# REPORT

ON THE

# SCIENTIFIC RESULTS

OF THE

# VOYAGE OF H.M.S. CHALLENGER

## DURING THE YEARS 1873-76

UNDER THE COMMAND OF

CAPTAIN GEORGE S. NARES, R.N., F.R.S.

AND THE LATE

CAPTAIN FRANK TOURLE THOMSON, R.N.

PREPARED UNDER THE SUPERINTENDENCE OF

THE LATE

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AND NOW OF

JOHN MURRAY

ONE OF THE NATURALISTS OF THE EXPEDITION



## NARRATIVE—VOL. I.

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so equable, and helps to keep the surface temperature in winter so much higher than the temperature of the air.

The route through the Strait of Magellan has been much facilitated by the excellent survey of the eastern portion by H.M.S. "Nassau," and by the beacons which have been erected by the Chilian Government, but the charts of its western entrance are capable of much improvement; a great part of the coast line there is still unexplored, and it is possible that harbours may exist of which nothing is now known; besides which a vessel employed on this service would, by keeping a careful meteorological register, enable the condition of the climate of the western side of Patagonia to be ascertained, which there is every reason to believe differs greatly from the climate of Sandy Point and the eastern coast.[1]

*The Isopoda.*—Mr. F. E. Beddard, the first part of whose Report on the Challenger collection of Isopoda is published,[2] writes:—"Among the specimens of Isopoda collected by the Expedition, those belonging to the genus *Serolis* are the most noteworthy. This genus, originally founded by Leach for the reception of *Oniscus paradoxus*, Fabricius, is chiefly interesting on account of its peculiar geographical distribution. For a long time it was only known to occur on the shores of Patagonia and the South Shetland Islands; the Challenger, however, discovered many species in other parts of the southern hemisphere. During the Transit of Venus Expedition and the voyage of the German ship 'Gazelle' several of these species were dredged off the coasts of Kerguelen subsequently to the Challenger's visit, and have already been described. New Zealand appears to be another locality of the genus, since the British Museum contains a single specimen each of the Patagonian *Serolis schythei* and *Serolis paradoxa* from that locality; and *Serolis latifrons*, a characteristic Kerguelen species, was obtained during the voyage of the 'Erebus' and 'Terror' at the Auckland Islands, south of New Zealand. The genus is therefore more particularly characteristic of the southern hemisphere, and, until quite recently, was believed to be entirely confined to that portion of the globe; within the last few years, however, a single species, *Serolis carinata*, has been met with as far north as San Diego in California. During the Challenger Expedition a large number of examples of several Patagonian species and of all the known Kerguelen species were dredged, but none of these were obtained from any new localities except in so far as regards the Crozets and Marion Island. These islands, as might be expected, are inhabited by species identical with those found at Kerguelen. On the shores of Southern and Eastern Australia six species were obtained, of which five prove to be new; it is an interesting fact that these Australian species form a well marked section of the genus, agreeing with each other and differing from their Patagonian and Kerguelen representatives in a number of small but

[1] H.M.S. "Sylvia," under Captain Wharton, was employed surveying here in 1882 and 1883.

[2] Report on the Isopoda—The Genus Serolis, by F. E. Beddard, Zool. Chall. Exp., part xxxiii., 1884.

quite definite characters; on the other hand, it is quite impossible to detect any such differences between the species of the genus which range from Patagonia through Kerguelen to New Zealand, and in some cases, as already pointed out, there is an absolute identity. It would be rather premature to draw any wide conclusions from the distribution of a single genus, but the facts recorded here seem to favour the division of the southern hemisphere into two regions—(1) an Australian, (2) an Antarctic extending from Patagonia to New Zealand. Other observers have commented on the close relationship that subsists between the littoral faunas of Patagonia and New Zealand.

