

AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Rainbow, W.J., 1901. Notes on the architecture, nesting-habits, and life-histories of Australian Araneidae, based on specimens in the Australian Museum. Part I. The Territelaridae. *Records of the Australian Museum* 4(1): 5–12. [29 March 1901].

doi:10.3853/j.0067-1975.4.1901.1076

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

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NOTES ON THE ARCHITECTURE, NESTING-HABITS, AND
LIFE-HISTORIES OF AUSTRALIAN ARANEIDÆ, BASED
ON SPECIMENS IN THE AUSTRALIAN MUSEUM.

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PART I.—THE TERRITELARIÆ.

THE Araneæ Theraphosæ include all those Spiders which construct subterranean tubes, some of which are protected by a trap-door or lid. These are divided into three families—Liphistiidæ, Aviculariidæ, and Atypidæ. Of these, the first, consisting of only one genus, *Liphistius*, Schiödte, is peculiar to the islands of Penang and Sumatra. The second, Aviculariidæ, is divided by Simon into seven sub-families, and representatives of it are found in all parts of the world. The third, Atypidæ, although not so numerous as the preceding group, occurs in Europe, America, Africa, Japan, and Malaysia.

The Australian species, as far as at present known, belong solely to the Avicularidæ. Formerly these Spiders were included under the generic name of *Mygale*,¹ Walck. (1802), a term which had, however, two years earlier, been used by Cuvier for a genus of Mammals, belonging to the family Talpidæ, and popularly known as Moles.

Vernacularly these Araneids are known as "Trap-door Spiders," from the fact that many of their dwellings are provided at the entrance with a trap-door. These doors are of two kinds: the *thick*, or "cork-lid" type, and the *thin*, or "wafer" type. Most of these Spiders are terrestrial, but some have quitted the ground in favour of an arboreal existence. The latter are included in the sub-families Miginæ and Diplurinæ, typical genera of which are *Moggridgea*, Camb., of South Africa, and *Macrothele*, Auss., of Spain, Malaysia, and New Zealand. Some species of the latter genus, however, inhabit the fissures of rocks. One species, *Macrothele huttoni*, Camb., together with nests, I collected at Wanganui, New Zealand, some years ago. The nests were small, and built upon the trunks of trees, the silk composing the outer wall being covered with chips of bark and lichen, rendering detection very difficult; the operculum or lid was of the wafer type.

¹ *Mygale* is the modern form of this word.

As far as known, no males construct nests, this branch of industry being apparently peculiar to females. During the periods of mating, both sexes may at times be taken in one nest or burrow; but when living apart, the males usually inhabit small cavities or the fissures of rocks.

Sub-family ACTINOPODINÆ.

This sub-family is represented in Australia by the endemic genus, *Eriodcn*, Walck., of which about a dozen species have been described by various authors. These Spiders are very characteristic, and in some instances, the males at least, are brightly coloured.

So far as I know, no observations of the nesting-habits of the Australian species have been recorded. The nest of the South American genus, *Actinopus*, Perty, is a deep, simple, cylindrical tube, perfectly smooth, and lined throughout with silk; the trap-door is round, and attached to one side with a hinge.

Sub-family MIGINÆ.

In his list of the Araneidæ collected by the Horn Scientific Expedition to Central Australia, Mr. H. R. Hogg, M.A., recorded² what he believed to be *Migas paradoxus*, L. Koch. The specimen, collected at Palm Creek, was mutilated, "consisting of a cephalothorax and three pairs of legs." As Mr. Hogg himself does not appear to be altogether certain as to its identity, and as, also, it is a long way from Auckland, New Zealand, to Palm Creek, Central Australia (and there is no other record of its having been found in Australia), we must, until further material is collected, exercise some little reservation in respect to its identity. Mr. Hogg is a very careful and conscientious worker, and his views are, at any rate, entitled to respect.

The Miginæ are a remarkable group of Spiders; those of the genus *Moggridgea* construct their nests upon the trunks of trees, as already described. *Migas paradoxus*, according to the Rev. O. P. Cambridge,³ makes a nest about an inch and a half in length, covered with particles of soil and decayed vegetable matter, and protected at the entrance by a thin wafer lid, attached by a weak silken hinge. It is found attached to the roots of fern, enabling the architect to obtain a suitable position without the necessity of excavating. None of the species have the extremities of their falces armed with teeth, these organs having been modified to suit them to their arboreal habits.

² Report Horn Expl. Exp., ii., 1896, Zoology, p. 334.

³ Proc. Zool. Soc., 1890, p. 624, pl. liii., fig. 3.

Sub-family CTENIZINÆ.

