

COMMONWEALTH OF AUSTRALIA

Department of Health

SERVICE PUBLICATION (SCHOOL OF PUBLIC
HEALTH AND TROPICAL MEDICINE)

NUMBER 6

SPIDERS, TICKS AND MITES

INCLUDING THE SPECIES HARMFUL TO MAN
IN AUSTRALIA AND NEW GUINEA

Section 1. Descriptive

By the late F. H. TAYLOR, F.R.E.S., F.Z.S.

Section 2. Clinical

By R. E. MURRAY, M.B., B.Sc., D.T.M. (Syd.)

Issued by

THE SCHOOL OF PUBLIC HEALTH AND TROPICAL MEDICINE
(UNIVERSITY OF SYDNEY)
COMMONWEALTH DEPARTMENT OF HEALTH

UNDER THE AUTHORITY OF
THE MINISTER FOR HEALTH

Printed by
AUSTRALASIAN MEDICAL PUBLISHING COMPANY LIMITED
Seamer and Arundel Streets, Glebe, New South Wales

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FOREWORD.

WARTIME conditions emphasize the relationship of man and insects, whether those insects are concerned in the transmission of disease, are poisonous, or merely nuisances, or whether they affect man's environment and economy. Amongst the arachnids, mites, spiders and ticks are also listed in one or other of these categories, and their importance is being increasingly recognized.

Dr. Murray and Mr. Taylor have assembled in one volume comprehensive information concerning these arachnids as they occur in the Australian region. This compilation should prove of value to all those whose duties, in war and in peace, require an understanding of these facts to enable them to identify, treat and control.

FRANK McCALLUM,
Director-General of Health.

Canberra, A.C.T.,
23rd July, 1945.

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THE LATE FRANK H. TAYLOR, F.R.E.S., F.Z.S.

Born 12th July, 1886.

Died 20th December, 1945.

Entomologist.

Australian Institute of Tropical Medicine, 1911-1918, 1925-1930.

School of Public Health and Tropical Medicine, 1930-1945.

PREFACE.

THIS publication has been compiled so that it may be of service to the man on the land, the medical practitioner and the public in general.

Three groups of the Arachnida are dealt with—mites, venomous spiders, and ticks. The Arachnida are often, erroneously, referred to as insects in the Press and elsewhere. One fundamental difference is that the Arachnid adult possesses eight legs, whereas the adult insect has but six legs.

There has been considerable difficulty in deciding what limits should be imposed on what mites should be included beyond those definitely known to cause disease or other disabling effects to man; to this end the majority of the subfamily Trombiculinæ have been included, since our knowledge is very far from complete concerning this group as to which species attack man or cause disease.

The scabies mite has been dealt with rather fully because, though common enough, it appears to be on the increase.

The descriptions and illustrations of the Trombiculinæ are for the most part those of Womersley.

The majority of the descriptions of the ticks are drawn from "Ticks, A Monograph of the Ixodoidea", by Nuttall, Warburton, Cooper and Robinson. In other cases from the authors themselves, except for *Argas laganoplastis* Froggatt, where the description was drawn by one of us (F.H.T.) and the illustrations made by Mr. E. H. Zeck. Opportunity is taken here to acknowledge in every case our indebtedness to the authors and the journals in question.

The description of *Latrodectus hasseltii* is a translation from the German, as no English description could be found.

A diagram illustrating the terminology of a spider has been added as one does not appear to have been previously published.

We have said nothing concerning the dipping of cattle against the cattle tick nor quoted any literature on the subject, as it is outside the scope of this publication.

There is no list of references to Section I, since the references are in every case placed under the species concerned.

The keys to the species of ticks are those published some years ago. They do not include species published in more recent years.

These keys to genera and species have been included reluctantly because we consider they should be for the use of experts alone.

It may appear that this publication is over-illustrated, but we would stress the fact that a species should be correctly illustrated when described. There are a few species in this publication that are not illustrated because a photograph of a tick, especially when out of focus, is valueless.

In the section dealing with the clinical aspects of spider bite, tick poisoning and mite infestation, an attempt has been made to gather together the salient features of the effects of the bites of and infestation by these Arachnida on man in Australia.

At times the data are meagre; many aspects of Arachnid physiology which have a bearing on these effects are imperfectly known and much research remains to be done.

Thus in the case of the Kangaroo tick (*Ornithodoros gurneyi*) only a few short notes can be quoted, whilst even the effects of the well-known Red Back Spider's (*Latrodectus hasseltii*) bite cannot be given with the detail that is possible in the case of the related *L. mactans* of America. In the latter case it is tempting to assume that the symptoms of the venoms of the two species of *Latrodectus* are similar and to quote American results, but such a course is unjustifiable as the venoms appear to differ in minor ways.

