

## Diagnosis and relationships of the myrmicine ant genus *Ishakidris* gen.n. (Hymenoptera: Formicidae)

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**ABSTRACT.** The ant genus *Ishakidris* from Sarawak is described as new. Its relationships with the Brazilian monotypic genus *Phalacrotermes* Kempf and the Malagasy monotypic genus *Pilotrochus* Brown are discussed, and the *Phalacrotermes* genus-group is established to hold the three genera. The resemblances of *Ishakidris* to the smithistrumiform dacetine genus *Glamyromyrmex* Wheeler and the agroecomyrmecine genus *Tatuidris* Brown & Kempf are discussed and the similarities are analysed as the results of convergence in the characters concerned.

### Introduction

In 1960 Kempf described a remarkable Brazilian myrmicine ant genus, *Phalacrotermes*, which bore a striking similarity in habitus to the smithistrumiform dacetines of the genus *Glamyromyrmex* Wheeler. He stated in the original description that 'this new genus seems at least superficially related with the ants of the tribe Dacetini', and observed that its habitus was reminiscent of both *Glamyromyrmex* and *Codiomyrmex* Wheeler. However, after listing the diagnostic characters of *Phalacrotermes* he ultimately decided that 'it seems best not to include the present genus in the Dacetini', but admitted that it appeared 'even farther removed from all other myrmicine tribes'.

Bolton (1983) retained *Phalacrotermes* as a peripheral dacetine, including it in the synopsis of the dacetine generic distribution and enumeration of species, as there seemed no better placement for it. In the text it was pointed out that *Phalacrotermes*, together with a related but undescribed Indo-Australian genus, did not fit in any of the recognized subtribes of the Dacetini, and speculated that

'there is a very strong possibility that *Phalacrotermes* and its undescribed relative may be convergent on the smithistrumiform dacetines from some other part of the Myrmicinae'.

The new genus, *Ishakidris*, is described below and its diagnostic characters listed. The description is followed by four separate sections analysing and discussing its real and apparent relationships with the genera *Phalacrotermes*, *Glamyromyrmex*, *Tatuidris* and *Pilotrochus* respectively. It is concluded that *Ishakidris* shares a genuine close phylogenetic relationship with *Phalacrotermes* and that these two genera together are most probably distantly related to *Pilotrochus*. A genus-group is established and defined to hold these three genera. The analysis of *Glamyromyrmex* and *Tatuidris* indicates that their apparent similarity to *Ishakidris* does not reflect a genuine relationship but is the result of convergence in a number of character-states.

Representatives of all the genera under discussion are components of the extensive tropical leaf litter and topsoil fauna of ants. All appear to be uncommon or rare and most species are represented by only very few specimens in museum collections. *Phalacrotermes* and *Tatuidris* are exclusively Neotropical, the former known from a single sample collected in Brasil, the latter from two samples collected

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in El Salvador and Mexico respectively. *Pilotrochus* is represented by a unique worker from east central Madagascar and a single worker also constitutes the known representation of *Ishakidris*, from the lowland rainforests of Sarawak. *Glomyrmex* is more widely distributed. With eighteen described species and a number of undescribed species it occurs in the tropical zones of all zoogeographical regions, but has a preponderance of species in the Neotropical and Afrotropical regions.

#### *Ishakidris* gen.n.

**DIAGNOSIS OF WORKER.** Ants belonging to subfamily Myrmicinae. Mandibles massively constructed and in profile the convex apical (masticatory) margin almost at a right-angle to the long axis of the head. Mandibles serially dentate and opposable, with 12 teeth on each apical margin and with the teeth alternately larger and smaller from base to apex; basal series of teeth larger than apical series and the mandible lacking a basal lamella. Labrum narrowly long-bilobed anteromedially. Palp formula 2,2 (*in situ* count). Outline shape of head in the form of a shield in full-face view (Fig. 2), the occipital corners acute and the margin between them concave except for a shallow median convexity which encloses a translucent area of cuticle. Sides of head shallowly convex and continuous with the frontal carinae, the latter massively expanded anteriorly and laterally, fused to the sides of the clypeus and completely obscuring the lateral parts of the head from full-face view; the expanded portions of the frontal carinae semi-translucent. Clypeus broad and broadly inserted between the antennal articulations, the median portion of the anterior free margin evenly convex and prominent. Sites of the antennal insertions showing through the expanded flanges of the frontal carinae in full-face view as a pair of blister-like areas close to the anterior margin of the head and abutting the lateral clypeal margins. Antennae with 9 segments, the apical club of 2 segments. Head in profile with deep antennal scrobes, the eyes small and situated posteriorly within the scrobal area close to the ventrolateral margin. Ventrolateral margin of head delimited by a

