

PENTOPLIIDAE, A NEW FAMILY OF ASTEROIDEA FROM THE SOUTH ATLANTIC OCEAN

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ABSTRACT

A monotypic family of Asteroidea, the family Pentopliidae n. fam., with *Pentoplia felli* n. gen., n. sp., is recorded from near the South Georgia and South Orkney islands, in 2681-4017 m. It is unique in possessing enormous, grablike pedicellariae.

INTRODUCTION

In February and March, 1963, the U. S. N. S. ELTANIN (cruise 7) occupied a number of stations in West Antarctica between 50° and 66° South. *Pentoplia felli* n. gen., n. sp. is recorded from three stations near the South Georgia and South Orkney islands.

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Subclass ASTEROIDEA de Blainville, 1830

Order VALVATIDA Perrier, 1884

Suborder Granulosina Perrier, 1894

Family **Pentopliidae**, n. fam.,

Diagnosis.—Asteroidea with a single, enormous, bivalved, grablike pedicellaria in each actinal interradius.

Type-Genus.—*Pentoplia*, n. gen.

Discussion.—The unique features of these specimens require their inclusion in a new family. In the currently accepted scheme of classification (see Moore, 1966) the genus would appear to fall within the order Valvatida, where it resembles especially the subfamilies Chitonasterinae and Hippasteriinae, but the possession of the very large pedicellariae is possibly a basis for erection of a new suborder.

Pedicellariae are rare in the orders Paxillosida and Spinulosida; they

are more common in the order Valvatida, being generally of the valvate type with their bases sunk into the ossicles. They are best developed in the order Forcipulatida where they are either straight or crossed and often form conspicuous wreathes around abactinal and adambulacral spines.

Genus *Pentoplia*, n. gen.

Diagnosis.—Abactinal plates round or rectangular, contiguous, bearing a number of obtuse granules or spinelets, central ones often enlarged; no interconnecting ossicles. Marginal plates with simple granules or spinelets; inferomarginals large, tumid, extending onto actinal surface and bearing besides granules, usually one distinct spine. No abactinal pedicellariae. Actinal interradial areas small, each almost completely occupied by an enormous grablike pedicellaria. Adambulacral plates with two furrow spines; one prominent subambulacral and several smaller spines. Oral plates with three or four furrow spines, two suborals.

Type-Species.—*Pentoplia felli*, n. sp.

Discussion.—*Pentoplia* is immediately distinguished from all other known asteroids by the presence of these five enormous pedicellariae. In arrangement and form of abactinal plates and granules, it is somewhat reminiscent of both *Hippasteria* (although it lacks characteristic pedicellariae) and of *Chitonaster*.

Etymology.—*Pentoplia*, Greek, "five weapons," referring to the very distinctive pedicellariae.

Pentoplia felli, n. sp.

Figs. 1, 2

Diagnosis.—As for genus.

Description.—Disc convex. Arms short, broad, basally tapering to blunt tips; terminal ossicle (Fig. 1,a) broadly saddle-shaped with curved row of five or six short, obtuse spinelets; one ossicle with four or five small, accessory, blunt-tipped spines on actinal surface near furrow; one unpaired spine also present.

Abactinal surface (Fig. 1,b) paved with round, rectangular or pentagonal, contiguous, membrane-covered plates. Plates irregularly arranged except for carinal series in midline of arms. On disc, each plate carries central group of one to four distinct, obtuse spinelets or small spines, one generally nearer edge; these are surrounded by several smaller spines, which may be absent near arm tips. Between carinals and superomarginals small plates present, each with one or two spinelets or granules. No pedicellariae

