

A NEW SPECIES OF THE GENUS ECHINARA-  
CHNIUS FROM JAPAN

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TWO FIGURES AND ONE PLATE

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Last year (1926) Professor Madoka Sasaki sent me some echinoids from northern Japan for identification. One of these echinoids was an *Echinarachnius* which could not be referred to any of the species hitherto known of that genus. As I was on the point of going abroad then for some months, I had to put off studying this form more closely till my return, about the end of the year. In the meantime Professor Sasaki sent me a few more specimens, and at the same time some Alaskan specimens of *Echinarachnius parma* were lent me from the U.S. National Museum, Washington, for comparison. I am thus now in a position to describe the new species, which I shall name.

*Echinarachnius griseus* n. sp. (pl. 1, fig. 1-4)

The outline of the test is not regularly round, the transverse diameter being somewhat larger than the longitudinal. The largest breadth is in the posterior paired interambulacra. In the ambulacra, especially in the posterior paired, the outline of the test is somewhat reenteringly curved to the effect that the posterior unpaired interambulacrum becomes slightly prominent. The edge of the test is flat and rather thin, the test very gently rising from the edge towards the apical system, which is slightly eccentric, a little nearer to the anterior than the posterior end. This eccentricity is made more conspicuous through the fact that the highest point of the test is somewhat anterior to the apical system, in the anterior ambulacrum. The height is here 7 mm. in a specimen of 50 mm. longitudinal diameter.

The oral side is perfectly flat. The mouth is slightly eccentric, a little nearer to the anterior end, just as is the apical system. The anal opening is distinctly supramarginal (pl. 1, fig. 4).

The ambulacral furrows bifurcate rather close to the mouth, at the end of the first ambulacral plates; the two branches generally subdivide, more or less, nearer to the edge of the test (pl. 1, fig. 3 and text-fig. 1a). The latter figure shows the details of the composition of the test, the main feature being the large size of the ambulacral plates of the second pair. The extent in which they join in the ambulacral midline is very long, the distance between the first, unpaired interambulacral plate and the second, paired interambulacral plates being thus very considerable, conspicuously larger than in *E. parma* (cf. fig. 1a and 1 b). Only in the right anterior interambulacrum the ambulacral plates of the second pair do not join in the interambulacral midline, the interambulacral plate 2,b being in contact with the inner unpaired interambulacral

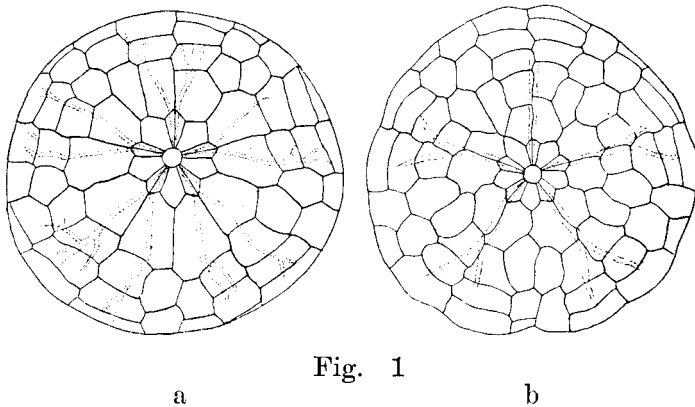


Fig. 1a *Echinarachnius griseus* n. sp. Diagram showing the outlines of the plates, oral side. The dotted lines represent the ambulacral furrows. slightly reduced.

Fig. 1b *Echinarachnius parma*. Diagram showing the outline of the plates, oral side. The dotted lines represent the ambulacral furrows. slightly reduced.

plate. The shape of the petals is mainly as in *E. parma*; they are subjectes to some variation in minor details, as is the case also with other species, and specific characters, therefore, are hardly to be found in the shape of the petals.

The tuberculation is very fine and close, and the glassy knobs occurring between the tubercles on the oral side are so small as to be hardly observable, while e.g. in *E. parma* they are very conspicuous. The spines of the aboral side (fig. 2a) are rather slender, with well differentiated, widened terminal part. Pedicellariæ of the usual bivalve type (fig. 2f). Color of both alcoholic and dried specimens a uniform gray. The specimens received were collected in Yamagata-ken, northern Japan, probably in shallow waters.

