

4. On the Marine Spiders of the Genus *Desis*, with
Description of a new Species. By R. I. Pocock, F.Z.S.

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(Text-figure 21.)

In this paper an attempt has been made to collect what is known of the habits of the marine or, more strictly speaking, littoral Spiders belonging to the genus *Desis*. It has been impossible to give a full account of the specific characters of all the known forms, since only four out of the seven described species are actually known to me. For the remainder I have been dependent upon the figures and descriptions published by other authors.

I have already pointed out (Ann. Mag. Nat. Hist. (6) xvi. p. 143, 1895) the identity between the so-called genera *Desis*, *Dandridgia*, and *Robsonia*, and Simon has subsequently and independently confirmed the synonymy of *Desis* and *Robsonia* (Hist. Nat. Araign. ii. p. 228, 1898). The genus *Paradesis* was instituted for the reception of the two S. African species of the same group, which differed from the species recorded up to that time from the Indo- and Austro-Malayan and New Zealand seas in the wider spacing of the eyes and the weak spine-armature of the legs—characters which, taken in conjunction with the geographical distribution of the two sets of species, appeared a sufficient basis for the establishment of the genus *Paradesis*.

A few months ago, however, the British Museum received from Miss Kenyon a specimen of a marine spider which was discovered on the coast of Victoria, in Australia. Curiously enough, this spider in the spacing of its eyes approximates to the South African species; and in the spine-armature of its posterior legs is also more nearly allied to the latter than to the known New Zealand and Austro-Malayan forms.

Since, therefore, no reasons based upon geographical grounds can now be alleged in support of the genus, I propose to drop *Paradesis* as a synonym of *Desis*, on the supposition that additional intermediate forms between the two types will in all probability be discovered in the Australian seas, and also because, so far as the spine-armature of the legs is concerned, the two South African species appear to differ from each other more than one of them does from the new Australian species.

Genus *DESIS* Walck.

Desis Walckenaer, Ins. Apt. i. p. 610 (1837).

Dandridgia White, Proc. Zool. Soc. 1847, p. 5.

Robsonia O. P. Cambridge, Proc. Zool. Soc. 1879, p. 686.

Paradesis Pocock, Bull. Liverpool Mus. i. p. 75 (1898).

In case it may be found possible and desirable in the future to resuscitate any or all of the above-given generic names, it is

advisable to point out what are the type-species to which these names must remain affixed :—

The type of the genus *Desis* is the species represented by the specimens (? in the Paris Museum) described by Walckenaer as *Desis dysderoides*.

The type of the genus *Dandridgia* is the species represented by the specimen in the British Museum described by White as *Dandridgia dysderoides*.

The type of the genus *Robsonia* is the species represented by the specimen in the Rev. O. P. Cambridge's collection described as *Robsonia marina*.

The type of the genus *Paradesis* is the species represented by the specimen in the British Museum described as *Paradesis tubicola*.

1. *DESIS MARTENSI* L. Koch.

Desis martensi L. Koch, Die Arachn. Austral. p. 347, pl. xxix. figs. 2–29 (1872); T. G. Workman, Malaysian Spiders, no. 11, p. 74 (1896).

Loc. Singapore; Pulo in the Java Sea.

The British Museum has specimens of this species from Singapore (*Major Archer*, *Lieut. Kelsall*, and *P. F. Bedford*).

Lieut. Kelsall's specimens, which were forwarded by Mr. H. N. Ridley in 1890, were accompanied by the following information :—“From the holes bored in the coral rock by a species of *Lithophaga*. From Buran Durat Reef near Blacku Mati Island. Nearest land $\frac{1}{2}$ mile distant. Reef uncovered at half-tide.”

