

## The Australian mygalomorph spider genus *Ixamatus* Simon (Dipluridae: Diplurinae) and its affinities

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### Summary

*Ixamatus varius* (L. Koch), the type-species, is redescribed. The term "spur" is confined to a cuticular apophysis, and "megaspine" is suggested to denote an enlarged spine which may be sited on a spur. *Ixamatus* is diagnosed by the presence of a tarsal rod on all tarsi, two megaspines on the male tibia, and usually a single spine on the palpal tarsus of females. *Ixamatus*, *Aname*, *Dekana* and *Chenistonina* are recognised as the tribe Anamini.

### Introduction

L. Koch (1873) described a new spider genus, *Ixalus*, from Bowen, Queensland, and Simon (1887), recognising that *Ixalus* was preoccupied by a mammal genus, replaced it with *Ixamatus*. *Ixamatus* was the second diplurine genus described from Australia (*Aname* Koch, 1873, preceded it by a few pages), and has since figured centrally in the taxonomy of the Australian Diplurinae.

Spiders of this genus are common in Queensland, and may be mistakenly referred to other diplurine genera. Main (1972) discussed differences between *Ixamatus* and other Australian diplurines and focussed on the following characters: sternal sigilla, foveal curvature, tibial spur (males), burrow (females), and the spines on the palpal tarsus (females). *Ixamatus*, *Aname*, *Chenistonina* and *Dekana*, and to a lesser extent, *Stanwellia*, form a complex of intergrading genera. Main (1972) clarified the diagnostic characters of *Stanwellia*. However, the recognition of *Ixamatus* species has long eluded the author. Thus, it was considered that the redescription of the type-species would facilitate the identification of *Ixamatus*.

### Methods

All drawings were done using a camera lucida (zeichentubus). Measurements are given in millimetres and are the maximum for the respective character, except eye interspaces which are the minimum distance between the respective eyes, and which are expressed as unreduced fractions of the diameter of an AME. Abbreviations are standard for the Araneae, and may be found in Raven (1978).

### Genus *Ixamatus* Simon, 1887

*Ixalus* L. Koch, 1873, p. 469 (nom. preocc.).

*Ixamatus* Simon, 1887, p. 195.

*Ixamatus*: Hogg, 1901, p.257; Simon, 1903, p. 967; Main, 1972, p. 101.