"The most interesting species of the genus *Serolis* that were dredged by the Challenger are four from deep water, all of which are new to science. The genus was not known to range into deep water until the publication of Dr. v. Willemoes Suhm's notes on the Crustacea observed during the voyage.[1]

"It is a remarkable fact that none of these deep-sea species were dredged north of the Equator; it will be interesting to note whether further dredgings show that, in common with the majority of deep-sea animals, they are comparatively unrestricted in their range.

"*Serolis bromleyana*, the largest of the deep-sea species, is figured, natural size, in the accompanying woodcut (fig. 325); the drawing represents the male specimen dredged at Station 156, near the Antarctic Ice Barrier, in 1975 fathoms. This species was met with again considerably to the north, off the east and west coasts of New Zealand, in 400, 700, and 1100 fathoms; it has already been pointed out by Dr. Gerstaecker[2] that this species, as well as *Serolis antarctica*, which ranges from off the coast of South America just under the Equator (400 fathoms) to the neighbourhood of the Crozets (1600 fathoms) appears to inhabit deeper water in the more southern latitudes; and there are other instances adduced to show that certain species which are widely distributed are found in shallower water towards the Equator, and in deeper water towards the poles.

"It is worthy of note that in the two instances just mentioned the examples from deeper water and more southern latitudes are larger than those from shallower water and nearer the Equator.

"The third deep-sea species, *Serolis neæra*, was dredged at Stations 320 and 318; at the latter from a depth of 2040 fathoms, the greatest which the genus is known to inhabit. The remaining deep-sea species, *Serolis gracilis*, was dredged at Station 120 in 675 fathoms. None of the deep-sea species were found to inhabit shallow water also, nor do any of the shallow-water species of the genus pass the 300 fathom limit; the *Serolis*-faunas of deep and shallow water are quite distinct, but it is impossible to distinguish the former by any definite characters which would serve to unite them into

[1] Suhm, *Proc. Roy. Soc. Lond.*, vol. xxiv. p. 590, 1876.
[2] Gerstaecker, Bronn's Klassen u. Ord. d. Thierreichs, Bd. v. Abth. 2, p. 247, 1883.

a special subgenus; they all present considerable differences from the shallow-water species, but these appear to be due to modifications produced by some unknown causes which affect the inhabitants of the deep sea, and not to be a mark of near affinity; for example, the epimera of *Serolis bromleyana*, *Serolis neæra*, and to a less degree of *Serolis gracilis*, are enormously elongated, and terminate in sharp spine-like points; this, however, is not necessarily an indication of near affinity, because the same thing is met with in other deep-sea Isopoda; moreover, *Serolis neæra*, in the disposition of the spines and carinæ of the caudal shield, most nearly resembles *Serolis schythei* among the shallow-water species, while *Serolis bromleyana* is unlike this or any other shallow-water species that has been yet described. *Serolis antarctica* is conspicuous for the extensive sculpturing of the dorsal surface of the body, and eyes are quite absent—a condition obviously correlated with the great depth at which it exists; in the other species the eyes are large but whitish in colour from the partial or entire absence of pigment, as in many deep-sea fishes, Pycnogonids and Crustacea.

