

***Katableps*, a new genus of lycosid spiders from the forests of Madagascar (Araneae: Lycosidae)**

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Summary

A new genus of wolf spider, *Katableps* n. gen., is described from Madagascar. The type species, *Katableps pudicus* n. sp., is known from both sexes while two further members of the genus, *Katableps masoala* n. sp. and *Katableps perinet* n. sp. are described from females only. The genus is unusual amongst lycosids for the downward-directed anterior lateral eyes and the exceptionally large posterior median eyes that project forward above the clypeus. The relationships of the genus, which unusually is confined to tropical forests, are discussed. The possible functional significance of the unusual modifications of the eyes and prosoma are briefly considered.

Introduction

While examining wolf spiders from Madagascar in the collections of the California Academy of Sciences, a number of specimens of an unknown genus were discovered. Initially, it was thought that these might belong to the Afro-tropical genus *Amblyothele* Simon, 1910, but subsequent more careful examination showed that they belonged to a new and distinctive genus which appears to be confined to Madagascar. Apart from their relatively small size, species

of the genus are distinguished by the extraordinary positioning of the anterior lateral eyes which are oriented in a downward-pointing direction, and by the exceptional size of the posterior median eyes which protrude forward over the clypeus in a manner quite unlike those of any other lycosid genus we have seen. In this paper we describe and diagnose this new genus and discuss its possible relationships.

Methods

Specimens were examined in 70% ethanol. Epigynes were cleared in methyl salicylate and temporarily mounted in a mixture of methyl salicylate and cedukol (Merck, Darmstadt). Measurements were made with an eyepiece micrometer and are in mm. Abbreviations: CAS = California Academy of Sciences, AME = anterior median eye, ALE = anterior lateral eye, PME = posterior median eye, PLE = posterior lateral eye, ALS = anterior lateral spinneret, PLS = posterior lateral spinneret.

Taxonomy

***Katableps* n. gen.**

Type species: Katableps pudicus n. sp.

Etymology: The generic name is derived from the Greek *katablepo*, meaning “to look down at”, and refers to the positioning of the anterior lateral eyes.

Description: Small wolf spiders (males 2.92–3.58, females 2.83–4.92). Carapace long and tapering anteriorly (Fig. 1). Head region not at all raised but extended forward so that carapace projects beyond clypeus (Fig. 3). Mainly without pronounced carapace pattern but with two dark lateral bands on paler background in *K. perinet*. Anterior eye row procurved, AME 1.33 to 2.00× diameter of ALEs, separated by 0.5–2.0× their diameters and from ALEs by 1.5–3.5× their diameters. ALEs directed downward and slightly outward (Figs. 4, 7). PME large, projecting strongly forward over clypeus, 1.67–2.00× diameter of PLEs,

separated by 0.80–1.00× their own diameter. Chelicerae relatively short, retromargin with 3 small teeth, promargin with two minute teeth, situated proximally to those on retromargin. Maxillae broad, widening distally, 2.0–2.3× length of labium. Labium slightly longer than broad to a little broader than long. Sternum scutiform, strongly produced between hind coxae (Fig. 8). Leg IV 1.21–1.66× length of leg I. Ventral spines of leg I: metatarsus 2-2-2, tibia 2-2 or 2-2-2. Tarsi I & II fusiform. Paired claws of tarsi relatively short, with 5–6 teeth of equal length, central claw minute, bent at right-angles. Abdomen dorsally dark grey with faint, paler, lanceolate stripe extending half length and two pairs of white spots in posterior half in male but lacking any distinct pattern in female. Ventrally cream. Spinnerets long and thin, PLS *c.* 1.5× length of ALS. Male palp viewed ventrally, with large curved, spoon-shaped median apophysis situated terminally (Fig. 9). Embolus arising ecto-laterally and curving mesally, thin, tapering and with tip directed towards inner margin of median apophysis. Viewed retrolaterally, with membranous ventral extension of tegulum directed anteriorly (Fig. 10). Female epigyne viewed ventrally with poorly defined central septum of varying width with either rounded or weakly notched posterior margin (Fig. 12). On either side of central septum two shallow, oval depressions of variable size. Spermathecae seen through cuticle either large and spherical or smaller and elongate oval, located anteriorly. In dorsal view, spermathecae either large and spherical with clearly defined spermathecal ducts or smaller and elongate oval, scarcely distinct from short spermathecal ducts. With either one or two pairs of blind diverticula connected to posterior portion of spermathecal ducts (Fig. 13).

Systematic position and diagnosis: The position of the median apophysis of the male palp of *Katableps* on the terminal portion of the tegulum and its sickle-shaped form suggest that this genus should be assigned to the subfamily Piratinae *sensu* Zyuzin (1993). However, in the absence of any cladistic analysis of the subfamily as a whole, its exact position in relation to other genera remains obscure.

