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Inhalt:

I. Wissenschaftliche Mitteilungen.

1. New Starfishes from the North Pacific. — I. Phanerozonia.

By W. K. Fisher, Stanford University, California.

eingeg. 2. Januar 1910.

The following new species will be described and figured in detail in a report on the *Asteroidea* of the North Pacific, now in preparation.

Astropectinidae.

Leptychaster propinquus new species.

Similar in general form to *L. anomalus*, but with narrower and more numerous marginal plates, less massive margin to disk, and smaller paxillae. R 29 mm; r 15 mm; R 1,93 r. Width of ray at base, 17,5 mm.

Vicinity of Commander Islands, Bering Sea, 72 fathoms. Bottom, pebbles.

Dipsacaster.

The three new species of *Dipsacaster* are best diagnosed in a comparative manner. The four north Pacific species are contrasted in the following key.

a. Inferomarginal plates with a tuft of enlarged spines at outer end or a series along aboral margin; border of rays subserrate; papulae distributed all over abactinal surface; madreporic plate very large bearing many paxillae on its surface.

b. Paxillae conspicuously large in central portion of disk and along median area of rays, their spinelets descending the pedicel in bristling array, so that they resemble miniature bottle-brushes; rays broad near tips; abactinal plates strongly stellate along median radial area, with 2 or 3 papulae to each area instead of 1; actinal intermediate areas broad, far along ray . . . . *D. eximius* Fisher.

bb. Paxillae not conspicuously larger in central portion of disk, etc., their spinelets grouped at top of pedicel; rays evenly tapered to tip; abactinal plates along median radial area either round or stellate but not surrounded by many papulae, never by more than 8; actinal intermediate areas narrow beyond middle of ray.

c. Abactinal plates lobed; marginals broader, covered with compact, rigid, polygonal granules (superomarginals) and squamae (inferomarginals); superomarginals with 1 or 2 tubercles; adambulacral furrow spines compressed with broad side to furrow, actinal intermediate plates covered with squamiform spinelets . . *D. borealis*, new species.

cc. Abactinal plates not lobed; marginals narrower, the superomarginals without tubercles and covered with delicate capillary spinelets; inferomarginals with delicate, imbricating, narrow, squamiform spinelets; adambulacral furrow spines strongly compressed with edge to furrow; actinal intermediate plates with slender spinelets . . . . . *D. laetmophilus* new species.

aa. Inferomarginals entirely without specialized spines; border of ray even, not serrate from the form of inferomarginals; papulae absent from center of disk; madreporic body median sized, hidden, but with only 1 or 2 paxillae on its surface . . . . . *D. anoplus* new species.

Dipsacaster borealis new species.

Related to *D. eximius* Fisher but differing in the shape of rays, in having smaller paxillae with fewer spinelets and these not descending far down the pedicel; in not having the paxillae conspicuously enlarged on center of disk and along middle of ray; in the shape and position of

the median radial plates, and in number of papulae surrounding them; in covering of marginal plates; in having thicker specialized ridges to inferomarginals, with correspondingly narrow fasciolar furrows; in the special spinelets on both series of marginals which are robust and blunt never slender or sharp; adambulacral spines 4, 5, or 6, flattened with broad side to furrow (not compressed with edge to furrow as in *eximius*).

Bering Sea, north of Unalaska Island, 350 fathoms. Bottom, mud.

Dipsacaster laetmophilus new species.

With the characters given in the key, above.

Between Unalaska and Kadiak, 695 fathoms. Bottom, mud.

This species differs from *D. nesiotes* Fisher (Hawaii) in having much broader rays, longer paxilla pedicels in proportion to width of crown of spinelets; more distantly spaced abactinal plates; marginals which correspond plate for plate and to not alternate on outer part of ray; wider superomarginals and inferomarginals; a less plane actinal surface to inferomarginals; less thick specialized ridge; broader fasciolar grooves; more pominently carinated actinal intermediate plates; larger actinal intermediate areas on rays.

