

The Spatangid Echinoids of New Zealand

By

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Abstract

THE family Spatangidae is represented in New Zealand waters by two genera, comprising five species, of which three are here recorded for the first time from New Zealand. Genera represented are *Spatangus* (with three species, two of which are here described as new) and *Paramaretia* (two species, of which one was previously known only from east Australia). Except for one species (*Spatangus multispinus*) all New Zealand Spatangidae have affinities with Indo-West-Pacific forms, or are identical with Indo-West-Pacific species, the closest relationship being with east Australia, which shares the two species of *Paramaretia*. The apparent absence of *Spatangus* from Australia is perhaps due to incomplete collecting in Australian waters, for the evidence now seems to imply its presence there. A species of *Spatangus* from the Philippines, closely related to a New Zealand species, but hitherto unnamed, is here named. A synoptic key to the known extant species of *Spatangus* is given.

INTRODUCTION

UNTIL now, only two species of Spatangidae have been recorded from New Zealand. These are *Spatangus multispinus* Mortensen, the first known New Zealand representative, described by Mortensen (1925) from material taken in Cook Strait; and *Paramaretia multituberculata* Mortensen, 1950, originally recorded from Bass Strait, but subsequently taken off the Chatham Islands (Fell, 1958). The material here recorded considerably increases our knowledge of the New Zealand representation of the family. It has been assembled over a number of years but, owing to some uncertainties in the existing literature on foreign species, the exact disposition of some of the New Zealand forms has for some time remained in doubt, and while this was the case it was deemed inadvisable to report them. A richer material now available makes it possible to take into account individual variation, and accordingly to determine the systematic status of the forms represented. The results show that the New Zealand Spatangidae are related to, or identical with, Indo-West-Pacific species, especially those occurring in Japan, Hawaii, Indonesia and eastern Australia. One anomalous species, *Spatangus multispinus* is apparently related to the North Atlantic *S. raschi*, as Mortensen (1925) has already indicated. In determining the relationships of the species of *Spatangus* here recorded, the conclusions agree more closely with H. L. Clark's (1917) analysis of the genus, than with Mortensen's (1951) more recent treatment, for it would appear that the characters used by Clark are more stable than those stressed by Mortensen; in particular, if the two newly discovered species of *Spatangus* are placed into Mortensen's key to the genus, they fall in a position far removed from species with which they share numerous characters, whereas under Clark's arrangement, the New Zealand species all fall into sections containing closely comparable species. It must be admitted, however, that the boundaries between the recorded species have probably been defined on an inadequate sample, and that the range of variation in individual species is probably much

greater than hitherto supposed. If, for example, future work shows that the New Zealand species here recognised as entities, are in fact only members of a cline, then it will inevitably follow that some of the Indo-West-Pacific species at present regarded as entities, cannot be maintained as such. Insufficient material is at present available to prove the existence of a cline in New Zealand waters, and accordingly it has seemed desirable to retain the existing method of classification. It is therefore impossible to treat the New Zealand forms as other than distinct species, each one falling in a different section of the genus. These conclusions are summarised in the form of a key to the known extant species from all seas.

ACKNOWLEDGMENTS

The material here reported has been collected over a number of years by Dr Patricia M. Ralph, Mr Fred Abernethy and, more recently, Mr and Mrs Thor Nielsen and Mr Noel Johnson, to all of whom I am deeply indebted. I am also grateful to Dr R. K. Dell for permission to study a specimen in the Dominion Museum, presented by Mrs O. Sansom, and to Mr Barry Smith, who presented to Victoria University the type specimen of one of the new species recorded below. Miss Dorothy Grantham allowed me to study another specimen of the same species in her collection. The most significant additions to the fauna are species discovered by Mr Thor Nielsen in Foveaux Strait, and forwarded to me at the instance of Mr John Graham. It is a pleasure to record the conspicuous part played by amateur naturalists in the discovery of these notable species, including as they do the largest and most remarkable species of *Spatangus* ever recorded.

Family SPATANGIDAE

KEY TO THE NEW ZEALAND GENERA

- | | | | | | | | | | |
|-------|--|-------|-------|-------|-------|-------|-------|-------|--------------------|
| 1 (2) | Plastron completely covered by spines (and tubercles), petals fully developed | ..... | ..... | ..... | ..... | ..... | ..... | ..... | <i>Spatangus</i> |
| 2 (1) | Plastron mainly naked, with spines (and tubercles) confined to the posterior region. Anterior series of plates and pores poorly developed on the antero-lateral petals | ..... | ..... | ..... | ..... | ..... | ..... | ..... | <i>Paramaretia</i> |

Spatangus Gray, 1825

Type species: *Spatangus purpureus* O.F.M.

KEY TO THE NEW ZEALAND SPECIES

- | | | | | | | | | |
|-------|--|-------|-------|-------|-------|-------|-------|---------------------|
| 1 (2) | Numerous tubercles on all interamb of the upper surface. Periproct placed on the truncated posterior end of the test, not overhung by an anal rostrum, not visible from above or below. Subanal fasciole ovoid, with no posterior re-entrant angle. Violet-coloured forms of medium size (less than 100mm long) | ..... | ..... | ..... | ..... | ..... | ..... | <i>multispinus</i> |
| 2 (1) | No tubercles on the anterolateral interamb of the upper surface. Periproct overhung by an anal rostrum, placed below the ambitus, obliquely ventrad, fully visible from below. Subanal fasciole heart-shaped, with a posterior re-entrant angle or re-entrant curve. Very large forms (usually exceeding 120mm in length), deep reddish-purple, thickly covered by short delicate spinules, resembling a dense coat of hair. | ..... | ..... | ..... | ..... | ..... | ..... |  |
| 3 (4) | About 15-17 enlarged whitish tubercles in each of the posterolateral interambs, arranged in a short zig-zag series; also a vertical series of tubercles along the dorsal midline of the unpaired posterior interamb, and on either side of the frontal groove | ..... | ..... | ..... | ..... | ..... | ..... | <i>thor</i> n. sp. |
| 4 (3) | No enlarged tubercles in any of the lateral interambs, or at the most, only 1 or 2 tubercles. Tubercles occur in a vertical series on the dorsal midline of the posterior unpaired interamb, and also on either side of the frontal groove | ..... | ..... | ..... | ..... | ..... | ..... | <i>beryl</i> n. sp. |

Spatangus multispinus Mortensen, 1925. Plates 1, 2, 5.