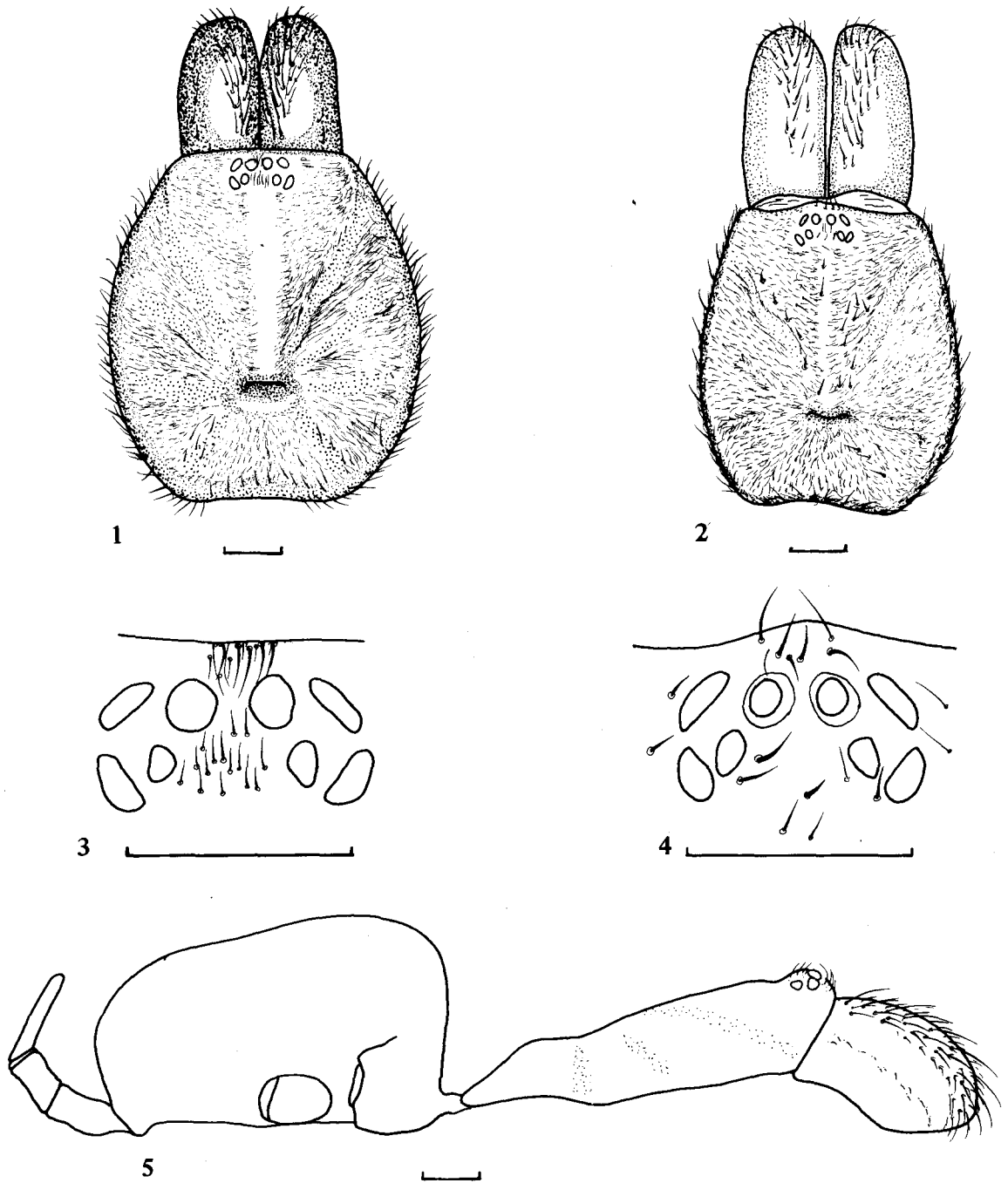
**Diagnosis:** Eight eyes in two rows on eye tubercle. Fovea straight or slightly procurved. Chelicerae with one row of teeth on ventral furrow. Labium much wider than long and without cuspules. Maxillae with rounded heel and numerous cuspules in a tight cluster on the anterior inner angle; serrula absent. Sternum with 6 sigilla: posterior pair long, oval; anterior and middle pairs oval — all separated from margin by half of their lengths. No spines on anterior leg tarsi; one or variable number of basal spines on female palpal tarsus. Three claws: superior claws with two rows of teeth; inferior claw small, bare; palpal claw with one row of teeth. Two rows of trichobothria on tibia; one irregular row on metatarsi and tarsi. Low tarsal rod distal of trichobothria. Lyriform organs present on tibiae. Light scopula on anterior tarsi of males, reduced in females; generally no metatarsal scopula in either sex. Cuticle highly rugose. Trichobothrial bases clearly corrugiform. Four spinnerets: posterior medians unsegmented; posterior laterals three-segmented — apical segment digitiform; basal segment with subsegmentation.

Male palp pyriform, embolus elongate and its basal origin straight. Tibia I of male generally with 2 megaspines on raised mounds (incipient spurs) at half the length of tibia or no modifications.

**Type-species:** *Ixalus varius* L. Koch, 1873.

**Type-locality:** Bowen, Australia. 20° 01' S. 148° 15' E.

**Distribution:** Congeners of *Ixamatus varius* are found throughout the coastal rainforests of Queensland as far north as the Atherton Tableland (17° S.),



Figs. 1-5: *Ixamatus varius* (L. Koch), syntypes. 1 Male carapace; 2 Female carapace; 3 Male eyes; 4 Female eyes; 5 Lateral profile of female. All scale lines, 1 mm.

and south to northern New South Wales.

*Remarks:* *Ixamatus* differs from all other Australian diplurine genera in the joint possession of two thick medial spines (Fig. 10) on the first tibiae of the male, a low tarsal rod (Figs. 11, 12) on all tarsi, a rounded heel on the maxillae and cuspules clustered only on the anterior inner angle of the maxillae. Although scanning micrographs of the tarsal rod of a female *Ixamatus* sp. are provided (Figs. 11, 12), it is readily visible under a dissecting microscope.

The above diagnosis differs in several respects from that implied by Main (1972, 1976). Main states that *Ixamatus* has no spurs on the male tibiae, two spines on the female palpal tarsus, a scopula in females, and often has orange leg segments.