Although no statistical tabulation of the incidence of morbidity and mortality as a result of attack by Arachnida in Australia is possible, many interesting data were supplied to the authors by the Government Statisticians of the various States, and it is desired to record our thanks for this cooperation.

Our sincere thanks are due to Dr. M. H. Watt, Director-General of Health, Wellington, New Zealand, for supplying us with a list of the literature on the Katipo or Red-Back Spider in New Zealand; to Dr. A. B. Walkom, Director, Australian Museum, Sydney, for the loan of the blocks, for Figure 3, for the drawing of *Latrodectus hasseltii* by Miss Phyllis Clark, and editorial assistance; to Mr. A. Musgrave, Mr. W. A. Rainbow and Miss O'Reilly, also Messrs. Kinghorn and Troughton, Australian Museum, for generous assistance; to the Linnean Society of New South Wales for permission to use the blocks of *Argas lagænoplastis* Froggatt, and Figure 159; to the Royal Society of South Australia and Mr. H. Womersley for permission to use Mr. Womersley's illustrations; to the Royal Society of Tropical Medicine and Hygiene and to Dr. T. C. Backhouse for permission to reproduce Figure 184. We also wish to thank Miss N. B. Adams and Mr. E. H. Zeck for the fine craftsmanship exhibited in their drawings and Miss J. Jamieson and Miss C. M. Mullen for the typing of the MSS. Finally, we wish to thank the printers, Australasian Medical Publishing Company, and their staff for the excellent job done by them.

F.H.T.

R.E.M.

Owing to the sudden death of Mr. F. H. Taylor whilst this publication was in the press, the task of helping in checking the proofs of the entomological section has fallen on Mr. K. J. Clinton, to whom sincere thanks are due.

R.E.M.

SECTION 1. DESCRIPTION.

Family AVICULARIIDÆ.

Subfamily DIPLURINÆ.

Atrax Cambridge, 1877.

Ann. Mag. nat. Hist., (4) XX, 26 ; Musgrave, *Rec. Aust. Mus.*,
XVI, 1927, 33.

Cephalothorax much longer than broad, lateral constriction at caput slight ; fore part truncate, and rather narrower than the hinder part ; caput not much elevated above the thorax, though rather roundly convex.

Falces large, massive, and very prominent, but with no teeth at the fore extremity of the upperside.

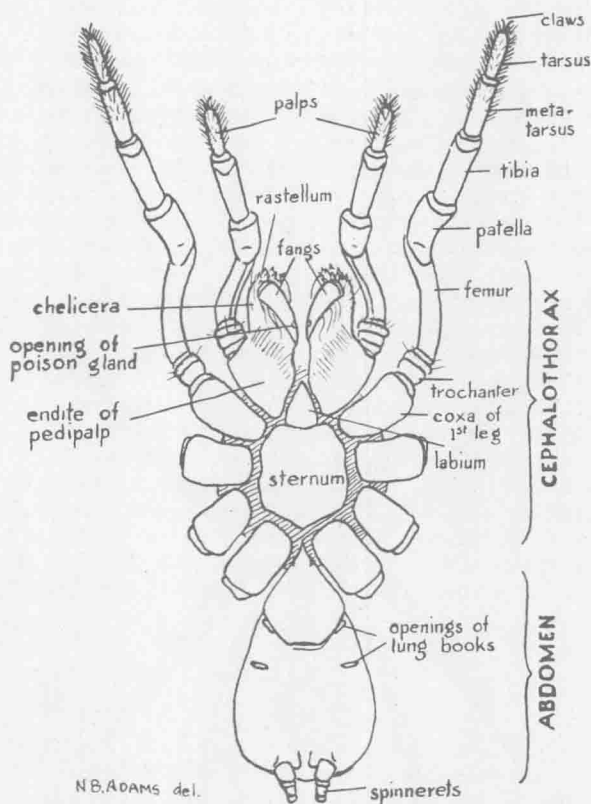


Fig. 1.—Diagram to show structural details of a spider.
N. B. Adams, *del.*

Eyes small and not greatly unequal in size ; their position is very nearly that of *Nemesia*, the four exterior ones (being the laterals of each row) forming a transverse oblong figure whose fore side is rather shorter than the hinder one ; and within this oblong is another shorter one, formed by the fore and hind central pairs of eyes, and whose fore side is considerably shorter than the hinder one.