The announcement of the discovery by Dr. von Martens that this spider is truly marine elicited the following expression of opinion from Dr. C. L. Koch, to whom the specimens were submitted for description :—“[The spider] was collected by [Dr. von Martens] on coral-reefs at Singapore. . . . The species is remarkable in that it has established itself in these reefs, which are only temporarily uncovered by the sea. . . . That the species discovered by Dr. E. von Martens and Dr. Johswick can really, like our indigenous *Argyroneta aquatica* Cl., live under water, is to me doubtful in the highest degree, for it is wanting in the outward visible signs of the breathing apparatus which corresponds to such submarine mode of life, and which has been anatomically demonstrated in *Argyroneta aquatica*¹. It also speaks against it, that yet another species of spider, an *Attus*, was found on the same coral-reefs, and we may assume with all certainty that this is a true terrestrial form. I opine that these spiders, perhaps in former times, were floated in an accidental manner from the land to these reefs and now live in the holes of the coral-bank, within which they withdraw at the time of flood, and which they close

¹ This is scarcely true, for, as I have pointed out (Ann. & Mag. Nat. Hist. (6) xvi. p. 143), *Desis martensi* has the tracheal slit large and well in advance of the spinners, though not so far forwards as in *A. aquatica*.

against the entrance of the water with a thick web. When once both sexes had been transferred to the coral-reefs, the species would increase and form a colony there."

Dr. Koch subsequently received the following further information from Dr. von Martens:—"During my residence at Singapore in October 1861, I repeatedly visited a coral-bank in the neighbourhood of New Harbour, of which large tracts were exposed above water during the ebb, at the time of new and full moon. My attention was chiefly directed to Crustacea and Mollusca; I tore off pieces of coral and broke them up to get at the creatures hidden within. To my astonishment, I several times observed spiders hurriedly escaping. The idea occurred to me at first that we ourselves had brought them from the shore in our clothing. This suspicion was rendered unlikely by the frequent repetition of the event, and was conclusively disproved, as Dr. Johswick found a web of undoubtedly one of these spiders in an old dead mussel-shell between the coral, stretched sheet-like in the cavity of the shell" (C. L. Koch, *Die Arach. Austral.* pp. 349-350). Dr. Koch had previously discussed the discovery of the marine habits of this Spider.

Mr. T. G. Workman (*Malaysian Spiders*, pt. 10, p. 74, 1896) writes of this species:—"This spider was discovered by me on the Blacku Mati coral-reef off the New Harbour, Singapore, the place where it was first discovered by Dr. Martens in 1861. I found it was perfectly helpless when placed in a bottle of water, showing in every way that it was not in its natural element. It lives in holes made by a species of *Lithodomus*, and spins a matted web across the hole and so keeping an air-chamber for itself during flood-tide. It is found in considerable numbers, but as it runs with great rapidity, is very hard to catch."

2. *DESIS MAXILLOSA* (Fabr.).

Aranea maxillosa Fabricius, *Ent. Syst.* ii. p. 411 (1793), teste Schiödte.

Desis dysderoides Walckenaer, *Ins. Apt.* i. pp. 610 & 682, pl. iv. fig. 151 (1837), also ii. p. 483 (1837); L. Koch, *Die Arachn. Austral.* p. 347 (1872).

Desis maxillosa Simon, *Hist. Nat. Araign.* ii. p. 225, figs. 215-217 (1898).

Loc. New Guinea (*Quoy & Gaimard*); Vanikoro (sec. *Simon*); Santa Cruz¹ Island in the Melanesian Archipelago to the north of the New Hebrides (*Fabricius*).

Habits unrecorded. No specimen in British Museum. The characters of this species given below are taken from Simon's figures.

¹ Fabricius gives St. Crux Island (Dr. Pflug) as the locality of this species. This is presumably the Santa Cruz Island in the Melanesian Archipelago. It must be borne in mind, however, that there is an island of St. Croix close to Port Elizabeth in South Africa, which is also the home of *Desis*. Is it not possible therefore that *maxillosa* Fabr. was based upon a South African species?

3. *DESI* *VORAX* L. Koch.

Desis vorax L. Koch, Die Arachn. Austral. p. 345, pl. xxix. figs. 1-1*f* (1872).

Loc. Upolu, in the Samoa Archipelago.

Habits unrecorded. No specimen in British Museum. The characters given below are taken from L. Koch's figures.