The term "spur" is regarded by Main (1972) as an extension of the cuticle, and distinct from the often enlarged spine which crowns it. Forster (1967) regards the term as inclusive of both apophysis and articulated thickened spine, if present; whereas Raven (1978) confines the term to a thick immovable spine. Main's usage is strictly correct, and I suggest a synthesis of Coyle's (1968) terminology to eliminate any ambiguity. A "spur" should then be regarded as the cuticular apophysis, and the thickened spines, whether articulated or not, crowning the spur on the male tibia will be known as "megaspines" (see Fig. 10a).

In contrast to Main's diagnosis, then, *Ixamatus* has two megaspinous on a low apophysis of the first male tibiae (Fig. 10); most females so far examined have only one spine on the female palpal tarsus, with no mark of a second spine; the tarsal scopula of both sexes is light, it does not obscure the cuticle, and may extend laterally.

As a result of the above diagnostic changes, species included in *Ixamatus* are restricted to *I. varius*, *I. broomi* Hogg, 1901 and *I. maculatus* Rainbow & Pulleine, 1918. Of the remaining species, *I. distinctus* Rainbow, 1914 is an *Aname*, and Main (1972) has referred *I. gregori* Hogg, 1901 to *Stanwellia*. Main (1972) erroneously transferred *Aname flavomaculata* to *Ixamatus*.

#### *Ixamatus varius* (L. Koch, 1873) (Figs. 1-10)

*Ixalus varius* L. Koch, 1873, p. 469 (nom. preocc.).

*Ixamatus varius*: Simon, 1887, p. 195.

*Types:* ♂♀ syntypes. Zoologisches Staatsinstitut und Zoologisches Museum Hamburg.

#### *Syntype Male*

*Colour in Alcohol:* Carapace, chelicerae and legs reddish brown. Dorsal abdomen dark brown with numerous pale spots; ventral abdomen centrally a pale field, surrounded posteriorly and laterally by brown mottling.

*Carapace* (Fig. 1): With light golden hairs on striae ridges. One row of strong marginal bristles. From 1-5 bristles in posterior striae. Foveal bristles absent. Fovea straight, ends reflexed back. Ten to 12 bristles between PME, and 2-5 in front of AME. Caput slightly raised. Clypeus about two-thirds width of AME.

*Eyes* (Fig. 3): Eight, on a low tubercle. AME circular, the rest suboval. Group occupies one-third the width of the head, and is wider than long in ratio 58:30. A line joining centres of anteriors is straight, a similar line through posteriors is recurved. Ratio of AME:ALE:PME:PLE = 13:16:8:16. Ratio of MOQ length:back width:front width = 25:38:29. Minimum eye interspaces: AME-AME, 9/13; AME-ALE, 3/13; ALE-PLE, 2/13; PME-PLE, 2/13; PME-PME, 24/13.

*Chelicerae:* Rastellum absent. Covered with stout bristles dorsally. Nine evenly sized and spaced teeth on promargin of furrow; 5-10 small teeth in an intermediate basal row.

*Labium* (Fig. 6): Length, width = 0.60, 0.80 respectively; anteriorly indented. Lacking cuspules; covered only with long bristles. Separated from sternum by a groove, 0.12-0.24 mm across.

*Maxillae* (Fig. 6): Quadrangular, posterior ental corner slightly produced. Length, width = 2.31, 1.20 respectively. With 50-60 fine cuspules confined to inner angle.

*Sternum* (Fig. 6): Long, oval; length, width = 3.60, 2.84 respectively. Six sigilla: posterior pair long, oval; anterior and middle pairs oval; all separated from margin by 0.50 times their respective lengths. Ratio of posterior: middle: anterior sigilla: maximal sternal width = 22:11:9:180.

*Legs* (Fig. 10): Leg I noticeably thicker and darker than leg II. Tibia I with a group of thick spines ventrally, with two large megaspinous on conspicuously raised mounds. Light scopula on tarsi I and II, absent from III and IV where only long

bristles present.

*Spines*: No spines on tarsi. Proximodorsal spine on femur II-IV very long and attenuate. *First leg*: femur, 0; patella, p.2; tibia, p.2.v.4. + 2 megaspines; metatarsus, v.2. *Second leg*: femur, d.1; patella, p.4; tibia, p.3.v.4. + 1 long thick spine; metatarsus, p.2.v.4. *Third leg*: femur, d.1; patella, p.1.r.1; tibia, p.2.r.3.v.7; metatarsus, p.3.r.3.v.6. *Fourth leg*: femur, d.1; patella, r.1; tibia, p.2.r.2.v.7; metatarsus, p.3.r.3.v.7. *Palp*: 0. *Claws*: 2 rows, each of 7 teeth on superior tarsal claws; inferior claw bare, slightly curved.

