

Tasmanian littoral Spiders with Notes on their Respiratory Systems, Habits and Taxonomy

By

V. V. HICKMAN

Ralston Professor of Biology, University of Tasmania

(Read 2nd November, 1948)

FIGS 1-15

In certain localities on the coast of Tasmania it is not uncommon to find spiders which have succeeded in adapting themselves to an aquatic or semi-aquatic mode of life. Two species are frequently met with, namely *Amaurobioides litoralis* sp. nov. and *Desis kenyonae* Pocock. The present paper gives an account of these two species, including a description of the hitherto unknown male of *Desis kenyonae*.

Family AMAUROBIOIDIDAE nov.

Cribellum and calamistrum wanting. Colulus present. Six spinnerets. Eight eyes in two rows. Chelicerae with condyle and scopula. Both margins toothed. Lip free. Maxillae parallel, with scopula well delimited. Legs with spines. Tarsi and metatarsi scopulated. Two tarsal claws pectinate in a single row. Claw-tufts present. Trichobothria in two rows on tarsi, a single row on metatarsi and two rows on tibiae. Thoracic groove longitudinal. Tracheal spiracle single and median, a short distance in front of colulus. Tracheal system extending into the cephalo-thorax. Heart with three pairs of ostia.

Genus *Amaurobioides* O. P. Cambridge

Only two species have been recorded as belonging to this genus, namely *Amaurobioides maritima* Cambridge and *Amaurobioides piscator* Hogg. Both species occur in New Zealand. *A. maritima* is found on rocks in the sea at Allday Bay, Otago, and *A. piscator* occurs on rocks between tide marks on Campbell Island. To these is now added a third species taken at Eaglehawk Neck, Tasmania. The name *Amaurobioides litoralis* is proposed for the species.

Amaurobioides litoralis sp. nov.

Male								mm.
Total length (excluding chelicerae)								7.420
Length of carapace								3.480
Width of carapace								2.320
Length of abdomen								4.234
Width of abdomen								2.204
Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total		
1	2.610	1.334	2.668	2.610	1.508	10.730		
2	2.494	1.334	2.610	2.610	1.392	10.440		
3	2.146	1.160	1.856	2.262	0.928	8.352		
4	2.494	1.334	2.262	2.378	0.928	9.396		
Palp	1.218	0.580	0.464	.....	1.450	3.712		

Colour. Carapace, legs and palpi brown. Front of head region and chelicerae very dark brown, nearly black. Maxillae, labium and sternum light brown. Coxae fawn. Dorsal surface of abdomen dark brown marked with a fawn pattern as shown in fig. 1. Sides dark brown, ventral surface fawn. Spinnerets fawn.

Carapace. Elongate, somewhat narrowed in head region, widest between the second coxae. Front margin recurved. Posterior margin rounded. Cervical and radial grooves faintly marked. Thoracic groove longitudinal; its front end being about $\frac{2}{3}$ of the length of the carapace from the anterior margin. Surface densely clothed with short fine recumbent silky hairs which point forwards.

Eyes. Eight, arranged in two rows. Viewed from above the front row is distinctly recurved and shorter than the hinder row, which is but slightly recurved. The eye-group occupies about half the width of the head. The eye space is black and the AME are mounted on a small tubercle that projects forward over the clypeus. Ratio of eyes AME : ALE : PME : PLE = 6 : 9 : 8 : 9. The AME are separated from each other by half their diameter and from ALE by one-third of their diameter. PME are separated from each other by $\frac{9}{8}$ of their diameter and from PLE by once their diameter. The median ocular quadrangle is wider behind than in front in ratio 25 : 14. Its posterior width is greater than its length in ratio 25 : 23. The height of the clypeus is slightly less than the diameter of AME.