4. *DESI* *MARINUS* (Hector).

Dandridgia dysderoides White, Proc. Zool. Soc. 1849, p. 5 (nec *Desis dysderoides* Walck.).

Argyroneta marina Hector, Tr. N. Zealand Inst. x. p. 300 &c. (1877) (in note to paper by C. H. Robson).

Desis robsoni Powell, Tr. N. Zealand Inst. xi. pp. 263-268, pl. xii. (1879).

Robsonia marina O. P. Cambridge, Proc. Zool. Soc. 1879, p. 686.

Desis marinus Pocock, Ann. Mag. Nat. Hist. (6) xvi. p. 143 (1895).

Loc. New Zealand (Cape Campbell) and E. Australia (Port Jackson); also New Caledonia (sec. *Simon*).

The only specimen the British Museum possesses of this species is the type of *Dandridgia dysderoides* from New Zealand (*Erebus & Terror*). I have, however, examined a specimen of apparently the same species belonging to Mr. H. R. Hogg, F.Z.S., which was taken between tide-marks in Port Jackson. It is probably this species, rather than the one described below as *D. kenyona*, that Mr. Whitelegge refers to in the following terms: "There is a very common species of spider found under stones about low-water mark. It appears to be covered with a short pubescence which prevents the salt water from wetting the body." Watson's Bay and Taylor Bay in Port Jackson. (See Journ. R. Soc. N. S. Wales, xxiii. p. 233.)

The original account of this species given by Mr. Robson runs as follows:—

" I found a veritable spider [at Cape Campbell] quite at home under the water, and having a nest in an old *Lithodomus*-hole, of which the rocks are full. All the spiders of this kind which we have found have had nests in these holes, and always under water at all times of the tide. Over the mouth of the hole the spider spins a close web, which when finished looks like a thin film of isinglass and is water-proof; and behind the film is the nest and egg-sac, which last is of various shapes and contains a large number of eggs. When the spider is disturbed, it goes to the bottom of the pool, and if a small stick or straw is extended to it it at once gets ready for a fight, advancing its long and powerful mandibles for that purpose. When a small fish is placed in a bottle of water with one of these spiders, the latter will attack it at once, driving its long sharp falces into the fish near the head and killing it instantly. Each spider seems to live in

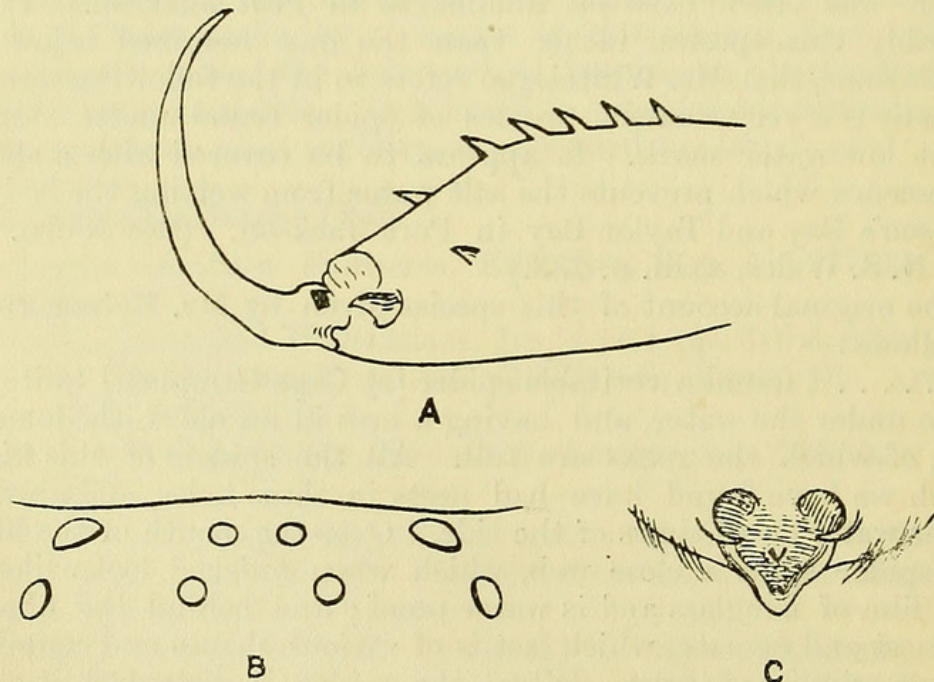
a solitary state, and it is, I believe, an exceedingly pugnacious little animal”