*Palp* (Fig. 8): Tibia at mid-point about twice its basal width. Bulb simple, pyriform, which with long tapering embolus is over half length of tibia.

*Spinnerets* (Fig. 7): Four. Posterior medians 0.88 long, 0.16 in diameter and separated by 0.67. Posterior laterals three-segmented, with a retrolateral subsegmentation of basal segment. Length of basal, middle, apical and total segments of posterior laterals = 1.40, 1.28, 1.80, 4.48 respectively.

#### *Syntype Female*

The female type is redescribed where it differs strongly from the male.

*Carapace* (Fig. 2): Fovea slightly procurved with recurved ends. Five to six anteromedian bristles; few bristles lateral to eye group. Caput low.

*Eyes* (Fig. 4): Group occupies 0.27 times head width, and is wider than long in ratio 58:28. Anteriors straight, posteriors recurved. Ratio of MOQ length:back width:front width = 22:36:23. Minimum eye interspaces: AME-AME, 8/8; AME-ALE, 5/8; PME-PLE, 3/8; ALE-PLE, 4/8; PME-PME, 22/8.

*Chelicerae*: Promargin with 9 teeth on ventral furrow; a group of 10 small teeth in an irregular long basal intermediate group.

*Labium* (Fig. 9): No cuspules. Width, length = 1.40, 0.60 respectively.

*Maxillae* (Fig. 9): Cuspules confined to inner angle. Front length, back length, width = 2.00, 2.60, 1.36 respectively.

*Sternum* (Fig. 9): Length, width = 3.00, 2.68 respectively. Ratio of posterior:middle:anterior sigilla:maximal sternal width = 10:7:5:67.

*Legs*: Scopula light on tarsus I, almost absent, on II; few scopuliform hairs distally on metatarsus I.

*Spines*: No spines on leg tarsi. *First leg*: tibia, v.3; metatarsus, v.5. *Second leg*: femur, d.3; patella, p.1; tibia, p.2.v.3; metatarsus, p.1.v.6. *Third leg*: femur, p.2.d.1.r.2; patella, p.2; tibia, p.2.r.2.v.7; metatarsus, p.3.r.2.v.7. *Fourth leg*: femur, d.1; tibia, r.2.v.7; metatarsus, p.2.r.3.v.8. *Palp*: tibia, v.7; tarsus, v.1 (proventral and on both left and right tarsi).

*Claws*: Two rows, each of 7 teeth, on superior claws of legs I and II; leg III with 4 teeth in ectal row, and 3 in ental row of each claw; leg IV with 4-5 teeth in ectal row, and 2 in ental row of each claw. Inferior claw similar to that of male. Palpal claw with one row of teeth entally.

*Trichobothria*: Number and position similar to male, but with 6-8 trichobothria on tarsi.

*Spinnerets*: Posterior medians, 1.00 long. Basal, middle, apical and total segments of posterior laterals = 1.25, 1.25, 1.84, 4.34 respectively.

*Internal genitalia*: Unilocular; genital aperture opens onto a smoothly curving lip.

*Material examined*: The types of *I. varius* and the following: 6♀3 juv., Crediton, 21° 13' S. 148° 31' E., Qld, open tube in rotting log, 15 April 1975, R. Kohout, V. E. Davies, QM S 398. Furthermore, the examination of undescribed species from Queensland and New South Wales has permitted greater understanding of the limits of variation, and the wider distribution of the genus.

