SOME INDIAN SPIDERS OF THE FAMILY LYCOSIDAE.

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The Lycosidae or Wolf Spiders are, for their abundance, probably the most neglected of all families of Indian spiders, with the single exception of the Attidae or Jumping Spiders. Superficially they are all much alike, being of a dull brownish general colour, so that there is little about them, except the abundance of certain of the smaller species, to attract the general collector; and their abundance is outw ighed by the agility with which they evade casual pursuit. It is not altogether surprising, therefore, that a large proportion of species appear to be new, including several of the commonest forms. It is possible, and indeed I think likely, that this proportion is not quite as high as the present paper suggests, for as explained on pages 258-259 of the first of this series of papers (Gravely, 1915) I am chiefly concerned to put on record descriptions and figures of the common Indian species, so as to facilitate reference to them by other workers in this country; and I am not in a position to obtain a sufficient knowledge of the general literature to ensure that no synonyms are created even if this were essential to my object, which fortunately it is not. Given clear comparative descriptions and adequate figures it will not be difficult for anyone wishing to study the family as a whole to determine what names are redundant; but such extended work can only be made possible with any approach to completeness by the stimulation of collecting locally, which is the object of the present paper.

Working, as I have been able to do, with ample material of most species, and living specimens of several in abundance at my doors for reference at any time, it has been possible to correlate males and females with a fair degree of certainty. In many species, as in many Mygalomorphs, mature males have parts of the palps or first legs decorated with a snow-white pile. In other species, so far as I have been able to ascertain, they are always without this. But in many species I have found that two forms of male occur, one with this hair and the other without, in which connection it is interesting to recall the "high" and "low" males of the crab *Dotilla intermedia*, recorded by Kemp in *Rec. Ind. Mus.* XVI, 1919 (pp. 331-333, text-fig. 10). It is perhaps likely that further collecting may show that two such forms of male occur in other species also.

My thanks are due to Mr. Hirst and the authorities of the Birtish Museum for facilities to examine species described in Thorell's "Spiders of Burma," to M. Berland of the Paris Museum who kindly compared specimens with some of Simon's species, and especially to the late Dr. Annandale for constant help with literature and in other ways, as well as for supplying most of the material described, which belongs to the Zoological Survey of India, in the collections of which all the types of new species have been deposited. The rest of the material belongs either to the Madras Museum or to the British Museum.

The following species of Lycosidae have been recorded from India, or may not improbably prove to occur there :—

Group HIPPASEAE.

Genus **Anomalomma** Simon.

A. lycosinum, Simon, 1891, p. 200. Tjibodas, Java.
A. micans, Simon, 1898, p. 24. Montalvan in Luzon, Philippines.
A. pygmaea (Thorell) 1890 (3), pp. 313-315. Penang.

Genus **Hippasa** Simon.

H. agelenoides (Simon) 1884, pp. 334-335. Minhla.
(Thorell) 1887, pp. 300-301 and 304-305. Burma.
Thorell, 1895 (1), p. 218. Tharrawaddy and Rangoon.
Pocock, 1900, p. 251. ?Konkan and Dehra Dun (Simon).
H. greenalliae (Blackwall), 1867, pp. 387-388. Meerut, Agra or Delhi.
(Thorell) 1887, pp. 300-301.
H. holmerae, Thorell, 1895 (1), pp. 218-221. Tharrawaddy.
Pocock, 1900, p. 251. Tharrawady and Singapore.
H. lycosina, Pocock, 1900, p. 250. E. Poona, Kanara, Nasik, Uran.
H. olivacea (Thorell) 1887, pp. 297-300. Rangoon and Bassein.
Thorell, 1895 (1), pp. 217-218. Kyeikpadem and Tharrawaddy.
= *simonis*, Thorell from Bhamo and Me-tan-ja.
H. pantherina, Pocock, 1899, p. 752. Trivandrum.
Pocock, 1900, p. 250. Trincomali, Trivandrum, Ootacamund, Coimbatore, Ramnad, Bangalore, Poona Dist., E. Khandesh.
= *greenalliae*, Simon, 1885, p. 31, *nec* Blackwall from Ramnad and Collegal.
H. partita (Cambridge) 1876, pp. 599-600. Near Alexandria.
Simon, 1897, p. 290. Egypt, Arabia, Central Asia, Karachi.
H. pisaurina, Pocock, 1900, p. 250. E. Khandesh, E. Poona, Bangalore.
H. simonis (Thorell) 1887, pp. 301-305. See *H. olivacea*.

Group LYCOSEAE.

Genus **Flanona** Simon.

F. puellula, Simon, 1897 (1), p. 349. Ceylon.

Genus **Lycosa** Latreille.

In drawing up the following list, which has to include many species that I have not seen, it has been necessary, for the sake of uniformity, to adopt Simon's nomenclature throughout. Simon (1897 (1), p. 361), gives *Lycosa*, Thorell, as a synonym of *Pardosa*. On p. 355 he specifically mentions *L. amazonia*, Thorell, as a *Pardosa;* and Thorell (1895 (1),

p. 242) places Simon's *P. birmanica* in the genus *Lycosa* as accepted by himself. In the present list, therefore, following Simon, the following species referred by Thorell to the genus *Lycosa* are all transferred to the genus *Pardosa* — *amazonia, birmanica, ludia, ipnochoera, nicobarica, pinangensis, psammodes, pusiola, rabulana, sumatrana, tenasserimensis, tenera, thalassia, tristicula, vagula.* The shape of the labium, on which this arrangement is based, does not, however, seem to me to afford a satisfactory basis of classification, at least for the Indian species; and I have retained such of the above species as I have seen in the genus *Lycosa* in the descriptive part of the paper, as I find myself unable to detect the difference by which Simon separates them. See page 598, footnote 3.

The remaining species are as follows :—

L. (*?*) *brevimetatarsis*, Strand, 1907 (1), pp. 442-445. Java.

L. catula (Simon) 1885, p. 457. Collegal.
Pocock, 1900, p. 254. Coimbatore, Yercaud.

L. chaperi (Simon) 1885, p. 8. Guntakal.
Pocock, 1900, p. 254. Guntakal.

L. comotti (Thorell) 1887, pp. 307-309. Bhamo.

L. conspersa (Thorell) 1877, pp. 529-530. Celebes.
(Thorell) 1897, p. 22. Rangoon and Bhamo.
= *subinermis* (Thorell) 1895 (1), pp. 234-235. Rangoon.

L. fragilis (Thorell) 1890, p. 136. Sumatra.
(Thorell), 1891-92, pp. 154-157 Singalang, Sumatra.

L. fuscana, Pocock, 1901, p. 485. E. Poona.

L. goliathus, Pocock, 1901, p. 484. Helvak, Satara District.

L. indigatrix, Walckenaer, 1837, p. 339. Coromandel Coast.
Simon, 1884, pp. 366-367. Pondicherry and Wagro-Karour near Bellary.
Pocock, 1900, p. 254. Chingleput.

L. inominata, Simon, 1886, p. 142. Cambodia.
Simon, 1904, p. 287 Cambodia.

L. inops (Thorell), 1890, pp. 135-136. Sumatra.
(Thorell) 1891-92, pp. 151-154. Sungei Bulu, Sumatra.

L. irani, Pocock, 1901, p. 485. E. Poona.

L. leucostigma (Simon) 1885, p. 10. Guntakal.

L. madani, Pocock, 1901, p. 486. Chopda, E. Khandesh.

L. maindroni, Simon, 1897 (2), p. 296. Karachi.

L. mastersi, Pocock, 1901, pp. 484-485. Jaoli, Satara District.

L. nigrotibialis (Simon) 1884, pp. 330-332, fig. 1. Minhla.
(Thorell) 1887, pp. 305-307. Minhla.
(Thorell) 1895 (1), p. 236. Tharrawaddy, Rangoon, Thayetmyo and Tenasserim.
Pocock, 1900, p. 253. No additional localities.

L. obscurides (Strand) ? var. *seuberti* (Strand) 1907 (1), pp. 445-446. Java[1].

L. orophila (Thorell) 1887, pp. 310-312. Me-tan-ja.

[1] *L. obscura*, Koch, from Australia, appears to have been renamed *obscurides* by Strand in "Fauna Arctica," Vol. IV, but I have not been able to consult this paper. In the work referred to above he records a variety from Java and names it *seuberti* provisionally, but is doubtful whether it is really distinct.