Katableps can be distinguished from all other genera of Piratinae by two synapomorphies: the downward-directed anterior lateral eyes, and the anterior portion of the carapace which projects forward strongly over the clypeus (Figs. 3–4, 7). Although the posterior median eyes of at least one other piratine genus, *Trabea*, are greatly enlarged, the anterior end of the carapace does not project over the clypeus in the same way (Russell-Smith 1982; Alderweireldt 1999). Males of *K. pudicus*, the only species for which both sexes are currently available, can be diagnosed from those of all other described Piratinae by the positioning of the embolus which, in the unexpanded palp, arises ecto-laterally and curves forward at an angle of *c.* 45° so that the tip is directed into the concave surface of the sickle-shaped median apophysis (Fig. 9). The terminal apophysis of *Katableps* is most reminiscent in form of that of some species of *Pirata* and also of *Amblyothele* (Russell-Smith *et al.* 2009), but the genus is easily distinguished by the somatic characters mentioned above. It differs from *Trabea*, *Proevippa* and *Pterartoria* by the absence of a terminal apophysis in the male palp and the lack of membranous extensions of the anterior margin of the tegulum.

Katableps pudicus n. sp. (Figs. 1–13, 18, 21)

Diagnosis: Males of *K. pudicus* are recognised by the conformation of the male palp and by the pattern of four white spots on the dorsal surface of the abdomen. Females of this species can be distinguished from those of other species in the genus by the large, spherical spermathecae of the epigyne (seen in dorsal view) and by the relatively long spermathecal ducts.

Etymology: The specific name is derived from the Latin *pudicus*, meaning “bashful”, and refers to the downcast anterior lateral eyes.

Type material: Holotype ♂, Madagascar, Antsiranana Province, Marojejy Reserve, 14°26'S, 49°45'E, pitfall, 10–16 November 1993, coll. C. Griswold, J. Coddington, N. Scharff (CAS 9008649), together with 1♂, 3♀ paratypes.

Other material examined: Madagascar: Fianarantsoa Province, Ranomafana N.P., 21°12'S, 47°27'E, forest, April 1992, 8♀, coll. V. & B. Roth & S. Kariko (CAS 9008651). Same site and date, 2♀ (CAS 9008648). Antsiranana Province, Marojejy Reserve, 14°26'S, 49°45'E, pitfall, 10–16 November 1993, 2♀, coll. C. Griswold, J. Coddington, N. Scharff (CAS 90027470). Same site and dates, pitfall: 1♂ 2♀ (CAS 9008650); 7♂ 6♀ (CAS 9008655); 5♂ (CAS 9008652); 1♂ (CAS 9008653).

Description: *Holotype male:* Total length 3.33. Carapace: length 1.50, width 1.00. Long and markedly tapering anteriorly, width at anterior eyes almost half maximal width. In lateral view, eye region projecting strongly forward over clypeus. Fovea short and shallow. Head region not at all raised but sharply narrowed and clearly distinct from thoracic region. With series of paired, long, dark, erect setae on either side of central pale band and sparse clothing of short paler setae throughout. Eyes: anterior row strongly procurved, eyes very small, AME 2× diameter of ALE, AME separated from each other by 2× their own diameter and by 3× their own diameter from very small ALEs. ALEs minute, directed downwards. PMEs large, projecting strongly forward over clypeus, 1.83× diameter of PLEs. Separated by their own diameter and by 1.2× their diameters from PLEs. Chelicerae relatively short, length 1.6× height of carapace, with sparse series of erect black setae on inner margin. Retromargin with 3 small teeth, promargin with two minute teeth, situated proximally to those on retromargin. Maxillae broad, widest distally, 2.3× length of labium, strongly truncate at distal end, densely clothed in setae and with dense tuft of dark setae on prolateral corner. Labium 1.4× broader than long, with few long black setae on anterior margin. Sternum scutiform, with long projecting portion between hind coxae and densely clothed in long, adpressed black setae. Legs: leg IV 1.66× length of leg I. All segments densely clothed in short, dark, adpressed setae. Ventral spines of leg I: metatarsus 2-2-2, tibia 2-2. Tarsi I & II fusiform, with scopula of short setae beneath. Paired claws of tarsi relatively short, with 5–6 teeth of equal length, central claw minute, bent at right-angles. Abdomen densely clothed in short, adpressed dark setae and sparse scattering of longer black setae. Spinnerets long and thin, PLS *c.* 1.5 length of ALS. Second segment of PLS 0.5× length of basal segment. Carapace pale brown with cream central band, broad anteriorly but tapering posteriorly. Eye region suffused with black. Chelicerae pale