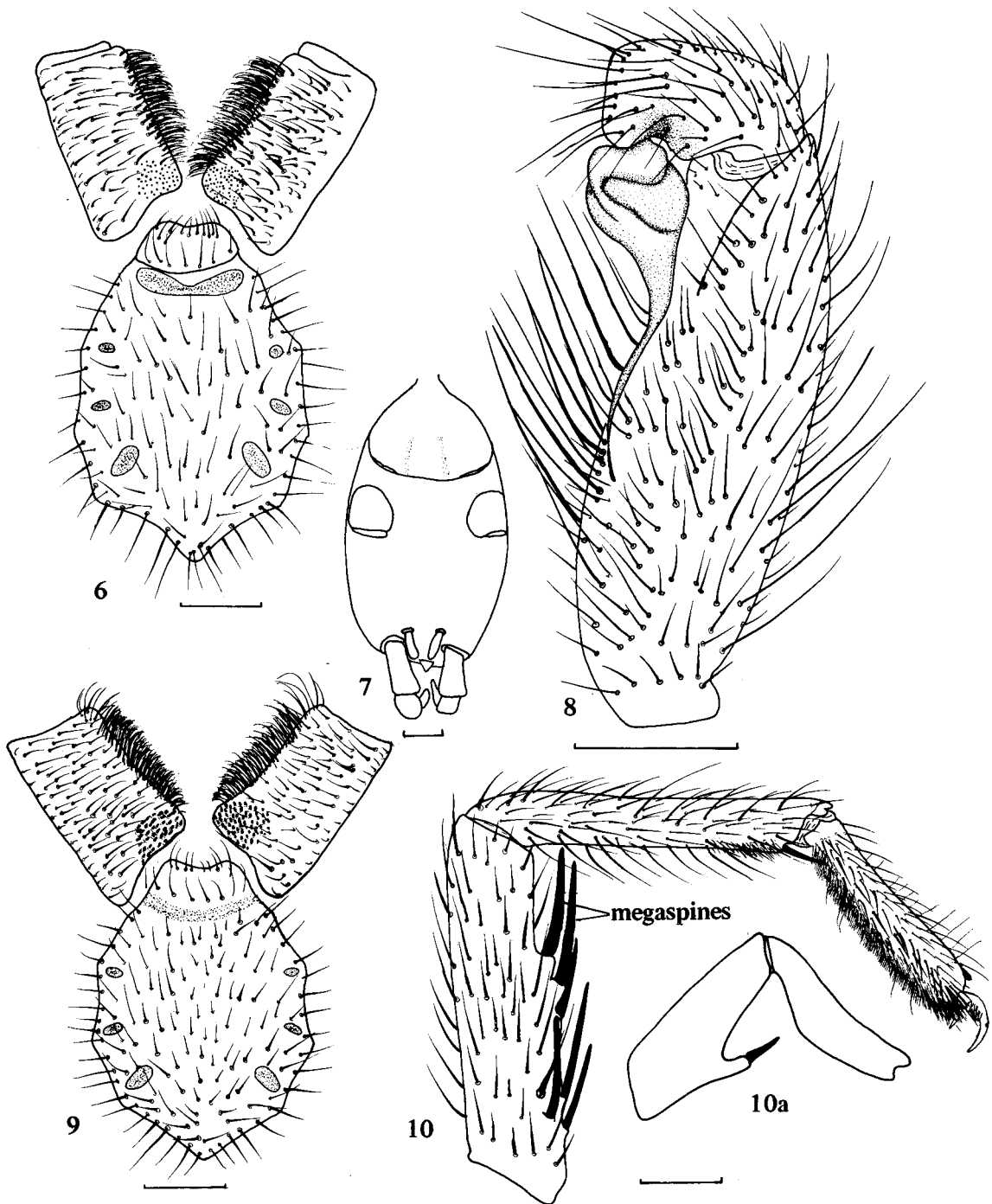
*Distribution and Habitat*: *I. varius* is known from the type-locality, and has been re-collected in rain-forest near Mackay.

Webs of *Ixamatus* species are well-defined tube-webs under logs and rocks; sometimes they have short (up to 4-5 cm) tubes into the ground.

An interesting aspect of the behaviour of *Ixamatus* species is suggested by the frequent capture of mature females in pitfall traps.

#### Discussion

*Ixamatus* is very closely related to the diplurine genera *Aname*, *Dekana* and *Chenistonina*. The form of the spur-megaspines combination on the first leg of males of these genera is readily derivable from ancestral *Ixamatus*-like megaspines. Main (1972, fig. 4) shows the tibial spur of a male of *Chenistonina* with a megaspine and a second smaller basal spine. In examining many *Aname* males, the general transition



Figs. 6-10: *Ixamatus varius*, syntypes. 6 Male sternum, maxillae and labium; 7 Male ventral abdomen showing spinnerets; 8 Male left palpal tibia and tarsus, retrolateral view; 9 Female sternum, maxillae and labium; 10 First right tibia, metatarsus and tarsus of male, retrolateral view. All scale lines, 1 mm. 10a Prolateral view of tibia and metatarsus I of ♂ *Aname*, *Chenistonia*, *Dekana*, showing megaspine on spur. Not to scale.