In 1870, the Rev. O. P. Cambridge described and figured a male example from the Swan River, West Australia, for which he proposed the name *Idiops sigillatus*.⁴ Simon, however, regards it as belonging to the widely distributed genus *Acanthodon*, Guér., the range of which he defines as: "Syria; Arabia merid.; Asia centr.; India et Burmania; Africa tropica orient., occid. et austr.; America merid.; Australia";⁵ whilst *Idiops*, Perty, occurs in Brazil only.⁶ This species is not represented in our collection.

The nests of *Acanthodon* are simple, cylindrical, deep, and lined throughout with silk, the lid is thick and heavy, of the "cork" type, and the edge bevelled, thus allowing it to fit when closed, as in a socket. It is made of several layers of silk and fine earth. The exterior is always of the same colour as its surroundings, and even if necessary covered with moss; hence, when closed, it is very difficult to detect. The tenants never leave their dwellings during the daytime, but go forth after dark in quest of prey, which consists of ground roving insects. When at home, the lid is always closed, and as the Spider hangs on to it tenaciously, some force is required to open it from without.

The genus *Aganippe*, Cambr., has so far been found only in Australia. Two species have been described and figured,⁷ namely, *A. subtristis*, Cambr., from Adelaide, S.A., and *A. latior*, Cambr., from West Australia.

Arbanitis, L. Koch, occurs in Australia and New Zealand. The type of the genus is *A. longipes*, L. Koch. This was originally described under the generic name of *Pholeuon*, L. Koch,⁸ a term applied by Hampe, in 1856, for a genus of Beetles of the family Silphidæ. The New Zealand form was assigned by Cambridge to the genus *Nemesia*,⁹ the range of which, according to Simon, is "Regio mediterranea præsertim occid."¹⁰

No observations have been recorded in connection with the nests made by Spiders of the Australian genus—*Aganippe*, Cambr., but those constructed by species of allied genera are described as being simple, and lined throughout with silk; the walls are hard, and, in some instances, continued above the surface of the soil; the orifice is rarely open, but is ordinarily closed with a lid. The latter is always thin, of the "wafer" type, sometimes rigid and

⁴ Proc. Zool. Soc., 1870, p. 103, pl. viii., fig. 3.

⁵ Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 91.

⁶ Simon—*Loc. cit.*, p. 92.

⁷ Ann. Mag. Nat. Hist. (4), xix., 1877, pp. 28–29, pl. vi., figs. 3–4.

⁸ Koch—Arach. Aust., i., 1871, pp. 471 and 491.

⁹ Trans. N.Z. Inst., viii., 1877, p. 284.

¹⁰ Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 112.

sometimes flaccid. The nests of some species are provided with a second, inner lid of a very special nature.

There are in the collection of the Australian Museum some nests from the Tweed River, New South Wales, and from Queensland. In one, from Mirwillumbar, Tweed River, the walls have been carried considerably above the surface, and built so as to incline forward, so that whilst the front elevation measures only three-quarters of an inch, the hinder measures one and a half. The outer walls are covered with a scale moss, determined by my colleague, Mr. T. Whitelegge, as one of the *Hepaticæ*; the interior is beautifully lined with silk. The lid is thick and heavy, truncate behind, where it is attached by a long hinge; the sides and front are round; it is concave without and convex below, and has its exterior also clothed with the *Hepatic* moss. Others, from the same district, and from Queensland, agree with the above in every detail, except that the lids were flush with the ground. As no Spiders were sent with the nests, it is impossible to assign them with certainty to any species or genus. They probably belong to the *Ctenizinæ*.

The Spiders allied to *Arbanitis*, exhibit great diversity in the construction of their terrestrial abodes. In some instances the nest is simple and cylindrical, sometimes branched, and not infrequently complicated. The lid is also variable, being, according to the species, either of the "cork" or "wafer" type, unequal in circumference, rigid or flaccid. In some cases the Spider constructs an interior door of a very different nature to the external one. This occurs where the nest is branched, and is employed to shut off communication with the main chamber. It is attached to the wall by a strong silky tissue, inclining or sloping to one side, and provided at its extremity with a little fringe of silk. It sometimes happens that predatory foes invade these subterranean dwellings; the invader is usually of a powerful and aggressive type, and one with which it would be difficult or dangerous to contend. The second chamber, with its door, affords a safe retreat. Immediately upon the approach of danger, the Spider passes into the supplementary chamber, closes the door, and by placing its body securely against it, resists pressure from without. The intruder, not suspecting the existence of a second chamber, and finding the main one empty, retires. Moggridge spent the declining years of an invalid life at Mentone, in the South of France, studying the habits of these interesting Arachnids.¹¹

Gillies has described and figured some New Zealand trap-door nests,¹² and these doubtless belong to this group. In some instances the nests were almost vertical, being nearly straight in outline;

¹¹ Moggridge—*Harvesting Ants and Trap-door Spiders*, London, 1873.