Numerous specimens have been examined from shelf stations in Cook Strait, as well as 63 individuals from deeper water (Fell, 1958). Bathymetric range, 36-790m.

DISTRIBUTION: Hawke's Bay, Cook Strait, Chatham Islands. The diagnostic characters, set out in the key above, are illustrated in Plate 1.

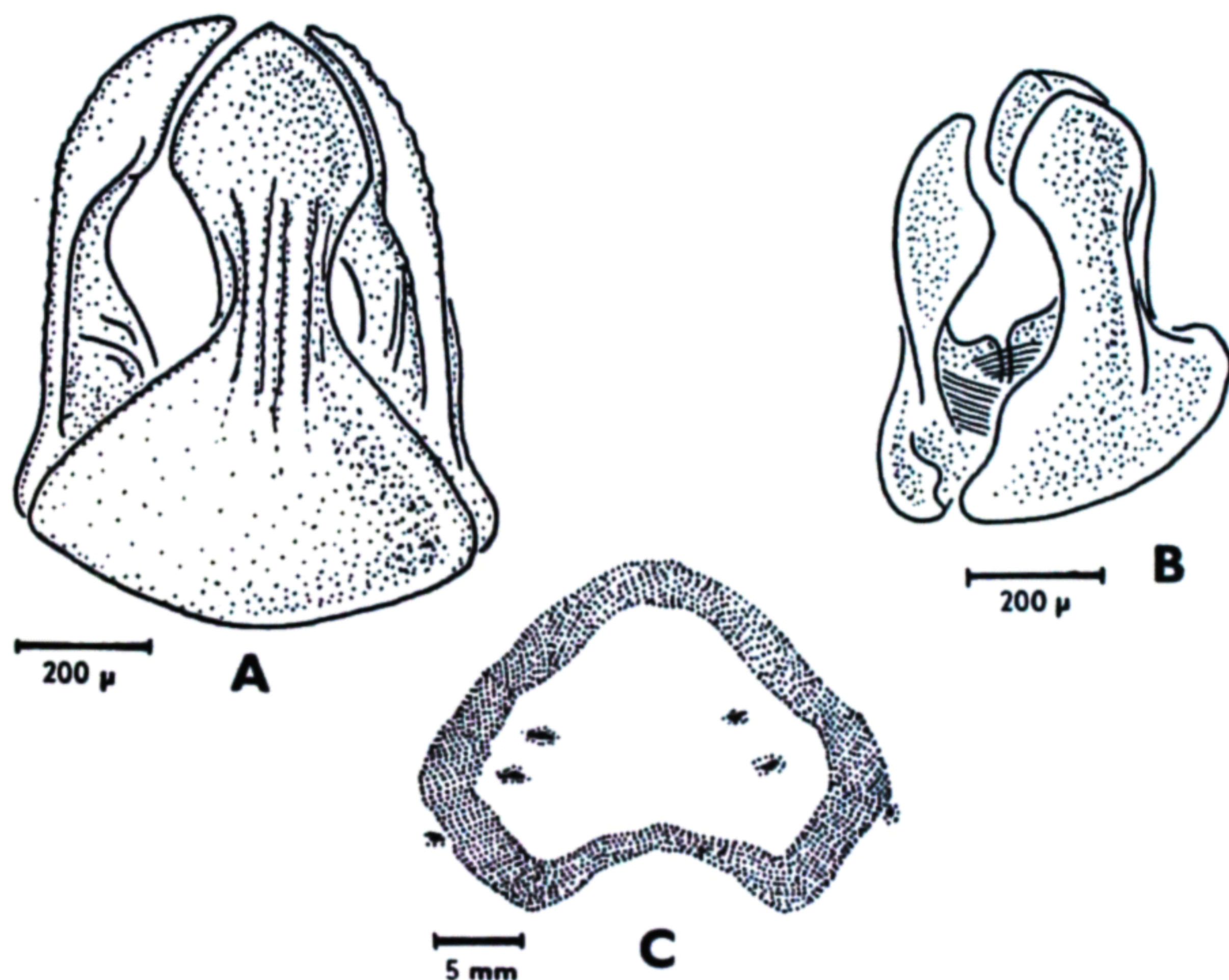
Spatangus thor n. sp. Plates 1, 3, 5.

DIAGNOSIS: As in the key above.

HOLOTYPE: A perfect specimen collected by Mr Thor Nielsen in 1959 from the western oyster beds of Foveaux Strait, south-west of Bluff, nearer Stewart Island than Bluff, 16-19 fathoms (29-34m), and now deposited in the Zoology Museum, Victoria University of Wellington. This is the largest specimen so far taken. Length, 134mm; breadth, 121mm; height, 78mm. Plastron: length, 64mm; breadth, 34mm. Subanal plastron with two pores on either side; bilobate; length, 28mm; breadth, 37mm. Subanal fasciole broad, 3-5mm wide.

PARATYPE: (a boiled test, devoid of spines) now in the collection of Mrs Beryl Nielsen, of Bluff. Length, 125mm; breadth, 117mm; height, 70mm. Plastron: length, 66mm; breadth, 32mm. Subanal plastron: length, 24mm; breadth, 38mm. The subanal fasciole, though broad, is much less so than on the holotype, 1.5-2mm wide.

The test in both specimens is robust. That of the paratype is perforated by two injuries, evidently made at the time of collection, but the shell remains otherwise intact. The pore-pairs are more widely separated, and more deeply sunken, in the paratype than in the type, indicating that this character is variable. The pedicellariae are rare, and seem to occur only in the adoral region. Only tridentate pedicellariae were observed; they are of the broad, short type, commonly occurring in the genus. (Text-fig. 1.) They range from 0.7-1.0mm in length, and are purple in colour.



TEXT-FIG. 1.—*Spatangus thor* n. sp., holotype. A, large tridentate pedicellaria, of broad type, from adoral region. B, smaller example of same type, also from adoral region. C, subanal fasciole, with included and excluded pores.

The subanal fasciole (Text-fig. 1, C) is broad and ribbon-like, and encloses 2 pore-pairs on either side, a third pore lying just outside the fasciole on either side.