Dipsacaster anoplus new species.

With the characters given in the key, above.

Off Cascade Head, Oregon, 345 fathoms. Bottom, mud.

This species resembles a *Leptychaster* of the *anomalus-pacificus* form but can at once be distinguished by the characteristic arrangement of gonads, which, as in all species of *Dipsacaster*, extend far along ray on either side, as independent tufts attached to the genital stolon.

Benthopectinidae.

Benthopecten Verrill.

The species occurring off the west coast of North America are contrasted in the following key:

a. Inferomarginal plates with pectinate pedicellariae at base of ray only; or if occurring beyond middle of ray, actinal spinelets clavate (bb). Odd interradial marginal plates normally present in all interradii. Actinal interradial areas small.

b. Abactinal plates of ray with only 1 slender central spinule; abactinal pedicellariae numerous on ray extending nearly to tip; actinal and inferomarginal spines of proximal part of ray not clavate . . *B. acanthonotus* Fisher.

bb. Abactinal plates of ray proximally with 1 spinule and several minute spinelets; beyond papular area with 1 to several minute spinelets; proximally the actinal and inferomarginal spines clavate; abactinal pedicellariae usually confined to disk and base of rays *B. claviger* new species.

aa. A majority of interradii usually without odd interradials, and inferomarginals with pedicellariae nearly to tip of ray. A few prominent spines on center of disk, the others short and stubby, robust. Interradial areas larger . . . . . *B. mutabilis* new species.

Benthopecten claviger new species.

Rays 5. R 110 mm; r 12; R 9,1 r. Breadth of ray at base, 14 mm. Disk small, rays long and evenly tapering; interradial angle abrupt. Abactinal surface of disk with numerous conspicuous thorny-surfaced spines which extend into rays for a short distance, these surrounded at base by 8 to 15 or even more very small thorny spinelets; numerous intermediate plates with 1 to 5 tiny spinelets; on ray plates with 1 to 5 similar spinelets forming a fine nap. Interradial odd superomarginal very prominent. Abactinal pectinate pedicellariae present but usually variable in number. Inferomarginal and actinal adambulacral spines of proximal part of ray club-shaped, the former 2, the latter 2 (sometimes 3) in number. Furrow spines 4 to 6, slightly curved. Pectinate pedicellariae between proximal inferomarginals, rarely farther along ray.

Off Cape Blanco, Oregon, 1064 fathoms. Bottom, green mud.

The most characteristic features of this species are the clavate actinal and inferomarginal spines, the prominent thorny disk spines, and the extremely delicate abactinal spinelets which often are exceedingly small. *B. spinuliger* (Ludwig) differs in lacking the prominent spines of disk, in having numerous (13 – 16) marginal mouth spines, and in lacking the characteristically formed actinal spines.

Benthopecten mutabilis new species.

In general appearance similar to *B. spinosus* Verrill but usually lacking some of the odd interradial marginal plates (always in one or the other series, as a rule in both); abactinal, actinal intermediate and inferomarginal pedicellariae, the latter series extending to tip of ray, the first extending far along ray, as a rule; (pedicellariae lacking in *B. spinosus*). Abactinal surface with several large spines near center of disk, each usually surrounded by several small spinelets; other plates of disk with 1 to 3 or 4 very short stubby spinelets, and plates of ray with typically 1 such spinelet. Superomarginals with 1, inferomarginals

with 2 unequal spines. Adambulacrals with 5 or 6 subequal furrow spinelets and 2 actinal spinelets. R 100 mm; r 15 mm; R 6,6 r. Breadth of ray at base, 17 mm.

Off Prince of Wales Island, British Columbia, 1569 fathoms. Bottom, gray ooze.

Acantharchaster Verrill.

Syn. *Marcellaster*, Koehler, Zool. Anz. Bd. XXXII. 1907. 144.