Legs moderately long, strong; terminal claws three; no scopula at the extremities. Relative length 4, 1, 2, 3.

Maxillæ long, cylindrical, but prominent in an obtusely pointed form at the inner side of the fore extremity.

Labium short, of a round-oval form, rather truncated at the apex.

Atrax robustus Cambridge, 1877.

Figures 2-4.

Ann. Mag. nat. Hist., (4) XX, 27; Musgrave, *Rec. Aust. Mus.*, XVI, 1927, 34; *Aust. Mus. Mag.*, III (4), 1927, 135.

Adult female, length 13 lines, to end of falcēs, 16 lines.

The whole of the fore part of this spider is of a deep rich red-brown colour; the cephalothorax smooth, shining, and

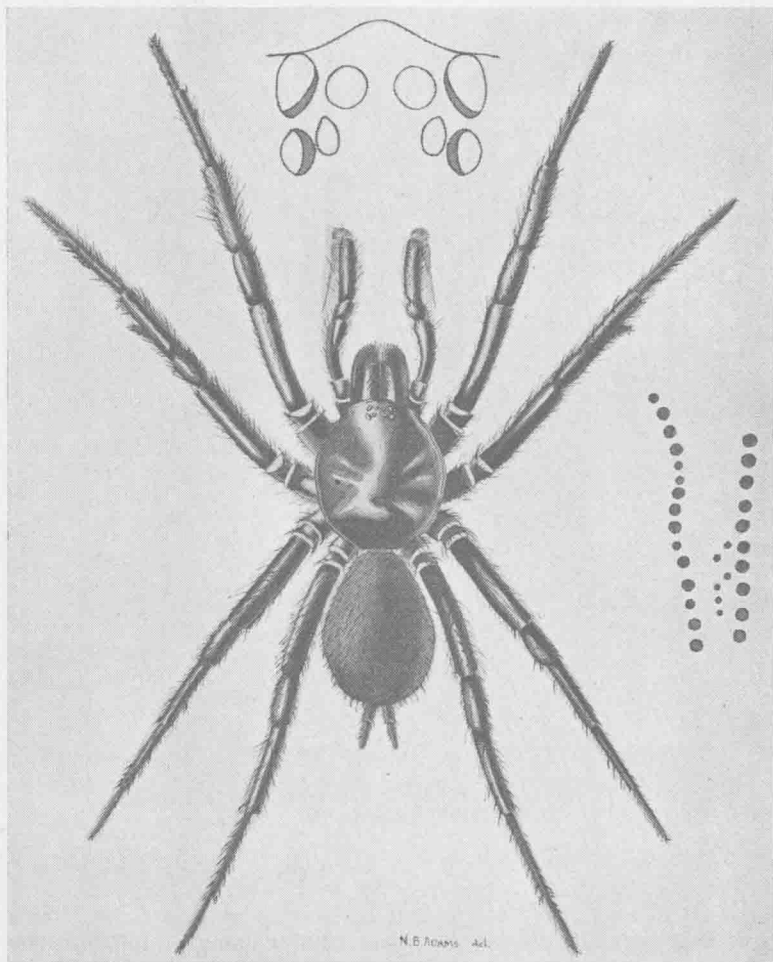


Fig. 2.—*Atrax robustus* Cambridge. Dorsal view male.
N. B. Adams, del.

destitute of hairs; the colour, however, of the falces is rather darker, and the fang is long and strong.

The legs do not differ greatly in length; and their armature consists of hairs, slender bristles, and a few spines.

The labium, which is convex in front, is studded with small tooth-like spines, a large portion at the base of the maxillæ being also similarly furnished.

The abdomen (in the only specimen examined, a dried one) was much shrunk; it is hairy, and its colour is a dark reddish-brown. The spinners, four (?) in number, were broken off.

Locality.—New South Wales: Sydney, particularly Northern Suburbs—Milson's Point to Thornleigh.

Supplementary notes from Musgrave's paper, quoted above, follow:

Male.—Cephalothorax 12.3 mm. long, 10.3 mm. broad; abdomen 11.2 mm. long, 9.8 mm. broad.