DISCUSSION

The species is evidently most closely related to *Spatangus pallidus* H. L. Clark, 1908, which, with *S. lutkeni* A. Agassiz, 1872, falls in the same section of the genus

(all three species having no anterolateral interamb-tubercles). From *lutkeni* the present species (like *pallidus*) is distinguished by its conspicuous keel on the plastron. From *pallidus*, as also from *lutkeni*, the present species is distinguished by its subambital periproct, fully visible from below, and also by its much greater size. Both *pallidus* and *lutkeni* are Japanese species, from the continental shelf. To no other known species does *thor* exhibit any obvious relationship, but it is important to note, as set out in the key above, that several characters are shared with the following species, to which it is evidently related; most important of these must be the subambital position of the periproct.

The species is named for its collector, Thor Nielsen, through whose efforts specimens were secured for examination; the specific name is treated as an indeclinable nominative in apposition, as permitted by the Code. *Spatangus thor*, as can be seen from the illustrations of the holotype, and from the measurements cited, is the largest and most splendid species of its genus ever discovered; its unheralded arrival in my laboratory a few months ago caused much astonishment and prompted the preparation of this paper dealing with all known New Zealand spatangids. So far as can be ascertained from published records, the largest known

EXPLANATION OF PLATES 1 TO 6

PLATE 1

FIG. 1.—*Spatangus beryl* n.sp., holotype (in the Zoology Museum, Victoria University of Wellington), in left lateral aspect. Length, 127mm; height, 75mm. Coll. B. Smith, Foveaux Strait, ca. 30m.

FIG. 2.—*Spatangus thor* n.sp., holotype (in the Zoology Museum, Victoria University of Wellington), in left lateral aspect. Length, 134mm. Height, 78mm. Coll. Thor Nielsen, Foveaux Strait, 29–34m.

FIG. 3.—*Spatangus multispinus* Mortensen, in right lateral aspect. Length, 72mm. Height, 36mm. Cook Strait, VUZ Station 53, 250–350 fathoms (460–540m).

PLATE 2

FIG. 4.—*Spatangus multispinus* Mrtsn., adoral aspect of specimen 74mm long; Cook Strait, VUZ Station 53, 250–350 fathoms (460–540m).

FIG. 5.—*Spatangus multispinus* Mrtsn., aboral aspect of another specimen, 72mm long, from same locality as Fig. 4.

PLATE 3

FIG. 6.—*Spatangus thor* n.sp., holotype, in aboral aspect. Length, 134mm. Breadth, 121mm. Foveaux Strait, 29–34m.

FIG. 7.—*Spatangus thor* n.sp., holotype, in adoral aspect.

PLATE 4

FIG. 8.—*Spatangus beryl* n.sp., holotype, in adoral aspect. Length, 127mm. Breadth, 120mm. Foveaux Strait, ca. 30m.

FIG. 9.—*Spatangus beryl* n.sp., holotype, in aboral aspect.

PLATE 5

FIG. 10.—*Spatangus beryl* n.sp., paratype (ex Noel Johnson), left petals and interamb (enlarged ca. 1.2 times).

FIG. 11.—*Spatangus beryl* n.sp., paratype (in Beryl Nielsen collection), right petals and interamb (enlarged ca. 1.2 times).

FIG. 12.—*Spatangus thor* n.sp., holotype (Victoria University of Wellington, ex Thor Nielsen collection), left petals and interamb (reduced to ca. five-sixths natural size).

FIG. 13.—*Spatangus beryl* n.sp., paratype (in Dorothy Grantham collection, ex Thor Nielsen), right petals and interamb (ca. natural size).

FIG. 14.—Suspected hybrid *Spatangus thor* x *beryl*, in the Dominion Museum, Wellington (ex Olga Sansom collection from Foveaux Strait). Left petals and interamb. The total length of the specimen is ca. 126mm, and the portion shown is ca. natural size.

FIG. 15.—*Spatangus multispinus* Mrtsn., right petals and interamb. Enlarged about 2 diameters.

PLATE 6

FIG. 16.—*Paramaretia peloria* (H. L. Clark), aboral aspect of a New Zealand specimen (from near Taiaroa Heads, coll. Patricia M. Ralph; length, —mm; breadth, —mm; height

FIG. 17.—*Paramaretia peloria* (H. L. Clark). Same specimen, in adoral aspect.

species hitherto reported is *Spatangus capensis*, of which Mortensen (1951) cited a "magnificent specimen measuring 125 x 120 x 68mm".

Spatangus beryl n. sp. Plates 1, 4, 5.

DIAGNOSIS: As in the key above.

HOLOTYPE: A denuded, but otherwise perfect, specimen collected from the same locality as *S. thor*, and presented to the Victoria University Zoology Museum by Mr Barry Smith, of Bluff. Length, 127mm; breadth, 120mm; height, 75mm. Plastron: length, 56mm; breadth, 34mm. Subanal plastron: length, 26mm; breadth, 39mm.

The holotype only recently received, has been selected as such since it is the best preserved of the specimens available for deposit in a museum. Earlier, however, material in damaged state had been received from Mrs Beryl Nielsen, collected by Thor Nielsen, and other material in private ownership has been examined since.

PARATYPES: A perfect specimen, obtained by Thor Nielsen, and now in the collection of Miss Dorothy Grantham, of Bluff: length, 126mm; breadth, 117mm; height, 71mm. A specimen in the collection of Mrs Beryl Nielsen, obtained by the same collector, length 115mm, breadth 119mm, height 75mm. A boiled and partly broken test, now in the writer's collection, presented by Mr Noel Johnson, of Bluff, from the same general locality, length 114mm, breadth 110mm, height 64mm.*

In all specimens the test is robust, and does not collapse when perforated by accidental injuries at the time of collection. All specimens have the pore-pairs widely separated, and deeply sunken.

DISCUSSION

The species is closely related to the Hawaiian *Spatangus paucituberculatus* A. Ag. and H. L. Clark, 1907, sharing with it the absence of tubercles from the anterolateral and posterolateral interambis. It differs conspicuously from the latter in the subambital periproct (posteriorly placed in *paucituberculatus*, where it is therefore not visible from below); other differences include the relatively robust test (excessively fragile in *paucituberculatus*, of which all known specimens are fragmentary).

