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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 II.—THE CRIBELLATÆ.

SIMON, in his work, "Histoire Naturelle des Araignées" (second edition), divides Spiders into two sub-orders, namely, *Aranæ theraphosæ* and *Aranæ veræ*. Of these, the former was dealt with in my last paper. The latter, which now claims our attention, is again divided into two sections—*Cribellatæ* and *Ecribellatæ*; these terms signifying that those of the first section have what is known technically as a *cribellum* and *calamistrum*, whilst those constituting the second section are not so provided.

All the Spiders of the sub-order under consideration may be distinguished from the *Territelariæ* by their falces, which, instead of being strongly porrected, as in the *Aranæ theraphosæ*, are directed vertically or obliquely from their base; moreover, their fangs strike sideways, the falces moving in a horizontal or oblique direction, whilst those of the *Trap-door Spiders* are directed downwards, and move vertically parallel to one another.

The *Aranæ veræ cribellatæ* are divided into eight families, namely: *Hypochilidæ*, *Uloboridæ*, *Psechridæ*, *Zoropidæ*, *Dictynidæ*, *Ecobiidæ*, *Eresidæ*, and *Filistatidæ*; and of these the second, fifth, and eighth are represented in Australia.

The *cribellum* is an additional silk-spinning organ, and is situated between and at the base of the first pair of spinners; it consists of a slightly elevated, transverse plate, divided above into two parts, but united at the base throughout their entire length. These parts consist of a single joint each, the apices of which are truncated, compressed, and concave. The surfaces of these joints are minutely and numerously punctured, and emit a quantity of fine, flocculent silk, which is used in the construction of webs.

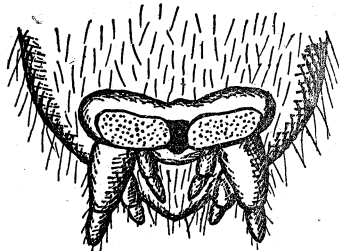


Fig. 15.—The Cribellum.

The calamistrum or comb is situated upon the upper side of the metatarsus of each of the fourth pair of legs, and consists of two parallel rows of short stiff bristles or spines. This organ is used for combing or carding the flocculent silk emitted by the cribellum.

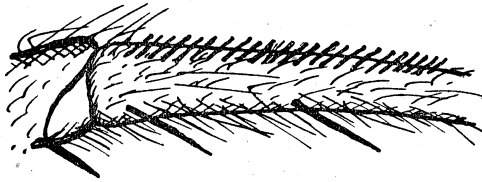


Fig. 16.—The Calamistrum.

The cribellum and calamistrum are always present in the female. Young males are also provided with them, but towards maturity they become in some cases atrophied, and in others disappear altogether.

Cribellate Spiders are of sedentary habits, and are therefore dependent upon their webs for the capture of prey. These snares vary according to the habits of the species, some being of an orb-like or geometrical construction, with rays and concentric circles, and others of an irregular design. Some of the Spiders of this section are arboreal, living amongst coarse herbage, the leaves of shrubs and trees, or upon bark; others lurk within crevices, fissures of rocks, and inside buildings; whilst others disfigure the outer walls with their untidy, dirty-looking webs. Indeed more serious annoyances occur at times, owing to the habit of these and other Spiders of attaching their webs to telegraph wires and poles, thus interfering with the transmission of messages. Railway telegraphs have been interfered with in this and other countries, and the authorities put to considerable trouble and expense to keep the wires clean and free.

Snares are composed of two kinds of silk—the one strong and tough, the other soft and flocculent. The former is used in the construction of the framework, whether the lines be those of an orb or an irregular web, and is discharged from the ordinary spinnerets; the flocculent silk is voided by the cribellum, and is attached to the lines forming the framework. But before being attached, it has to pass through the process of combing, and the method by which this is accomplished is interesting. One of the posterior limbs is held up and passed just under the cribellum, and as the silk is emitted, worked rapidly backwards and forwards. When one limb becomes wearied, the other relieves it, and so on until the completion of the snare.

This muscular action has the effect of entangling the silk as it is voided, and giving to the snare, when completed, a somewhat untidy appearance. It is nevertheless very effective in the capture of prey, for the silk clings tenaciously to whatever touches it.

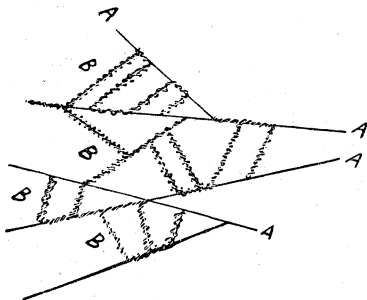


Fig. 17.—Diagram illustrating radial lines and flocculent silk. A, radial lines; B, flocculent silk, produced by cribellum.