sharp longitudinal carina on each side which runs from the ventral base of the mandibular insertion to the posterior cuticular lug or flange at the occipital corner. Ventral surface of head with a broadly convex median bulge or tumulus. Alitrunk fused, without sutures, the pronotum marginate anteriorly and the sides marginate throughout their length. In profile the propodeal dorsum sloping downwards posteriorly to the triangular laminate propodeal spines, which themselves are subtended by, and partially fused with, a broad infradental lamella on each side. Orifice of propodeal spiracle circular, situated close to the posterior margin adjacent to the narrowest point of the propodeal infradental lamellae. Mesopleuron excavated anterodorsally just posterior to the posteroventral corner of the pronotal laterotergite, the excavated area containing a semicircular patch of thin cuticle upon which (or embedded in which) are a series of radially arranged fine hairs or cuticular processes. From this presumably glandular organ a shallow open groove extends posteroventrally, ending in a slit-like impression at the margin of the mesopleuron. In dorsal view the pronotum much broader than the mesonotum and propodeum, the last two separated by a low but sharp transverse carina. Petiole curved-clavate in profile, with a long anterior peduncle and a long low node. Anterodorsal angle of node blunt but well developed, the dorsum of the node merging evenly with the shallowly sloping posterior face, without a developed posterodorsal angle. Petiolar spiracle small, situated at about the midlength of the peduncle. Ventral process of petiole a low laminar crest which runs the length of the segment. In ventral view the process seen to be double and narrowly V-shaped, with a laminar crest ventrolaterally on each side of the peduncle diverging posteriorly and meeting anteriorly close to the insertion. First gastral tergite without a transverse lamellate or spongiform crest basally, the petiole, post-petiole and gaster lacking spongiform appendages. First gastral sternite basally with a very conspicuous broad median flat-topped longitudinal crest which fits between the ventrolateral flanges of the petiole and the post-petiolar laterosternal lobes and restricts the degree of anterior flexion of the gaster.

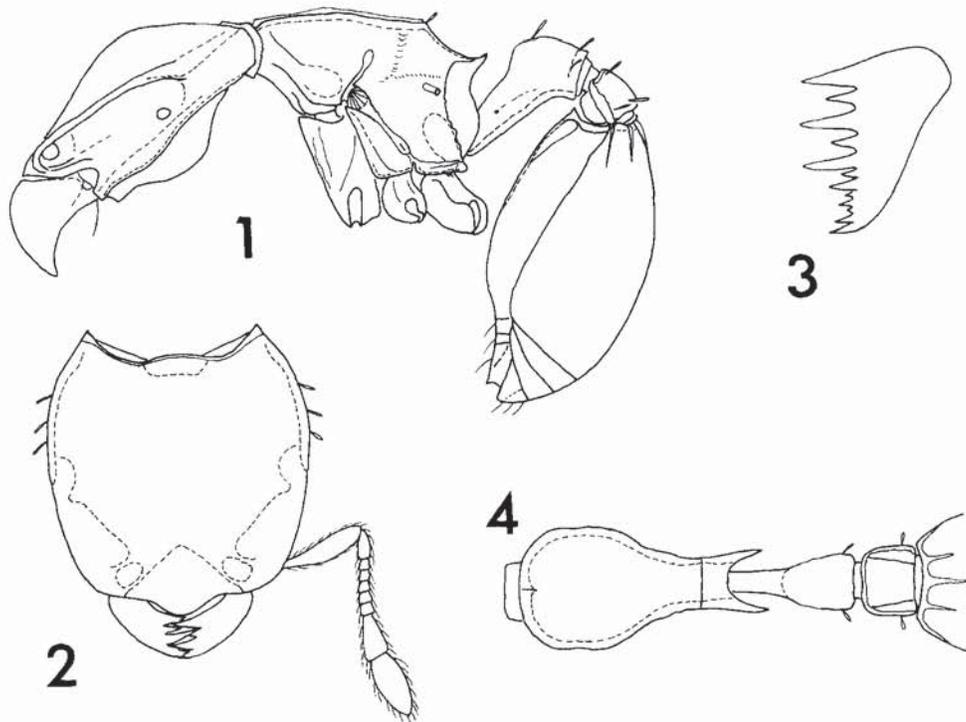
Type-species: *Ishakidris ascitaspis* sp.n.