In Mortensen's (1951) classification, the species without tubercles in the anterolateral and posterolateral interambis are referred to a subgenus *Granopatagus* Pomel, to which accordingly the present species would be admitted. However, I do not think this classification is justified. The distinctive subambital position of the periproct in *beryl* is a character not shared with *paucituberculatus*, but it is shared with *S. thor* which, in Mortensen's classification, would not be admitted to *Granopatagus*. As it seems unlikely that the subambital periproct could have evolved quite independently in two sympatric (and potentially interbreeding) species, it would seem wiser to abandon the subgenus *Granopatagus*.

Further, examination of Mortensen's excellent photographs of a specimen from Albatross Station 5565, in the Philippines (reproduced by him as Plate 2, fig. 3 and Plate 3, figs. 21 and 22, Mortensen, 1951), shows that the species in question cannot be identified as *Spatangus paucituberculatus* (as Mortensen believed). This specimen has a much larger anterior notch than in the holotype of *paucituberculatus* (H. L. Clark, 1917, Plate 157, figs. 7 to 9), and more important, the Philippines specimen has a subambital periproct, as in the New Zealand species, whereas the Hawaiian type material has a terminal periproct. The obvious differences between the Philippines specimen and *S. beryl*, which can be seen by comparing the illustrations here given with those published by Mortensen, prohibit the union of both under one name. Accordingly it is necessary to introduce

* Since the above was written, additional specimens of *S. thor* and *S. beryl* have been examined in the collections of the Southland Museum, and of J. Graham, Oamaru.

a new name for the specimen from *Albatross Station 5565*, now in the United States National Museum, and for this *Spatangus diomedae* is hereby proposed. Its diagnostic characters are set out in the general key to all known extant species of *Spatangus* which follows, but are also indicated in the present paragraph.

It is evident, thus, that *Spatangus beryl* is more closely related to *S. diomedae* than to any other known species, but differs in having a more robust test, and a shallower and smaller frontal notch, and a more extensively dorsal and ventral tuberculation. Both species share with *S. thor* the character of a distinctly subambital periproct.

Spatangus beryl is named for Mrs Beryl Nielsen, who first forwarded a specimen of the species for examination, and subsequently was instrumental in obtaining other valuable material. The specific name is treated as a nominative in apposition.

SYNOPTIC KEY TO THE KNOWN EXTANT SPECIES OF *Spatangus*

1	(8) No primary tubercles in the anterolateral interambs, and usually none (occasionally 1 or 2) in the posterolateral interambs.	
2	(5) Periproct subambital, fully visible from below.	
3	(4) Peristome transversely oval, not overhung by labrum. Anterior notch shallow, not reaching midway to the anterior margin of peristome. Test robust	<i>beryl</i> n. sp.
4	(3) Peristome transversely crescentic, overhung by labrum. Anterior notch deep and broad, reaching midway to the anterior margin of peristome. Test fragile	<i>diomedae</i> n. sp.
5	(2) Periproct terminal, not overhung by ambitus.	
6	(7) One or two primary tubercles in each posterolateral interamb. Subanal plastron obliquely subventral	<i>paucituberculatus</i>
7	(6) No primary tubercles in posterolateral interambs. Subanal plastron terminal	<i>inermis</i>
8	(1) A dozen or more tubercles in each posterolateral interamb.	
9	(14) No tubercles in the anterolateral interambs, and in the posterolateral interambs the tubercles are restricted to the area within the petals.	
10	(11) Sternum with no keel	<i>lutkeni</i>
11	(10) Sternum keeled.	
12	(13) Periproct terminal, not overhung by ambitus, and not visible from below. Greyish lavender	<i>pallidus</i>
13	(12) Periproct subambital, entirely visible from below. Deep reddish purple (large forms)	<i>thor</i> n. sp.
14	(9) Numerous tubercles in all interambs.	
15	(18) Tubercles in the ambcs, beyond the petals.	
16	(17) Test low, posterior end vertically truncate	<i>multispinus</i>
17	(16) Test high, posterior end obliquely truncate	<i>raschi</i>
18	(15) No tubercles in the ambcs beyond the petals.	
19	(20) Subanal fasciole transversely elongate, with a re-entrant posterior margin	<i>purpureus</i>
20	(19) Subanal fasciole shield-shaped, margin entire.	
21	(22) Three pore-pairs in either side of subanal plastron	<i>altus</i>
22	(21) Two pore-pairs in either side of subanal plastron	<i>capensis</i> and <i>californicus</i>

Whether *capensis* and *californicus* are distinct is a question which requires further study. Mortensen's key (1951, p. 10), and subsequent discussion (1951, p. 17) seems to have been based on inadequate material of *californicus*. A representative series of *californicus* received from F. C. Ziesenhenné shows that the periproct in that species is normally subambital, as in *capensis* (not terminal as in the specimen illustrated by Mortensen (1951, Plate II)).

So far as the other species are concerned, the forms with a subambital periproct comprise a linear sequence which can be arranged in order of steadily increasing tuberculation, as follows:

1. *diomedae* (all lateral interambms naked, and very few and inconspicuous tubercles in the posterior interamb and anterior amb-margins).
2. *beryl* (similar, but tubercles more conspicuous)
3. *thor* (anterolateral interamb naked, but tubercles present in posterolateral and posterior interambms)

Of this group, *diomedae* (Philippines) is northern, and the other two forms are restricted to the Southern Hemisphere.

In the same way, the forms with a posterior periproct can be arranged in a corresponding sequence, as follows:

1. *inermis*
2. *paucituberculatus*
3. *lutkeni* and *pallidus*
4. *altus* and *purpureus*
5. *raschi* and *multispinus* (tubercles present in all interambms, and also in the ambms beyond the petals)

Save for *multispinus* (New Zealand), every one of this second sequence is a Northern Hemisphere form.

Whether this geographic bias has any real significance cannot be established until richer collections are available from a greater number of stations.