¹² *Trans. N.Z. Inst.*, viii., 1875, p. 222, *et seq.*, pls. vi.-viii.

in others, sinuous; one figure shows the secondary tube, or *cul-de-sac*, directed obliquely upwards, whilst another depicts it directed downwards and outwards. An interesting feature in connection with this group, as also species of the genus *Atypus*, Latr., is the enlarging of a portion of the tube for the reception of the ova-sac or "cocoon." This usually occurs a little below the surface, and here the tube, for a short distance downwards, is enlarged to about twice the diameter of the nest at its aperture. Sometimes the enlargement is only upon one side, but at others it is perfectly round. Gillies found white cocoons with bright golden yellow eggs in some of these enlargements. The cocoons were suspended from the sides by threads of silk, but sufficient space was left to enable the Spider to pass up or down. This observer also noted that in digging out a nest, he accidentally cut through another which he had not observed, and found the Spider in the enlargement "embracing the side of the cocoon." It is well known that the maternal instinct is very strong with Spiders. Many mount guard over their cocoons, and never leave them, even for food, until the young have hatched. Doubtless the one referred to above was so employed when her home was thus rudely broken.

There is one bifurcated nest in our collection from northern New South Wales, but unfortunately unaccompanied by the architect. It is obviously of the *Nemesiæ* type, and may have been constructed by a species of *Arbanitis*. Both chambers have been plugged with cotton wool, and all the soil removed from the silk. The outer layers are coarse and discoloured by the soil, but the inner lining is beautifully white. Another from the same locality is simple, but somewhat enlarged laterally near the top.

Sub-family BARYCHELINÆ.

This sub-family is represented in Australia by the genera *Idiommata*, Auss., and *Trittame*, L. Koch. Of these, the former also occurs in New Guinea, Pelew Islands, and New Caledonia. *Trittame* contains a single species, *T. gracilis*, L. Koch.

Around Sydney, *Idiommata reticulata*, L. Koch, is somewhat common; it also occurs in Queensland, having been taken at Port Mackay, and again in New Guinea (Mt. Scratchley, at 12,200 ft.)¹³

The nests of these Spiders are deep, simple, and cylindrical, the burrows directed sometimes vertically and sometimes obliquely; the lid is of the "wafer" type, circular, and rigid, and always concolorous with its surroundings, being composed of silk and thin layers of earth. Within, the tube is lined with a thin layer of silk, and discoloured.

No observations have been recorded in respect of *T. gracilis*.

¹³ Proc. Linn. Soc. N.S.W., xxiii., 1898, p. 329.

In the Report of the Horn Exploring Expedition to Central Australia, Mr. H. R. Hogg, gives a list of the Spiders collected, and enumerates amongst others *Idiopsis helva*, L. Koch.¹⁴ This species was originally recorded from Ovalau Island, Fiji, so that if there is no mistake in Koch's locality, and Mr. Hogg's determination, its occurrence in two such widely divided areas is, to say the least, remarkable. Moreover, the climate of the two localities is vastly different. Ovalau, from its position, is oppressive, warm, and humid; in the centre of Australia the climate is hot and dry; hence the vegetation in each place must be widely different. Palm Creek, where Mr. Hogg's specimens were collected, is an isolated spot—an oasis in the desert. It is quite true, as Mr. Hogg points out, that "they [the Spiders] present a general analogy to those from the coastal districts of New South Wales and Queensland, exhibiting here and there interesting variations in what are clearly co-ordinate types."¹⁵ Still, that would hardly appear sufficient to account for the occurrence of *I. helva*.

Mr. Hogg's note reads:—"In seven female specimens, the third pair of legs is longer in proportion, the lips are shorter and the body larger than in those described by Koch."¹⁶

The type of *I. helva* was in the Museum Godeffroy, so that the recorder was guided solely by Koch's description and figures.¹⁷ Had he had the privilege of comparing his specimens with the type, he might have observed further differences which would have influenced his determination.

The nest of *I. helva* is figured by Koch.¹⁸ It is an exceedingly interesting structure, consisting of a short downward tube whence two branches extend; one of these is horizontal, and rather more than twice the length of the entrance tube; the other is much longer, directed downwards and curved under; the lid is nearly circular.

Sub-family AVICULARIINÆ.

This sub-family is represented in Australia by two genera, *Ischnocolus*, Auss., and *Phlogius*, E. Simon.¹⁹ The former occurs in the Mediterranean region—Spain, Sicily, Barbary, Cyprus, and Syria; Ethiopian region—East India, Nicobar Islands; Malaysia—Java, Sumatra, Borneo, Phillipine Islands; Australia; Central America; the Antilles; South America—Colombia, Brazil, and Uruguay. *Phlogius* is distributed over S.E. Asia—Burma,

¹⁴ Report Horn Expl. Expd., ii., 1896, pp. 312 and 335.