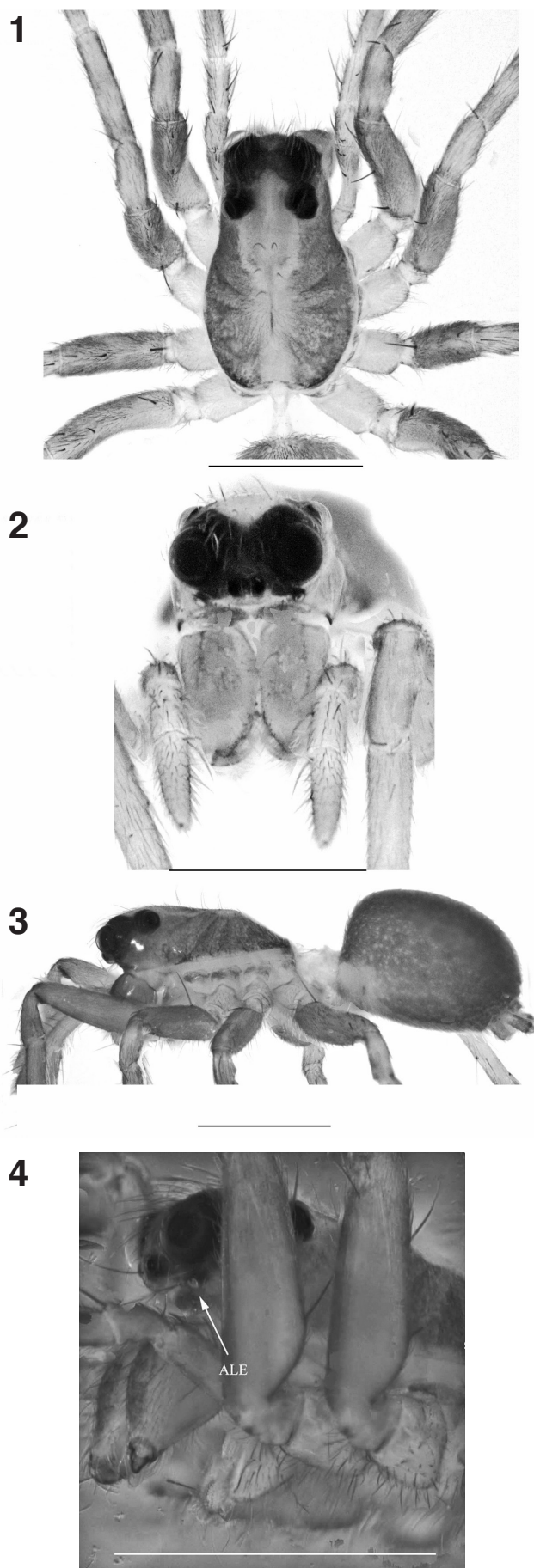
brown, heavily streaked with black. Maxillae and labium pale cream. Sternum cream. Legs: coxae cream, femora dark grey, patellae, tibiae and metatarsi pale grey, tarsi cream. Abdomen dorsally dark grey with faint, paler, lanceolate stripe extending half length and two pairs of white spots in posterior half (sometimes missing); ventrally pale cream. Spinnerets dark grey. Male palp (Figs. 9–11): femur, patella and tibia grey, cymbium orange-cream, all segments clothed in short, adpressed dark setae and longer, erect, black setae. Viewed ventrally, bulb with large curved, spoon-shaped median apophysis situated terminally. Embolus arising ecto-laterally and curving mesally, thin, tapering and with tip directed towards inner margin of median apophysis. Viewed retrolaterally, with membranous ventral extension of tegulum directed anteriorly.

Female: Total length 4.00. Carapace: length 1.70, width 1.00. Shape as in male but less tapered anteriorly; width at anterior eye row 60% of maximal width (Figs. 1, 3). Setation as in male (Figs. 6, 7). Eyes: anterior row procurved as in male but eyes slightly larger. AMEs $2\times$ diameter of ALEs, separated by their own diameter and from ALEs by $3.5\times$ their diameters. ALEs directed downwards. PMEs as in male, $2\times$ diameter of PLEs, separated by their own diameter and by $1.25\times$ their diameters from PLEs (Figs. 5–7). Chelicerae: shape as in male. Cheliceral teeth as in male but those on retromargin slightly larger. Maxillae and labium (Fig. 8): shape as in male. Sternum: shape as in male but much less produced between coxae IV (Fig. 8). Setation as in male. Legs: leg IV $1.49\times$ length of leg I. Ventral spines of leg I: metatarsus 2-2-2, tibia 2-2-2. Spines slightly longer and thinner than in male. Tarsi less fusiform than in male, tarsal claws similar but slightly longer. Abdomen: shape and setation as in male. Spinnerets: form as in male. Coloration as in male except for chelicerae, maxillae and labium which are pale gold. Leg coloration as in male but somewhat paler with less contrast between coxae and tarsi and remaining segments. Abdomen dorsally pale grey with faint, paler, lanceolate mark in anterior half but otherwise without detectable pattern. Epigyne (Figs. 12–13, 18): viewed ventrally, with small central septum which expands posteriorly to form polygonal plate with rounded posterior margin. On either side of septum two large, oval depressions and positioned anterior and lateral to these depressions round spermathecae seen through cuticle. Viewed dorsally, spermathecae large, almost touching. Spermathecal ducts broad, curving mesally to fertilisation pore near hind margin of central septum. Paired short diverticula apparently join spermathecal duct just before fertilisation pore.