Related to *Benthopecten*; odd interradial marginal either absent, or present in only a part of the interradii; abactinal plates (of disk at least) tabulate, the larger bearing a conspicuous central spine surrounded by a circle of more or less elongate spinelets.

In this genus the primary abactinal plates of the papular region are either stellate with numerous lobes, or roundish with faint indication of lobing. The plates are raised into a low tabulum bearing a variable number of spinules, and a central movable spine.

The following species, all but the first new, occur off the west coast of North America.

a. No odd interradial marginal plates; R, less than 6 r; abactinal plates not stellate on papular area *A. dawsoni* Verrill.

aa. Odd interradial marginal plates; R, more than 7 r; abactinal plates stellate on papular area.

b. Papulae extending far beyond middle of ray; dorsolateral musclebands inconspicuous; marginal mouth spines 10 or more, not graduated in length toward the inner 2 which are abruptly larger.

c. Abactinal accessory spinules long and slender forming with the primary spines a dense armament; secondary plates with long spinules, furrow spinules 1 to 3. *A. aciculosus* new species.

cc. Abactinal accessory spinules not greatly developed, in length or number; if developed at all only 2 or 3 around each spine: secondary plates with short spinelets; abactinal integument firmer and plates closer together; furrow spinules 4 to 7.

d. Numerous abactinal pectinate pedicellariae together with inferomarginal and actinal intermediate pedicellariae. Disk larger . . *A. variabilis pedicellaris* new subspecies.

dd. Very few abactinal pectinate pedicellariae, and only exceptionally actinal or inferomarginal ones. Disk smaller. *A. variabilis* new species.

bb. Papulae extending only $^1/_7$ length of ray; dorsolateral musclebands conspicuous; marginal mouth spines 5 or 6 graduated toward inner tooth . . . *A. intermedius* new species.

Acantharchaster aciculosus new species.

Rays 5 (very rarely 6). R 146 mm; r 16 mm; R 9 r. Width of ray at base, 19 mm. Cotype: R 217 mm; r 16 mm; R 13,5 r. Width of ray at base 19 mm. Rays very long, slender, flexible, and tapering gradually from narrow base to attenuate extremity. Abactinal surface covered with stellate plates of 2 general sizes, large primary plates bearing a raised tabulum with a central, long, slender, movable, needle-like spine surrounded by a circle of 8 to 15, divergent very slender, seta-like spinules $^1/_3$ to over $^1/_2$ the length of spine; interspersed among these, smaller plates with spinules only, or perhaps an incipient central spine; beyond middle of ray, plates with a uniform covering of minute spinelets, 3 or 4 to a plate; a few abactinal pectinate pedicellariae. Papulae numerous, large, distributed all over disk and on ray to about $^2/_3$ R from center. Superomarginals with 2 or 3 long slender movable spines, surrounded by 7 to 12 auxiliary spinules, inferomarginals similarly armed. About 3 or 4 (as few as 1, or rarely all 5) interradii with an odd marginal plate, in both series, bearing 1 or 2 spines, but not always corresponding; an odd superomarginal sometimes opposite paired interradial inferomarginals. Adambulacral plates with 2 to 4 furrow spinules, and 2 or 3 long slender actinal ones in oblique series. Mouth plates broadly spade-shaped with 9 to 15 marginal spinules, subequal except for the inner 1 or 2 which are enlarged to form teeth. Typically, no actinal pedicellariae; exceptionally these may be present in northern examples.

Between San Diego and San Clemente Island, Cal., 542 fathoms. Bottom, green mud.

Acantharchaster variabilis new species.

Nearly related to *A. aciculosus*, but differs in having a firmer abactinal integument with closer fitting plates; in the reduction of the spinules surrounding abactinal primary spines, these being either very short, or when lengthened comparatively few, and not forming a dense chevaux-de-frise; in having short accessory marginal spinules; in having, as a rule, 4 to 6 (instead of 1 to 3) furrow spinules. R 175 mm; r 15 mm; R 11,6 r. Breadth of ray at base 19 mm.