Mr. Robson subsequently supplied Dr. Powell with the following additional observations :—“The nests of this spider do not, in my opinion, occur below low water ; but it is difficult to state positively. The mouth of the *Lithodomus*-hole in which the nest is made is often, if not always, under low water in a tidal pool, and the nest is only to be got at by breaking up the rock with a heavy hammer. The spider when going to the bottom of the pool, on being disturbed, does not take down an air-bubble so far as I could see, and is able to live a considerable time without air or only the small amount to be found in sea-water. I have kept them alive for several days in a bottle quite full [of water]. The cocoons of eggs are found at the end of the hole and always quite dry. I have not seen these spiders at any place but Cape Campbell, and then not far above low-water mark, there being many feet of water over the rocks in which they live at high tide.”

5. *DESIS KENYONÆ*, sp. n. (Text-fig. 21.)

Colour normal ; carapace and mandible yellowish red ; legs and abdomen olive-yellow, sternum more uniformly testaceous than the carapace, the scopula on the protarsi of 2nd, 3rd, and 4th legs showing as dusky patches.

Text-fig. 21.



Desis kenyonæ.

A, lower side of the left mandible, to show the arrangement of the teeth.

B, eyes viewed from above, the anterior edge of the carapace uppermost.

C, vulva.

Carapace low, a little longer than tibia of 1st leg and also longer than the patella and tibia of 4th.

Eyes (text-fig. 21, B) of posterior line slightly recurved, widely separated, the laterals a little further from the medians than the medians are from each other; medians considerably smaller than laterals, about four diameters apart and about five diameters from the laterals; laterals on each side subequal, about a diameter apart; anterior median eyes barely a diameter apart, at least three diameters from the anterior laterals; ocular quadrangle about one-third wider behind than in front, the anterior median eyes a little nearer to each other than either is to the corresponding lateral; distance between anterior and posterior median about one-third of the distance between anterior median and anterior lateral, and one-fourth of that between posterior median and posterior lateral.

Mandibles (text-fig. 21, A) normal in size and direction; fang-groove armed behind with two teeth, the distal much the largest, the proximal separated from it by a space which is equal to about four times its own length; anterior border of fang-groove armed with 6-7 teeth, the distal near the base of the fang opposite the interval between the two teeth of the posterior row, the remaining 5 or 6 remote from it, evenly spaced, the distal of the series rising well behind the proximal tooth of the posterior row.

Legs: 1st pair unspined, 2nd leg with three inferior protarsal spines, one apical and two submedian; tibia of 3rd and 4th with a pair of inferior apical spines; protarsi with two or three spines at the base of the scopula and three at the apex, one median and one on each side; tarsi also with a few spiniform bristles intermixed with the normal bristles.

Vulva (text-fig. 21, C) as in the other species, consisting of a horny plate impressed with a heart-shaped pit which is wider than long, marked posteriorly by a low median crest and bordered by an upstanding edge which is posteriorly produced into an angular process with rounded apex, and armed on each side with a slender pointed process directed downwards and backwards.

Measurements in mm.—Total length 11, carapace 5; 1st leg 18, 2nd leg 13, 3rd leg 10.5, 4th leg 13.

Loc. Australia: San Remo, Westernport Bay in Victoria (*Miss Kenyon*).

Perhaps belonging to this species were the specimens recorded from Port Jackson by Mr. Whitelegge, J. R. Soc. N.S.W. xviii. pp. 162-323 (*cf. supra*, p. 101).