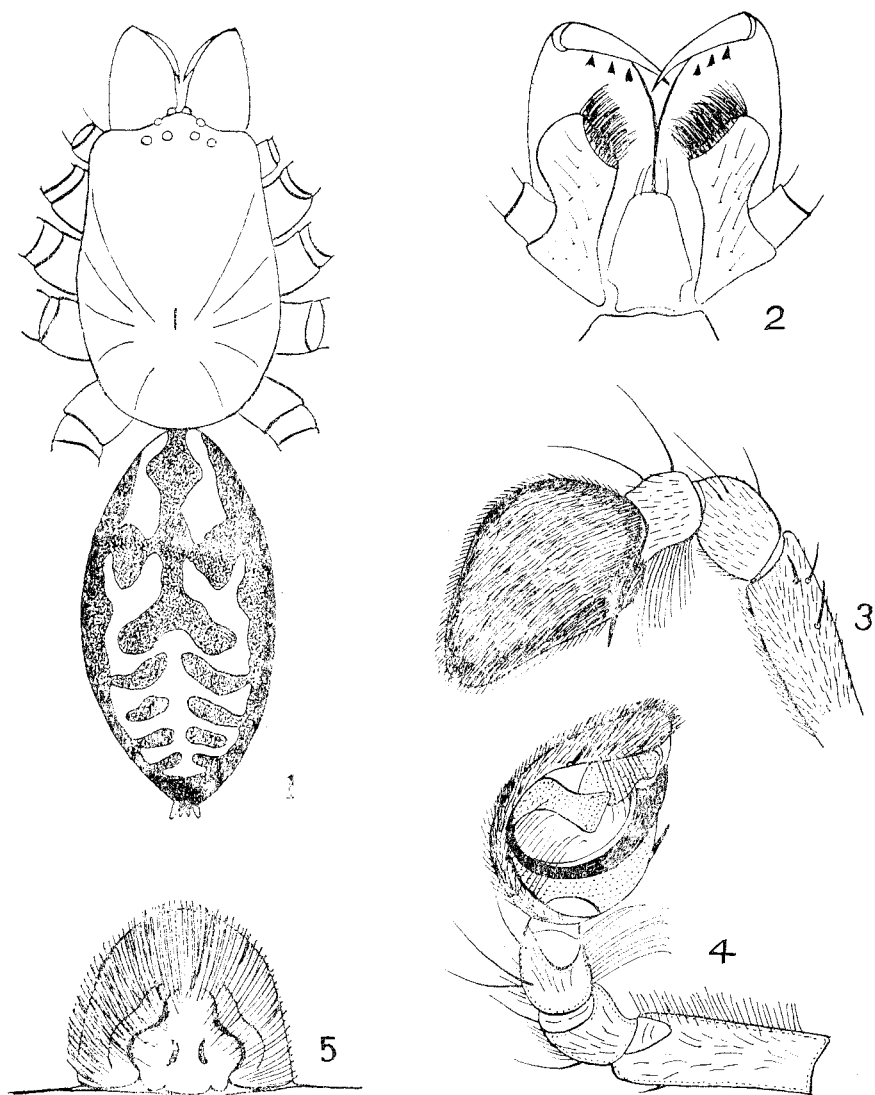
Chelicerae. Strong, geniculate, projecting forward and clothed with hairs in front. Furrow oblique; retromargin with three teeth of equal size; promargin with two large teeth and a small basal tooth.

Maxillae. Long, parallel, obliquely truncate on the inner side near the apex, rounded on the outer side and constricted near the middle. A dense scopula is present on the obliquely truncated part of the apex and a well-developed serrula on the rounded outer margin (fig. 2).

Labium. Longer than wide in ratio 14 : 9 and extending beyond the middle of the maxillae. Rounded at the apex and slightly emarginate on each side near the base (fig. 2).

Sternum. Long, ovoid and convex. Longer than wide in ratio 32 : 21. Widest between second coxae. Front margin slightly recurved. Lateral margins sinuous with slight projections opposite the coxae. Posteriorly the sternum ends in a point between the fourth coxae, which are separated by about half their diameter. Clothed with short fine hairs.

Legs. 1.2.4.3. A moderately dense scopula on the tarsi and metatarsi of the first and second pairs of legs. A thick clothing of ordinary hairs on the third and fourth pairs. Claw-tufts present on all legs. Two tarsal claws, each with a row of seven teeth. Trichobothria in two rows on tarsi, a single row on metatarsi and two rows on tibiae. Spines are present on all legs and are arranged as follows: *First leg*—Femur: dorsal 1-1-1, prolateral 0-0-1, retrolateral 0-1-0, ventral 0. Patella 0. Tibia: dorsal 0, prolateral 1-1-1-1, retrolateral 1-1-1-2, ventral 2-2-2-2-2-2. Metatarsus: dorsal 0-1-0, prolateral 1-1-1, retrolateral 1-1-1, ventral 0. Tarsus 0. *Second leg*—Femur: dorsal 1-1-1, prolateral 0-1-1, retrolateral 0-1-1, ventral 0. Patella 0. Tibia: dorsal 0, prolateral 1-1-1, retrolateral 1-1-1, ventral 2-2-2. Metatarsus: dorsal 0-1-0, prolateral 1-1-1, retrolateral 1-1-1, ventral 0. Tarsus 0. *Third leg*—Femur: dorsal 1-1-1, prolateral 0-1-1, retrolateral 0-1-1, ventral 0. Patella 0. Tibia: dorsal 0, prolateral 1-1-1, retrolateral 1-1-1, ventral 2-2-2. Metatarsus: dorsal 0-1-0, prolateral 1-1-1, retrolateral 1-1-1, ventral 2-2-2. Tarsus 0. *Fourth leg*—Femur: dorsal 1-1-1, prolateral 0-1-1, retrolateral 0-0-1, ventral 0. Patella 0. Tibia: dorsal 0, prolateral 1-1-1, retrolateral 1-1-1, ventral 2-2-2. Metatarsus: dorsal 0-1-0, prolateral 1-1-1, retrolateral 1-1-1, ventral 2-2-2. Tarsus 0.



Amaurobioides litoralis, sp. nov.

- FIG. 1.—Dorsal view of male showing pattern on abdomen.
 FIG. 2.—Chelicerae, maxillae and labium of male.
 FIG. 3.—Retrolateral view of left palp of male.
 FIG. 4.—Ventral view of left palp of male.
 FIG. 5.—Epigynum.

Palpi. Tibial segment short and produced into a long sharp apophysis at the apex on the retrolateral side. Tarsus large and ovoid. Femur has 1-1-1 spines on dorsal side and 0-0-1 on both prolateral and retrolateral sides. Elsewhere spines are absent. The form of the palp and genital bulb is shown in figs 3 and 4.

Abdomen. Oblong, nearly twice as long as wide. Clothed with short fine hairs. Anterior spinnerets stout and conical with a very short apical segment. Middle and posterior spinnerets cylindrical and arranged in a transverse row above the anterior spinnerets. Apical segment of hind spinnerets minute. A short colulus is present. Pulmonary spiracles in the usual position. Tracheal spiracle single and median, situated about the length of the anterior spinnerets in front of the colulus.

