Schulze, but did so, rather disdainfully, for the benefit of those who refused to accept Linck's names. Sladen said that *Pentaceros* was used by Schulze "exactly in Linck's sense," overlooking the fact that "Linck's sense" of *Pentaceros* was a combination of *Hippasteria*, *Orcaster*, and *Asterina*!

*tis*, der Vierstral, *Tetractis*, etc. All 5-rayed forms are grouped in the second genus (*quinquefidæ*), under which he mentions numerous species or kinds, as das Fünfeck *Pentagonaster*, das reguläre Fünfeck, *Pentagonaster regularis*, das gesternte Fünfeck mit ausgerundeten Seiten, *Pentagonaster semilunatus*.

Further, he says: "Der fünfhornichte, *Pentaceros*, hat fünf tiefe, ausgeschweifte Seiten, und lange, kolbichte oder zugespitzte Strahlen. Die hierher gehörigen Arten sind entweder platt, *planæ*, oder aber hockericht und bauchicht, *gibbæ*."

Then are mentioned: Der eingekerbte Fünfstral *Astropecten*, der eingekerbte reguläre Fünfstral *Astropecten regularis*, der eingekerbte irreguläre Fünfstral *Astropecten irregularis*, der Gänsefussformige *Palmipes*, der lederartige *coriacea*, die stumpfwinklichte *obtusangulæ*, spitzwinklichte *acutangulæ*, fünfblattrichte *pentapetalæ*, die Meersonne *Sol marinis*, die Sternhand *Pentadactylus aster*. Besides those mentioned, there are numerous other single names referring to starfishes and ophiurans.

The absurdity of Schulze's names for other than historic purposes is well exemplified in *Pentadactylus aster*, which is Linck's *Pentadactylosaster* divided, possibly because it appeared too long. As a recognizable description accompanies this name, those writers who accept *Pentaceros* can hardly avoid adopting *Pentadactylus* also.

Sherborn, who has given the weight of his authority in favor of Schulze, misquotes in two instances in the "Index Animalium." *Palmipes* Schulze [= *Anseropoda* Nardo] has, according to Sherborn (l. c., 1151), the following species: *coriacea*, *obtusangula* (sic), *acutangula* (sic), and *pentapetala* (sic). Schulze mentions no names under his *Palmipes* (p. 51). Those quoted by Sherborn have nothing to do with *Palmipes*, and, with one exception, are incorrectly spelled in the bargain. *Coriacea*, for instance, is coordinate with *Palmipes*, and is a descriptive term ("der lederartige"). The other names occur in the plural. So under *Pentaceros* Sherborn cites "*gibbus*" and "*planus*." Schulze says: "Die . . . arten sind entweder platt, *planæ*, oder aber hockericht und bauchicht, *gibbæ*."

These are not specific terms, either in form or intent—that is, not as we now employ specific names. But if *Pentaceros* "*planæ*" were taken as a binomial, equivalent to *Pentaceros planus* Linck (the type of *Pentaceros*), then *Hippasteria* Gray would become *Pentaceros* and *Oreaster* would replace *Pentaceros* Gray, Sladen, *et al.* As a matter of fact, *Pentaceros* Schulze is not a genus, and if it were it has no species name, being in the same class with *Palmipes*, *Coriacea*, *Tetractis*, *Hexactis*, *Heptactis*, *Octactis*, *Enneactis*, *Decactis*, *Dode-*

*cactis*, *Triscædecactis*. No efforts are being made to replace *Solaster* Forbes by *Octactis* Schulze, yet the identification by means of Linck, table XIV, n. 25 (the source of Schulze's name) is certain. Similarly if *Pentaceros* is valid, so is *Dccactis* for *Crossaster*; or if there is any doubt about *Dccactis*, none can be urged against *Triscædecactis*! In some cases Linck's plates are singularly good.

Schröter, in 1782 (*Musei Gottwaldiani Testaceorum, Stellarum marinum*, etc., Nürnberg, 58), used *Pentaceros*, but he is not a consistent binomialist, and his "generic" names are not tenable.

*Pentaceros* Schulze should be changed to *Orcaster* Müller and Troschel, 1842. *Pentaceros*, for starfishes, was given binomial standing by Gray in 1840, but Cuvier and Valenciennes adopted the name for fishes in 1828. The family becomes the *Orcasteridæ*. The type of *Orcaster* is *Asterias reticulata* Linn. (= *O. reticulatus* M. and T.).

Fortunately *Astropecten* was given binomial standing by Gray in 1840, and its signification does not change. *Stellaria* Nardo, 1834, another name for the same group, is invalidated by *Stellaria* Møller, 1832, for a mollusk. Gray's *Astropecten* includes *Ctenodiscus*, *Astropecten*, and *Chataster*. *Chataster* was described a few months previously by Müller and Troschel, and *Ctenodiscus* was eliminated in 1842. No type was designated by Gray; as it is desirable to have one, *A. aurantiacus* (Linn.) may be so considered.

*Pentagonaster* Schulze is superseded by *Goniaster* Agassiz (type,<sup>1</sup> *Asterias tessellata* Lamarck). The name *Pentagonaster* was given validity by Gray, 1840, for a small and different group of which *P. pulchellus* is type. Ayres' *Stephanaster*, adopted by Perrier, is long antedated by this name, while *Phaneraster* Perrier is similarly invalidated by *Goniaster*.

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<sup>1</sup> Indicated by Agassiz. Mem. Soc. Sc. Neuchatel, t. i, 1835, 145.