*Ishakidris ascitaspis* sp.n. (Figs. 1–4)

HOLOTYPE WORKER. TL 4.2, HL 1.14, HW 1.06, CI 93, ML 0.18, MI 16, SL 0.52, SI 49, PW 0.50, AL 1.00 (measurements in millimetres, as defined in Bolton, 1983).

Mandibles longitudinally costulate-rugose, with punctures between the longitudinal components, the mandibles more densely sculptured than any other part of the body. Dentition of apical (masticatory) margins partially obscured by a mesially directed row of yellowish hairs which arise at the base of the tooth-row down the length of the margin. Counting from the base of the mandible the first (= basal), third and fifth teeth are approximately the same length (c. 0.10) and are the largest teeth on the margin; teeth 2, 4 and 7 are about the same size (c. 0.08); teeth 8 and 10 are reduced to denticles whilst 6, 9 and 11 (preapical) are intermediate in size between 5 and 7; the apical tooth (12) is sharply pointed and is only slightly smaller than teeth 2, 4 and 7. Outer margins of mandibles straight to

shallowly concave when the blades are viewed so that the entire dental row is visible, basally passing through a narrow blunt curve to their insertions. Mandibles with fine appressed short hairs, the ventral margin on each side with a single very long fine hair close to the articulation; this is most probably a mandibular trigger hair. Anteromedian margin of labrum with a pair of elongate narrow digitate lobes which are fringed by narrow lanceolate hairs. Apices of lobes dorsally apparently with a fused mass of very fine hairs, but this may be an artefact. Dorsum of clypeus and of head proper mostly smooth, with minute shallow widely scattered punctures from which tiny inconspicuous appressed hairs arise. On the clypeus these tiny hairs are directed towards the anterior margin; on the anterior half of the head they are directed towards the midline and on the posterior half they are directed towards the highest point of the vertex. The semitranslucent expanded portions of the frontal carinae are longitudinally finely arched-costulate, some of the costulae extending on



FIGS. 1–4. *Ishakidris ascitaspis*, holotype worker: 1, body in profile, antennae and legs omitted; 2, head in full-face view; 3, left mandible to show dentition; 4, alitrunk and pedicel segments, dorsal view.