FAMILY ULOBORIDÆ.

This family is divided by Simon into four sub-families, namely, *Dinopinæ*, *Uloborinæ*, *Miagrammopinæ*, and *Æbutininæ*. The three first-named are represented in Australia.

The *Dinopinæ* consists of two genera—*Dinopsis*, Macleay, and *Menneus*, E. Simon. Of these, the former is distributed as follows: "Africa tropica occid.; Nova-Hollandia et Nova-Caledonia."¹

Nothing is known of the nesting-habits or architecture of these interesting Spiders. I have on several occasions captured specimens of the genus *Dinopsis* around Sydney when out collecting. Usually they are found running over long grass or low shrubs. I have never found a web made by one of these Spiders, although I have searched for them diligently. Owing to their long, attenuated bodies and legs, together with their colouration, it is not easy to detect them unless they are moving, and when they seek shelter by dropping down amongst the long, thick grasses, searching is frequently in vain.

Simon, who has spent much time in the field, and captured many species of *Dinopsis*, has never been so fortunate as to observe their architecture. Mr. H. B. Bradley, a Trustee of this Museum, some years ago, personally collected numerous species of Australian Araneidæ. Many of these were figured and described in Koch's Monograph, "Die Arachniden Australiens," and amongst them are several species of *Dinopsis*. At the foot of the description of

¹ Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 210.

D. subrufus, L. K., there is a note to the effect that specimens had been taken at Bowen and Brisbane, and were then in the Godeffroy Museum; there was also an example from Boude [? Bondi] in Mr. Bradley's collection, which that gentleman had found on the 3rd of June running about amongst grass.² *D. ravidus*, L. K., was taken by Herr Daemel, under dry leaves, at Gayndah;³ *D. fasciatus*, L. K., was collected by him at Bowen and Gayndah, under leaves;⁴ *D. bicornis*, L. K., was described from a male example collected by Mr. Bradley, at Sydney, where it had been found living amongst the grass, but there was no web.⁵ Doleschall records, briefly, a species of *Dinopsis*, in Amboina, that constructs a large, irregular snare, in the centre of which it rests, with its anterior feet extended in a line with its body.⁶

The second sub-family, Uloborinæ, also includes only two genera, namely, *Uloborus*, Latr., and *Sybota*, E. Sim. The latter does not occur in Australia. *Uloborus* is distributed as follows:—"Europa et Regio mediterranea; Africa; ins. Atlantica; Madagascar; Asia, centr., merid. et orient; Malaisia; Papuaasia et Oceania; America septr., centr., merid. et antilliana."⁷

Five species of *Uloborus* have been recorded from Australia, namely, *U. barbipes*, L. K., from Port Mackay; *U. canus*, Macl., collected during King's survey of the intertropical and western coast of Australia, but no specific locality given; *U. variabilis*, Keys., Rockhampton, Peak Downs, Gayndah, and Sydney; *U. spinatarsis*, Keys., Sydney; and *U. pantherinus*, Keys., Sydney.

The webs of *Uloborus* are obicular, and are usually spread horizontally. They consist of rays and concentric circles, the meshes being supported and strengthened by numerous outer lines or guys, the latter being directed in an irregular manner, and at every conceivable angle. The spiders of this genus are mostly small, and so are their webs. The number of rays and concentric rings, as far as I have been able to gather from observation of Uloborid snares around Sydney, vary slightly. Usually there are twenty-four of the former and fourteen of the latter, sometimes more and sometimes less. The silk employed in the construction of the outer lines and rays is discharged from the mammiform spinnerets, and is tough and strong; that of which the spirals is composed is voided by the cribellum, and carded by the calamistrum, and is soft, dry, and flocculent. In this respect the spirals of an Uloborid web differ widely from those constructed

² L. Koch—Die Arach. Austr., ii., 1871, p. 1041.

³ L. Koch—Loc. cit., p. 1043.

⁴ L. Koch—Loc. cit., p. 1047.

⁵ L. Koch—Loc. cit., p. 1051.

⁶ Doleschall—Tweede Bijdr. Kennis. Arach., v., d. Ind. Arach., 1859, p. 11.

⁷ Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 215.

by the Argiopidæ, the latter being studded with numerous beads of a sticky nature.

Again, the architecture of these spiders differs in another essential feature from that of the Argiopidæ. No nest or retreat is made by them, but their nests are always furnished with what Simon terms a *stabilimentum*, a closely woven silken plate, which acts as a support. These supports are usually placed diagonally, and occupy a space between an upper and a lower ray; they are, as Simon expresses it, "dilated to each of the intersections of the circles, and produce a series of small triangles." The cocoon is attached to the rays of mesh, and over this the mother mounts guard until the young have hatched out. In appearance and colour the cocoon closely resembles withered leaves.