Female		mm.				
Total length (excluding chelicerae)	.....	12.00				
Length of carapace	.....	4.35				
Width of carapace	.....	3.31				
Length of abdomen	.....	7.83				
Width of abdomen	.....	4.06				
Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
1	3.48	1.80	2.78	2.55	1.62	12.23
2	3.36	1.74	2.78	2.49	1.51	11.88
3	2.90	1.51	2.09	2.32	1.16	9.93
4	3.19	1.80	2.73	2.61	1.16	11.49
Palp	1.74	0.70	0.81	.....	1.45	4.70

Colour. Carapace and chelicerae very dark brown, almost black. Legs reddish brown above merging into yellow on the sides and ventral surface of the femora and on the apex of each patella. Maxillae and labium dark reddish brown, the apex of the labium and the inner side of the apex of each maxilla being yellow. Coxae yellowish. Sternum yellowish in the middle, brown round the margin. Abdomen dark brown above ornamented with paired yellowish areas and chevrons as in the male. Sides of abdomen dark brown merging into yellow on the ventral surface. Epigynum yellowish brown.

Carapace. Oblong, its width in front being only slightly less than its greatest width. Cervical and radial grooves not distinct. Thoracic groove longitudinal and situated about 2/3 of the length of the carapace from the front. Surface clothed with short fine recumbent hairs which point forwards.

Eyes. Eight, arranged in two rows. Front row shorter than posterior row in ratio 13 : 22. Viewed from above the front row is slightly recurved and the posterior row is straight. Ratio of eyes AME : ALE : PME : PLE = 6 : 12 : 11 : 14. The AME are separated from each other by 7/6 of their diameter and from ALE by half their diameter. The PME are separated from each other by 13/11 of their diameter and from PLE by 9/11 of their diameter. The lateral eyes are separated by a distance equal to the diameter of AME. The median ocular quadrangle is wider behind than in front in ratio 35 : 19 and its length is shorter than its posterior width in ratio 26 : 35. The front row of eyes is very close to the margin of the clypeus, the height of the clypeus below AME being equal to the diameter of AME.

Chelicerae. Stout, conical and geniculate. Provided with large yellowish lateral condyles. In front the surface is rough and furnished with coarse black

hairs. Margins of furrow oblique. Promargin with three teeth, the basal tooth being smaller than the others. Retromargin with three teeth of equal size. Fang strong and moderately curved.

Maxillae. Parallel. Rounded in front with an oblique truncation and dense scopula on the inner side near apex. Constricted in middle as in the male.

Labium. Longer than wide in ratio 7 : 5. Exceeding half the length of the maxillae. Excavated on each side at the base. Apex rounded and fringed with long black hairs.

Sternum. Long shield-shaped, its length being greater than its width in ratio 50 : 28. Pointed posteriorly between the fourth coxae, which are separated by about half their diameter. The surface is slightly convex and shows indistinct elevations opposite the bases of the coxae. The margin is produced into a point opposite each coxa.

Legs. 1.2.4.3. Clothed with hairs and long bristles. The tarsi and metatarsi of the two front pairs of legs are scopulate to base, those of the two hind pairs of legs have a thick clothing of ordinary hairs on the ventral side. Trichobothria in two rows on tibiae, a single row on the metatarsi and a double row on the tarsi. Two tarsal claws are present and furnished with about seven long teeth. Claw-tufts of spatulate hairs are present on all the legs. Spines are arranged as follows: *First leg*—Femur: dorsal 1-1-1, prolateral 1 at apex, elsewhere 0. Patella 0. Tibia: ventral 2-2-2, elsewhere 0. Metatarsus: ventral 2 near base, elsewhere 0. *Second leg*—Femur: dorsal 1-1-1, prolateral 1 at apex, elsewhere 0. Patella 0. Tibia: dorsal 0, prolateral 1, retrolateral 0, ventral 1-1-2. Metatarsus: dorsal 0, prolateral 1 near middle, retrolateral 0, ventral 2 near base. *Third leg*—Femur: dorsal 1-1-1, prolateral 1 at apex, elsewhere 0. Patella 0. Tibia: dorsal 0, prolateral 1-1-1, retrolateral 1-0-1, ventral 2 at apex. Metatarsus: dorsal 2 near apex, prolateral 1 at apex, retrolateral 1 at apex, ventral 2-0-2. *Fourth leg*—Femur: dorsal 1-1-1, prolateral 0, retrolateral 1 at apex, ventral 0. Patella 0. Tibia: dorsal 0, prolateral 0, retrolateral 1 near apex, ventral 1-1-2. Metatarsus: dorsal 2 near apex, prolateral 1 near apex, retrolateral 1 near apex, ventral 1-0-2. No spines are present on any of the tarsi.

Palpi. Clothed with long hairs and slender bristles. Spines are present on the dorsal side of the femur and on the prolateral side of the tibia and tarsus. The tarsal claw is slightly curved and provided with three very small teeth in the basal half.