to the head proper on each side of the median convexity. Sides of head behind level of frontal carinae with 3 pairs of short acute laterally projecting hairs, otherwise the cephalic dorsum without standing pilosity of any description. Occipital margin bounded by a low but sharply defined carina which ends in a pair of translucent cuticular flanges or lugs running down the posterolateral occipital lobes. Ventrally these lugs are confluent with the ventrolateral longitudinal carinae which run forwards to the bases of the mandibles. Eyes small, with only 7–8 ommatidia, the maximum diameter 0.06 (c.  $0.06 \times HW$ ). Sides of head between eye and mandibular base finely irregularly rugulose with roughened to punctulate spaces between the rugulae. Above the eye the rugulae fading out and behind the eye the sides of the head mostly smooth. A secondary longitudinal rugule or weak carina runs from near the mandibular base to a point well behind the level of the eye, and is situated between the eye and the carinate ventrolateral cephalic margin. Bulging convex ventral surface of head smooth and shining. Antennal scapes and funiculi clothed with decumbent or appressed narrowly spatulate hairs. With the alitrunk in dorsal view the humeri rounded, the lateral marginations darker in colour than the dorsum proper, the surface lacking standing hairs except for a single pair on the transverse ridge separating the mesonotum and propodeum. A narrow arcuate ridge between the propodeal spines separates the dorsum from the declivity. Dorsum of alitrunk mostly unsculptured, with one or two faint longitudinal rugulae on each side of the mesonotum which run forward on to the posterior pronotum. Both pronotum and mesonotum with a few scattered minute appressed hairs arising from shallow pits, as on the head. Anteromedially the pronotum with a very short low carina. Propodeal declivity between the infradental lamellae exceedingly finely punctulate. Sides of alitrunk glossy and smooth, the propodeal infradental lamellae showing an internal fine reticular patterning. Petiole with sides and dorsum of node rugose, the rugae less well defined dorsally than laterally. Laminar ventral crest of petiole reticulate-punctate as is the area below the level of the spiracle. Dorsum of petiole node with one anterior and two posterior pairs of short narrowly

spatulate hairs, and with another pair posterolaterally. On the postpetiole there is a similar pair of hairs anterodorsally, two pairs posterodorsally and two pairs laterally. Petiole node in dorsal view longer than broad, broadening from front to back; postpetiole broader than long, subrectangular, margined by thick rugae anteriorly and laterally and with a more dorsally situated pair of longitudinal rugae which weakly converge posteriorly. Laterosternites of postpetiole densely punctate. First gastral tergite finely superficially reticulate everywhere, without pilosity and with a few short but sharply defined basal costulae arising from the slightly thickened basal margin. First gastral sternite smooth and convex, the broad basal carina thin-walled and translucent close to the base of the sclerite; the true basal surface of the sternite concave and thickly sclerotized below the postpetiole. Apex of gaster with a few inconspicuous projecting hairs. Femora and tibiae of middle and hind legs with appressed narrowly spatulate hairs. Colour of head, alitrunk and pedicel segments glossy medium brown to reddish brown, the frontal carinae, antennae, legs and gaster lighter brown to yellowish brown. Mandibles darker in colour than head-shield; marginations of head ventrolaterally and of alitrunk laterally blackish.

Holotype worker, EAST MALAYSIA: Sarawak, 4th Division, Gunong Mulu National Park, v–viii.1978, litter sample Camp 5 (*P. M. Hammond & J. E. Marshall*) (BMNH).

#### Comments

The holotype is damaged, lacking its left middle and hind legs which were missing on collection.

The single known specimen of *I. ascitaspis* was recovered from a Winkler bag sample of previously sieved leaf litter collected at Camp 5 in Gunong Mulu National Park during the Royal Geographical Society expedition there in 1978. Camp 5 lay beside the Melinau River in lowland rainforest at the edge of the limestone outcrop which slopes up to the spectacular Limestone Pinnacles of the park.

Diagnostic characters which in combination isolate *Ishakidris* from the workers of all other myrmicine ant genera are as follows.