The species occurring around Sydney are of solitary habits. Some exotic species, however, live together in large communities, each individual reposing in the centre of its own snare, but each snare being attached to its neighbour, thus united forming a mesh of huge dimensions. Simon described and figured such a mesh as the one referred to, together with the architects, *U. republicanus*, E. Sim., from Brazil.⁸

The same author has also recorded the singular fact that *U. servalus*, E. Sim., from Venezuela, is parasitic upon the large snares of *Cyrtophora*. It establishes its small orbicular snare at the centre of the network, which surmounts that of *Cyrtophora*.⁹

The sub-family Miagrammopinæ, like the preceding, is comprised of only two genera, namely, *Hyptiotes*, Walck., and *Miagrammopes*, Camb., and of these the last-named only occurs in Australia. It has a wide geographical range, which Simon has defined as follows:—"Africa tropica orient et occid.; Madagascar; India septentr.; Taprobane; Indo-China; Nova-Hollandia; Antillæ et America meridionalis."¹⁰ Two species occur in Australia, one *M. caudata*, Keys., from Peak Downs, and the other *M. bradleyi*, Camb., from N. Australia.

Nothing is known of the architecture of the spiders of this genus, although a number of species have been described. It is not at all unlikely, however, as Cambridge suggests, that their snares will be found to be similar to those constructed by *Uloborus*.¹¹

FAMILY DICTYNIDÆ.

This family is much more numerous than the Uloboridæ, both in point of genera and species. Altogether there are sixteen genera, and of these, three—namely, *Amaurobius*, C. K., *Badumna*, Thor., and *Lathys*, E. Sim.—are represented in Australia.

⁸ Simon—Ann. Soc. Ent. France, lx., 1891, pp. 8 and 12, pls. iii. and iv.

⁹ Simon—Hist. Nat. Araignées (2nd edit., i., 1892, p. 213.

¹⁰ Simon—*Loc cit.*, p. 220.

¹¹ Cambridge—Journ. Linn. Soc., Zool., x., 1870, p. 399.

Amaurobius is one of those genera that have a wide geographical range. It is as follows:—"Europa et regio mediterranea; Sibiria; Malaisia; ins. Amboina; Nova-Hollandia et Nova-Zealandia; Polynesia; America septentr.; America merid. (præsertim in montibus): Colombia, Uruguay, et Chili.¹² *Badumna*, Thor., occurs in Malaisia (Java) et Nova-Hollandia;¹³ and *Lathys*, E. Sim., "Europa et regio mediterranea; insulæ. Maderæ et Canariæ; Nova-Hollandia; Sibiria orient.; America septr."¹⁴

The Spiders of the three genera here quoted may be sought for upon shrubs or trees (sometimes under bark), under stones or dead leaves, and other forest *débris*, fissures of rocks, the interior of caves, the outer and inner walls of buildings. The webs are frequently large, consisting of indefinite rays or irregular lines of strong silk, produced by the ordinary spinnerets, and the flocculent cobweb voided by the cribellum. Sometimes a rude tubular retreat is made, wherein the Spider patiently rests until the vibration of the web announces the capture of some unwary insect. By gently agitating one of these snares with a bit of straw, or stiff grass, the Spider may frequently be enticed out, but upon discovering its mistake, will quickly betake itself to its den. Some species are exceedingly courageous, attacking not only large but exceedingly aggressive insects, such as wasps. The cocoons of such species as occur upon plants are lenticular, and securely attached to the web by numerous threads; in respect of those living under bark the ova-sac is flat, round, cushion-like, and composed of two discs, an upper and a lower. The outer covering of the cocoons is usually white, and exceedingly tough, thus affording admirable protection to the enclosed eggs. Sometimes, however, the walls of cocoons of these and other Spiders are pierced by some minute species of Ichneumonidæ, with the result that when the eggs of the latter hatch out, the Hymenopterous larvæ feed upon the Arachnid ova.

FAMILY FILISTATIDÆ.

This family, although composed of only one genus, *Filistata*, Latr., is widely distributed, its range being:—"Regio mediterranea; ins. Atlanticæ; Africa occid. et orient.; Arabia merid.; Asia centr.; ins. Nikobaricæ; ins. Philippinæ; Nova-Hollandia; America septentr., centr., et merid.; Antillia."¹⁵

One species only of this genus occurs in Australia, namely, *Filistata australis*, L. K.; and this was originally recorded from Rockhampton, but without, however, any note in reference to its architecture. The snares fabricated by those species that have

¹² Simon—Hist. Nat. Araignées (2nd. edit.), i., 1892, p. 238.