Variation: Total length: males 2.92–3.58, median 3.25 ($n = 10$), females 3.25–4.92, median 4.08 ($n = 10$). As in most spiders there is variation in the depth of pigmentation and in particular the white spots on the dorsal surface of the abdomen of males vary considerably in visibility.

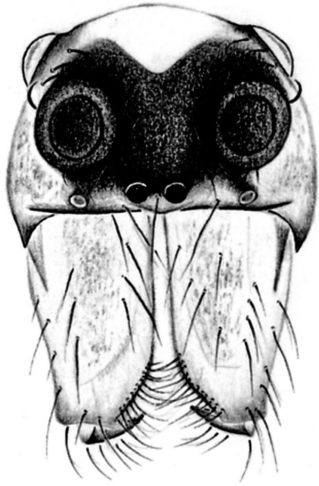
Distribution: Madagascar (Fig. 21). Since the two areas from which it has been recorded are widely separated it is likely to occur in other forest areas.

Biology: In Marojejy Reserve this species was collected in primary lower montane rainforest (about 700–800 m a.s.l.) under closed canopy, while in Ranomafana National Park it was taken from disturbed primary forest, also under closed canopy.

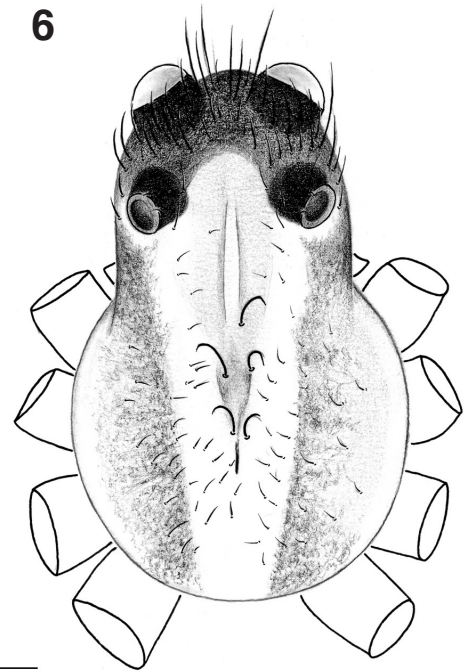


Figs. 1–4: *Katableps pudicus* n. gen. & sp., female. **1** Carapace, dorsal view; **2** Habitus, frontal view; **3** Habitus, lateral view; **4** Frontal part of carapace, lateral view (ALE = anterior lateral eye). Scale lines = 1.0 mm.