L. ovicula (Thorell) 1895 (1), pp. 230-232. Rangoon.
L. palliclava, Strand, 1907 (2), p. 567. Ceylon.
L. phipsoni, Pocock, 1899, p. 751. Bombay.
Pocock, 1900, p. 253, fig. 85. Bombay; Jaoli, Satara District; Uran; Kanara; Nasik.
L. pictula, Pocock, 1901, p. 486. Chopda, E. Khandesh.
L. prolifica, Pocock, 1901, p. 485. E. Poona.
L. semoni, Simon, 1901 (2), p. 350. Buitenzorg.
L. stictopyga (Thorell) 1895 (1), pp. 232-234. Rangoon and Tharrawaddy.
L. subinermis (Thorell) = *conspersa* (Thorell), see Thorell, 1897, p. 22.
L. subinermis [1], Simon, 1897 (2), p. 295-296. Karachi.
L. tagax (Thorell) 1897, p. 24. Burma.
L. tenebrosa[2] (Thorell), 1897, p. 24. Burma.
L. wroughtoni, Pocock, 1899, pp. 751-752. Bulsor, Gujerat.
Pocock, 1900, p. 253. Same locality.
L. yerburyi, Pocock, 1901, p. 486. Trincomali.

Genus **Lycosella** Thorell.

L. minuta, Thorell, 1890, pp. 139-140. Sumatra.
Thorell, 1891-92, pp. 183-185. Mt. Singalang, Sumatra.
L. tenera, Thorell with var. *bisulcata*, 1890, p. 139. Sumatra.
Thorell, 1891-92, pp. 179-183. Mt. Singalang, Sumatra.

Genus **Ocyale** Audouin.

O. atalanta Audouin, 1826, p. 150.
Simon, 1897 (1), p. 342. Egypt, Ethiopia, Senegal, Guinea and Congo Coasts, Ceylon and Burma.
Pocock, 1900, p. 252. No additional localities.

Genus **Venonia** Thorell.

V coruscans, Thorell, 1895 (2), p. 333. Singapore.
Workman, 1896, pl. 96. Singapore.

Genus **Zantheres** Thorell.

Z. gracillimus, Thorell, 1887, pp. 318-321. Bhamo.

Group CYCLOCTENEÆ.

Genus **Galliena** Simon.

G. montigena, Simon, 1897 (1), p. 353. Java.

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[1] This name will have to be changed as it is preoccupied by Thorell's species, of which Simon was evidently not aware, describing his as new.

[2] This name appears to be preoccupied, having been used in 1877 by Keyserling (*Verh. z. b. Wien* XXVI, p. 665) for an American species which he referred to the genus *Trochosa* (= *Lycosa*).

Group PARDOSEÆ.

Genus **Acroniops** Simon.

A. heterophthalmus, Simon, 1897 (1), p. 362.

Genus **Evippa** Simon.

E. rubiginosa, Simon, 1885, p. 11. Guntakal.
E. praelongipes (Cambridge) 1870, pp. 822-823, pl. 1, figs. 3 *a-f.* Sinai.
Simon, 1897 (2), p. 290. Karachi.

Genus **Pardosa** Koch.

P. amazonia (Thorell) 1895 (1), pp. 236-239. Rangoon and Tharrawaddy.
P. birmanica, Simon, 1884, pp. 333-334. Minhla.
(Thorell) 1895 (1), pp. 242-244. Tharrawaddy, Rangoon, Java, Sumatra.
=*ipnochoera* (Thorell) 1890 (2), p. 138. Sumatra.
(Thorell) 1891-2, pp. 176-178. Ajer Mancior Sumatra.
P. evippina, Simon, 1897 (2), p. 296. Karachi.
P. fidelis (Cambridge) 1872, p. 319. Jericho, Beirut, Egypt, Bombay.
=*venatrix,* Lucas. See Simon, 1897 (1), p. 360.
P. ipnochoera (Thorell)=*birmanica,* Simon.
P. irretita, Simon, 1886, p. 140. Bachiou, Cambodia.
Simon, 1901, p. 69. Ligeh, Saigon, Singapore and Borneo.
Simon, 1904, p. 288. Cochin-China.
P. laidlawi, Simon, 1901 (1), p. 69. Perak.
P. ludia (Thorell) 1895 (1), pp. 245-247. Tharrawaddy.
P. nicobarica (Thorell) 1891, pp. 68-71. Nicobars.
P. pinangensis (Thorell) 1890, p. 137. Pinang.
(Thorell) 1891-92, pp. 166-169. Pinang.
?=*vagabunda* van Hasselt *nec* Lucas from Sungei Abu and Limun in Sumatra ; Thorell, *loc. cit.* p. 169.
P. psammodes (Thorell), 1887, pp. 312-314. Rangoon.
P. pusiola (Thorell) 1890, p. 316. Nias and Pinang.
(Thorell) 1891, pp. 157-161.
(Thorell) 1891-92, pp. 157-161. Ajer Mancior and Kaju, Sumatra ; Sarawak, Borneo.
(Thorell) 1895 (1), p. 239. Tharrawaddy.
Simon, 1905, p. 70. Java.
P. rabulana (Thorell) 1890, p. 138. Sumatra.
(Thorell) 1891-92, pp. 173-176. Padang Pandjong in Sumatra.
P. spinicrus (Thorell) 1890, p. 140. Pinang.
(Thorell) 1891-92, pp. 186-190. Pinang.
P. sumatrana (Thorell) 1890, p. 136. Sumatra.
(Thorell) 1891-92, pp. 161-166. Mt. Singalang, Sungei Bulu and Ajer Mancior in Sumatra.
P. tenasserimensis (Thorell) 1895 (1), pp. 239-242. Tenasserim.
P. thalassia (Thorell) 1891, pp. 65-68. Nancowry.

P. timida (Simon) 1882, p. 221, fig. Tes, Yemen.
Simon, 1897 (2), p. 290. Karachi and Ceylon.
P. tristicula (Thorell) 1887, pp. 315-317. Bhamo.
P. vagula (Thorell) 1890, pp. 137-138. Sumatra and Java.
(Thorell) 1891-92, pp. 169-173. Ajer Mancior in Sumatra; Tjibodas in Java.
P. venatrix, Lucas=*fidelis* (Cambridge).

In addition to the above records Blackwall (1864, p. 36) describes *Sphasus lepidus* as a new species from the East Indies. The genus appears, however, to have been overlooked by Simon, and I am unable to place it. It is also not improbable that additional species may prove to be common to India, especially the dry northern regions, and to N. Africa, Arabia, and Persia. For this reason species from these regions, of which there are very few in the collection before me, have been dealt with only in cases where I have been able to identify them with species already described.

Genus **Hippasa** Simon.

Of the species of this genus already recorded from India all but two (possibly three[1]) are before me. These two — *H. partita* (Cambridge) and *H. greenalliae* (Blackwall)—come from the dry northern regions. In neither species are the original descriptions adequate for purposes of identification, no mention being made of the characters of the vulva. Simon states that the former has a wide distribution extending from India (Karachi) through Central Asia and Arabia to Egypt, where the type specimens were collected near Alexandria. The latter was described from two immature specimens from "Meerut, Agra and Delhi" and its identity remains quite uncertain.

The females of the remaining Indian species may be distinguished thus :—

1	Of large size (carapace nearly 10 mm. long)	2.
	Of small size (carapace not more than about 5 mm. long)	7.
2	Pit of vulva exposed	3.
	Pit of vulva covered	6.
3	Pit of vulva triangular	*H. himalayensis*, p. 593.
	Pit of vulva rounded in front	4.
4	Pit of vulva semicircular	5.
	Pit of vulva transversely elliptical	*H. olivacea*, p. 593.
5	Posterior margin of vulva straight	*H. lycosina*, p. 593.
	Posterior margin of vulva with strong median notch	*H. nilgiriensis*, p. 593.
6	Plate covering pit of vulva reddish brown throughout, deeply impressed medially in front, posterior margin with median notch, the convexities on either side of this small, not elevated	*H. loundesi*, p. 594.
	Plate covering pit of vulva with its posterior angles produced into a pair of large and strongly elevated reddish processes, otherwise colourless	*H. pantherina*, p. 594.
7	Sternum with dark median stripe as in all preceding species	8.
	Sternum unicolorous	*H. madraspatana*, p. 595.

[1] There is some doubt as to the identity of the species I have referred to *agelenoides*, Simon. See below, p. 594.

8	Plate of vulva with a pair of outwardly directed truncate processes behind	*H.? agelenoides*, p. 594.
	Plate of vulva pointed behind	9.
9	Plate of vulva triangularly pointed, not much produced	*H. pisaurina*, p. 595.
	Plate of vulva produced into a definite tongue-like or more pointed process	*H. holmerae*, p. 595.

Males are less frequently met with than females, and can best be determined by their association with them. Those of *H. himalayensis* and *H. lycosina* I am unable to distinguish in any other way. Those of *H. pantherina* have the palps relatively shorter, the tibia being not more than four times as long as broad instead of about five times as long. The proportions, however, are not constant even in the few specimens before me, and it is noticeable that in *H. pantherina* from Madras (city) and Orissa the length is scarcely more than twice the breadth, being much greater in specimens from Kambakkam (about 50 miles north of Madras), Cochin and (?) Ceylon.