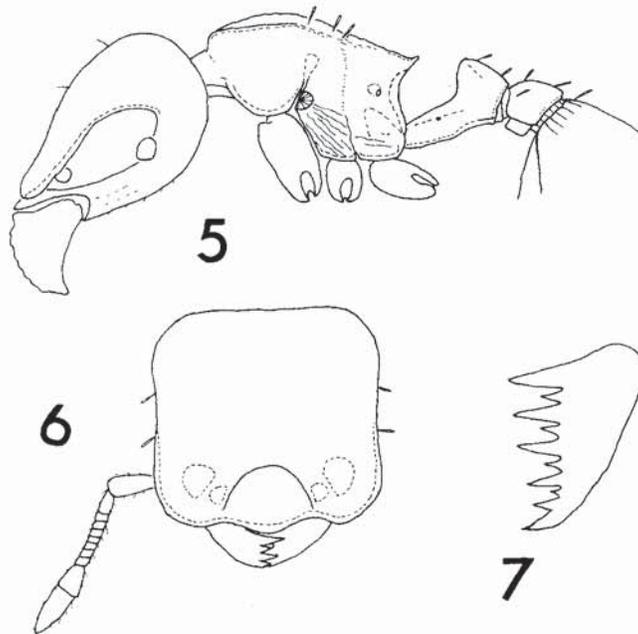
1. Form and dentition of the massive mandibles and their lack of a basal lamella (Fig. 3).
2. Palp formula 2,2.
3. Labrum anteriorly with a pair of elongate digitate lobes.
4. Antennae with 9 segments, the two apical segments forming a strongly defined club (Fig. 2).
5. Antennal scrobes deep and extensive, the eye situated ventrolaterally within the scrobal area (Fig. 1).
6. Head shield-like, the frontal carinae very widely separated and greatly expanded anteriorly and laterally (Fig. 2).
7. Frontal carinae flanking lateral portions of clypeus and forming the anterolateral corners of the head (Fig. 2).
8. Mesopleural presumed glandular area present, with subtending open groove (Fig. 1).
9. Petiole and postpetiole lacking spongiform or lamellate appendages (Figs. 1, 4).
10. Massive longitudinal basal carina present on first gastral sternite (Fig. 1).

**Relationship with *Phalacromyrmex* Kempf (Figs. 5–7).**

The single species of the Brazilian genus *Phalacromyrmex*, *P. fugax* Kempf, is known from a short series of workers recovered from

a sample of topsoil taken at Ibicaré, Santa Catarina State. This species shows a marked similarity in habitus to *Ishakidris* and also shares the following suite of apomorphic characters.

1. Mandibles massive and strongly downcurved in profile.
2. Mandibles with alternating large and small teeth down the length of the masticatory margin.
3. Apical tooth of mandible not clearly the largest on the masticatory margin.
4. Labrum narrowly bilobate.
5. Palp formula 3,2 or 2,2.
6. Frontal carinae very strongly expanded anteriorly and laterally.
7. Frontal carinae flanking clypeus laterally and forming the anterolateral angles of the head.
8. Antennae with less than 12 segments.
9. Antennal club of two enlarged apical segments.
10. Antennal scrobes deep and extensive.
11. Eyes situated ventrolaterally within the scrobal area.
12. Alitrunk flattened dorsally and marginate laterally.
13. Propodeal spiracle close to margin of decivity (discounting the propodeal infradental lamellae).
14. Propodeal spines laminate and subtended by infradental lamellae.



FIGS. 5–7. *Phalacromyrmex fugax* Kempf, paratype worker: 5, body in profile, antennae and legs omitted; 6, head in full-face view; 7, left mandible to show dentition.

15. Mesonotum and propodeum much narrower than pronotum.

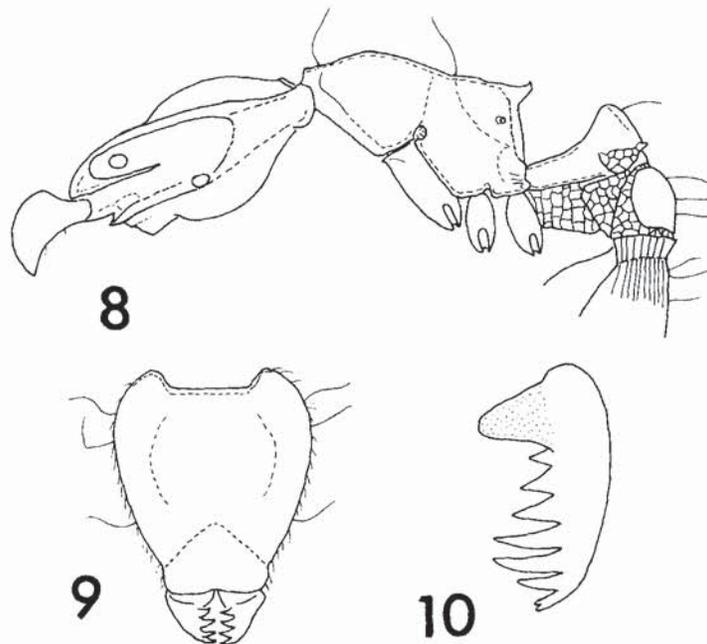
16. Middle and hind legs lacking tibial spurs.