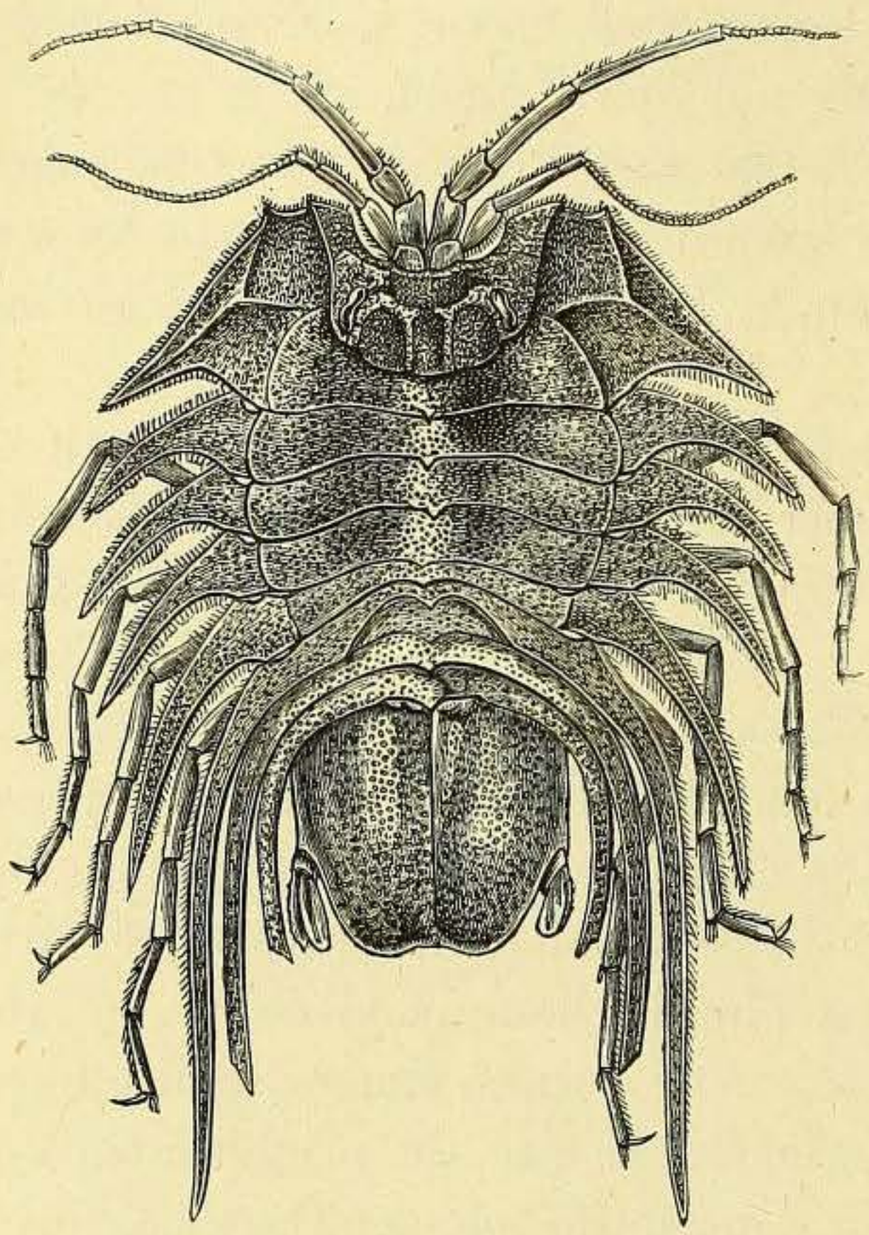

FIG. 325.—*Serolis bromleyana*, Suhm. Antarctic Ocean, 1975 fathoms.

"The large size of *Serolis neæra* and *Serolis bromleyana* is all the more remarkable since it does not appear to be a general rule that the deep-sea Isopoda are conspicuously larger than their shallow-water allies, though there are certain exceptions, such as *Bathynomus giganteus* of Milne-Edwards, which is no less than 9 inches in length.

"Nearly all the families of the Isopoda are represented by deep-sea forms, but in very different proportions; the most characteristic are the Munnopsidæ and the Arcturidæ, and of both these a great number of new species were obtained during the voyage. The Munnopsidæ are indeed typical inhabitants of the deep sea, as has been already made known by the results of Professor Sars' dredgings off the coast of Norway; very few of the forms described by him were got in water shallower than 120 fathoms, and the majority range beyond the 300 fathom limit. The Munnopsidæ collected by the Challenger were invariably dredged in very deep water, one species having been obtained from 2600 fathoms. At Station 68, in 2175 fathoms, a very remarkable example of the Munnopsidæ was dredged; this specimen is of considerable size, upwards of an inch in length (the majority of the group do not exceed half an inch or so), and the integument,