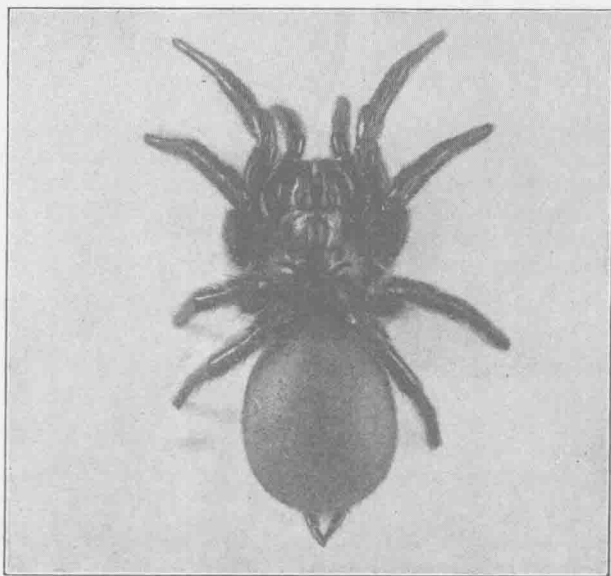


Fig. 3.—*Atrax robustus* Cambridge, female.

Cephalothorax.—Black, shining, smooth. Abdomen.—Dull brown, covered with long black spine-like hairs. Ventrally the body is reddish-brown except for the coxæ.

Eyes.—Conform to original description, except that the front median eyes are separated by a space slightly less than their individual diameter.

Legs.—Conform for the most part to the description of the allotype, except that patella ii is equipped with two strong spines on underside, not four as in the allotype. These numbers are subject to variation, specimen K56172 having eight-twelve

on the right and left patella i and six-five on patella ii. This would indicate that the number of spines can be of little specific value, though their presence or absence may be of importance. The apophyses on tibiae ii are conical in shape; this character at once differentiates the male from *A. formidabilis* Rainbow, in which the apophyses are rounded. In the drawing of the spider the second pair of legs are twisted to show the apophyses; normally they project downwards and are not visible from above.

Measurements of the legs are given below in millimetres :

Leg.			Coxa.	Trochanter and Femur.	Patella and Tibia.	Metatarsus and Tarsus.	Total.
1	..	..	5.2	10.7	11.4	12.0	39.3
2	..	..	4.8	10.5	11.0	11.7	38.0
3	..	..	4.3	10.3	10.0	11.7	36.3
4	..	..	4.5	10.5	11.8	13.0	39.8
Palpi	..	..	4.4	6.9	6.9	Tarsus 2.2	20.4

Falces.—In Rainbow's description of the allotype he states : "The outer ridge of the furrow of each falx armed with ten strong teeth and the inner ridge with fifteen of varying lengths; in addition to these there is an intermediate row of six small teeth near the base"; upon examining the allotype I find that the rows of teeth are as follows :

Right falx-sheath, outer row 13, intermediate row 18, inner row 7.

Left falx-sheath, outer row 14, intermediate row 18, inner row 16.

In the specimen under consideration the formula reads :

Right falx-sheath, outer row 14, intermediate row 18, inner row 13.

Left falx-sheath, outer row 13, intermediate row 20, inner row 13.

Female Register number K56197. Cephalothorax 14 mm. long, 10.6 mm. broad; abdomen 18.3 mm. long, 14.4 mm. broad.

Cephalothorax.—Above red-brown, smooth, shining. Abdomen.—Above black-brown covered with hairs. Ventrally the body is light reddish-brown. Sternum redder than rest of undersurface.

Eyes.—Front median eyes separated by a space slightly more than their individual diameter.

Legs.—No spines on tibia ii, all other tibiae bespined. Patellae i-iv bespined. (Spines are present on tibia ii in other specimens of the series.)

Measurements of the legs are given below in millimetres :

Leg.			Coxa.	Trochanter and Femur.	Patella and Tibia.	Metatarsus and Tarsus.	Total.
1	..	..	6.4	11.4	12.2	9.7	39.7
2	..	..	4.7	8.3	8.3	7.5	28.8
3	..	..	4.6	9.3	9.0	9.0	31.9
4	..	..	4.8	10.8	11.2	11.4	38.2
Palpi	..		5.3	7.7	7.2	Tarsus 4.7	24.9