There is, however, one additional piece of evidence which may be relevant in this context, for it is indicative that there is no hard and fast boundary between species (or forms) of the *beryl-inermis* type on the one hand, and of the *thor-lutkeni-pallidus* type on the other hand. As will be seen from the foregoing synopsis, typical *paucituberculatus* carries one or two primary tubercles in the posterolateral interambms, as if it were an intermediate form between the strictly naked group (*beryl-inermis*), and the group with a dozen or more tubercles in the posterolateral interambms (*thor-lutkeni-pallidus*). Of the New Zealand material examined, six specimens could be readily separated into groups, one of the groups (two specimens) comprising the material here assigned to *thor*, and the other group (four specimens) comprising *beryl*. There remains a seventh specimen, in the collection of the Dominion Museum, Wellington, obtained by Mrs Olga Sansom, from the oyster beds of Foveaux Strait in July, 1958. The specimen, when I examined it, was badly fragmented, but it has been possible to reconstruct the fragments so as to yield most of the characters of the specimen. It is illustrated, as restored, in Plate 5, fig. 14. In most respects it corresponds to *beryl*. The length is 126mm, breadth 122mm, height approximately 75mm. The plastron is 58mm long by 33mm wide. In the posterolateral interamb, however, there are three inconspicuous primary tubercles. It is thus intermediate between *thor* and *beryl*. The most reasonable interpretation of the data appears to be that this specimen must represent a hybrid *beryl* x *pallidus*; for if we were dealing with a single, variable species, we would expect to find a majority of intermediate forms, and a minority of extremes, whereas in fact the reverse appears to be the case, most specimens being either definite *beryl* or definite *thor*. The situation is thus comparable with that presented in the North Sea, where *Spatangus purpureus* and *S. raschi* are sympatric, and yield occasional hybrids. Whether this interpretation is correct or not is a question which must await the discovery of a richer material. The third species, *S. multispinus*, does not seem to range into Foveaux Strait, and no evidence of hybridisation (nor of marked variation) has ever been observed; it would seem to be genetically isolated, since no close congener is known in the Southern Hemisphere.

Paramaretia Mortensen, 1950

Type species: *Paramaretia multituberculata* Mrtsn.

The genus has already been reported from New Zealand on the basis of the type species (Fell, 1958). The second, and only other known species has, however, been taken on a number of occasions from southern New Zealand; it has not hitherto been reported as the poor quality of the material, together with the lack of detailed information on variation limits in the Australian specimens, made it difficult to decide whether or not the New Zealand material is identical with that from Australia. Other specimens now available suggest that no real differences exist between the New Zealand and Australian representatives of the genus, and that therefore all local specimens are to be referred to one or other of the described Australian species. They may be separated by the following key:

KEY TO THE KNOWN SPECIES OF *Paramaretia*

- | | | | | | | | | | | |
|---|-----|--|-------|-------|-------|-------|-------|-------|-------|-------------------------|
| 1 | (2) | Numerous (30–85) large primary tubercles in the posterior unpaired interamb | ..... | ..... | ..... | ..... | ..... | ..... | ..... | <i>multituberculata</i> |
| 2 | (1) | Very few (one or two) large primary tubercles in the posterior unpaired interamb | ..... | ..... | ..... | ..... | ..... | ..... | ..... | <i>peloria</i> |

Paramaretia multituberculata Mortensen, 1950

Illustrations of this species, based on Chatham Islands material, have already been published (Fell, 1960, Plate 10). About 30 specimens are known, mainly from 280–600m, off the Chatham Islands. It is as yet unknown from Otago-Southland where, however, the second species occurs rather rarely, on shelf stations.

Paramaretia peloria (H. L. Clark, 1916). Plate 6.

Specimens now referred to this species were taken from near Taiaroa Heads by a party of Victoria University students, led by Dr Patricia M. Ralph. The material was fragmentary, and the one nearly entire specimen (Plate 6) showed a partial internal fasciole near the apical system, a character which seemed to remove the species from the Spatangidae and to place it in the Loveniidae. However, material sent recently by Mrs Beryl Nielsen from Foveaux Strait shows that the internal fasciole is inconstant, or disappears before maturity. Thus it may be compared with the fate of the subanal fasciole which, as Mortensen (1951) showed, may disappear in *Paramaretia multituberculata* (the same is known to occur in *Spatangus raschi*). It is evident that in the Australian holotype the internal fasciole had failed to develop, or had disappeared, as in the Foveaux Strait material recently examined. There is therefore no longer any doubt as to the status of the New Zealand specimens, which may be recorded formally. The characters of the species are indicated in the photographs here given, and these may be compared with those cited above for the other species of the genus.

There is a pronounced difference in colour between the species. Whereas *multituberculata* is a deep reddish-purple, *peloria* is a greyish fawn; there is little difference in maximum size, the largest known specimens of both species reaching a length of ca. 120mm.

P. peloria ranges the south-eastern and southern coasts of the South Island, in 30–75m. It is apparently nowhere common. Specimens from Foveaux Strait are in the Dominion Museum, and fragments are represented in various N.Z. Oceanographic Institute samples not yet examined in detail nor reported upon.