Abdomen. Long ovoid. Clothed with fine short recumbent hairs intermingled with longer erect hairs. The pulmonary spiracles are in the normal position. The tracheal spiracle is single and median. It is situated in front of the spinnerets and at a distance from them equal to the length of the anterior pair. The spinnerets form a compact group. The front pair are stout and conical. The posterior pair are about equal in length to the front pair but much more slender. The middle pair are small and partly concealed by the others. A small colulus is present. The epigynum has the form shown in the fig. 5.

Locality. The male and female type specimens, together with a number of others of the same species, were collected at Eaglehawk Neck, Tasmania, during February, 1948.

Amaurobioides litoralis closely resembles *A. maritima* Cambridge. However, according to Cambridge (1883, p. 356) the cephalothorax of *A. maritima* is twice as long as it is broad. Moreover the figure (Cambridge, 1883, Plate XXXVI, fig. 3e) depicting the maxillae and labium of *A. maritima* shows the maxillae curved on

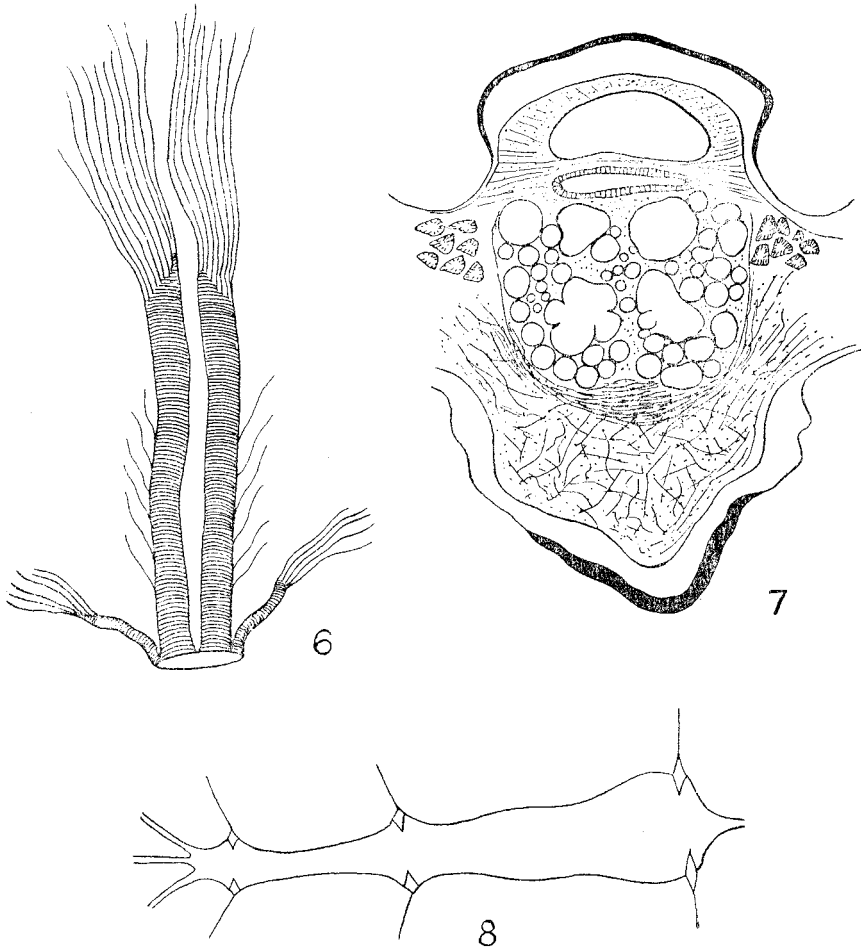


FIG. 6.—Tracheal tubes.

FIG. 7.—Transverse section through petiolus showing main tracheal trunks dividing into tubules which lie below the gut.

FIG. 8.—Dorsal view of heart showing position of the ostia.

Amaurobioides littoralis, sp. nov.

the inner side and the labium without lateral excavations at the base. If the figures are correct the structures differ from those of *A. litoralis*.

The species *A. piscator* Hogg (1909, p. 164) described from the Campbell Islands differs from *A. litoralis* in the leg formula, in having spines on the under side of the femora and in the form of the epigynum.

Respiratory System and Heart. The respiratory system consists of a pair of book-lungs in the usual position and tracheal tubes which supply both cephalothorax and abdomen. As mentioned previously the tracheal spiracle is single and median and is situated a short distance in front of the spinnerets. It leads into two stout median trunks and two much smaller lateral trunks (fig. 6). The two large median trunks pass straight forward and enter the petiolus. Here they divide into a number of smaller tubules (fig. 7), which enter the cephalothorax and extend into the appendages. The abdomen is supplied mainly by the two small lateral trunks. These also divide to form a number of fine tubules. In addition to these the abdomen also receives a few small tubes from the sides of the large median trunks as they pass towards the petiolus.

The heart is in the usual position close beneath the dorsal surface of the abdomen. It has three pairs of ostia arranged as shown in fig. 8.

Habits. *A. litoralis* makes a small nest of tough white silk in crevices and holes in rocks near high-tide mark. The nest is about 3 or 4 cms. long and more or less oval in shape. It has a small tubular exit on one side. In some cases the nests are made among shell-grit that has accumulated between rocks just below the high-tide mark. In most cases, however, the nests are situated above high-tide level, although the rocks on which they occur may be surrounded by water and splashed by the waves. The crevices in which the nests are made are often frequented by Isopods of the genus *Ligia* and remnants of these crustacea sometimes occur in the nests of the spider.