The males of *H. olivacea*, *H. nilgiriensis* and *H. loundesi* are not known to me.

Those of the remaining species, like their females, are much smaller than any of the preceding. Between those of *H.? agelenoides*, *pisaurina* and *holmerae* I am unable to find any differences. *H. madraspatana* may easily be recognised by the absence of the dark median stripe on the sternum and by its entirely different colouration, which resembles that of the female.

Hippasa himalayensis, sp. nov.

Fig. 1 A.

Localities.—Darjiling District of E. Himalayas: Sevok, 1,000 ft.; Pashok, 2,000-3,500 ft.; Kalimpong 600-1,500 ft. and 2,000-4,500 ft., W Himalayas: Simla.

Size, colouration, etc., much as in *H. pantherina*, from which it is, however, clearly distinguished by the form of the vulva (fig. 1 A).

Hippasa olivacea (Thorell).

Fig. 1 C.

Localities.—Keikpedem and Pegu. Also one specimen without record.

Distinguished by the form of the vulva only (fig. 1 C).

Hippasa lycosina Pocock.

Fig. 1 B.

Localities.—Helvak, Koyna Valley, Satara District, and Bombay.

Also distinguished solely by the form of the vulva (fig. 1 B).

Hippasa nilgiriensis, sp. nov.

Fig. 1 D.

Locality.—Gudalur Ghat, Nilgiris, 3,000-6,000 ft.

Also distinguished solely by the form of the vulva (fig. 1 D).

Hippasa loundesi, sp. nov.

Fig. 1 E.

Locality.—Yercaud, Shevaroy Hills.

Distinguished by the form of the vulva only (fig. 1 E).

Hippasa pantherina Pocock.

Fig. 1 F.

Localities.—? Ceylon ; Krusadai Island, Gulf of Manaar ; Trivandrum, Travancore ; Chalakudi and Trichur, Cochin State ; Jalarpet, Salem District ; Madras City ; Red Hills and Kambakkam Hill, Chingleput District ; Barkuda Island (Ganjam District) and Barkul (Orissa), Chilka Lake ; Balighai, Orissa.

Distinguished from the preceding species by the form of the vulva (fig. 1 F), and apparently also by the shorter palps of the male (above, p. 592). Distinguished from the following species by its much greater size. This seems to be one of the commonest spiders over the greater part of India.

Hippasa ? agelenoides Simon.

Fig. 1 G.

Localities.—Parambikulam, Cochin State, 1,700-3,200 ft.; North Malabar ; Gudalur, foot of Nilgiris, *ca.* 3,000 ft.

Distinguished from all the preceding species by its much smaller size, and both from these and from the following species by the form of the

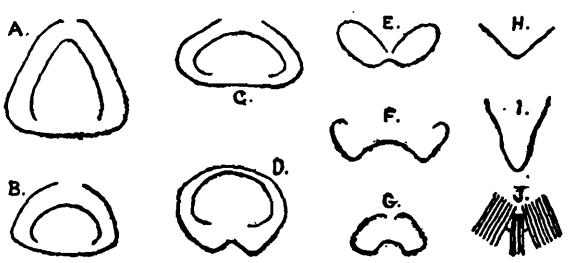

Fig. 1.—*Hippasa* spp. Vulva.

A. *H. himalayensis,* n. sp.
B. *H. lycosina* (Thorell).
C. *H. olivacea,* Pocock.
D. *H. nilgiriensis,* n. sp.
E. *H. loundesi,* n. sp.
F. *H. pantherina,* Pocock.
G. *H. ? agelenoides,* Simon.
H. *H. pisaurina,* Pocock.
I. *H. holmerae,* Thorell.
J. *H. madraspatana,* n. sp.

vulva (fig. 1 G), which when cleared of hair somewhat resembles that of *H. pantherina.* Until the hair is removed, however, the plate of the vulva appears to be simply truncate behind. There can be little doubt, I think, that these specimens (in which slight local differences possibly exist) are identical with those recorded by Simon from the Konkan ; but it is not improbable that closer examination of the vulva of specimens from Burma will show that the true *agelenoides* from that country is distinct, as already suggested by Pocock ; and very possibly the Dehra Dun form may also prove to be distinct.

Hippasa pisaurina Pocock.

Fig. 1 H.

Localities.—Bangalore and Seringapatam, Mysore ; Poona ; Siripur Saran, Bihar.

Distinguished by the form of the vulva (fig. 1 H).

Hippasa holmerae Thorell.

Fig. 1 I.

Localities.—Kalimpong, E. Himalayas, 600-1,500 ft.; between Tengueh and Nan Tien, Yunnan ; Tharrawaddy, Lower Burma.

The dorsal surface of the abdomen is inclined to be more strongly chequered than in the preceding species, especially in the Kalimpong specimens, where a reddish anterior median line, followed by pairs of large dorsal and smaller and less regular lateral light brown spots contrast strongly with a background of black. How far this is characteristic of the living spider is, however, uncertain, as in all species the prevailing grey colouration seems to be more or less replaced by mottled brown and black after prolonged immersion in spirit. The form of the vulva, by which the species can alone be distinguished with certainty, is shown in fig. 1 I.

Hippasa madraspatana, sp. nov.

Fig. 1 J.

Locality.—Madras city. Two males and one female were found running on garden paths, several females in lairs spun among grass in a low-lying, and in the rains waterlogged, part of the Museum compound. The latter were found in November, shortly after the rains.

The colour of this species is quite unlike that of any other Indian *Hippasa.* The carapace is brown with a wide border of whitish hair and sometimes variegated with the same. The upper surface of the abdomen is of a rather pale ochraceous or golden brown hue, often with a distinct anterior median browner area. The sides of the abdomen are dark brown in the male, dark brown above and white below in the female, each of the different colour areas being sharply defined in outline. The sternum, coxae and spinnerettes are dark brown, the legs dark brown annulated with white hairs in both sexes. The plate covering the pit of the vulva is somewhat angularly convex behind and bears three pencils of hair, one medially and a pair laterally (fig. 1 J).

Genus **Ocyale** Audouin.

Ocyale atalanta Audouin.

Localities.—Peradeniya and Haragama, Ceylon (the latter with young, "caught as it had captured a butterfly"); Barkuda Island, Chilka Lake ; Siripur, Saran, Bihar. The Siripur specimen is very small and if it belongs to this species cannot be fully mature, the vulva being pale in colour and without a definite median piece. It may be a new species, but it would be unwise to describe it as such without more material.

Genus **Lycosa** Latreille.

This immense genus contains a number of the commonest Indian spiders, but many even of these have yet to be described. The smaller species, such as *L. birmanica*[1], are often to be found in very large number hunting their prey on open ground, especially in moist situations; but as they are very active and not very conspicuous they have not come much under the notice of collectors. Certain large species, such as *L. indigatrix*, live in burrows where they are also reasonably secure from general collectors. Several species, especially the common and widely distributed *L. nigrotibialis*, are very variable in size and other characteristics, which complicates the determination of specific limits. The best characters appear to be found in the eyes, vulva and colour. Colour, however, in this as in other groups of spiders, is a character which must be used with great caution. And it often fails to give any good indication in material that has long been in spirit.

All species of *Lycosa* known to me appear to have the same fundamental colour scheme — one median and one pair of lateral pale longitudinal stripes on a dark ground on the carapace, and similar stripes broken into a series of pale blotches on the abdomen. On the carapace these stripes vary in width and distinctness; but though not strictly constant within specific limits the mean often differs so greatly in different species as to afford a most useful guide in conjunction with other characters. The colour of the abdomen similarly shows much individual variability and yet is a most useful guide, especially when the mean colouration of a species can be determined by the examination of large numbers of fresh specimens. The median pale band is ususally deep ochraceous, and is confined to the anterior half of the abdomen. In many species it is altogether absent, the dark bands on either side of it coalescing throughout to form a dark median band. The lateral bands when continuous are usually whitish; but in many species they also are deep ochraceous and broken up into a series of patches which give the spider an irregularly mottled appearance. In considering the colour of species the possibility of such variations from the mean, always on these lines, and therefore always in the direction of the mean of some other species, must be constantly borne in mind.

In all the species before me there are three teeth on the ventral margin of the chelicerae, though in a few of them the tooth nearest the base is minute.

To the following key to the species of Indian Lycosidae now before me I have added footnotes indicating the probable position of other Indian species. In some cases I have had to rely entirely upon descriptions, but in others I have been able to use notes which I recently made in the British Museum.