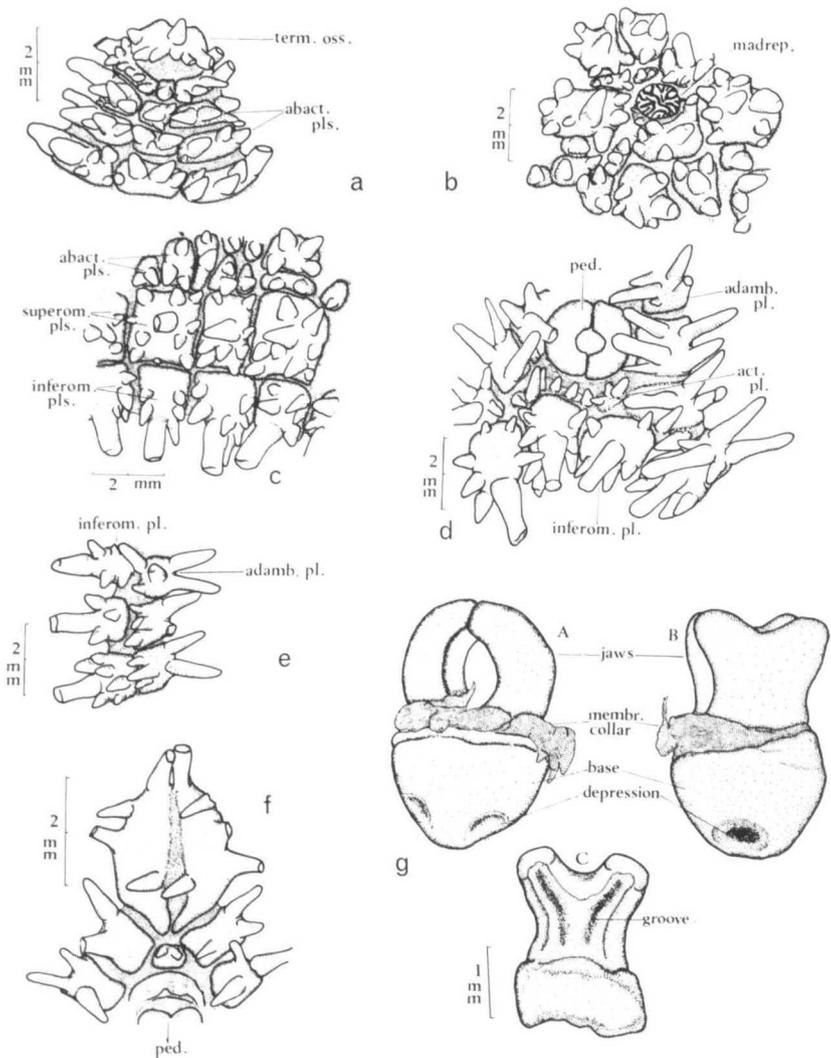


FIGURE 1. *Pentoplia felli* n. gen., n. sp.—a-e, Type-specimen: a, arm tip, showing ossicle and abactinal plates; b, abactinal plates and madreporite; c, abactinal, superomarginal, and inferomarginal plates; d, inferomarginal, actinal, and adambulacral plates and pedicellaria; e, three adambulacral and adjacent inferomarginal plates.—f, Paratype, ELTANIN Sta. 469, oral and adjacent adambulacral plates and part of pedicellaria.—g, Paratype, ELTANIN Sta. 474, pedicellaria. (A and B, side views of pedicellaria; C, jaw of same pedicellaria showing distinct groove.)