[The assumed plesiomorphic states for these characters at this level of analysis are: 1. Mandibles relatively slender and feebly down-curved; 2. mandibles with teeth regularly decreasing in size from apex to base; 3. apical tooth the largest on the masticatory margin; 4. labrum simple to weakly medially indented; 5. palp formula  $> 3,2$  (to a maximum at PF 6,4); 6., 7. frontal carinae absent; 8. antennae with 12 segments; 9. antennae filiform; 10. antennal scrobes absent; 11. eyes lateral; 12. alitrunk transversely convex, immarginate; 13. propodeal spiracle approximately at mid-length; 14. propodeal spines not laminate; 15. mesonotum and propodeum subequal to pronotum in width; 16. pectinate tibial spurs present on middle and hind legs. These assumed plesiomorphic states are abstracted from the conditions presently thought to accord most accurately with the hypothetical ancestral condition of the myrmicine ants, and assumes that the subfamily Myrmicinae constitutes a holophyletic taxon.]

The similar habitus and wealth of detailed correspondence in specialized characters between *Phalacromyrmex* and *Ishakidris* leads to the conclusion that a true phylogenetic relationship, rather than a strong convergence, is indicated here. Particularly convincing are the remarkable specializations shown by the head and mandibles, and the construction of the antennae.

Characters which differentiate the two genera are as follows.

<i>Ishakidris</i>	<i>Phalacromyrmex</i>
Antenna with 9 segments	Antenna with 11 segments
Mandibles with 12 teeth	Mandibles with 10 teeth
Palp formula 2,2	Palp formula 3,2
Occipital corners acute in full-face view	Occipital corners rounded in full-face view
Ventrolateral margins of head carinate	Ventrolateral margins of head not carinate
Pronotal humeri rounded	Pronotal humeri angulate
Mesopleural presumed glandular area subtended by an open groove	Mesopleural presumed glandular area subtended by a series of oblique costulae
Base of first gastral sternite carinate	Base of first gastral sternite not carinate



FIGS. 8–10. *Glomyromyrmex* workers: 8, *G. tetragnathus* (Taylor), body in profile, antennae and legs omitted; 9, *G. africanus* Bolton, holotype, head in full-face view; 10, *G. sistrurus* Bolton, paratype, left mandible to show dentition.

### Relationship with *Glamyromyrmex* Wheeler (Figs. 8–10)

Among the smithistrumiform dacetines some members of the genus *Glamyromyrmex* show a most striking habitus resemblance to *Ishakidris* and *Phalacromyrmex*, especially to the former as can be seen by comparing Figs. 1–3 with Figs. 8–10. In the *Glamyromyrmex* figures *G.tetragnathus* (Taylor) (Fig. 8) and *G.africanus* Bolton (Fig. 9) have been selected specifically because of their habitus similarity to *Ishakidris*, other species are not nearly so like *I.ascitaspis* in general appearance. The mandible of *G.sistrurus* Bolton (Fig. 10) is in reality very strongly arched-downcurved but has been drawn here as if flat so that the entire dental array can be seen, and is thus semi-diagrammatic; the prominent large basal lamella, characteristic of the genus, is stippled.

Eighteen species of *Glamyromyrmex* have been described from the Neotropical and Afrotropical regions, and further undescribed species are known from the Oriental and Indo-Australian regions. It is suspected that a few species from Australia and the Neotropics which are presently placed in *Codiomyrmex* Wheeler may also really belong in *Glamyromyrmex*.

Apart from habitus similarity the following characters also correspond in *Ishakidris* and *Glamyromyrmex* workers.