1 { Area occupied by posterior eyes nearly square (fig. 2A); posterior medians not more than one diameter apart .. .. .. 2.
  { Area occupied by posterior eyes much broader behind than in front (fig. 2B); or posterior medians more than one diameter apart . . .. 5.

2 { Anterior portion of median piece of vulva hidden beneath the enlarged anterior chitinized margin of the cavity (fig. 3 B) . .. . *L. barnesi*, p. 599.
  { Cavity and median piece of vulva exposed throughout .. .. 3.

[1] Concering the genus of this species and its allies see above, pp. 588—9.

3	Median piece of vulva spade-shaped, the transverse posterior part being about as long as broad (fig. 3 A); very large species (male with conspicuous white hair on all legs, but especially on tibia and tarsus of first two pairs)	*L. indigatria*[1], p 599.
	Median piece of vulva T-shaped, the transverse posterior portion slender like the longitudinal portion	.. .. 4.
4	Posterior median eyes separated from each other by about a diameter as seen from above[2] and from laterals by slightly more than a diameter; anterior row almost straight as seen from in front; pale lateral bands on abdomen complete and very strongly marked; abdomen pale beneath (males of two forms — one with patella and tibia of first legs nearly black and upper surface of tarsus thickly clothed with long white hairs, the other with these joints coloured like those of the other legs)	*L. bistriata*, p 600.
	Posterior median eyes separated from each other by less than a diameter and from laterals by about a diameter; anterior row slightly more procurved as seen from in front; pale lateral bands on abdomen incomplete behind and less distinct; abdomen (? always) black beneath (male ? always with first legs coloured like the others)	*L. prolifica*[3], p 600.
5[4]	Posterior median eyes not more than a diameter apart; median piece of vulva T-shaped or hourglass-shaped ..	.. .. 6.
	Posterior median eyes more than a diameter apart; or median piece of vulva not T-shaped or hourglass-shaped ..	.. .. 10.
6	Dorsal surface of carapace and abdomen without extensive white areas medially (male coloured like female so far as known)	.. .. 7.
	Dorsal surface of carapace with broad median band of whitish hair; dorsal surface of abdomen more or less completely covered by a large patch of same colour, rest of body very dark in colour (vulva as in fig. 3 G; male with anterior tibiae and tarsi clothed with decumbent white hair)	*L. himalayensis*, p 603.
7[5]	Upper surface of abdomen with dark median band, often incomplete behind, lateral pale areas coalescing behind; size large, sometimes very large. Vulva variable, median piece usually narrow or keeled in front (fig. 3 C—E)	*L. nigrotibialis*, p 600.
	Upper surface of abdomen mottled, with dark-bordered deep ochraceous median patch in front. Almost always smaller, never very large	.. .. 8.

[1] *L. wroughtoni*, Pocock, from Bulsar, Gujerat, is closely allied to this species. It is known from the male sex only, and is said only to differ in colour.

[2] Actually by rather less as seen from in front. When the two species are compared they can easily be separated, the posterior eyes being larger and therefore closer together in *L. nigrotibialis* than in *L. bistriata*; but it is very difficult to define either with such precision as to make it easily recognisable in the absence of the other.

[3] *L. fuscana*, Pocock, from E. Poona and *L. pictula*, Pocock, from Chopda, E. Khandesh, resemble *L. prolifica* in the arrangement of the eyes and may be identical with it. The types of both are darker in colour, especially those of the former in which, moreover, the median piece of the vulva is very long and slender in an elongated narrow cavity.

[4] The median piece is occasionally indistinct in the first group, *e.g.*, in *L. iranii*, Pocock.

[5] *L. orophila* (Thorell), *L. subinermis*, Simon (*nec* Thorell), *L. comotti* (Thorell), *L. tenebrosa* (Thorell, described from an immature specimen only), *L. inerminata*, Simon, *L. iranii*, Pocock, *L. mastersi*, Pocock, and *L. yerburyi*, Pocock, probably belong to this group. The last three can easily be distinguished from the species before me by the structure of the vulva. In *L. iranii* the median piece is indistinct. Pocock's description of the vulva of *L. chaperi*, Simon, suggests affinities with *L. iranii* but does not refer to the eyes. I have not been able to consult the original description. *L. comotti* appears to be very closely related to *L. madani* and may possibly prove to be identical with it.

8[1]	Moderately large species, usually 12-18 mm. long; anterior line of eyes straight or slightly procurved (middles of laterals very slightly lower than middles of medians), rarely lightly recurved	9.
	Smaller species, not more than about 9 mm. long; anterior line of eyes lightly recurved (middles of laterals very slightly higher than middles of medians), rarely quite straight	*L. stictopyga*, p. 602.
9	Longitudinal portion of median piece of vulva narrow or keeled, T-shaped; anterior line of eyes very slightly procurved as a rule ..	*L. madani*, p 602.
	Longitudinal portion of median piece of vulva very broad and flat, hourglass-shaped (fig. 3 F); anterior line of eyes straight as a rule ..	*L. kempi*, p. 602.
10	Posterior median eyes not more than a diameter apart, anterior line extending to their outer margins or beyond	11.
	Posterior median eyes more than a diameter apart, anterior line not extending to their outer margins	12.
11[2]	Body and legs not covered with long erect hair; vulva (fig. 3 H) a single plate with a pair of oblique slits (male coloured like female) ..	*L. leucostigma*, p. 603.
	Body and legs covered with long erect hair; vulva (fig. 3 I) a pair of minute plates each with a single aperture (male coloured like female)	*L. punctipes*, p. 603.
12[3]	Area occupied by posterior eyes broader than long and much broader behind than in front; medians not very widely separated; sternum pale, or (rarely) with dark border	13.
	Area occupied by posterior eyes not much longer than broad, and not much wider behind than in front; medians very widely separated; sternum often black, especially in the middle	19.
13	Vulva flat in the middle line or narrowly keeled	14.
	Vulva with a median lobe	17.
14	Cleft of vulva (fig. 4 A) linear, sharply defined, narrow throughout (male apparently resembling female in colour)	*L. moulmeinensis*, p. 604.
	Cleft of vulva broader or not sharply defined	15.
15	Cleft of vulva (fig. 4 B) narrow behind, with more or less circular expansion in front (male resembling female in colour)	*L. carmichaeli*, p. 604.
	Cleft of vulva not markedly constricted behind	16.
16	Cleft of vulva (fig. 4 C—E) parallel-sided or ill-defined (male either resembling female in colour or with palps black throughout)	*L. sumatrana*, p. 604.
	Cleft of vulva (fig. 4 F) narrow in front, very broad behind, lateral margins very prominent (male coloured like female)	*L. fletcheri*, p. 606.

[1] The difference in the eyes is very minute and, being slightly variable, extremes sometimes have the character of the other species. The difference in size is, however, more definite, and is clearly correlated with the minute difference in the eyes. I have, therefore, no hesitation in regarding the species as distinct.

[2] *L. conspersa* (Thorell) and *L. oviculа* (Thorell) are probably allied to these two species, though the structure of the vulva appears to be somewhat different. *L. maindroni*, Simon, is separated from *L. leucostigma* only by reason of its colour and may perhaps be identical with it. *L. tagax* (Thorell), known from the male only, probably also belongs to this group.

[3] Many, possibly all, of the species in this group would be placed by Simon in the genus *Pardosa*, which differs according to his definition in having the labium at least as broad as long and not more than half as long as the maxillary processes, which are relatively narrow. While agreeing that the arrangement of the eyes, on which my classification is based, does not give grounds for generic separation, I find the shape of the labium even harder to use. I have therefore followed Thorell in regarding these species as *Lycosa*. *Pardosa* I confine to species with the carapace very high in front, these forming a more distinct group among the species before me.

17	A conspicuous transverse plate, keeled in the middle line, present behind median lobe of vulva (fig. 4 G) and between ends of side pieces which are obliquely truncate and slighlty concave (male coloured like female)	*L. sutherlandi*, p. 606.
	No such plate visible, side pieces of vulva more distinctly bilobed behind or on inner side	.. .. 18.
18	Side pieces of vulva (fig. 4 H) curved inwards so that bilobed extremity is directed inwards, both lobes being in contact with median lobe (palps of male with tarsus and extreme tip of tibia black, the rest white)	*L. mackenziei*, p. 606.
	Side pieces of vulva (fig. 4 I) straighter, only in contact with median lobe on inner side behind (male either coloured like female or with tibia and tarsus of palps black, patella and tip of femur white)	*L. annandalei*, p. 606.
19	Vulva (fig. 4 J) with minute, grooved and bluntly pointed projection in middle line behind (palps of male with white hair from tip of femur to base of tarsus)	*L. birmanica*[1], p. 607.
	Vulva (fig. 4 K) with flat quadrangular plate in middle line behind (male as in preceding)	*L. quadrifer*, p. 608.