Concerning the habits of this spider, Miss Kenyon, to whom I have great pleasure in dedicating the species, writes:—"During a recent stay at San Remo, while turning over stones at low-water in search of Mollusca, I noticed what seemed to be the sea-worn shell of a *Crepidula*. Upon detaching the shell from the partially submerged rock to which it adhered, I found underneath it the spider with its legs drawn backwards and its head concealed under a sheet of web which exactly resembled the septum of the valve of a *Crepidula*, although the shell itself was that of an *Anomia*. The spider was conspicuous from the intense

blue of its abdomen and the vivid red of its cephalothorax. The shell was apparently fixed to the ground by means of a silken attachment, since the shell had to be removed by the insertion of the point of a penknife."

6. *DESIS FORMIDABILIS* O. P. Cambridge.

Robsonia formidabilis O. P. Cambridge, Proc. Zool. Soc. 1890, p. 625, pl. liii. fig. 5.

Paradesis formidabilis Pocock, Bull. Liverpool Mus. i. p. 77 (1898).

S. Africa.

Habits unrecorded. No specimen in British Museum.

Unfortunately the arrangement of the teeth on the mandible in this species is neither figured nor described. The alleged absence of spines from the legs compels the conclusion that this species is distinct from the following *D. tubicola*. In the subjoined table of species, having no other characters to lay hold of, I have had no choice but to use this absence of spines in contrasting the two forms—an arrangement which unfortunately suggests that the relationship between the two South African species is less than that between one of the latter and the Australian species *D. kenyonæ*. On *à priori* grounds this is hardly likely to be the case.

7. *DESIS TUBICOLA* (Pocock).

Paradesis tubicola Pocock, Bull. Liverpool Mus. i. pp. 76–77, figs. 1–3 (1898).

Loc. S. Africa; Wynberg in Cape Colony (*N. Abraham*).

Mr. Nendick Abraham's account of the habits of this spider is reprinted from the 'Bulletin of the Liverpool Museum.' After describing his first discovery of the animal in the tube-masses of *Tubicola*, the writer proceeds:—"This formation [the *Tubicola*-masses] is invariably covered by the sea at high tide, and much of it even at low tide Sometimes I have found five or six spiders in one piece of material weighing five or six pounds. Now, what is curious is that these spiders cannot swim or dive, and when placed on the surface of the water appear to be quite helpless, or nearly so I eventually succeeded in securing several nearly perfect examples [of their dwellings]. I then saw that the spider does not, as a rule, make its home in the empty tubes of the worms, but in the spaces left between the tubes." The dwelling consists of a delicate silken chamber with the opening seaward. "It is so frail and delicate that the least rough handling" destroys it. "Yet in this frail home of silk, hidden away in some little space in the mass of tubes built by marine worms, these spiders live and thrive, the waves breaking over them all day long I have watched the tubes when the tide was low in the hope of seeing a spider crawling or running about, but I have never yet seen one. They live out of

sight deep down amongst the worm-tubes. How they catch their food, what their food is, and how they keep the sea from drowning them, are questions I have not yet demonstrated, though I have tried again and again to keep them in my marine aquaria. Shortly after introducing one, I have often found it floating helplessly on the water, apparently half dead, and I have had it lifted out of the water and placed on the rockwork, when it soon became active and ran about very quickly, when it appeared to be just like an ordinary spider."