Remarks. That this is a perfectly distinct species is beyond any doubt. From *E. parma*, together with its Pacific variety *obesus* H.L. Clark, and *E. asiaticus* Mich. it differs above all in the important feature of the ambulacral furrows, bifurcating close to the mouth, and further in the supramarginal position of the periproct. The shape of the spines of the aboral side is conspicuously different from that of *parma* and var. *obesus* (fig. 2a compared with fig. 2c, d) being considerably more specialized than in the two latter; according to the description given by Clark (Hawaiian a. o. Pacific Echini; Clypeastroidea. Mem. Mus. Comp. Zool. 46. 1914 p: 68) they would seem to be still more developed in *asiaticus* (no figure is given by Clark of these spines).

In regard to the forking of the ambulacral furrows near the peristome the new species agrees with *E. mirabilis*, with which it agrees also in the shape of the spines (fig. 2b), but the central position of the apical system and apex of the test the marginal position of the periproct and the conspicuous dark violet or purple color in *E. mirabilis* are such evident differences that it is out of the question to regard these two species as identical.

Through the eccentric position of the apical system this species is intermediate between *Echinarachnius* and *Dendraster*. This makes it very doubtful whether the genus *Dendraster*, with the only species *eccentricus*, can justly be maintained as a separate genus besides *Echinarachnius*. That it stands somewhat apart from the other species, on account of its conspicuous eccentricity, is undeniable—also the strong development of the terminal part of the aboral spines (fig. 2e) and the situation on the oral side of the periproct separate it from the other species and mark it as the most specialized of all of them. While the new species, here

described, occupies, as regards eccentricity of the test, an intermediate position between *Dendraster* and typical *Echinarachnius*, the supramarginal position of the periproct marks it as the most primitive of the whole group, so that it might be as well qualified as *eccentricus* to form the type of a separate genus. This does not, however, seem to me a desirable course, and I, therefore, prefer simply to refer it to the genus *Echinarachnius*, with which *Dendraster* should, in my, opinion, also be united.

I may call attention to the fact that the characters derived from the arrangement of the plates on the oral side of the test are not to be too confidently relied upon as distinguishing characters of the species within this genus. Thus I find that in specimens of *E. parma* from one and the same locality (Maine) and of about the same size (adults), the first interambulacral plate may be well separated from the 2nd pair of plates in the same interambulacrum,

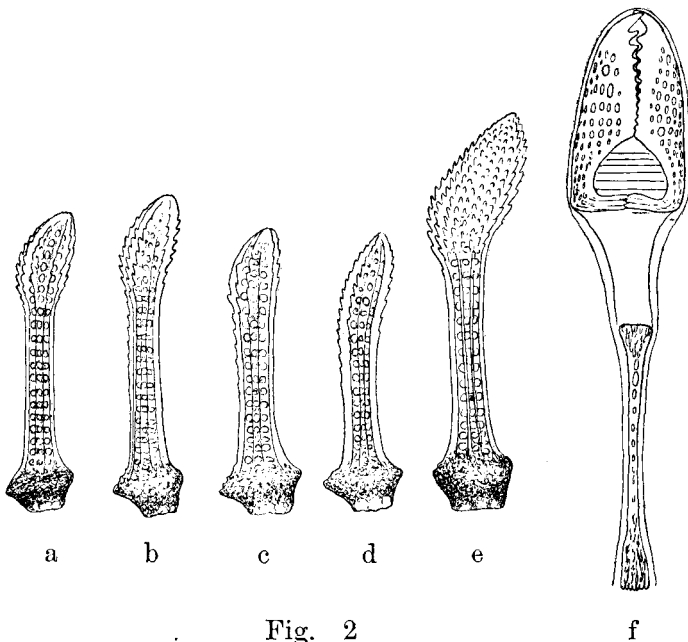


Fig. 2

Fig. 2a-e Spines from the aboral side of test of *Echinarachnius griseus* n. sp. (a), *E. mirabilis* (b), *E. parma* var. *obesus* (c), *E. parma* (d) and *E. excentricus* (e).  $\times 72$

Fig. 2f Bidentate pedicellaria of *Echinarachnius griseus* n. sp.  $\times 103$

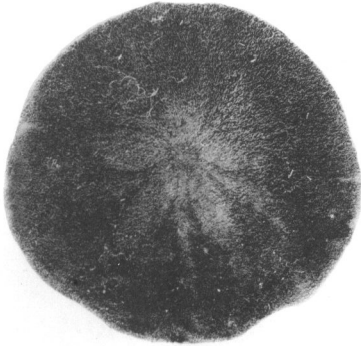
or only separated a very short distance, or they may be in contact some or all of them. It is very noticeable that there should prove to be so considerable a variation in the structure of such primary, morphological importance. But it is a fact which we have got to accept.