The egg-sac of *A. litoralis* is lenticular, about 8 mm. in diameter and made of white silk. It is attached to the inner surface of the wall of the nest. One egg-sac in which the eggs were counted contained 60 eggs. These are yellow in colour and measure 1.05 mm. in diameter. Not more than one egg-sac is found in the nest. During the first fortnight in February when the specimens were collected some nests contained eggs in process of development and others young spiders newly emerged from the egg-sac.

Most of the males apparently reach maturity later in the year, probably in the autumn, since the 75 specimens collected included only one mature male. The remaining 74 specimens were composed of 33 mature females, 24 immature females and 17 immature males. Two of the immature males were kept in vivaria in the laboratory until they reached maturity.

Taxonomy. The genus *Amaurobioides* Cambridge is considered by Simon (1903, p. 1034) as synonymous with *Uliodon* L. Koch. Hogg (1909, p. 162), however, states that *Amaurobioides piscator* differs materially from *Uliodon* and places it in the Clubionidae. Dalmás (1917, p. 394) follows the classification proposed by Hogg. Petrunkevitch (1908, p. 210) agrees with Simon in regarding the genus *Amaurobioides* as a synonym of *Uliodon*, and places the genus *Uliodon* in the family Ctenidae. Bristowe (1930, p. 344) agrees with Petrunkevitch.

These different views are largely due to the fact that the descriptions of *A. maritima* Cambridge and *A. piscator* Hogg omit to mention such important characters as the colulus, the position of the tracheal spiracle, the distribution of the tracheal tubes, etc. In the Tasmanian species *A. litoralis* a colulus is present, the tracheal spiracle is a short distance in front of the spinnerets and the

tracheal system enters the cephalothorax and its appendages. In all these features *A. litoralis* differs from members of the Clubionidae and Ctenidae. Moreover, members of the Ctenidae are usually wandering spiders, which do not make a permanent silken nest, whereas *A. litoralis* makes a tubular retreat in which it lives. For these reasons it seems necessary to establish a new family, Amaurobioididae, for the three species of *Amaurobioides*. The family is most closely related to the Clubionidae.

Whether the genus *Utiodon* should be included in the family cannot be determined until more detailed descriptions of the species are available.

Family AGELENIDAE

Genus **Desis** Walckenaer, 1837

Desis kenyonae Pocock

Male							mm.
Total length (excluding chelicerae)							9.280
Length of carapace							4.350
Width of carapace							2.900
Length of abdomen							4.930
Width of abdomen							2.668
Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total	
1	3.770	1.914	4.234	4.524	2.494	16.936	
2	2.900	1.624	2.668	2.900	1.624	11.716	
3	2.436	1.218	1.914	2.436	1.160	9.164	
4	2.900	1.508	2.726	2.900	1.508	11.542	
Palp	1.972	0.812	1.450		1.392	5.626	

Colour. Carapace, legs, palpi, maxillae, labium and sternum yellowish brown. Basal segment of chelicerae golden brown, fang dark reddish brown. Upper surface and sides of abdomen greyish brown, ventral surface and spinnerets somewhat lighter in colour.

Carapace. Oblong, truncate in front. Head region almost as wide as thoracic region. Sides gently rounded. Posterior end slightly emarginate. Thoracic groove longitudinal, situated about 2/3 of the length of the carapace from the front. Radial striations distinct but not deep. The head region is clothed with short recumbent hairs which point forward. Thoracic region has few hairs.

Eyes. The eight eyes are arranged in two rows (fig. 9). Viewed from above both rows appear almost straight. Viewed from in front the anterior row is slightly procurved, the lateral eyes being nearer the edge of the clypeus than are the median eyes. The width of the eye-group is slightly more than half the anterior width of the carapace. The front row of eyes is shorter than the posterior row in ratio 68 : 78. Ratio of eyes AME : ALE : PME : PLE = 7 : 10 : 8 : 8. The AME are separated from each other by 5/7 of their diameter and from ALE by 10/7 of their diameter. The PME are separated from each other by 15/8 of their diameter and from PLE by 18/8 of their diameter. The lateral eyes are separated by 5/7 of the diameter of AME. The median ocular quadrangle is wider behind than in front in ratio 30 : 19. Its length is slightly greater than its anterior width. The AME are dark coloured; all the other eyes have a white pearly appearance. The lateral eyes of each side and the AME are mounted on slight elevations. A long slender hair projects in front of AME. On each side above the condyle of the chelicera the margin of the clypeus is dark reddish brown. The distance from the AME to the front margin is equal to 6/7 of the diameter of AME.