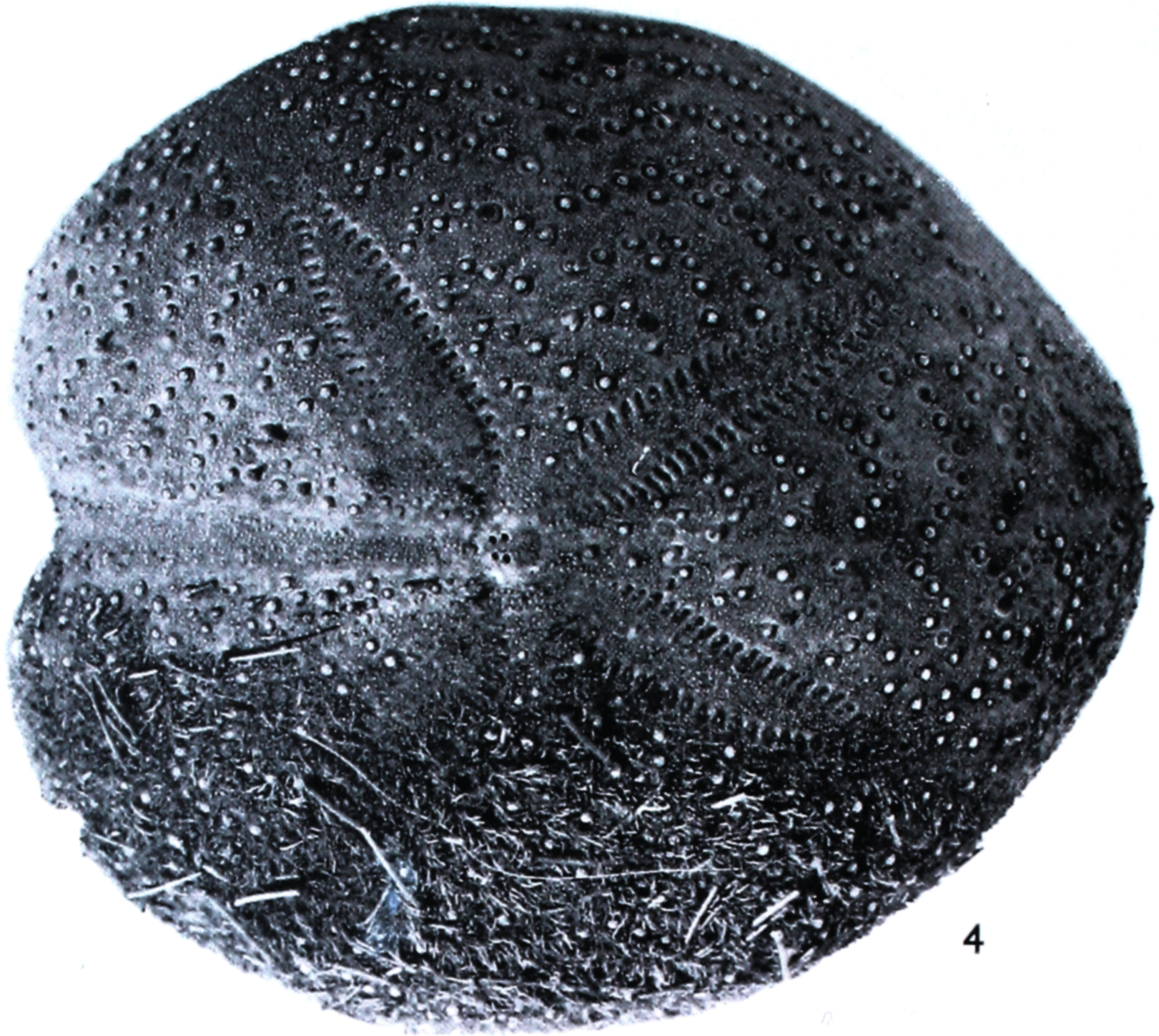
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Photo: M. D. King.

FIG. 1.—*Spatangus beryl* n. sp., holotype. FIG. 2.—*Spatangus thor* n. sp., holotype. FIG. 3.—*Spatangus multispinus* Mrtsn. For explanation, see p. 4.



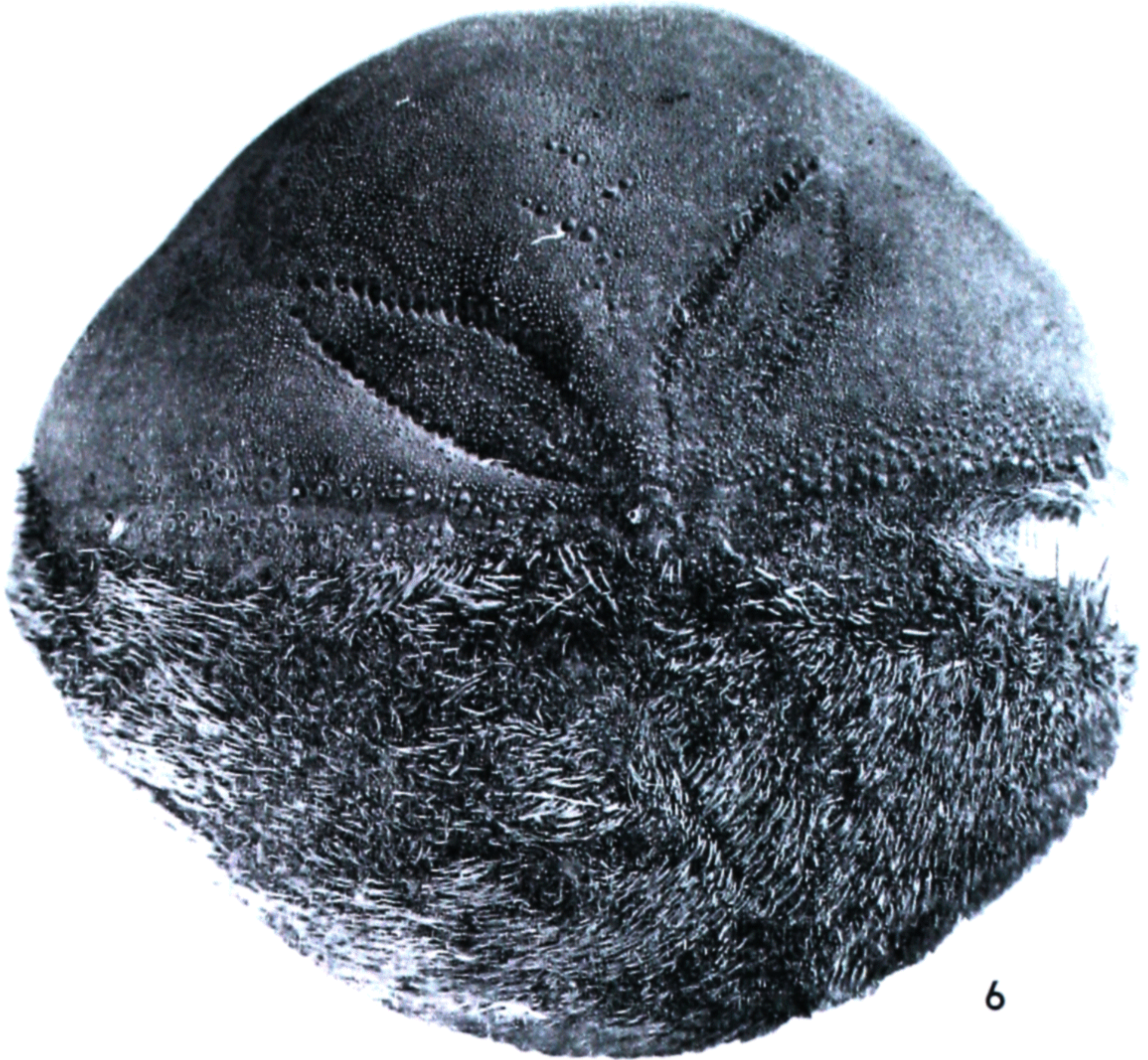
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Spatangus multispinus Mrtsn.; for explanation, see p. 4. $\times 1.4$.