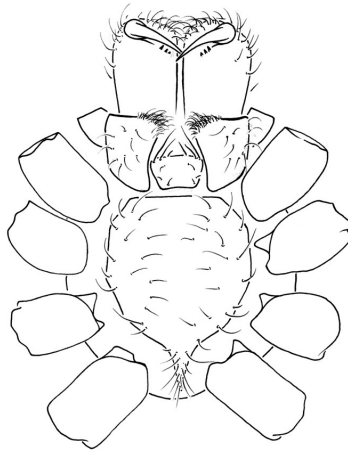
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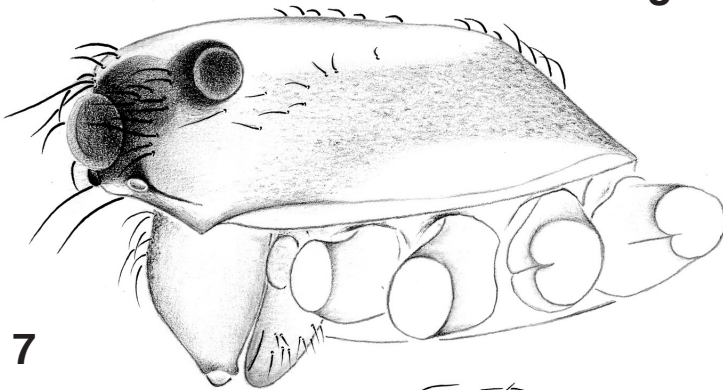
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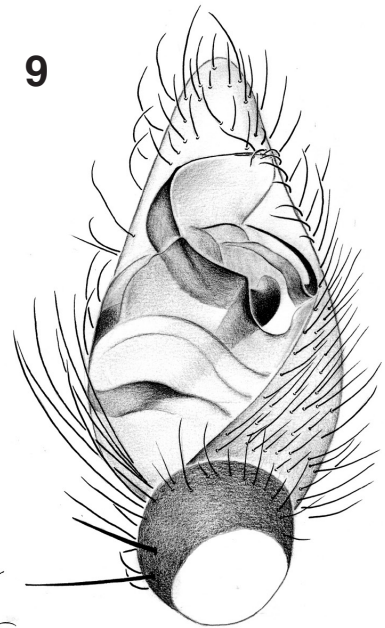
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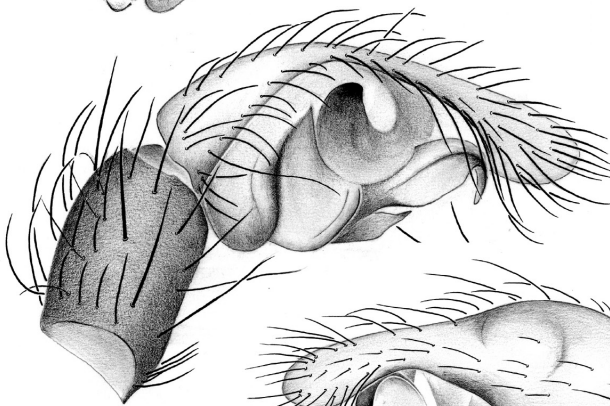
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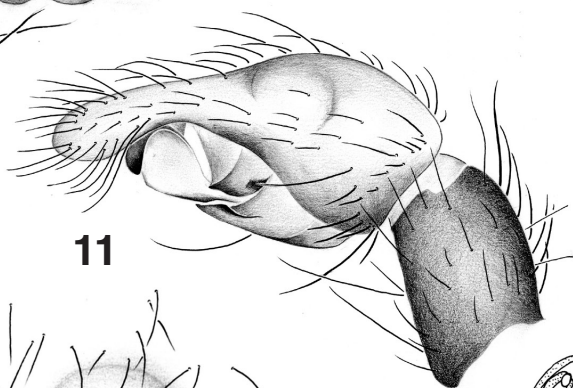
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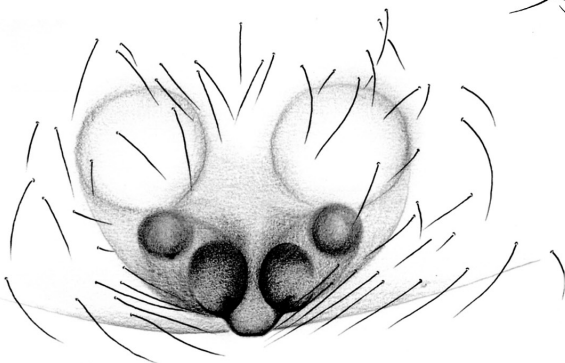
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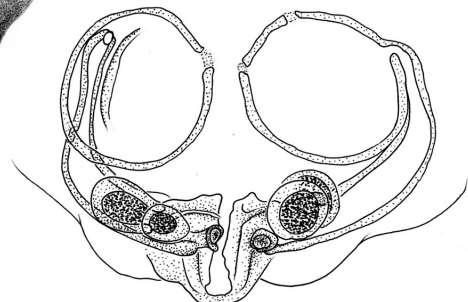
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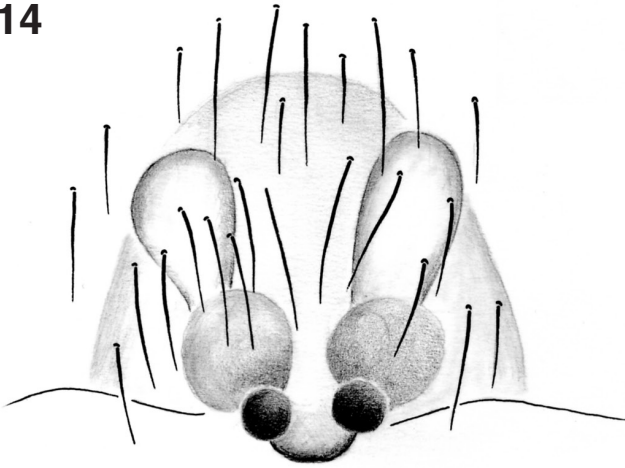


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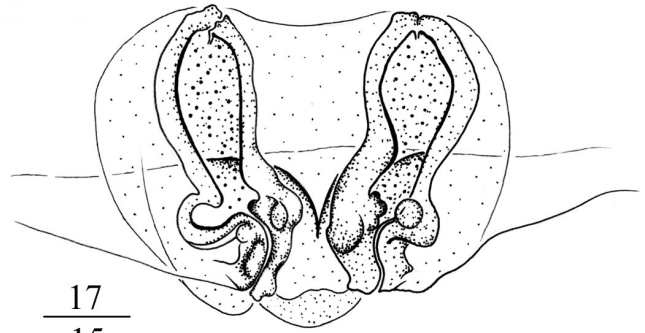


Figs. 5–13: *Katableps pudicus* n. gen. & sp. **5** Female carapace, frontal view; **6** Ditto, dorsal view; **7** Ditto, lateral view; **8** Prosoma, ventral view; **9** Right male palp, ventral view; **10** Ditto, retrolateral view; **11** Ditto, prolateral view; **12** Epigyne, ventral view; **13** Epigyne, cleared, dorsal view. Scale lines = 0.50 mm (**5–7, 9–13**), 1.0 mm (**8**).