The characters of the species of the genus *Desis* may be tabulated as follows:—

- | | | |
|------------------|--|----------------------|
| a. | Eyes of posterior line subequally spaced; tibia and protarsus of posterior legs strongly spined. | |
| a ¹ . | Eyes of posterior line closer together, the medians about two diameters from each other and from the laterals. | |
| a ² . | The two teeth on the posterior border of the fang-groove close together, the distal much larger and closer to the proximal than to the base of the fang (according to Simon) | <i>maxillosa.</i> |
| b ² . | The two teeth on the posterior border of the fang-groove wide apart, the distal not larger than the proximal and equidistant from it and from the base of the fang (according to Koch) | <i>vorax.</i> |
| b ¹ . | Eyes of posterior line farther apart, the medians about three diameters from each other and from the laterals. | |
| a ³ . | Teeth on posterior border of fang-groove relatively close together, separated only by a space a little exceeding the length of the proximal, the two relatively subequal; teeth of anterior row starting nearer base of fang | <i>martensi.</i> |
| b ³ . | Teeth of posterior border of fang-groove far apart, separated by a space equalling about three times the length of the proximal, the distal tooth much the larger of the two; teeth of anterior row starting farther from base of fang | <i>marina.</i> |
| b. | Eyes of anterior and posterior lines very unequally spaced, the distance between the medians and the laterals far greater than that between the medians; posterior legs weakly spined or unspined. | |
| a ⁴ . | Posterior legs without spines (according to Cambridge) ... | <i>formidabilis.</i> |
| b ⁴ . | Posterior legs with tibial and protarsal spines. | |
| a ⁵ . | Distal tooth on anterior margin of fang-groove remote from the base of the fang and close to the rest of the series; protarsus of 2nd, 3rd, and 4th legs spined only at apex; no median crest on floor of cavity of vulva, and the lateral processes shorter and projecting inwards more at right angles | <i>tubicola.</i> |
| b ⁵ . | Distal tooth on anterior margin of fang-groove nearer to base of fang and remote from the rest of the series; protarsus of 2nd, 3rd, and 4th legs with a pair of spines on the proximal side of the scopula as well as at apex; vulva with median crest on floor of cavity, and lateral processes projecting obliquely backwards | <i>kenyonæ.</i> |

The discovery that a close specific relationship obtains between the South African and South Australian species is of the highest interest from a geographical standpoint, as favouring the hypothesis of a direct land connection, accompanied by temperate conditions, between these two continents. All the evidence that

we possess as to the habits of these sea-spiders shows that they live between tide-marks on the shore; and that although gifted with considerable activity on land, they are quite unable to swim and are indeed practically helpless in the water. Hence their presence in S. Africa and S. Australia may be used as testimony to the former extension between these countries, either of a coast-line with shallow water, or at least of a submerged bank, partially exposed at low tide.

It may of course be urged by those who oppose the theory of the former existence of an Antarctic tract connecting the southern continents, that the species of this group of Spiders have reached the coasts of Cape Colony, New Zealand, and Australia by migration in a south-easterly and south-westerly direction from the coasts that border the Indian Ocean on the north. This hypothesis, however, affords no explanation of the fact that no spiders of this genus have been recorded from any spot along the miles of coast-line that intervene between, say, Durban and Singapore. Nevertheless I was myself disposed to adopt the hypothesis of a southward migration to account for the presence of these animals on the coasts of the continents which separate the Indian from the Atlantic and Pacific Oceans, until the example of *D. kenyona* came to hand, to testify to the very close affinity between the S. African and Australian types. If the hypothesis of migration from the north be the sole explanation of the distribution of the genus *Desis*, we should expect to find the annectant form between the two types of structure exemplified by, say, *D. formidabilis* from S. Africa and *D. marina* from New Zealand, not in the south, but in the north. As a matter of fact it has turned up in the south, and the most northerly known species, namely *D. martensi* from Singapore, is no nearer to the South African type than is the species that occurs in New Zealand. In my opinion, therefore, the theory of a transoceanic land-connection supplies the most satisfactory explanation of the affinity between the Australian and South African species. Clearly, however, this theory does not necessarily exclude the other entirely. The group may have come down from the north in the first place, and subsequently crossed, either from S. Africa to Australia, or the other way about; but until further light is thrown on the subject by the discovery of species along the western and northern shores of the Indian Ocean, I venture to think the available evidence bearing on the question favours the view that the group originated in the Austro-Malayan Islands and spread westwards from South Australia to S. Africa, along a coast-line connecting the two continents with one another.



Pocock, R. I. 1902. "On the marine spiders of the genus Desis, with Description of a New Species." *Proceedings of the Zoological Society of London* 1902, 98–106.

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