Lycosa indigatrix Latreille.

Incl. *L. catula* Simon.

Figs. 2 A and 3 A.

Localities.—Killinochchi, Ceylon ; Horsleykonda, Chittoor District ; Jalarpet, Salem District ; Mysore ; Bangalore ; S. Arcot ; Palavaram, Chingleput District ; and Madras City. A specimen from Waltair, with a broad, flattened, plate-like rather than keel-like median bar to the vulva, which resembles this species in other respects, is perhaps distinct. The lines of white spots on the ventral surface of the abdomen, by which *L. catula* is distinguished from *L. indigatrix* are variable in extent and distinctness, and do not appear to me to provide a sound specific character. It is possible, however, that they may be characteristic of distinct local races, for all the three specimens from Bangalore possess them, although none of the more numerous ones before me from Madras do so. Other localities are represented by a single specimen each, none of which show them. The upper surface is of a somewhat uniform dull brown colour, without longitudinal stripes. This appears to be the largest common Indian *Lycosa*, reaching a total length of 24 mm., with carapace 12 mm. long.

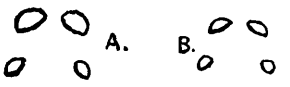

FIG. 2.—*Lycosa* spp. Posterior eyes.
A. *L. indigatrix*, Latreille.
B. *L. nigrotibialis*, Simon.

Lycosa barnesi, sp. nov.

Fig. 3 B.

Locality.—Dhoni Forest, *ca* 1,500-4,000 ft., S. Malabar. A single specimen, 12 mm. long (carapace 5 mm.).

This species is closely related to the next, but has the cavity of the vulva (fig. 3 B) covered by a large, transverse, strongly chitinized

[1] *L. laidlawi* (Simon) is closely allied to this species.

plate. It is also much darker in colour, the dorsal surface of the abdomen being of a very dark brown with the pair of longitudinal bands deep ochraceous and somewhat broken. The abdomen is paler below, but even there it is speckled with black. The carapace bears a median ochraceous band, very broad in front, then two still broader dark bands, then two broad but somewhat broken ochraceous lateral bands immediately above the narrow dark margin. The eyes are exactly as in the following species.

Lycosa bistriata, sp. nov.

Localities.—Kalare, Bangalore and Bandipur, Mysore; Madras City (*types*); Vettuvankeni and Ennur, Chingleput District; Gmatia, Birbhum District; Calcutta; Darjiling District 1,000-3,000 ft.

This species is one commonly found hunting on more or less open ground like *L. birmanica*. It is of about the same size as the last, often rather smaller. It closely resembles it in general structure and appearance though the vulva is different and the colour much paler. The detail of the vulva is somewhat variable, as in *L. nigrotibialis*, the median piece sometimes having somewhat inconspicuous transverse branches behind instead of the usual conspicuous ones; the edges of the cavity, also, bend inwards to a variable extent.

The anterior row of eyes is also somewhat variable, being straight or lightly procurved. The medians are distinctly larger than the laterals in both rows.

There are two distinct kinds of male, as already indicated in the key, one resembling the female in colour, the other with the patella and tibia of the first pair of legs nearly black and the upper surface of the tarsus clothed with thick white hair.

Lycosa prolifica Pocock.

Localities.—Poona District (*cotypes*); Pimpalner, W. Khandesh; Kas, 3,700 ft., Satara District.

In size, variability and general appearance this species closely resembles the next. The eyes, however, are arranged as in the preceding species, the posterior laterals being much nearer to each other and somewhat further from the medians than in *L. nigrotibialis*. The posterior eyes are somewhat larger and closer together than in *L. bistriatus* and the anterior row is somewhat more distinctly procurved than is usual in that species.

Lycosa nigrotibialis (Simon).

Incl. *L. goliathus*+*phipsoni* Pocock.

Figs. 2 B and 3 C–E.

Localities.—Jalarpet, Salem District; Bangalore; Taloshi, *ca.* 2,000 ft., Medha, *ca.* 2,200 ft., and Poona and Khandala, *ca.* 2,500 ft., Poona District, Bombay Presidency; Zangi Nawar, 20 miles west of Nushki, Baluchistan; Afghanistan; Taru, Peshawar; Rawalpindi, Punjab; Pusa, Siripur and Katihar, Bihar; Gmatia, Birbhum District, and

Calcutta, Bengal ; Simla and Dharampur, *ca.* 5,000 ft., W Himalayas ; Nepal Valley, 4,500-6,500 ft., E. Himalayas ; Sukna, *ca.* 1,000 ft., Singla 1,500 ft., Kalimpong 2,000-4,500 ft., Darjiling District, E. Himalayas ; Sibsagar and Garo Hills, Assam ; Assam-Bhutan Frontier, Mangaldai District ; Arakan and Rangoon, Burma ; Talé Sap, Singora Province, Siam ; Yunnan. Podaspur.

Thorell (1887, p. 305) has already called attention to the extraordinary range of variation found in this species. Sometimes it is even larger than *L. indigatrix*, but this is exceptional. Usually it is about 20 mm. long, with carapace about 10 mm. Often, however, it is no bigger than *L. kempi*. Not only is it extremely variable in size, but the lower surface may be either an intense and uniform black as in *L. indigatrix*, uniformly

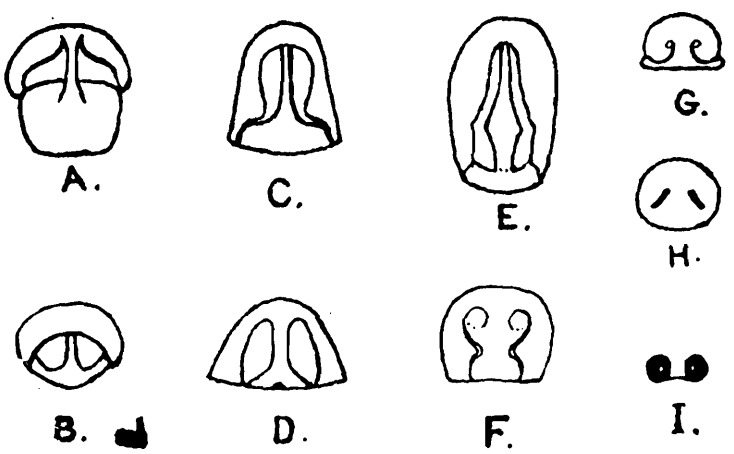

FIG. 3.—*Lycosa* spp. Vulva.

A. *L. indigatrix*, Latreille.
B. *L. barnesi*, n. sp.
C. *L. nigrotibialis* (Simon) usual form.
D. *L. nigrotibialis* (Simon) from a co-type of *L. phipsoni*, Poc.
E. *L. nigrotibialis* (Simon) from a co-type of *L. goliathus*, Poc.
F. *L. kempi*, n. sp.
G. *L. himalayensis*, n. sp.
H. *L. leucostigma*, Simon.
I. *L. punctipes*, n. sp.

pale yellowish, or yellow with more or less definite greyish or black longitudinal bands. The upper surface of the abdomen is marked longitudinally with a dark median band of somewhat ribbed appearance, bordered on either side by a pale band, with darker colour beyond, becoming gradually paler below. This colour scheme, though subject to the usual variation in intensity, is quite distinct from that of *L. indigatrix*, which is mottled more as in *Ocyale atalanta*.

The structure of the vulva varies considerably in detail. Usually the cavity is quite broad, and its sides follow to some extent the course of the T-shaped median piece (fig. 3 C.). Sometimes, however, the sides are straight instead of angulate behind, as in *L. phipsoni*, Pocock. (fig. 3 D), and the cavity may be much longer than broad as in *L. goliathus*, Pocock (fig. 3 E). In two specimens, one from the Second Defile of the Irrawaddy and one from outlying spurs of the Kakhyin Hills, the anterior part of the median piece is expanded into an extensive circular plate which in the former fills and in the latter nearly fills the anterior part of the cavity. These form a transition to *L. Kempi* and may

perhaps represent a distinct local race, possibly even a distinct species. No trace of colour pattern remains in either.

The male resembles the female in general colour, but it is not possible to say definitely that secondary sexual characters are not developed, in some specimens at least, without an examination of fresh material, which I have not got.

Lycosa madani Pocock.

Localities.—Kavalai, 1,300-3,000 ft., Cochin State; Bangalore, *ca.* 3,000 ft., Mysore; Horsleykonda, *ca.* 3,000-4,100 ft., Chittoor District; Barkuda Island, Chilka Lake; Siripur, Saran, Bihar.

Maximum length about 14 mm., carapace 6 mm.