Bering Sea, north of Unalaska, 350 fathoms. Bottom, mud.

Acantharchaster variabilis pedicellaris new subspecies.

Resembling *A. variabilis*, but differing in having a large number of abactinal pectinate pedicellariae which are scattered all along ray; in

the presence of numerous inferomarginal and usually 1 or 2 actinal interradial pedicellariae; in the typically somewhat larger disk. R 168 mm; r 22 mm; R 7,6 r; breadth of ray at base 26 mm.

Acantharchaster intermedius new species.

Differs from *A. aciculosus* in the absence of long accessory abactinal spinules; in the restriction of papulae to disk and proximal seventh of ray; in having stouter dorsolateral muscle bands; and in the smaller mouth plates with comparatively few marginal spinules. R 158 mm; r 17 mm; R 8,3 r; breadth of ray at base 21 mm.

Monterey Bay, California 958—755 fathoms. Bottom, mud.

Cheiraster agassizi evoplus new subspecies.

Differing from *Ch. agassizi* Ludwig in having abactinal and intermarginal pedicellariae and usually larger papular areas with more numerous papular pores. Rays 5; R 72 mm; r 11,5 mm; R 6,4 r. Nearly related to *Ch. forcipatus* (Sladen) and *Ch. mimicus* (Sladen). From the former *evoplus* differs in having larger papularia and differently formed abactinal pedicellariae (pectinate in *evoplus*). In *forcipatus* the paxillae have stouter spinelets and the central spinelet is short and conical; secondary superomarginal spinule in *evoplus*, none in *forcipatus*; more numerous and prominent secondary spinules on proximal inferomarginal plates in *evoplus*, and the furrow spinelets longer, slenderer, and curved. *Evoplus* differs from *mimicus* by the presence in the adult and moderately young specimens of abactinal, intermarginal, and much more abundant actinal pedicellariae. The papularia are larger and contain many more pores. In *Ch. evoplus* the furrow spinelets are slenderer and curved, and the spine in the actinal surface of each adambulacral plate is not so prominent as in *mimicus*, while the proximal inferomarginals are more heavily armed than in *mimicus*.

Off San Diego, Cal., 1059 fathoms. Bottom, green mud.

Goniasteridae.

Pseudarchaster dissonus new species.

Closely related to *Ps. pectinifer* Ludwig but differs in having actinal bivalved pedicellariae of a highly characteristic form, coarser granules to abactinal paxillae and superomarginal plates, proximally smaller adambulacral plates, fewer actinal adambulacral spinelets and pointed furrow spines. R 170 mm; r 61 mm; R 2,6 r.

This species is characterized by post-ambulacral fascioles of a bilvalved form, in reality pedicellariae, which may consist of multiple opposing jaws. The actinal intermediate plates and their pedicellariae

proximally encroach upon the adambulacrals and sometimes push between them (thus separating the adambulacrals one from another) and border the furrow.

Off Oregon, 786 fathoms. Bottom, green mud.

Ceramaster clarki new species.

General form stellato-pentagonal but last 2 or 3 superomarginals in contact medially. General aspect somewhat resembling *C. patagonicus* (Sladen), but margins much thinner, marginal plates smaller, their granules coarser, hemispherical, and slightly spaced, the abactinal plates with fewer and larger granules, more numerous and slightly larger pedicellariae; the actinal intermediate plates with smaller and less regular plates (especially in the series adjacent to adambulacrals), and larger, less regular, thimble-shaped granules; adambulacral plates with subequal, robust, truncate tubercular spinelets in the first actinal series instead of granules, and the plates narrower than long, instead of wider than long. Furrow spinelets 4 or 5, compressed, and longer than plate. R 53 mm; r 33 mm; R 1,6 r.