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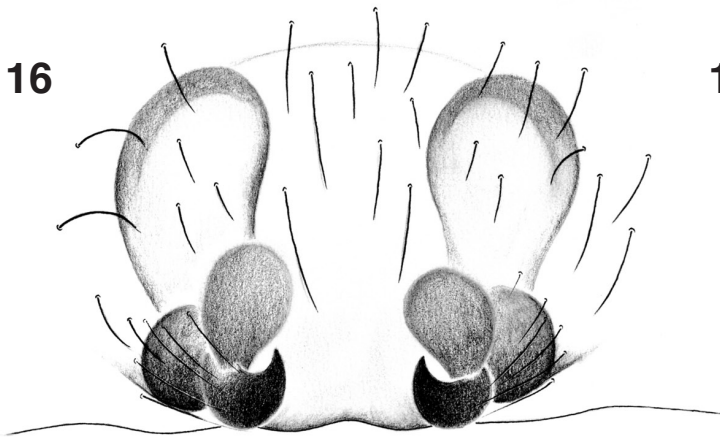
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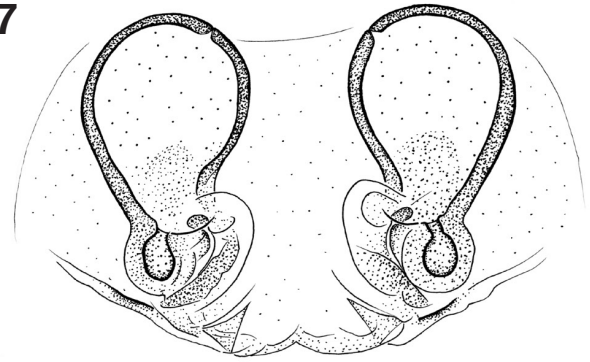
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Figs. 14–17: *Katableps perinet* n. sp. **14** Epigyne, ventral view; **15** Epigyne, cleared, dorsal view. **16–17** *Katableps masoala* n. sp. **16** Epigyne, ventral view; **17** Epigyne, cleared, dorsal view. Scale lines = 0.1 mm.

Katableps perinet n. sp. (Figs. 14–15, 19, 21).

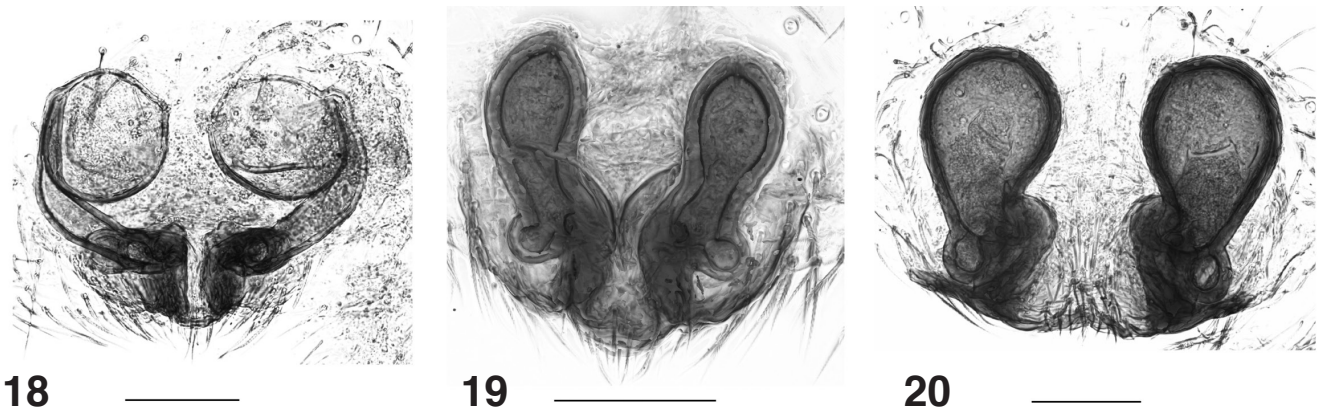
Diagnosis: Females of *K. perinet* differ from those of *K. pudicus* by the elongated oval spermathecae (spherical in *K. pudicus*) and from *K. masoala* by the smaller spermathecae and much narrower central septum.

Etymology: The specific name is a toponym derived from Perinet, the area of Madagascar where the species was first recorded.

Type material: Holotype ♀, Madagascar, Toamasina Province, Perinet N. P., near Andasibe, 1000 m a.s.l., 18°56'S, 48°24'E, 4–5 November 1993, coll. C. Griswold, J. Coddington, N. Scharff (CAS 9008654).