This species is only distinguished from *L. nigrotibialis* by its mottled rather than longitudinally striped colour pattern and by its smaller size. The former character is often unrecognizable in spirit material, and the latter is somewhat indefinite. Identifications of spirit material are consequently apt to be a little uncertain, especially when the material is old. The vulva is like that found in the more typical forms of *L. nigrotibialis*, with T-shaped median piece.

Lycosa kempi, sp. nov.

Fig. 3 F.

Localities.—Darjiling District, 1,000-3,000 and 6,000 ft., and Singla, 1,500 ft.; Assam-Bhutan frontier, Mangaldai District, Assam (*type*).

Maximum length 18 mm., carapace 9 mm.

The colour is of the same mottled pattern as in the last species, often distinctly speckled with greyish black. The anterior row of eyes is straight, with very slight variation in either direction. The broad median piece of the vulva (fig. 3 F) is the most distinctive character of the species. The male is coloured like the female.

Lycosa stictopyga (Thorell).

Localities.—Lahore, Punjab; Siripur, Saran, Bihar; Calcutta; Singla, 1,500 ft. and Kalimpong 2,000-4,500 ft., Darjiling District; Garo Hills; Singapore.

A much smaller species than any of the last four, being of about the size of *L. bistriata*. Maximum length 9 mm., carapace 4. It is readily distinguished from the last named by the more trapezoidal arrangement of the posterior eyes. From the larger, but more closely related, species with similar posterior eyes it may be separated by the faint recurvature of the anterior eyes which are rarely straight as in *L. kempi*, never procurved as in the others. The vulva is intermediate between that of *L. madani* and that of *L. kempi* and is very variable, extremes being very like one or other of these. Normally the median piece is broad and hourglass-shaped with a distinct keel behind; but it may be broad and flat or may be more slender and T-shaped.

The male is coloured like the female.

Lycosa himalayensis, sp. nov.

Fig. 3 G.

Localities.—Singla 1,500 ft., Ghumti 2,500 ft., Pashok 2,500, 3,000 and 3,500 ft.; Soom 4,000-5,000 ft.; Kalimpong ; Sitong Ridge 4,700 ft. and Nam Ting Pokri, Sitong Ridge ; Sureil 5,000 ft. All these localities are in the Darjiling District. There is also a single specimen from Sonarpur, Assam.

Maximum length 13 mm., carapace 6½ mm.

This is one of the most easily recognizable of all species of *Lycosa*, both by its dark ground colour with patch of white hair on the abdomen in the middle line in front and by the structure of the vulva (fig. 3 G), which is particularly strongly chitinized.

In all the males I have seen the tibia and tarsus of the first legs is clothed with decumbent white hair.

Lycosa leucostigma Simon.

Fig. 3 H.

Localities.—Trivandrum ; Cochin State ; Madras City ; Ennur, and Kambakkam Hill, 200-800 ft., Chingleput District ; Barkuda Island, Chilka Lake ; E. Khandesh, Bombay Presidency ; Siripur., Saran, Bihar ; Gmatia, Birbhum District ; Calcutta.

Length up to about 9 mm., carapace 5 mm.

The simple vulva and small eyes, with the anterior row extending at least to the outer margins of the posterior medians, at once separates this species and the next from all others known to me. This one may easily be distinguished from the next by its short hair and more mottled and usually darker colour.

The vulva consists of a more or less circular plate with a pair of oblique slits in it (fig. 3 H). The male resembles the female in colour.

Lycosa punctipes, sp. nov.

Fig. 3 I.

Localities.—Ulsoor tank, Bangalore (*type*) ; Ennur, Chingleput District ; Lucknow ; Ballia village tank, Lalganj, Mirzapur ; Siripur, Saran, Bihar ; Berhampur Court, Bengal ; Calcutta.

Length 8 mm., carapace 4½ mm.

A small, intensely hairy, yellowish or greenish grey spider found among vegetation on the surface and edges of tanks. The carapace, sternum and appendages are yellowish. The abdomen bears a pair of longitudinal rows of white spots, either round or produced laterally into transverse lines, and sometimes completely obscured by the extension dorsally of the general ventral covering of white hair. There are normally three white spots on the dorsal surface of the protarsus ; one at the tip of the patella and one near the middle of the tibia, but the full number is not always developed, especially on the first pair of legs.

The vulva consists of a pair of small circular plates, each with an aperture slightly towards the inner side (fig. 3 I). The male resembles the female in colour.

Lycosa moulmeinensis, sp. nov.

Fig. 4 A.

Locality.—Moulmein, Lower Burma.

Maximum length 7 mm., carapace 3½ mm.

Scarcely a trace of the original colour remains in any of the specimens, which are very old. There appears, however, to have been a pale median band along the whole length of the abdomen, formed by the suppression of the median ochraceous patch and its dark borders and the fusion of the pale lateral bands in the middle line ; and superimposed on this there appears to have been a series of transverse white lines as in the preceding species. The sternum appears to have borne a longitudinal dark median stripe. The vulva with its narrow median cleft is the most distinctive character of the species (fig. 4 A).

There is no indication of any secondary sexual colouration in the single male present.

Lycosa carmichaeli, sp. nov.

Fig. 4 B.

Localities.—Amangarh, Bijnor District, U. P.; Kathgodam, 1,200 ft., Kumaon, W. Himalayas ; Sevok, 1,000 ft., Darjiling District (*type*), Darjiling, 6,000 ft.; Assam-Bhutan Frontier, Mangaldai District (river-bed). Sukhwani.

Maximum length 19 mm., carapace 8½ mm.

The colour is not well shown on any of the specimens before me, but the abdomen appears to be without the anterior dorsal ochraceous patch on the abdomen, its dark borders being united across the middle line right to the front. There has evidently, also, been a considerable amount of whitish pile all over the upper surface of the body, and the abdomen appears to have been marked in addition with narrow transverse bands of a more snowy white. The cavity of the vulva (fig. 4 B) is widely expanded in front, and its floor is raised in the middle line behind forming the stem of the T-shaped median piece. There are a pair of apertures on either side of the cavity behind, but they are much smaller than in the previous species and although situated against the arms of the median piece they are much farther from their ends.

The male does not appear to differ from the female in colour.

Lycosa sumatrana Thorell.

Fig. 4 C-E.

Localities.—Anuradhapura, Ceylon ; Parambikulam, 1,700-3,200 ft. and Chalakudi, Cochin State ; Yercaud, Shevaroys ; Bangalore, *ca.* 3,000ft. and Bandipur, *ca.* 3,000 ft., Mysore ; Gudalur, *ca.* 3,000 ft., Ootacamund, *ca.* 6,700-8,000 ft., Keti, *ca.* 6,500 ft., and Stillbrook Garden, Coonoor, Nilgiris ; Madras City ; Red Hills, Chingleput District ; Horsley-konda, *ca.* 3,000-4,100 ft., Chittoor District ; Bombay ; Bandra nr. Bombay ; Saugor, C. P.; Siripur, Saran, Bihar; Gmatia, Birbhum District ;

Kierpur, Purneah District; Calcutta; Dum-Dum nr. Calcutta; Simla, W. Himalayas; Nepal Valley, 4,500-6,500 ft.; Darjiling District, 1,000-3,000 ft., Sukna, 1,000 ft., Singla, 1,500 ft., Ghumti, 1,500-5,000 ft., Tindharia, Rungneet Tea Estate, 4,500-5,000 ft., Pashok, 3,000 ft., Kalimpong, 2,000-4,500 ft., Sureil, 5,000 ft., near Sureil, 6,000 ft., Darjiling District; Rangamati, Chittagong Hill Tracts; Garo Hills, Assam; Camorta, Nicobars.

This species is common on damp ground with *L. birmanicus.*

Maximum length 10 mm., carapace 4½ mm.

The general colour is dull brownish. The carapace is black round about the eyes, with broad median and submarginal pale bands. The sternum is usually pale in the female but is sometimes dark, especially in E. Himalayan specimens. The sternum is often dark in the male. The abdomen is mottled above, whitish below, with more or less distinct median ochraceous patch in front. The legs are uniformly dark or banded. The vulva (fig. 4 C-E) is somewhat variable in detail, the dark side-pieces sometimes being longer than broad instead of broader than

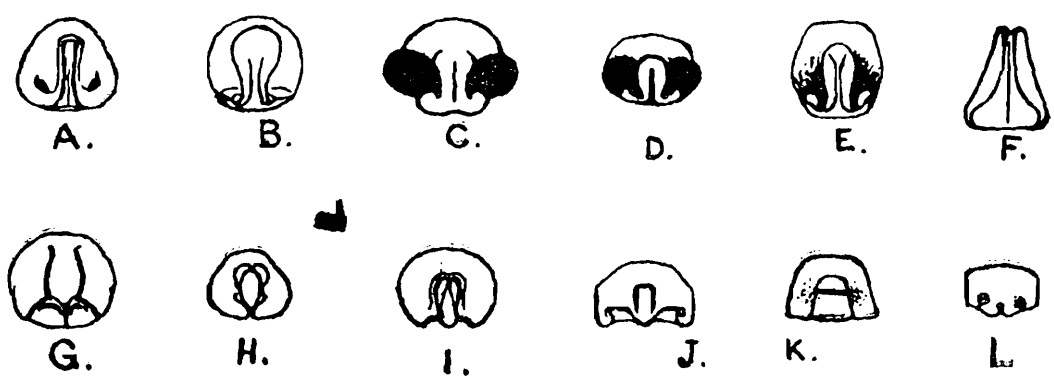

FIG. 4.—*Lycosa* spp. and *Venonia* sp. Vulva.