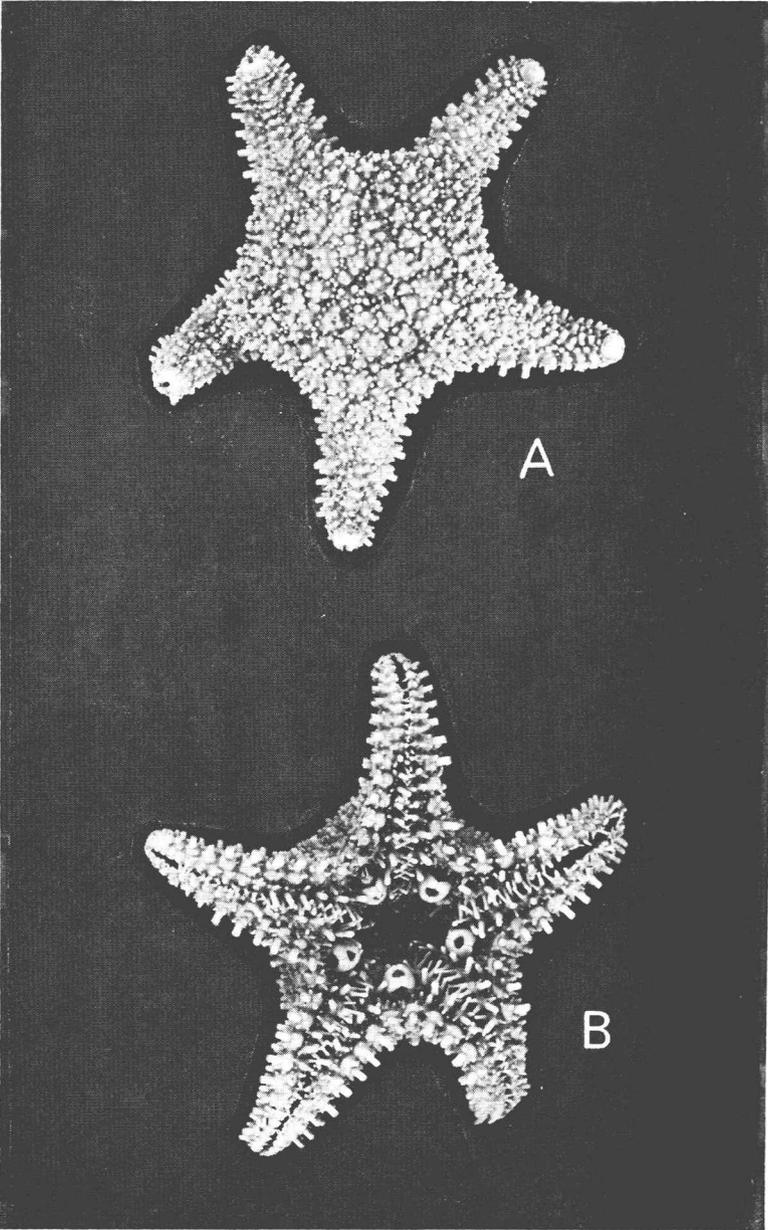


FIGURE 2. *Pentoplia felli* n. gen., n. sp.: A, abactinal aspect of type-specimen; B, actinal aspect of type-specimen.

either abactinally or marginally. Gonopores open abactinally just above superomarginals on either side of interradial midline.

Papulae indistinct.

Madreporite (Fig. 1,b) small, oval, tumid, nearer center than edge of disc, dissected by few deep sinuous grooves.

Anus central on disc, inconspicuous, surrounded by several enlarged granules.

Marginal plates form distinct edge to disc and arms; nine or ten plates present from interradial angle to arm tip. Superomarginals (Fig. 1,c) rectangular, slightly longer than broad, tumid, with one to three enlarged, obtuse spines forming central vertical row at right angles to arms and from five to seven small granules or spinelets along plate margins; those adjacent to inferomarginals sometimes slightly enlarged; towards arm tips small granules few or missing. Marginal plates separated by distinct membranous channels.

Inferomarginals (Fig. 1,c) also rectangular, longer than broad, large, tumid, especially actinally where they form distinct border; each plate generally bears single, sturdy, blunt-tipped spine near actinal surface. Proximally, there are about eight (distally three or four) small spinelets or granules, those near major spines often longer.

Actinal interradial areas (Fig. 1,d) small, each almost totally occupied by single, enormous, bivalved grablike pedicellaria (Fig. 1,d,g); small row of spines generally present between pedicellaria and inferomarginal plates; outline of actinal plates obscured by membrane.

Adambulacral plates (Fig. 1,d,e,f) rectangular, separated by muscular intervals; generally two, sometimes three, long, slender, blunt-tipped furrow spines. Where there are two they are of equal length, where three are present, either central spine is flanked by two smaller spines or a very small spine may be present near two large spines. Single subambulacral spine similar in length to furrow spine but more sturdy and blunt tipped, outside this are two or three smaller spines, one generally longer.