Photo: M. D. King.



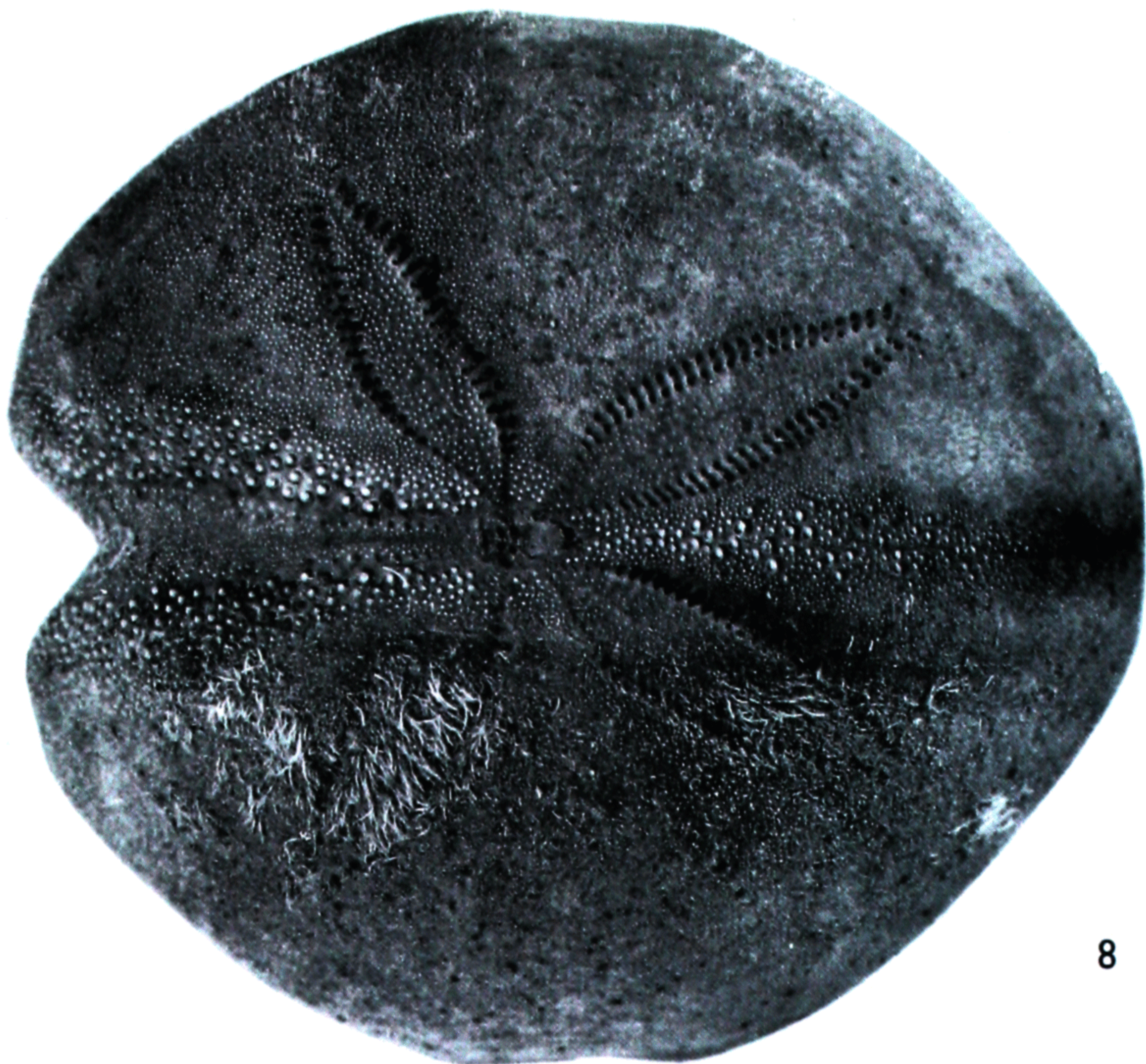
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Spatangus thor n. sp., holotype; for explanation, see p. 4. $\times 0.75$.

Photo: M. D. King.