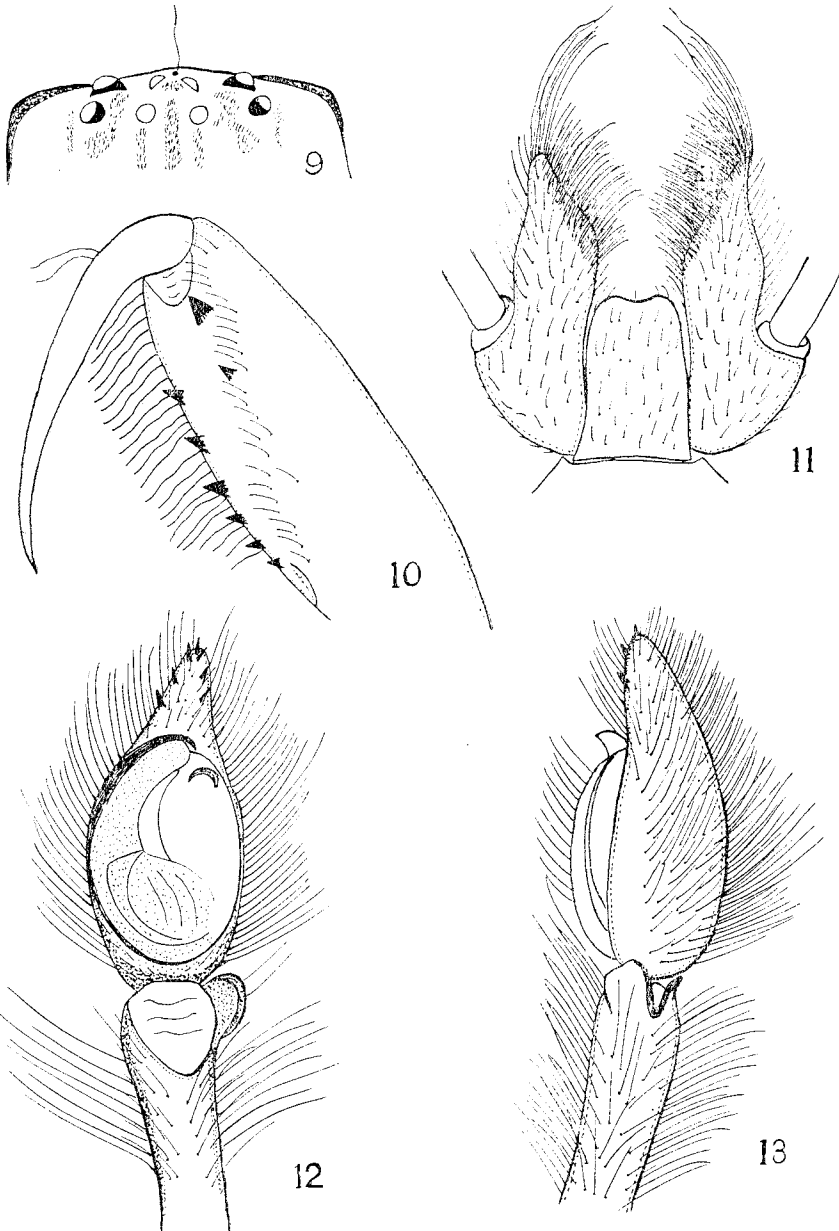
*Desis kenyonae* Pocock

FIG. 9.—Eyes of male.

FIG. 10.—Ventral view of left chelicera of male.

FIG. 11.—Maxillae and labium of male.

FIG. 12.—Ventral view of left palp of male.

FIG. 13.—Retrolateral view of left palp of male.

Chelicerae. Very large, powerful and projecting forwards. The length of the basal segment is equal to $\frac{4}{5}$ of the length of the carapace. Promargin provided with a row of six teeth, which are evenly spaced and decrease slightly in size towards the base. Retromargin is furnished with two teeth, one of which is large and situated near to the base of the fang, while the other is much smaller and almost opposite the apical tooth of the promargin (fig. 10). The fang is dark reddish brown, very long and slightly curved. When closed its tip rests in a small depression on the basal segment. There is a thick scopula of long hairs on the promargin and a somewhat lighter scopula on the retromargin. The dorsal surface is provided with a few very small scattered hairs.

Maxillae. Parallel, sharply pointed in front, with curved outer margin and oblique inner margin (fig. 11). A serrula is absent. A scopula of long hairs is situated at the apex and on the inner margin. Surface is lightly clothed with long hairs.

Labium. Longer than wide in ratio 4 : 3. The length is equal to about $\frac{4}{7}$ that of the maxillae. The apex is truncate and slightly emarginate (fig. 11).

Sternum. Long shield-shape, ending in a point between the fourth coxae. Front margin with a projection on each side. Lateral margins with small projections opposite the coxae and also opposite the spaces between the coxae. Surface clothed with long hairs.

Legs. 1.2.4.3. The front pair much longer than the others. All the legs are clothed with long outstanding hairs. The last three pairs of legs, but not the first pair, have a much thicker clothing of hairs at the apex of the metatarsus than elsewhere. Trichobothria in two rows on the tarsi, a single row on the metatarsi and two rows on the tibiae. Scopulae and claw-tufts absent. Three tarsal claws are present. Upper claws similar with about 11 teeth on those of the front legs and 8 on those of the hind legs. Lower claw is strongly curved and without teeth. Spines are arranged as follows: *First leg* has no spines. *Second leg*—Femur 0. Patella 0. Tibia: ventral 1 at apex on prolateral side, elsewhere 0. Metatarsus: ventral 1 near middle and 3 at apex, elsewhere 0. *Third leg*—Femur 0, Patella 0. Tibia: ventral 1 at apex on retrolateral side, elsewhere 0. Metatarsus: ventral 2 near middle and 3 at apex, elsewhere 0. Tarsus: ventral 4 small spines close together in apical quarter. *Fourth leg*—Femur 0. Patella 0. Tibia: ventral 1 at apex on retrolateral side, elsewhere 0. Metatarsus: ventral 1 near middle on retrolateral side, 3 at apex, elsewhere 0. Tarsus: ventral 5 small spines in the apical quarter. All the spines are small and easily overlooked owing to the dense clothing of long hairs. The number of spines varies slightly in different specimens and sometimes on the corresponding left and right legs of the one specimen.