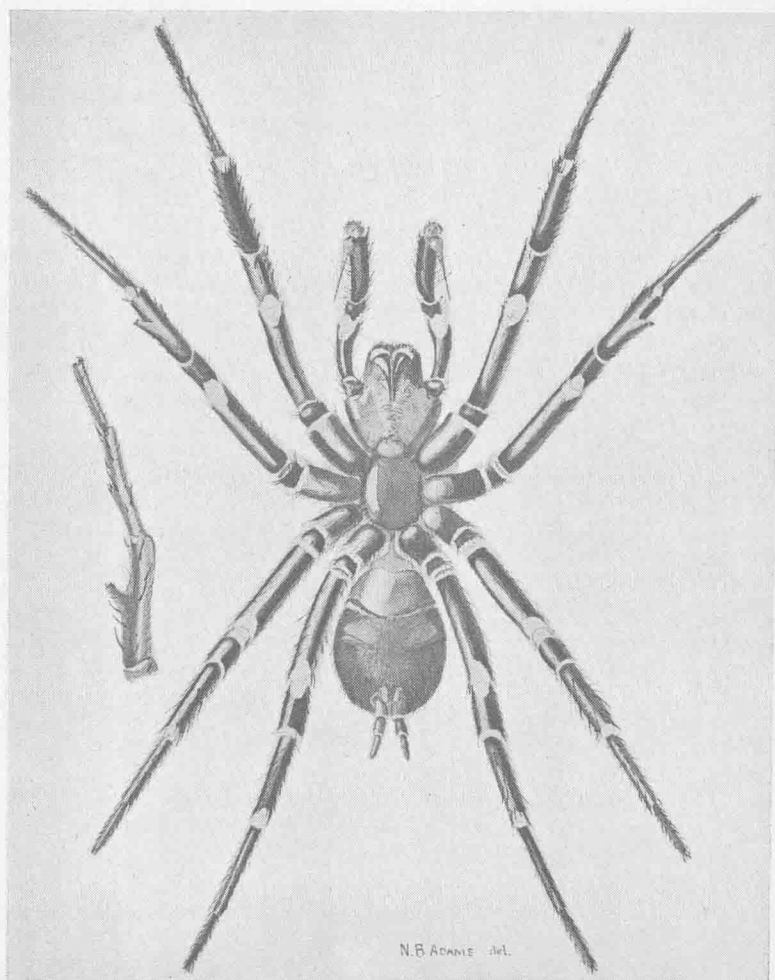


Fig. 4.—*Atrax robustus* Cambridge, male, ventral view.
N. B. Adams, del.

Falces.—Hogg (*supra*) has stated that “there are 13 large teeth on the outer margin of the falx-sheath, 11 on the inner, and 9 rather large in an intermediate row”. In the specimen under consideration the numbers are as follows :

Right falx-sheath, outer row 14, intermediate row 21, inner row 13.

Left falx-sheath, outer row 16, intermediate row 25, inner row 15.

The intermediate row usually consists of a number of small teeth at the end of the furrow underlying the point of the fang, and a row of larger ones extending in a line towards the fang and terminating before the fourth or fifth teeth of the inner and outer rows.

Variation.—The number of teeth in the rows in the falx-sheath of this species varies considerably, and . . . were viewed ventrally ; the right falx is thus seen as the left, and the left as the right.

Atrax formidabilis Rainbow.

Figure 5.

Rec. Aust. Mus., X, 1914, 255, figs. 63–66 ; Musgrave, *Rec. Aust. Mus.*, XVI, 1927, 41 ; *Aust. Mus. Mag.*, III (4), 1927, 136.

Male.—Cephalothorax 11.5 mm. long, 9.6 mm. broad ; abdomen 10.5 mm. long, 7.3 mm. broad.

Cephalothorax.—Obovate, arched, shining, rich dark-brown, smooth. *Pars cephalica* moderately raised, strongly arched, sides compressed, sloping backwards to thoracic fovea, a few fine setæ distributed over the surface ; ocular area a moderately raised tubercular eminence, much broader than long, almost black, arched laterally and longitudinally, and furnished in front with a few bristles ; clypeus deep, precipitous yellowish. *Pars thoracica* broad, arched ; radial grooves broad, distinct ; thoracic fovea deep, broad, procurved ; marginal band reflexed, thinly fringed with moderately long hairs.

Eyes.—In two rows of four each ; anterior row faintly procurved, rear row recurved ; anterior medians largest of the group and separated from each other by about one-half their individual diameter, and each again from its front lateral neighbour by a space scarcely equal to that ; front and rear laterals seated obliquely ; posterior medians smallest of the group.

Legs.—Concolorous with cephalothorax, long, tapering, first and second pairs strongest and heavily bespined ; the spines are longest, strongest and most numerous on tibiae and metatarsi i and ii ; tibia and metatarsus ii are each strongly produced towards the middle on the underside ; the spines are less numerous and less strong on leg iv ; each tarsus is closely spined laterally ; no true scopula present ; superior claws long, armed with a curved row of thirteen or fourteen teeth, of which those at the centre are the longest. Measurements in millimetres as follows :