instead of being firm and opaque like other Crustacea, appeared to be almost entirely uncalcified; indeed the only parts of the body at all hard and resistant are the mouth appendages and, though to a considerably less extent, the ambulatory limbs; the integument is naturally extremely transparent; it might perhaps be imagined that this specimen has but just shed its skin, but the presence of a colony of well developed Hydroids attached to the body seems to negative this possibility; the floor of the ocean at the locality where this specimen was dredged is composed of Globigerina ooze, and there is therefore no lack of calcareous salts which might otherwise explain the anomalous condition of the integument in this Isopod. At another Station in the Antarctic a somewhat similar Munnopsid was dredged, but in this species it is the abdomen only that is clear and transparent, and but little calcified; the rest of the body is comparatively hard and opaque.

"Several species are remarkable for the great development of spines, and one example dredged at Station 157 (1950 fathoms) especially so; the anterior part of the body (the abdomen is unfortunately lost) is furnished with a ring of long slender spines upon each segment a quarter of an inch or so in length. The excessive development of spines appears to be commonly met with among the deep-sea Isopoda; the long spine-like epimera of the deep-sea *Serolis* have been already referred to, and in many of the Arcturids the tubercles on the surface of the body are prolonged into sharp spiniform processes, attaining in many cases a considerable length, while one species at least, allied to the Munnopsidæ, has comparatively long and spiniform epimera analogous to those of *Serolis*. None of the Munnopsidæ possess eyes, but the deep-sea Arcturidæ in every case have well-developed eyes, strongly pigmented.

"Of the Cymothoadæ one example was dredged in deep water (Station 218, 1070 fathoms) which is of some interest; this Isopod is remarkable for the fact that *all* the abdominal appendages are modified into foliaceous gill lamellæ; the terminal pair are in no way different from the five preceding pairs, whereas in other Isopoda it is the general rule that this pair of appendages does not form branchial organs but swimming feet. Eyes are quite absent; the anterior antennæ are short and broad, consisting of two joints only; the second pair of antennæ have four joints and a terminal filament, and are much more slender; the first pair of thoracic appendages are clawed. The specimen measures about 70 mm. in length. The Challenger collection contains only one other species belonging to this family from deep water.

"The Sphæromidæ, judging from what is known at present, are but poorly represented in deep water; only two examples, apparently a male and a female of the same species, were dredged at Station 218, 1070 fathoms. This species is evidently closely allied to the genus *Næsa*, but is probably distinct; the most noticeable peculiarity is that the eyes are nearly abortive; there is no pigment present, and the cornea is not clearly facetted. Of the Anthuridæ one or two specimens were dredged in deep water.

"Several species of *Tanais* were obtained from deep water, one of these at Station 248 in 2900 fathoms; this is the greatest depth at which any Isopod is known to exist; all the deep-sea species of *Tanais*, without exception, are entirely blind, but this fact is the less noteworthy since several species from shallow water are also blind.

"The long stay of the Challenger at Kerguelen naturally resulted in the collection of a large number of new forms of Isopoda from this little explored region; several of these, however, have been since described from the collections made during the cruise of the German ship 'Gazelle.'[1] The Isopoda appear to form a more important element in the fauna of this region than anywhere else. According to Dr. v. Willemoes Suhm about 20 per cent. of the Kerguelen Crustacea belong to this order.[2]

"An abundant species is *Tanais willemoesii*, Studer. This Isopod is remarkable for the fact that the females carry their eggs in two sacs attached between the fourth and fifth pairs of legs. Dr. v. Willemoes Suhm has already referred to this peculiarity; even in the youngest females the sacs are present, and with the normal shape and position, so that it is impossible to state whether they are entirely new and anomalous structures, or whether they result from the modification of the ordinary ovigerous lamellæ that are met with in other Isopoda.