Description: Female: Total length 2.83. Carapace: length 1.20, width 0.90. Head region somewhat elevated, only slightly tapered, width at anterior eyes two-thirds maximal width. Fovea slightly longer than in other species of genus. Clothed in short, dark, adpressed setae and with few long, erect, black setae located centrally behind ALEs. Eyes: anterior row strongly procurved. AMEs 2× diameter of ALEs, separated by 0.5× their diameters and by 2.5× their diameters from ALEs. ALEs directed downwards. PMEs projecting strongly forward over clypeus, 1.67× diameter of PLEs, separated by 0.80× their diameters and by 1.1× their diameters from PLEs. Chelicerae relatively short and broad, length 1.20× height of carapace, sparsely clothed in erect

black setae. Retromargin with three minute teeth, promargin not seen. Maxillae 2× length of labium, distal margin rounded. Labium subquadrate, 1.2× as long as broad, with few long black setae on anterior margin. Sternum scutiform, strongly produced between coxae IV, with sparse scattering of very long black setae. Legs: leg IV 1.21× length of leg I. Ventral spines of leg I: metatarsus 2-2-2, tibia 2-2-2, spines long, thin and tapering. Paired tarsal claws very short with 5–6 subequal teeth. Abdomen densely clothed in short, adpressed dark setae. Spinnerets largely retracted and shape hardly discernible. Carapace pale golden yellow with two broad, dark, longitudinal bands running full length. Eye region shining black. Chelicerae orange streaked with black. Maxillae, labium and sternum golden orange. All leg segments pale golden yellow, tibiae of legs I and II slightly darker. Abdomen dorsally pale brown, without any detectable pattern, ventrally pale cream. Spinnerets pale cream. Epigyne (Figs. 14–15, 19): in ventral view, most similar to that of *K. masoala* but much smaller. Posterior margin of central septum narrow and rounded. Depressions on either side of septum poorly developed and obscure. Outline of spermathecae seen through cuticle elongate oval, small. In dorsal view, spermathecae small, almost same diameter as greatly reduced spermathecal ducts. With single pair of blind diverticula on each side opening into spermathecal ducts approximately halfway along their length.



Figs. 18–20: Cleared epigynes, dorsal view. **18** *Katableps pudicus* n. gen. & sp.; **19** *Katableps perinet* n. sp.; **20** *Katableps masoala* n. sp. Scale lines = 0.1 mm.

Male: Unknown.

Distribution: Madagascar (Fig. 21). Only recorded from the type locality.

Biology: This species occurs in montane rain forest but otherwise nothing is known.

***Katableps masoala* n. sp. (Figs. 16–17, 20, 21)**

Diagnosis: Females of *K. masoala* can be distinguished from those of *K. pudicus* by the oval rather than spherical spermathecae and very short spermathecal ducts and by the broader central septum of the epigyne. They differ from those of *K. perinet* by the larger spermathecae and the much broader central septum.

Etymology: The specific name is a toponym derived from Masoala, the area of Madagascar where the species was first recorded.

Type material: Holotype ♀, Madagascar, Toamasina Province, Presqu'île de Masoala, 6.3 km S of Ambanizana, Andranobe, 15°41'S, 49°57'E, 14 November 1993, sifted from litter in rainforest, coll. B. L. Fisher (CAS 9008647).

Description: Female: Total length 4.08. Carapace: length 2.00, width 1.40. Moderately tapered, width at anterior eyes two-thirds maximum width, head region slightly elevated. Fovea slightly longer than in other species of genus. With single long, erect, black seta located centrally behind ALEs. Eyes: anterior row moderately procurved. AMEs 1.33× diameter of ALEs, separated by 0.5× their diameters and by 1.5× their diameters from ALEs. ALEs directed downwards. PMEs projecting strongly forward over clypeus, 1.87× diameter of PLEs. PMEs separated by 0.87× their diameters and by 0.93× their diameters from PLEs. Chelicerae relatively short and broad, length 1.42× height of carapace, sparsely clothed in erect black setae. Retromargin with three minute teeth, promargin with two minute teeth situated proximally to those on retromargin. Maxillae 2× length of labium, distal margin strongly truncate. Labium subquadrate, as long as broad, with few long black setae on anterior margin and on maxillae. Sternum scutiform, strongly produced between coxae IV, with sparse scattering of erect black setae. Legs: leg IV 1.34 length of leg I. Ventral spines of leg I: metatarsus 2-2-2, tibia 2-2-2, spines long, stout and tapering. Tarsi not scopulate, paired tarsal claws short with 5–6 subequal teeth, central claw bent at right angles. Abdomen densely clothed

in short, adpressed dark setae and some longer black setae as well as row of long black setae projecting forward from anterior margin. Spinnerets apparently shorter than those of *K. pudicus* but possibly because unexpanded. Carapace pale golden yellow with narrow dark marginal band. Eye region black. Chelicerae, maxillae and labium coloured as carapace. Sternum cream. Legs: coxae and basal half of femora cream, remaining segments golden brown except for cream tarsi. Abdomen dorsally pale brown, without any detectable pattern, ventrally pale cream. Spinnerets coloured as abdomen. Epigyne (Figs. 16–17, 20): in ventral view, central septum poorly defined but much broader than that of *K. pudicus*. Depressions on either side of septum poorly defined and small, but outline of spermathecae seen through cuticle clearly elongate oval rather than spherical. In dorsal view, spermathecae oval with greatly reduced spermathecal ducts and apparently a single blind diverticulum on each side opening into them near posterior margin of epigyne.