A. *L. moulmeinensis*, n. sp.
B. *L. carmichaeli*, n. sp.
C. *L. sumatrana*, Thorell, usual form.
D. *L. sumatrana*, Thorell, transitional form.
E. *L. sumatrana*, Thorell, from Garo Hills.
F. *L. fletcheri*, n. sp.
G. *L. sutherlandi*, n. sp.
H. *L. mackenziei*, n. sp.
I. *L. annandalei*, n. sp.
J. *L. birmanica*, Thorell.
K. *L. quadrifer*, n. sp.
L. *V. himalayensis*, n. sp.

long. But they are almost always of darker colour than the rest of the vulva and the broad plate behind them renders the species easy to recognize as a rule (fig. 4 C). In some specimens, however, especially those from eastern localities and the hills of Cochin State, the side pieces are produced backwards on the inner side of the small aperture beneath their posterior margins, thus leaving a longer, narrower and more clearly defined cleft between them (fig. 4 D). This is still more marked in specimens from the Garo Hills (fig. 4 E), and it may be necessary to recognize it as a distinct race when more material is available. The single specimen from Camorta in the Nicobar Islands is of the normal type. Unfortunately there are none present from Burma.

The male is often difficult to distinguish from that of *L. annandalei* (see below). Two forms occur, one coloured like the female, the other with the whole of the palps and usually the sternum and bases of legs, especially the first pair, black.

Lycosa fletcheri, sp. nov.

Fig. 4 F.

Localities.—Abbotabad, Hazara District, North-West Frontier Province (*type*); Sutlej Valley below Simla and Dharampur, *ca.* 5,000 ft., W Himalayas.

Maximum length 12 mm., carapace 5 mm.

The area occupied by the eyes is black; behind this the carapace is brownish with large pale dorsal area and broad but not very sharply defined pale submarginal band. The abdomen is mottled, with ochraceous patch in the middle line in front. The sternum is darker at the margin than in the centre. The legs, which are long and slender, are mottled.

The structure of the vulva, which is the most distinctive character of the species, is shown in fig. 4 F and has been described in the key.

The male resembles the female in colour.

Lycosa sutherlandi, sp. nov.

Fig. 4 G.

Localities.—Singla, 1,500 ft. (*type*); Pashok, *ca.* 1,000 ft.; Kalimpong, 2,000-4,500 ft., all in the Darjiling District of the E. Himalayas.

Maximum length 10 mm., carapace 5 mm. Legs very long and slender.

This species appears to have the same colour scheme as the last. The vulva, however, is entirely different (fig. 4 G). There is a median lobe, acuminate behind, extending about two-thirds of the distance to the posterior margin; on either side of this are the side pieces, whose truncate or slightly concave posterior extermities cover the paired apertures. Behind these is an extensive flattened plate, finely keeled in the middle line.

The male does not appear to differ in colour from the female.

Lycosa mackenziei, sp. nov.

Fig. 4 H.

Localities.—Bangalore, *ca.* 3,000 ft., Mysore State (*type*); Siripur, Saran, Bihar; Dinapore, Bihar; Calcutta.

Maximum length 8½ mm., carapace 4 mm.

In colour this species closely resembles the last three. The vulva (fig. 4 H) has a median lobe as in *L. sutherlandi*, but the side pieces are curved round so that their extremities, which are bilobed, practically meet behind it, and there is no distinct posterior plate.

The femur, patella and tibia of the palps of the male are white, the tibia alone being tipped with black; the tarsus is black, tending to a slightly paler shade at the tip.

Lycosa annandalei, sp. nov.

Fig. 4 I.

Localities.—Trivandrum, Travancore; Bangalore, *ca.* 3,000 ft., Mysore; Ootacamund, Nilgiris; Madras City (*type*); Red Hills, Chingleput

District; Horsleykonda, *ca.* 3,000-4,100 ft., Chittoor District; E. Khandesh, Bombay Presidency; Mooltan, Punjab; Siripur, Saran, Bihar; Gmatia, Birbhum District; Calcutta, Salt Lakes and Dum-Dum near Calcutta, and Berhampur Court, Bengal; Sitong, *ca.* 4,700-4,800 ft., Darjiling District; Chittagong; Silcuri, Cachar.

Maximum length 12 mm. (usually at least 1 mm. less than this), carapace 5½ mm.

This species is found chiefly beside water.

The general colour is usually olivaceous rather than brown in fresh specimens, but it soon becomes brown in spirit; and there is usually a fine mid-dorsal line of white hair on the carapace. The general pattern, however, resembles that of the four preceding species. The vulva (fig. 4 I) is of the same general plan as that of the last species, but the side pieces do not curve inwards to meet behind the median lobe, which extends to the posterior margin.

It is probable that two forms of the male occur in this species, as in *L. sumatrana* with which it is commonly found. But I know of no certain means of distinguishing between the two species in the case of the form which resembles the female in colour. Most such males are small in size; and I therefore refer them with some degree of certainty to *L. sumatrana*, this being as a rule somewhat smaller than *L. annandalei*. But it is not unlikely that some at least really belong to *L. annandalei*. In the second form of male the tibia and tarsus of the palps are black, but the dorsal surface of the patella and the tip of the femur are clothed with glistening white hair, which at once distinguishes them in life from the corresponding male of *L. sumatrana* in which the palps are black throughout. In spirit the distinction is, however, less obvious, as the silky hair of *L. annandalei* becomes almost invisible when wet, and may even reveal a uniformly black colouration beneath, while the femur and patella of spirit specimens of *L. sumatrana* often appear less dark than the tibia and tarsus.

Lycosa birmanica Thorell.

Fig. 4 J.

Localities.—Bangalore, Mysore State; Ootacamund, *ca.* 6,700-8,000 ft. and Coonoor, *ca.* 5,700-6,000 ft., Nilgiris; Madras City; Ennur, Chingleput District; Horsleykonda, *ca.* 3,000-4,100 ft., Chittoor District; Barkuda Island, Chilka Lake, Ganjam District; Bandra, nr. Bombay; Burhanpur, C. P.; Mowai, Bara Banki, U. P.; Siripur, Saran, Bihar; between Chaibassa and Chakradharpur, Singbhum District and Purulia, Manbhum District, Chota Nagpur; Gmatia, Birbhum District, Calcutta and Dum-Dum, Bengal; Singla, 1,500 ft., Darjiling District; Tavoy. Also Sukhwani.

Maximum length 8 mm., carapace 3 mm.

An extremely common species found running about among dead leaves or on open ground, especially in damp places.

The carapace is uniformly dark, without the pale median and submarginal bands found in the preceding species. The sternum is almost always dark. The abdomen is mottled, ochraceous and black, with the anterior median area entirely black or with only a streak of ochraceous

colouration. The legs are strongly banded. The area occupied by the posterior eyes is not so much wider behind than in front as in the preceding species, being almost square instead of strongly trapezoidal.

The vulva (fig. 4 J) is deeply grooved in the middle line almost to the posterior margin which is produced backwards to form a triangular projection between the side pieces.

The palps of the male are usually black to near the tip of the femora, but may be quite pale. From the tip of the femora to the base of the tarsus they are clothed with dense white hair, the rest of the tarsus being black. Usually the whole of the tarsus except the extreme base is black, but the area of white hair is sometimes more extensive. In this case the femora and sternum are usually pale instead of dark in colour. I have seen no males with palps coloured like those of the female, although I have examined a large number.

Lycosa quadrifer, sp. nov.

Fig. 4 K.

Localities.—Anuradhapura (*type*), Peradeniya and Hambantota, Ceylon; Parambikulam, 1,700-3,200 ft., Cochin State; Bangalore, *ca.* 3,000 ft., Mysore State; Covelong, Ennur and Kambakkam Hill, 200-800 ft., Chingleput District; Madras City.