Ambulacral grooves narrow, deep, ambulacral furrow spines nearly meeting across them; tube feet biserial with distinct sucking discs.

Oral plates (Fig. 1,f) with four (sometimes three) furrow spines, first and last longest; generally, only one suboral spine; when two are present most anterior longest and blunt tipped.

Internal Anatomy.—One specimen (Sta. 545) dissected. Intestinal caeca small, lobed; pyloric caeca finely divided, extending for at least three-quarters length of each arm. Retractor muscles short, conspicuous, attached to first ambulacral ossicles. Interradial septa distinct, in each interradius large, egg-shaped pit houses grablike pedicellaria. Gonads attached on either side of interradial septa, slender, branching, intermittently swollen,

almost filling area on either side of pedicellaria. Polian vesicles large, one in each interradius. Tiedemann's bodies indistinct. Ampullae of tube feet double, but very small, no superambulacral ossicles. Abactinal plates viewed from coelomic side, scalelike, irregular, closely imbricating. No connecting ossicles.

Variation.—Apart from smaller size and less inflated disc, the remaining three specimens show little variation. In two smaller specimens (Stas. 469, 474; $R/r = 13/5$ and $18/9$ mm, respectively) abactinal plates have fewer (generally one or two) spinelets; most anterior adambulacral plates may lack conspicuous, large subambulacral spine, while on more distal plates the two or three small spines at base of subambulacral may be absent; adambulacral furrow spines may be very small and slender near arm tip and they are often widely spaced. Only one suboral spine is present in small specimens, while in larger ones there may be two or three. In one small specimen (Sta. 469) one massive pedicellaria is displaced, leaving pit which does not open into body cavity. One pedicellaria is absent from another specimen (Sta. 474) and here pit continues through into body cavity; each pedicellaria (Fig. 1,g) has a round base almost as large as the jaws. Dissection of a pedicellaria shows a distinct internal groove on both jaws (Fig. 1,g); there is also an external basal sheath or membranous collar surrounding jaws.

Discussion.—The large unique pedicellariae give rise to speculation as to their function; possibly, at least in smaller specimens, they may be capable of a small degree of rotation in the pit so that they may be used in capturing food and in some way manipulating it towards the mouth. In the largest specimen there is a small crustacean in the jaws of one pedicellaria, but this may be accidental. Alternatively, the pedicellariae may be used as a modified form of brood pouch or chamber, the young stars clinging to it or sheltering within it; if this is so, the young stars must migrate ventrally from the gonopores on the abactinal surface.

This species is named in honor of Professor H. B. Fell, Museum of Comparative Zoology, Harvard University.

Holotype.—Specimen described here, U. S. National Museum. $R/r = 22/13$ mm. ELTANIN Sta. 545; $60^{\circ}02' - 59^{\circ}55'S$, $49^{\circ}14'W$, near South Orkney Islands, in 2681-4017 m.

Paratypes.—U. S. National Museum. R varies between 13-22 mm (average 17 mm); $r = 5-13$ mm (average 8 mm). ELTANIN Sta. 469(1), $55^{\circ}02' - 55^{\circ}11'S$, $44^{\circ}21' - 44^{\circ}23'W$, near South Georgia, in 3623-3714 m; Sta. 474(1), $55^{\circ}56' - 56^{\circ}25'S$, $44^{\circ}43' - 44^{\circ}52'W$, near South Georgia, in 3486-3537 m; Sta. 545(1).

SUMARIO

PENTOPLIIDAE, UNA NUEVA FAMILIA DE ASTEROIDEA DEL
OCÉANO ATLÁNTICO SUR

Se reporta una familia monotípica de Asteroidea, la familia Pentopliidae n. fam., con *Pentoplia felli* n. gen., n. sp., cerca de las islas South Georgia y South Orkney, a 2681-4017 m. Es única en poseer enormes pedicelarias de aspecto prensor.

REFERENCE

- MOORE, RAYMOND C. (ED.)
1966. Treatise on invertebrate paleontology. Part U. Echinodermata 3,
Vol. 1, xxx + 367 pp., 271 figs.