Palpi. Long and slender. Femur slightly curved. The length of the trochanter is almost $\frac{2}{3}$ that of the femur. The tibia has a short cleft apophysis on the retrolateral side at the apex (fig. 13). The tarsus is spoon-shaped and produced into a somewhat pointed apex. All segments are clothed with long hairs and the tarsus is provided with a few small spines at the apex. The genital bulb forms a rather flat oval disc. The embolus curves round the prolateral margin of the disc (fig. 12). Trichobothria are arranged in a row on each side of the tibia

Abdomen. Ovoid. The dorsal surface and sides clothed with long erect hairs, which are curved forwards. The anterior pair of spinnerets are short, stout and conical. The posterior pair cylindrical and slightly longer than the front pair. The middle spinnerets are short and somewhat triangular in section. A colulus is absent. The tracheal spiracle is single and median. It opens close in front of the spinnerets.

Female							mm.
Total length (excluding chelicerae)							10.730
Length of carapace							4.756
Width of carapace							3.364
Length of abdomen							5.800
Width of abdomen							3.826
Leg	Femur	Patella	Tibia	Metatarsus	Tarsus	Total	
1	3.774	2.030	4.118	4.234	2.320	16.476	
2	2.958	1.682	2.668	2.900	1.566	11.774	
3	2.726	1.392	2.030	2.552	1.160	9.860	
4	3.248	1.682	2.900	3.074	1.334	12.238	
Palp	2.204	0.870	1.624		1.740	6.438	

The female resembles the male in colouration and general appearance. The description given by Pocock (1902, p. 102) is correct as far as it goes. However, he does not describe the following features:

Labium. Somewhat rectangular, slightly emarginate at the apex. Longer than wide in ratio 23 : 14, and more than half the length of the maxillae.

Maxillae. Parallel, broad at the base, pointed at the apex, rounded on the outer margin and obliquely truncate on the inner margin. Scopula as in the male. Serrula absent.

Sternum. Long shield-shape. Longer than wide in ratio 45 : 31. Widest between the second coxae. Surface slightly convex, almost flat, clothed with long hairs. Margin slightly rebordered and furnished with projections as in the male.

Legs. 1.4.2.3. Clothed with long hairs. Trichobothria arranged as in male. Upper tarsal claws similar with about 12 teeth in those of the front legs and 10 in those of the hind legs. Lower claw without teeth. The spines on the legs are arranged as follows: *First leg* has no spines. *Second leg*—Tibia: ventral 1 in the middle, 3 at apex. *Third leg*—Tibia: ventral 2 at apex. Metatarsus: dorsal 2 at apex, prolateral 1 near middle, ventral 1 near middle, 3 at apex. Tarsus: ventral several small spines near apex. *Fourth leg*—Tibia: ventral 2 at apex. Metatarsus: ventral 1 near middle, 3 at apex. Tarsus: ventral several small spines near apex. Elsewhere on the legs spines are absent.

Palpi. Clothed with long hairs. A few small spines are present on the ventral side of the tarsus near the apex. Claw slightly curved and furnished with five small teeth. Two rows of trichobothria on dorsal surface of tibia and tarsus. Trochanter very long, slightly more than half the length of the femur.

Abdomen. Ovoid. Densely clothed with long erect curved hairs interspersed with somewhat shorter recumbent hairs. In surface view the epigynum has the form described and figured by Pocock (1902, p. 102). In transparent preparations it has the form shown in fig. 14. Spinnerets as in the male. Tracheal spiracle single and median, situated in front of the spinnerets at a distance about equal to the length of the anterior pair.

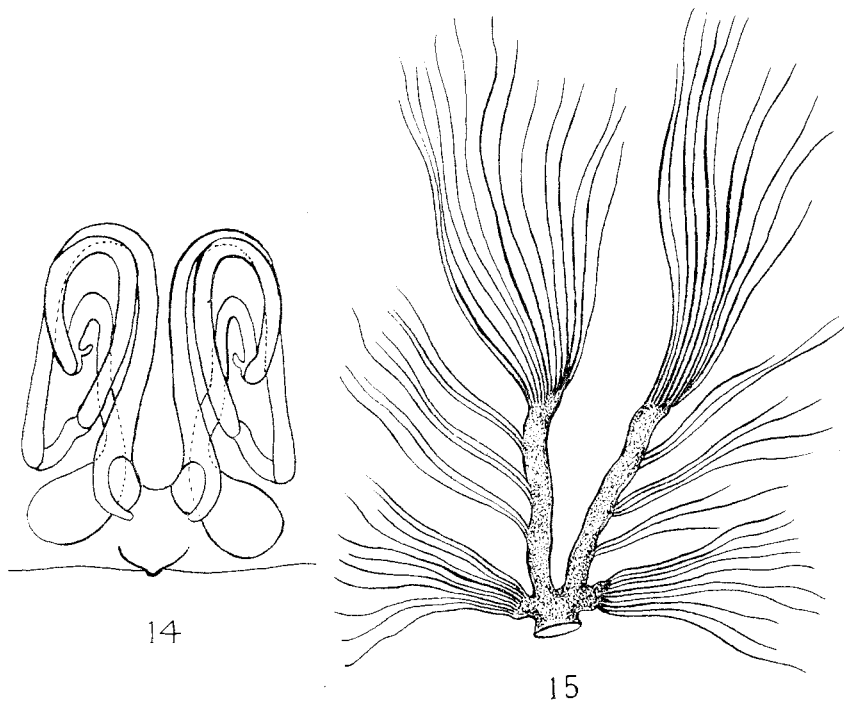
Locality. The allotype male together with a number of other males and females was collected at Eaglehawk Neck, February, 1948. The spider has also been found at Adventure Bay on Bruni Island, at the Gardens on the East Coast of Tasmania and at Gravelly Beach on the River Tamar. The holotype female, on which Pocock based his description of the species, was found at San Remo, Westernport Bay, Victoria.