This species seems to be widely distributed in S. India, but never to be common. In Ceylon, however, it appears to replace *L. birmanica*, for which I mistook both sexes when collecting specimens at Anuradhapura, where it was abundant. I therefore refer the Hambantota specimen, which is a male, to this species. Both sexes are indistinguishable from *L. birmanica* in size and colour, but in the female the vulva (fig. 4 K) is quite different, the median piece being depressed and truncate behind, so that when viewed from above the posterior portion of it appears to be a quadrangular plate separating the ends of the side pieces, which are also truncate.

Genus **Venonia** Thorell.

Venonia himalayensis, sp. nov.

Fig. 4 L.

Localities.—Rungneet Tea Estate, 4,500-5,000 ft. (*type*) and Darjiling, 6,000 ft., Darjiling District.

Maximum length $3\frac{1}{2}$ mm., carapace $1\frac{1}{2}$ mm.

The carapace is low, not strongly convex in outline as in Workman's figure of *V coruscans* from Singapore. The cephalic portion is narrow and almost parallel sided; the posterior portion is broader. The anterior eyes are strongly procurved, and do not extend beyond about the middles of the posterior medians[1] which are separated from each other by about a diameter. The four posterior eyes are about equal in size, rather large and prominent; they form a quadrangle which is about as long, and about twice as wide behind, as it is wide in front. The carapace

[1] In Workman's figure of *V. coruscans* they extend quite to their outer margins.

is dark reddish brown, sometimes with a purplish sheen. Both it and the abdomen are covered with glistening golden pile. The sternum is ochraceous. The legs are ochraceous banded with grey. The abdomen is dark brownish above with pale spots arranged in three longitudinal bands on the upper surface, and pale oblique stripes on the sides extending upwards from the pale ventral surface.

The vulva is shown in fig. 4 L. The palps of the male appear to be somewhat slenderer than in *V coruscans*. The male does not appear to differ from the female in colour.

Genus **Pardosa** Koch.

As already explained (*antea*, pp. 588, 589) I include in this genus only species in which the carapace is much elevated and vertical in front. It is with some hesitation that I describe three of the four species before me as new. They are so common and so widely distributed that they may easily prove to be identical with species already known from outside India. Two such species, *P. fidelis* (Cambridge) and *P. timida* (Simon) have already been recorded; but the descriptions of these do not seem to agree with the specimens before me. As I am unable to identify them it seems best to describe them and give them names by which they can, for the present, be referred to even though these may have to be relegated to synonymy later on.

They may be distinguished as follows :—

1	Vulva with well developed orifice beneath posterior end of each side piece (fig. 5 A); sternum with dark median stripe (palps of male black) ..	*P. pusiola*, p. 609.
	Vulva not as above; sternum uniformly pale	2.
2	Space between side pieces of vulva (fig. 5 B) entirely covered in (palps of male black, with whitish hair on upper side of femur) . .	*P. atropalpis*, p. 610.
	Space between side pieces of vulva not covered in behind	3.
3	Vulva (fig. 5 C) broader than long; space between side pieces very narrow, its anterior half covered by slender tongue-like process; side pieces very broad (palps of male black, with white hair on upper side of femur and inner side of patella) ..	*P. ooklëyi*, p. 610.
	Vulva (fig. 5 D) longer than broad; space between side pieces broad, only partially covered in front by broad tongue-like process; side pieces very narrow (palps of male pale, except tarsus which is brown).	*P. leucopalpis*, p. 610.

Pardosa pusiola Thorell.

Fig. 5 A.

Localities.—Peradeniya, Ceylon; Sureil, 5,000 ft., Darjiling District.

Maximum length 8 mm., carapace $3\frac{1}{2}$ mm.

The general colour of this spider is very dark. The carapace bears a deep ochraceous median band between a pair of black lateral bands, beyond which it is mottled. The abdomen is dark at the sides, with pale median band, at the anterior end of which the usual lenticular ochraceous patch is distinguishable with traces of dark outline. In colour, therefore, this species closely resembles *Lycosa moulmeinensis*. The femora are strikingly marked with black on the inner side. The

hind legs are much the longest. The vulva (fig. 5 A) is somewhat like that of *L. sumatrana*, but the apertures beneath the posterior ends of the side pieces face more inwards and are very broad.

The male is usually darker in colour than the female. Its palps and the basal two-thirds of the first femora are black throughout.

Pardosa atropalpis, sp. nov.

Fig. 5 B.

Localities.—Bangalore, *ca.* 3,000 ft. and Bandipur, *ca.* 3,000 ft., Mysore State ; Gudalur, *ca.* 3,000 ft., foot of Nilgiris ; Madras City (*type*) ; Horsleykonda, *ca.* 3,000-4,100 ft., Chittoor District ; Nellore ; ? Barkuda Island, Chilka Lake, Ganjam District (male only). Found abundantly at Madras and Bangalore.

Maximum length 5½ mm., carapace 2½ mm.

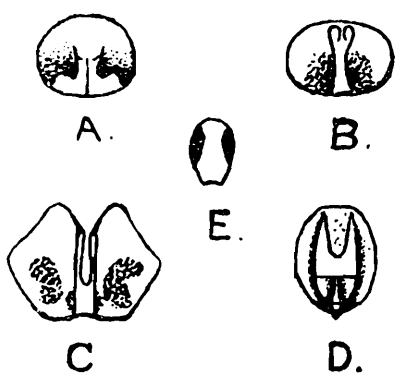

Fig. 5.—*Pardosa* spp. and *Evippa* sp. Vulva.
A. *P. pusiola* (Thorell).
B. *P. atropalpis*, n. sp.
C. *P. oakleyi*, n. sp.
D. *P. leucopalpis*, n. sp.
E. *E. rubiginosa*, Simon.

The colour pattern is as in the preceding species, but the median pale band on the carapace and abdomen is less definite, while the sides of both carapace and abdomen are much paler. The femora, like the other joints of the legs, are uniformly pale in colour, as are also the palps of the female. The hind legs are much the longest.

The vulva (fig. 5 B) is of the same general form as that figured by Simon for *L. timida*, but the median piece is much narrower.

The palps of the male appear black throughout in spirit, but have the upper surface of the femora covered with ash-coloured pile, which shows only on drying.

Pardosa oakleyi, sp. nov.

Fig. 5 C.

Localities.—Plentiful among grass on open ground at Ootacamund, 6,700-8,000 ft., Nilgiris (*type*) ; two specimens from Siripur, Saran, Bihar.

Maximum length 5 mm., carapace 2½ mm.

In colour this species closely resembles the last, except that it is slightly darker. The female is, however, distinguished by the large angular side pieces of the vulva (fig. 5 C), with a narrow cleft between them of which the anterior half is filled by a slender tongue-shaped median piece. The male can be distinguished by the purer white pile on the upper surface of the femora of the palps, and by the continuance of this pile on to the inner side of the patella.

Pardosa leucopalpis, sp. nov.

Fig. 5 D.

Localities.—Galle, Ceylon ; Madras City (*type*) ; Ennur, Chingleput District ; Barkuda Island, Chilka Lake, Ganjam District.

Maximum length 8 mm., carapace 3½ mm.

A slightly larger species than *P. atropalpis* and quite as abundant, indistinguishable from it in general colour. The vulva (fig. 5 D) is very long, with extremely narrow side pieces. These are much narrower than the oval cavity between them, over the anterior part of which there is a short broad tongue-like process. Within this cavity the posterior ends of the side pieces bend forward dorsally round a pair of conspicuous orifices in its lateral walls, to disappear behind a transverse plate of soft tissue.

The femur, patella and tibia of the palps of the male are pale as in the female, the tarsus is brownish; they are covered with whitish pile, which is very dense on the tibia and tarsus, but sparcer and often scarcely visible on the femur and patella.

Genus **Evippa** Simon.

In this genus the superior claws are long and slender and toothed at the base only, the anterior part of the carapace is somewhat abruptly elevated, forming a distinct angle with the low posterior part and the margin of the chelicerae bears only two teeth.

Evippa rubiginosa Simon.

Fig. 5 E.

Locality.—Cuddapah.

Maximum length 7 mm., carapace 3 mm.

A specimen in the Indian Museum collection from Samagooting, Assam, probably belongs to the same species. Larger specimens (maximum length 10 mm., carapace 5 mm.) from Kachh probably belong to a different species, possibly *E. praelongipes* (Cambridge), the vulva being slightly different. But without more extensive material it is impossible to determine specific limits with certainty.

The ocular area of *E. rubiginosa* is black, the rest of the carapace brown with broad median and narrower and somewhat broken submarginal pale bands. The sternum is pale. The dorsal surface of the abdomen is chequered. The legs are strongly banded and very spiney. The vulva is shown in fig. 5 E. It is small and inconspicuous.

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