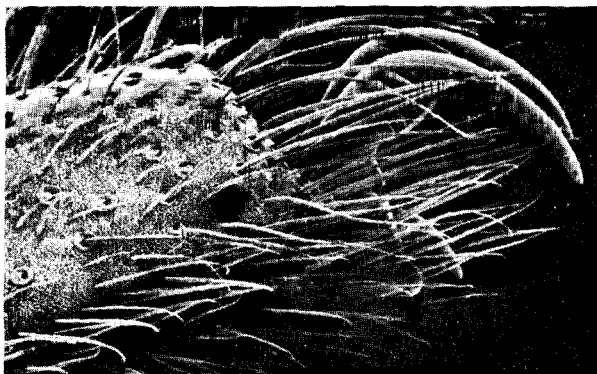
from 2 megaspines on the tibia to a selective thickening of one of these megaspines, and the elevation of a spur, as in *Chenistonia*, is readily evidenced. Thus, the form of the male tibial modifications of these four genera, *Aname*, *Ixamatus*, *Dekana* and *Chenistonia*, are very similar, and are regarded herein as constituting the tribe Anamini.

Of the other characters used by Main (1972) in the diagnosis of diplurine genera, the form of the burrow and the spination of the female palpal tarsus vary within each genus. Furthermore, the spination of the female palpal tarsus may be bilaterally variable in *Aname*, *Ixamatus* and *Dekana*, i.e. with a different number of spines on the left and right palp of the same individual. However, B. Y. Main (pers. comm.) comments that the spination of the palpal tarsus of

females of *Chenistonia* and *Stanwellia* is bilaterally invariant.

It is important that a genus should have an independently derived and unique character in order to be regarded as monophyletic. Therefore, the presence of a pair of basal spines on the female palpal tarsus — a character present in several Neotropical diplurine genera — cannot be used to delimit monophyletic groups. Until further genera have been examined the uniqueness of the characters of *Ixamatus*, and of the tribe Anamini, is uncertain, but the central position of the spur-megaspine combination in this group appears to be unusual.

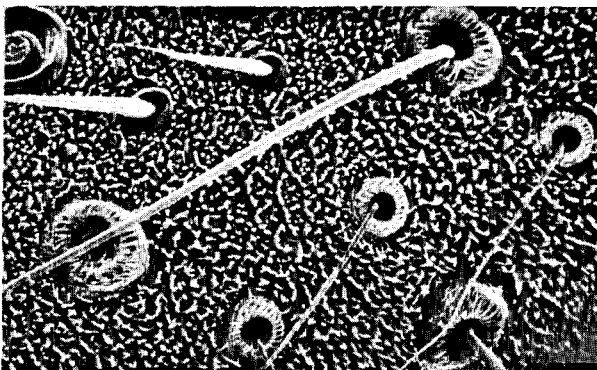
The affinities of the Anamini are diffuse. Simon (1903) suggested that *Entypesa*, from Madagascar, had affinities with *Ixamatus*, although *Entypesa* has a



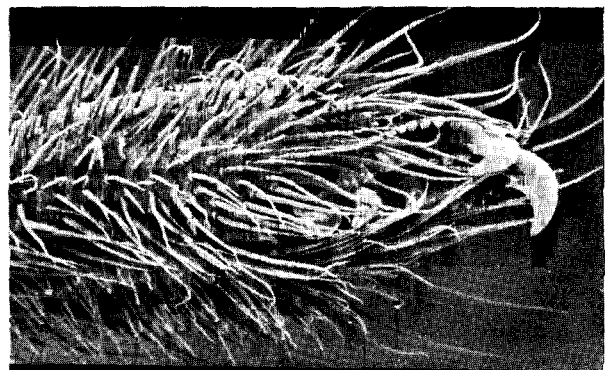
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Figs. 11-14: *Ixamatus* sp., female. 11 End of tarsus, showing rod and claws; 12 Tarsal rod; 13 Tarsal cuticle and trichobothrial bases; 14 Ventral tarsus, showing claws and scopula. Scale lines: Fig. 12 = 12.5  $\mu$ ; Figs. 11, 13, 14 = 125  $\mu$ .

spur on tibia I of males (Benoit, 1965) as do males of *Brachythele* (Hogg, 1901). From recent examination of Australian diplurines it is apparent that the Anamini share the absence of the maxillary serrula with *Teyl*, some *Stanwellia* species and *Kiama*. The sporadic appearance of the serrula in *Stanwellia* suggests that the serrula may be secondarily lost in the anamine genera. The Anamini differ from the Neotropical Trechoninae in the absence of stridulatory lyra on the maxillae, the presence of short, digitiform posterior lateral spinnerets, and short inflexible tarsi; their affinities may therefore lie with *Brachythele* and allied genera.

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