One of the most interesting questions in regard to the species of *Echinarachnius* is the identity of the North Pacific and the North Atlantic form of *E. parma*. It may be pointed out that the structure of the aboral spines shows a slight difference (fig. 2c compared with fig. 2d)<sup>1</sup>. But judging from the material available to me I must agree with H. L. Clark and previous authors that the two forms are so closely alike that it is hardly possible to distinguish them. The occurrence of five species in the Northern Pacific against only a single species in the North Atlantic, hardly distinguishable from one of the Pacific forms, proves that the Northern Pacific is the home of this group of sea-urchins, whence one of the species has spread to the Atlantic. As it is a northern form, not known south of New Jersey on the Atlantic Coast, and of Puget Sound on the Pacific Coast, this evidently means that its wanderings into the Atlantic took place via the north coast of America. In recent times it is known to occur as far north on the Alaskan Coast as Point Belcher (Rathbun. Catalogue of the Collection of Recent Echinidæ in the U. S. National Museum. Proc. U. S. Nat. Mus. 1886 p. 283); it is noteworthy that it is not recorded from Point Barrow (Rep. Internat. Polar Exped. Point Barrow, Alaska. Washington 1885). On the Atlantic coast it does not appear to reach farther north than Labrador (it does not occur at Greenland). This remarkable discontinuous distribution is very naturally explained through the suggestion that the wandering took place during a former, somewhat warmer period. The actual occurrence of a warm, post-glacial epoch has been proved by Ad. S. Jensen and P. Harder in their paper "Post-glacial changes of climate in arctic regions as revealed by investigations on marine deposits" (in "Postglaziale Klimaveränderungen." Stockholm,

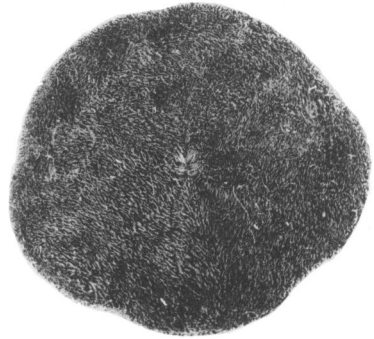
1 On the whole the shape and structure of these spines afford very good distinguishing characters between the species of *Echinarachnius*, whereas the pedicellariae do not seem to offer reliable differences.

1910), to have existed at least in Greenland, and then, no doubt, in the whole of the North American region. Later on, on account of the decreasing temperature, *Echinarachnius* must have disappeared again in the sea along the north coast of America, and the Atlantic colony of the species has thus been isolated. The time of the isolation has not, however, been long enough for it to develop into a separate species.

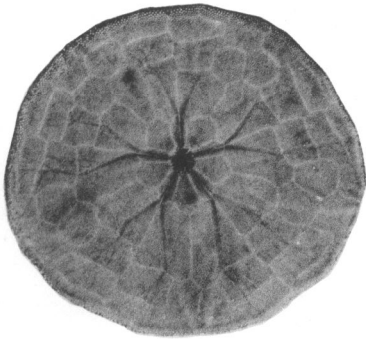
If this suggestion be right, it is to be expected that *E. parma* will be met with as subfossil in deposits at the north coast of America. As far as I know, it has not been found there till now, but it may be desirable to call attention to this very interesting problem.



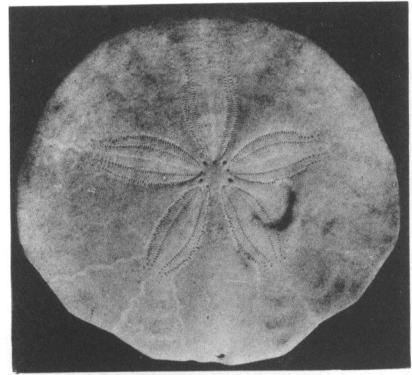
1



2



3



4

Fig. 1-4 *Echinarachnius griseus* n. sp. 1 and 2 with the spines, 3 and 4 denuded tests. 1 and 4 aboral, 2 and 3 oral side. Natural size.

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