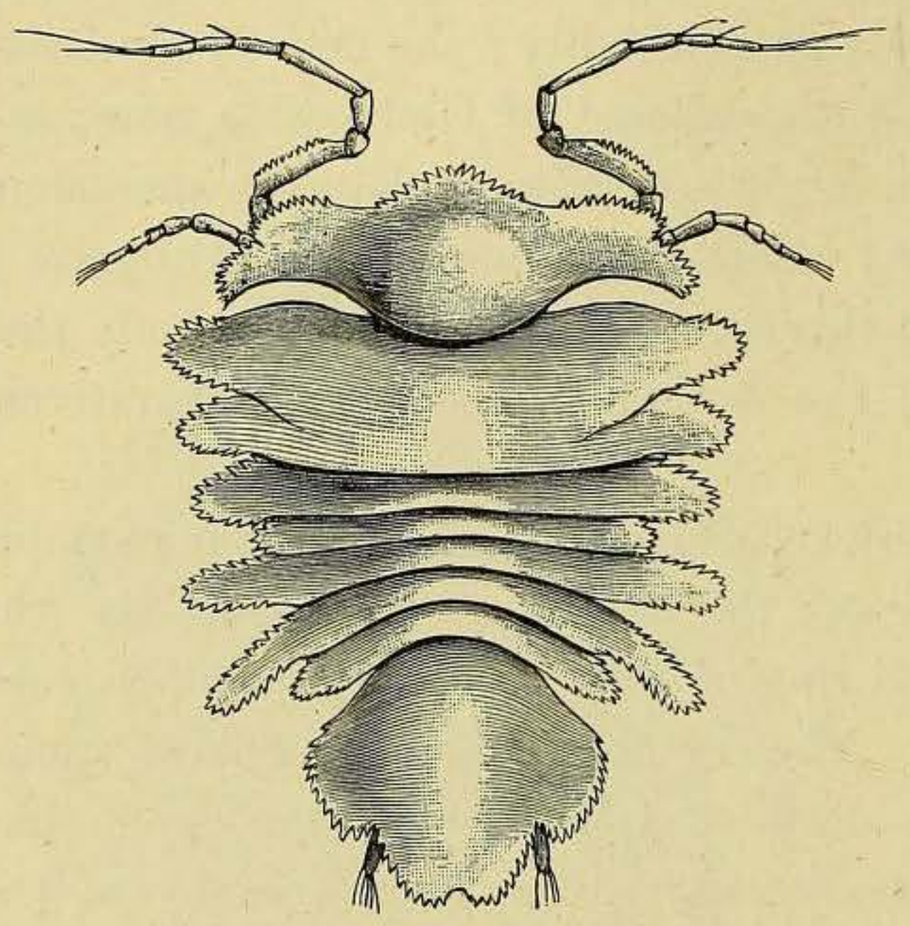

FIG. 326.—*Neasellus kerguelenensis*, n. gen. and sp.

"The accompanying woodcut (fig. 326) is a representation of a very curious little Isopod, of which only a single example was got; the figure is greatly enlarged, since the specimen itself does not measure more than one-tenth of an inch in length, it is remarkable for the great lateral elongation of the head, so that the antennæ come to be placed quite at the side of the body instead of being close to the median line. The epimera of all the segments as well as the fore part of the head and the caudal shield are fringed with a dense series of leaf-shaped processes; the eyes are completely aborted. This Isopod evidently belongs to the family of the Asellina, and I have called it *Neasellus kerguelenensis*.

"Other characteristic Kerguelen Isopoda represented by specimens in the Challenger collection have been already described by Studer."

[1] Th. Studer, *Archiv f. Naturgesch.*, Jahrg. xlv. Bd. i. p. 19, 1879; *Abhandl. d. k. Akad. d. Wiss. Berlin*, pp. 1–28, 1883.

[2] *Proc. Roy. Soc. Lond.*, vol. xxiv. p. 590, 1876.