¹³ Simon—*Loc. cit.*, p. 238.

¹⁴ Simon—*Loc. cit.*, p. 240.

¹⁵ Simon—*Loc. cit.*, p. 258.

been observed, take the form of an irregular mesh, and have an ill-defined tube. The cocoon, which is flat and flocculent, is attached to the centre of the web, like those of *Amaurobius*.

Hints on Collecting Araneidæ.—From time to time friends of the Museum are good enough to forward to the Trustees, by way of donations, specimens of Araneidæ. It frequently happens that those who do so would take a greater interest in collecting if they had some little knowledge to guide them:—What to do, and where to look. It will therefore serve a useful purpose if a few hints, indicating the best means to be adopted when collecting, are published. With this object in view, the following directions have been drawn up to assist those who may be willing and anxious to help, but who lack the necessary knowledge.

In the first place, Spiders may be sought for in every conceivable position—on the ground, under logs, stones, and *débris*, in crevices and fissures of rocks, amongst herbage, upon plants, shrubs, and trees, under bark, in dark and light situations, and near water-courses; indeed it would be hard to say where they are not to be found. But in making a collection, it is of equally great importance to obtain specimens of architecture or industry, as to collect the animals themselves, and where convenient both should be taken, and notes upon the surroundings made.

With a little practice, Spiders may be easily collected. Let the collector provide himself with a conveniently-sized bottle, having a large mouth, and containing some spirit, some chip or glass-topped pill-boxes of assorted sizes, a piece of card, pair of fine-pointed forceps, a camel-hair brush, a net, and a lead pencil. The bottle should be attached to the waist by a piece of string, so as to allow the hands to remain free, and the cork should be large enough to allow of its being tied to the neck of the bottle. This precaution will prevent the cork being mislaid, and so avoid not only vexation but waste of time in searching for it when the collector should be busy hunting for specimens. Always take the bottle when collecting, but do not be a slave to it by placing everything obtained therein. For instance, when a Spider is discovered that has a particularly interesting web, one of the boxes should be used, and a brief note written on the bottom. By abbreviating words, a great deal of useful information may be cramped into a very small space. Thus, for instance, "Irreg. w., tub. ret., coc. susp." might be neatly written, and would mean "irregular web, tubular retreat, cocoon suspended;" "U. bark, coc. attach. tree" would read, "Under bark, cocoon attached to trunk of tree;" "Orb. hor." or "Orb. perp." would indicate that the web was a round, orbicular one, and that it was suspended either horizontally or perpendicularly as the case may be. Other abbreviations will

suggest themselves as the necessity for employing them arises. If the spider and cocoon can be placed in one box, well and good; if not, then two should be used, one for the animal and the other for the cocoon or nest, but care must be taken to put a corresponding number upon each. Do not put two living specimens together in one box; spiders are cannibals. Some spiders may be taken by holding either the spirit bottle or chip box underneath; when this method is adopted the Arachnid should be gently touched with the finger or a light stick, whereupon it will drop into whatever receptacle is held below. Quick running

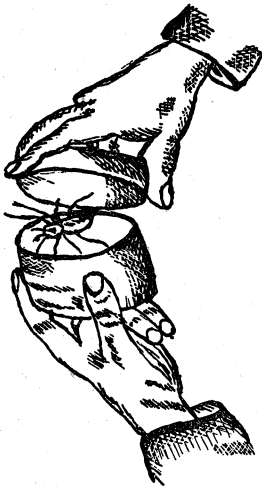


Fig. 18.—Capturing a Spider from the Web.

spiders (and some are very active) may be taken by clapping a chip box over them, and insinuating the card beneath, after which the animal may be finally secured by placing the lid on top of the card, and then deftly withdrawing the latter and adjusting the lid. The Spider resting in its web, may be easily captured by taking the lid of a chip-box in one hand and the bottom in the other, and then bringing the two parts together sharply, so as to encompass the animal. Shaking branches into a net or inverted umbrella will be found very profitable. The larger specimens may be lifted with the forceps, and the smaller ones by dipping the camel-hair brush in spirit. Sweeping the long herbage will bring to light a lot more. At first, doubtless, many a prize will be lost, but practice and experience will soon remedy that.

When transmitting specimens through the post, be careful to pack firmly and lightly, and write the address upon a tag. If specimens of architecture are sent in company with the spider, the latter should be in spirit, then both may be packed in the one box. Sometimes living specimens, with their nest or cocoons, may be sent through the post. The mere fact of being carried from place to place, even openly, will not disturb the architect, providing its cocoons are conveyed with it.