Male: Unknown.

Distribution: Madagascar (Fig. 21). Only recorded from the type locality.

Biology: This species occurs in rain forest at low altitude but otherwise there is nothing known.

Discussion

Madagascar is well known for its unusual spider fauna which, in common with many other groups, shows high levels of endemism. Recent studies on Archaeidae (Wood *et al.* 2007; Wood 2008), Ctenidae (Silva-Dávila 2007), Cyatholipidae (Griswold 1997), Migidae (Griswold & Ledford 2001), Pholcidae (Huber 2003), Pisauridae (Jocqué 1994), Salticidae (Andriamalala 2007) and Theridiidae (Agnarsson & Kuntner 2005) clearly demonstrate the high levels of diversity and endemism in Madagascan spiders. By contrast, our knowledge of lycosid spiders of this region is fragmentary. Only ten species of wolf spiders were previously known from Madagascar, of which all but one (*Tricassa madagascariensis* Jocqué & Alderweireldt, 2001) were described before 1908, mostly without figures and all without adequate diagnoses (Platnick, 2009). There is absolutely no reason to suppose that the diversity of lycosid spiders in Madagascar should be any lower than in Africa, where, with almost 500 species, they rank as the second

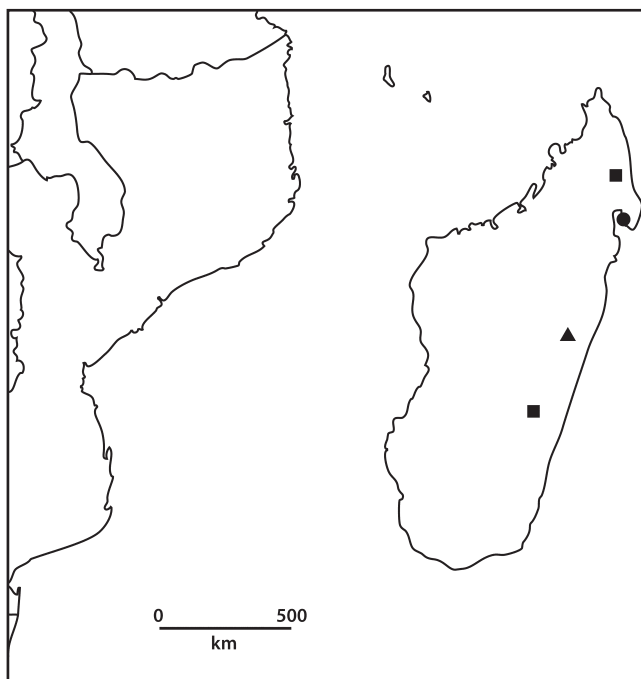


Fig. 21: Map of Madagascar with localities of *Katableps pudicus* n. gen. & sp. (■), *Katableps perinet* n. sp. (▲), *Katableps masoala* n. sp. (●).

most speciose family after Salticidae. The apparent poverty of lycosids in Madagascar is almost certainly a result of under-collecting and the lack of systematic specialists to describe them. It is perhaps therefore not surprising that a new and unique genus of lycosids should be discovered in the first significant collection of this family from Madagascar that we have examined.

For the most part, lycosids are typically inhabitants of open habitats in Africa, including savannas, savanna woodlands, fynbos and agricultural habitats amongst others (Jocqué & Alderweireldt 2005) while in closed forests their ecological niche is usually filled by Ctenidae (Jocqué *et al.* 2005). This is not, however, always the case. The second author has, for example, found a small lycosine species to be abundant in lowland secondary forest in western Nigeria, and a piratine species assignable to the genus *Auloniella* to be common in montane forest in central Ethiopia. Thus the presence of an apparently abundant lycosid in forests in Madagascar is certainly unusual but by no means unique.

The functional significance, if any, of the downward-directed orientation of the anterior lateral eyes in this genus can only be surmised at present. Could they play a role in detecting prey on the poorly lit forest floor? In salticids, it has been shown that the secondary eyes (including the ALEs) are largely movement detectors (Homann 1928) and it is possible that they have a similar function in lycosids. However, the anterior lateral eyes are extremely small in *Katableps* and it can thus be assumed they contain only a small number of visual cells, limiting their effectiveness at detecting anything other than light and dark. An alternative explanation, that their position is merely a side-effect of the enlargement of the posterior median eyes by forward elongation which has forced the anterior lateral eyes to

point downwards cannot be rejected, although this seems somewhat unlikely. The enlargement of the principal (posterior median) eyes in this genus could be an adaptation to improved light gathering in the dark conditions of the forest floor. However, since there have been no comparative studies of the structure and function of eyes in different genera of lycosids, this remains speculation at present.

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