Bering Sea (54° 30′ 30″ N. Lat.; 179° 14′ E. Long.), 344 fathoms. Bottom, greenish brown sand.

This species differs from *C. leptoceramus* (Fisher) in lacking secondary abactinal plates, in having coarser actinal and marginal granules, much coarser and fewer abactinal granules to each plate, fewer and longer furrow spinelets, and in having the first series of the actinal adambulacral spinelets well developed and tubercular. From *C. japonicus* (Sladen), *clarki* differs in all these points (except secondary abactinal plates): especially striking are the differences in abactinal and actinal granulation, and in the form and armature of the adambulacral plates. In *C. arcticus* (Verrill) the adambulacral plates are very short, more than twice as wide as long, and furrow spinelets are only 2 or 3; the papulae are usually not single (as in *clarki*) but 2 to 4 in each group, the interradial abactinal plates are lobed, never in *clarki*.

Named for Dr. Hubert Lyman Clark.

Cladaster validus new species.

Arcuately pentagonal with slightly convex abactinal surface; broad marginals with tumid naked abactinal surface; regular abactinal plates bearing spaced, deciduous obovoid granules and spatulate pedicellariae of small size; with 2 furrow spines and 1 larger heavier clavate spine on surface of adambulacral plate; with unequal actinal intermediate granules and relatively large broadly spatulate pedicellariae. R 17 mm; r 10 mm; R 1,7 r.

Amukta Pass Aleutian Islands, 283 fathoms. Bottom, black sand.

C. validus differs from *C. rudis* Verrill in having a definite tumid naked area on upper surface of each superomarginal, abactinal pedicellariae, very unequal actinal intermediate granules of larger size, larger actinal pedicellariae, and relatively to the abactinal granules, larger granules on lateral face of marginals. *C. rudis* has more difinite rays the last 4 marginals being in contact medially, but this may vary with age (2 superomarginals in contact in *validus*).

Hippasteria leiopelta new species.

General form stellato-pentagonal to arcuate pentagonal, the latter being usual for small specimens which have R, about 1,45 r while larger examples have R 1,5 r. Some have the radii as 1,7 : 1. Abactinal plates smooth in the middle surrounded by a single series of granules, and bearing besides occasionally à central granule, rarely a tubercle, and (interradially) here and there a large low bivalved pedicellariae. Marginal plates regular, large, dorsally and ventrally naked, except for a peripheral series of granules; a cluster of granules with sometimes a spine or tubercle on outer face; no marginal pedicellariae; scattered large bivalved actinal pedicellariae; actinal granules large, adambulacral spines 2, large and clavate in a transverse row on plate, the single furrow spine slightly the larger. R 30 mm; r 20 mm; r 1,5 r.

Off Kamchatka (52° 46′ 50″ N. Lat., 158° 44′ 30″E. Long.) 69 to 48 fathoms. Bottom, green sand.

This small, well-marked species differs from *phrygiana* and allies in the absence of abactinal spines or tubercles, the central portion of plates being usually smooth and bare, except for an occasional granule or pedicellaria. Likewise the marginal plates lack the characteristic spines of *phrygiana* although spines may be present on the lateral surface of the plates. The greater part of the surface of the marginals is entirely bare. The adambulacral spines are heavy and reduced to 2 forming a transverse series.

2. Parametabolie und Neotenie bei Cocciden.

Von Carl Börner.

Aus der Kaiserlichen Biologischen Anstalt für Land- und Forstwirtschaft.)

(Mit 8 Figuren.)

eingeg. 8. Februar 1910.

In meiner vergleichenden Studie über die Verwandlungen der Insekten[1] habe ich den Nachweis führen können, daß die postembryonale

[1] Die Verwandlungen der Insekten (vorl. Mitteilung). Sitzber. nat. Freunde, Berlin, 1909. S. 290—311.