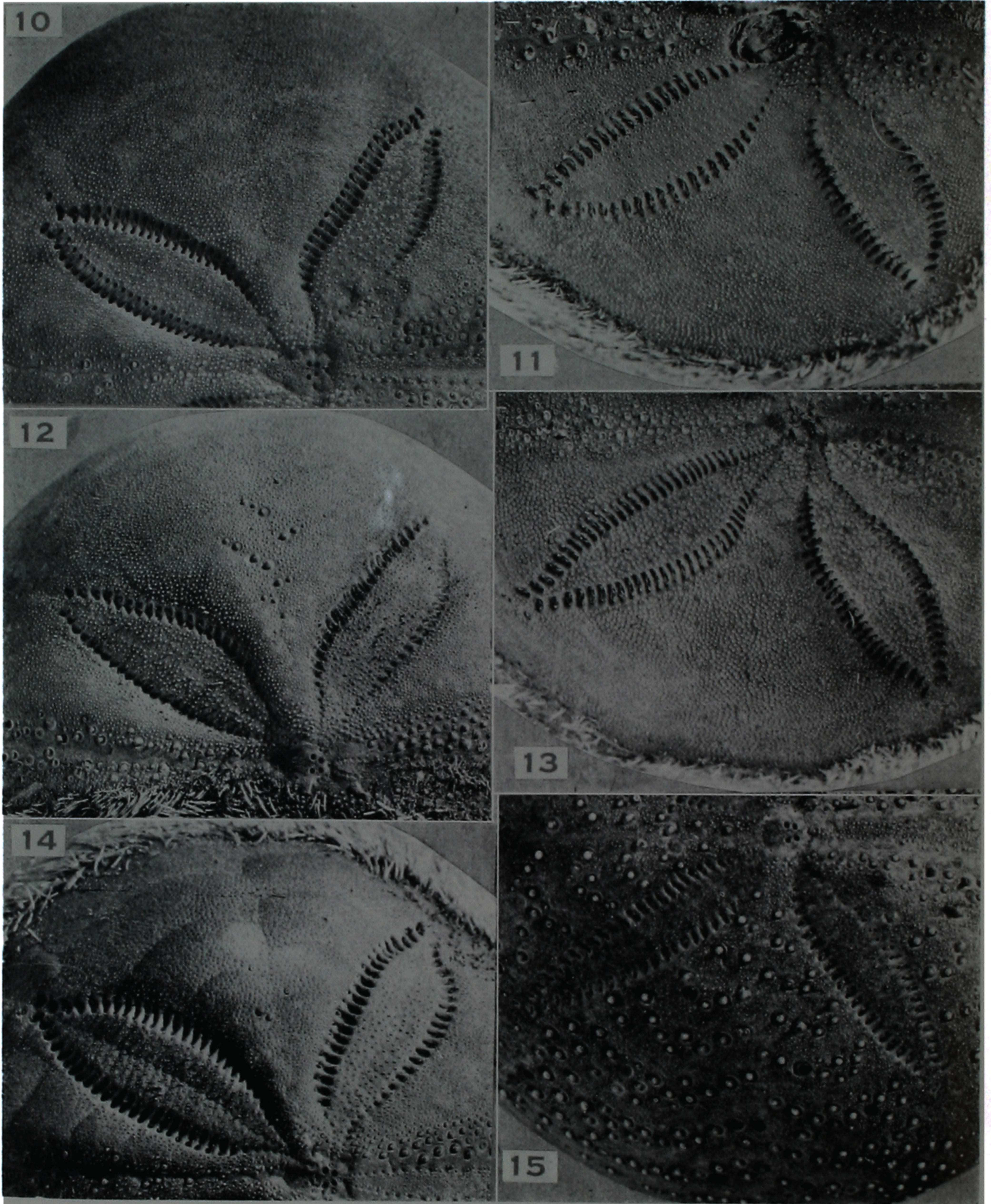
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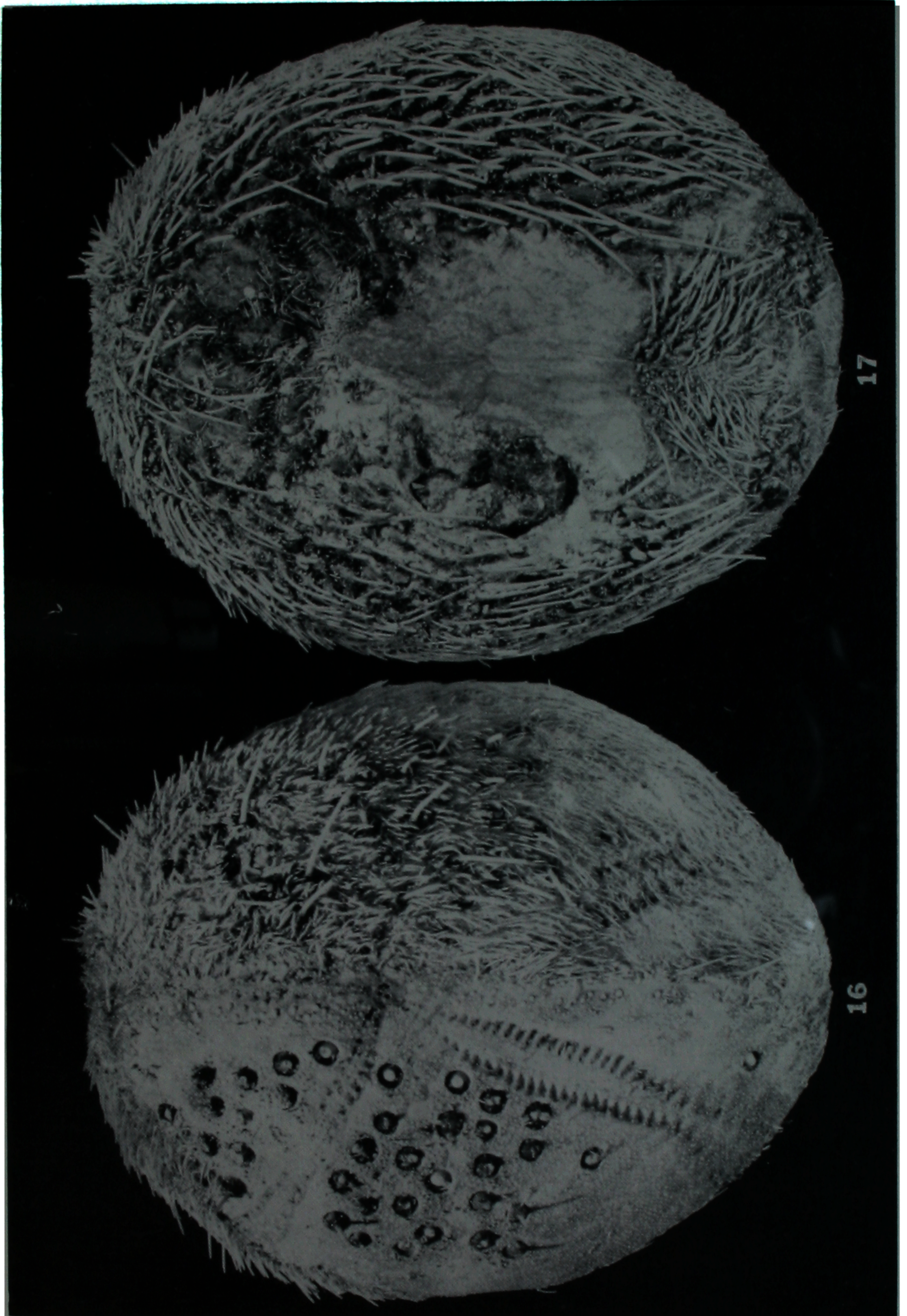
Spatangus beryl n. sp., holotype; for explanation, see p. 4. $\times 0.75$.

Photo: M. D. King.



FIGS. 10, 11, 13.—*Spatangus beryl* n. sp. FIG. 12.—*Spatangus thor* n. sp. FIG. 14.—Suspected hybrid *Spatangus thor* x *beryl*. FIG. 15.—*Spatangus multispinus* Mrtsn. For explanations, see p. 4.

Photo: M. D. King.



Paramaretia peloria (H. L. Clark). For explanation, see p. 4. Natural size.
Photo: M. D. King.