Respiratory System and Heart. The respiratory system consists of a pair of book-lungs in the normal position and tracheal tubes confined to the abdomen. The book-lung of a male specimen was examined in serial sections and found to have about 50 leaves.

The tracheal spiracle, which opens a short distance in front of the spinnerets, leads into two stout median trunks, which extend forward for about one-quarter the length of the abdomen. Lateral trunks, which are present in many spiders, are reduced to a pair of short stump-like branches, one on each side near the base of the median trunks. Both the median trunks and the short lateral branches divide and give rise to numerous fine tubules, all of which supply the abdomen. No tubules pass into the cephalothorax (fig. 15).

The heart of *Desis kenyonae* has three pairs of ostia and resembles that of *Desis formidabilis* Cambridge, which has been described by Petrunkevitch (1933, p. 371).

Habits. With the exception of those collected at Gravelly Beach, which is about 20 miles up the Tamar estuary from the mouth, all the specimens of *Desis kenyonae* were found on the sea coast. The spider lives between high-tide and low-tide levels, where it may be found occupying empty mollusc shells, cavities on the under side of rocks or crevices among *Galeolaria* tubes. The spider lines the cavity with a layer of silk and closes the opening with a sheet of web.



Desis kenyonae Pocock

FIG. 14.—Epigynum as seen in a transparent preparation.

FIG. 15.—Tracheal tubes.

At other times a cocoon-like nest is made in the narrow space between two rocks. Unlike *Amaurobioides litoralis*, *Desis kenyonae* never makes its nest above high-tide level.

During December, 1947, and February, 1948, 9 mature males, 5 mature females and a number of immature forms were collected at Eaglehawk Neck. Two egg-sacs were found on 4th December. One sac contained 30 eggs, the other 30 spiderlings almost ready to emerge. The egg-sac is lenticular in shape and measures about 17 mm. in diameter. It is made of white silk. The outermost layer is tough and parchment-like and has a shiny lustre. The egg-sac is placed on the side of the cavity occupied by the spider, and the mouth of the cavity is closed over by a sheet of silk. Such sealed up nests containing the egg-sac and the female spider are sometimes placed in cavities on the under side of rocks almost at the low-tide level, so that for the greater part of the day the nest is completely submerged. However, the cavity which is used for the nest is generally in such a position, that when the tide comes in the air contained in the cavity is not displaced. Moreover, the strong sheet of web, which covers the opening, helps to retain the air and exclude the water.

Desis kenyonae will live for several weeks in specimen tubes, if filter paper or cotton wool soaked in sea-water is placed in the tube with the spider. Specimens kept in this manner in the laboratory fed eagerly on ordinary house-flies. A female made an egg-sac in one of the tubes. It was firmly fixed in the angle between the bottom of the tube and the side. By placing a strong light behind the egg-sac the eggs could be observed. They hatched in 47 days from the time the egg-sac was made. The newly hatched spiderlings remained in the sac and after 14 days from the time of hatching they underwent their first post-embryonic ecdysis. The egg-sac was then opened in order to examine the young spiders more closely. Hence the normal mode of escape from the sac could not be observed.

REFERENCES

- BRISTOWE, W. S., 1930.—Notes on the Biology of Spiders.—II Aquatic Spiders. *Ann. Mag. Nat. Hist.*, Ser. 10, Vol. VI, 1930, pp. 343-347.
- CAMBRIDGE, O. P., 1883.—On some new Genera and Species of Spiders. *Proc. Zool. Soc.*, London, 1883, pp. 352-364, Plates XXXVI and XXXVII.
- DALMAS, COMTE DE, 1917.—Araignées de Nouvelle—Zélande. *Ann. Soc. Ent. de France*, Vol. LXXXVI, 1917, pp. 317-430.
- HOGG, H. R., 1909.—Spiders and Opiliones from the Subantarctic Islands of New Zealand. Article IX. Subantarctic Islands of New Zealand, Wellington, N.Z., 1909, pp. 155-181, Plates VII and VIII.
- KOCH, L., 1875.—Die Arachniden Australiens, Nürnberg.
- PETRUNKEVITCH, A., 1928.—Systema Aranearum. *Trans. Conn. Acad.*, Vol. 29, 1928, pp. 1-270.
- , 1933.—An Inquiry into the Natural Classification of Spiders, based on a Study of their Internal Anatomy. *Trans. Conn. Acad.*, Vol. 31, 1933, pp. 299-389, Plates I-XIII.
- POCOCK, R. I., 1902.—On the Marine Spiders of the Genus *Desis*, with Description of a new Species. *Proc. Zool. Soc., London*, Vol. II, 1902, pp. 98-106.
- SIMON, E., 1903.—Histoire Naturelle des Araignées. Tome 2. Paris.