¹⁵ *Loc. cit.*, p. 309.

¹⁶ *Loc. cit.*, p. 335.

¹⁷ Koch—*Arach. Aust.*, i., 1871, p. 484, pl. xxxvii., figs. 3, 3a, 3b.

¹⁸ Koch—*Loc. cit.*, pl. xxxvii., fig. 3c.

¹⁹ Simon—*Hist. Nat. Araignées* (2nd edit.), 1892, p. 136.

Siam, Cochin China ; Malaysia—Sumatra, Borneo, the Mollucas ; New Guinea ; North, Eastern, and Central Australia.²⁰

The Aviculariinae rarely excavate a tube, but avail themselves of the natural cavities in the soil or trunks of trees ; these they line with a thick mantle of silk, which is light and transparent, and without a tubiform retreat, and no lid protects the entrance. Their eggs, which are numerous, and not agglutinated, are enveloped in a cocoon of white, flaccid silk. Some species carry their cocoons with their falces wherever they go, and never relinquish them until the young are hatched out.

Phlogius crassipes, L. Koch, is a large tunnel-boring species. It is known, popularly, by the white settlers as the "Barking Spider," owing to the peculiar stridulating noise which it makes. The sound produced, however, is more of a whistling nature, hence it would be more appropriately termed the "Whistling Spider." Professor Baldwin Spencer investigated sounds supposed to emanate from Spiders at Alice Springs, and came to the conclusion that the noises ascribed to them were evidently made by birds—probably quails. The latter frequent the very parts—grassy flats amongst the hills—where the sounds are heard and the Spiders live ; and they are most abundant just after rainfalls, when also the sound is heard most frequently. Not only this, but they actually produce a noise which is apparently identical with that attributed to the Spider. The time spent in observing the animals was not, however, altogether thrown away, as one day, whilst teasing a large female (which had been kept in a tin box for ten days), with a piece of straw, it raised its body and, rubbing its palpi against the mandibles, made a distinctly audible whistling noise.²¹ The stridulating organs, responsible for the noise referred to, are fully described and figured by the narrator.²²

The burrow of *Phlogius* is made in hard ground ; it is deep, and, as noted by Professor Spencer in his account of *P. crassipes*, is directed downwards in a slanting direction to the depth of a foot and a half, or even more, when it ends in a more or less spherical space of about two inches in diameter. As previously stated, no lid is made. The Spiders occupy these burrows during the daytime, but quit them at night, when they emerge in quest of prey, which usually consists of large beetles. At the bottom of the burrows there is invariably an accumulation of *débris* consisting of the remains of beetles upon which the spiders have fed. The species occurs in Queensland, Northern New South Wales, and Central Australia. A nest, measuring six inches in length, made by a young specimen, is in the Australian Museum. It was taken in Queensland.

²⁰ Simon—*Loc. cit.*, p. 146.

²¹ Report Horn Expl. Exp., ii., 1896, Zoology, p. 413.

²² Spencer—*Loc. cit.*, p. 414, pl. xxviii.

Sub-family DIPLURINÆ.

Four genera of this sub-family occur in Australia, namely :—*Brachythele*, Auss. (= *Aname*, L. Koch), *Hapalothele*, Lenz. (= *Ixalus*, L. Koch), *Atrax*, Cambr., and *Hadronyche*, L. Koch.

The first of these has a wide range. Simon²³ quotes it from the Eastern Mediterranean region—Greece, Cyprus, Asia Minor; Central Asia; South Africa; Madagascar; Australia and Tasmania; North, West, and South America. *Hapalothele* occurs in Madagascar; Central America; South America—Bolivia and Brazil.²⁴

These Spiders do not make terrestrial galleries, but, on the contrary, owing to their sedentary habits construct rather large, sheet-like webs, which are light, dense, and transparent, much after the style of the Agelenidæ. Hence they differ in many essential points from the majority of those of the preceding sub-families; the apical extremities of the falces, for instance, being devoid of teeth. Other distinctions are also apparent, but as these have been fully defined by Simon,²⁵ there is no need to repeat them here.

In conclusion, I would suggest that in future our friends, when sending specimens to the Museum, should forward both architect and nest. Such a donation would be of far greater value than if the Spider or nest alone were sent. Where a nest is known to exist, the tenant may be captured with it, if (before it has a chance to escape) a little cotton-wool is inserted, and the lid closed down. Then, by digging well and deeply round it, the whole may be secured. If this be then placed in a suitable box, and well packed, so as to prevent the soil breaking away, it may be carried safely.

²³ Simon—Hist. Nat. Araignées, (2nd edit.), i., 1892, p. 180.

²⁴ Simon—*Loc. cit.*, p. 180.

²⁵ Simon—Hist. Nat. Araignées (2nd edit.), 1892.