1. Apical mandibular tooth is not the largest. [In *G.sistrurus*, illustrated in Fig. 10, teeth 4 and 5 in front of the basal lamella are the largest. There is some variation in *Glamyromyrmex* in size-distribution of teeth but in general one of the basal series of five teeth, which follow the basal lamella, is the largest on the masticatory margin.]
2. Mandibles massive and bear trap-like, strongly arched-downcurved and at least in part at a right-angle to the long axis of the head.
3. Labrum bilobate.
4. Antennal club of two segments.
5. Frontal carinae widely separated and strongly expanded to form a shield-like head in full-face view.
6. Extensive deep antennal scrobes present.
7. Eyes small and situated ventrally within the scrobal area or on the ventrolateral margin.
8. Propodeal spiracle set close to the margin of the declivity (not counting any infradental lamellae which may be present).

The supposedly glandular area of the mesopleuron, well defined and subtended by a posteroventrally directed open groove in *Ishakidris*, is variously developed in *Glamyro-*

*myrmex*. The anterodorsal excavation of the mesopleuron, just behind the posteroventral corner of the pronotal laterotergite, is always present and sometimes has a few short hairs traversing it (thus in *G.sistrurus* Bolton, *crypturus* Bolton, *tetragnathus* (Taylor), *tagon* Bolton, *sahurus* Bolton, *tukultus* Bolton, *thuvidus* Bolton, and an undescribed species from Paraguay). In other species the excavation is present and traversed by numerous hairs, but is not subtended by a groove (*G.semicomptus* (Brown), *aztecus* Kempf, *excisus* (Weber), and an undescribed species from Sarawak). In an undescribed species from Hong Kong the mesopleural impression is well developed and fringed with fine flocculent material. Given this variation of development in *Glamyromyrmex* (and in some other smithistrumiform genera), and the corresponding amount of variation in this supposed glandular structure in other genera of similar habitus, where it is small in *Phalacromyrmex*, moderately developed in *Ishakidris* and very large and subcircular in *Pilotrochus*, it seems most likely that it has developed independently several times and cannot be utilized in assessing the relationships of these genera.

In spite of the characters listed above I consider the apparent similarities between *Ishakidris* and *Glamyromyrmex* to have been acquired convergently, and view the resemblances as superficial. This conclusion is justified by a comparative analysis of the diagnostic characters of *Ishakidris* with all the eighteen presently recognized species of *Glamyromyrmex*, tabulated below.

<i>Ishakidris</i>	<i>Glamyromyrmex</i>
1. Teeth alternating in size down the length of the mandibular masticatory margin	Teeth not alternating in size down the length of the mandibular masticatory margin
2. Mandibles without a basal lamella (Fig. 3)	Mandibles with a basal lamella (Fig. 10)
3. Clypeus in full-face view not forming a part of the side of the head in front of the frontal carinae (Fig. 2)	Clypeus in full-face view forming a part of the side of the head in front of the frontal carinae (Fig. 9)
4. Lateral clypeal margins flanked by the expanded frontal carinae, which form the anterolateral angles of the head	Lateral clypeal margins not flanked by the expanded frontal carinae, the clypeus forming the anterolateral angles of the head

5. Palp formula 2,2	Palp formula 1,1
6. Antennae with 9 segments	Antennae with 6 segments
7. Ventral surface of head without a transverse post-buccal impression	Ventral surface of head with a transverse post-buccal impression
8. Mandibular trigger hairs on ventral bases of mandibles	Mandibular trigger hairs on apices of labral lobes
9. Petiole and postpetiole without spongiform or lamelliform appendages	Petiole and postpetiole with spongiform or lamelliform appendages
10. Basal third of first gastral sternite with a strong median longitudinal crest	Basal third of first gastral sternite without a crest (often with a median felt-like pad, sometimes bare)
11. Base of first gastral tergite without a transverse crest of lamellate or spongiform tissue	Base of first gastral tergite with a transverse crest of lamellate or spongiform tissue

In *Ishakidris* characters considered apomorphic at this level of analysis are 1, 3, 4 and 10; those considered apomorphic in *Glamyromyrmex* are 2, 5, 6, 7, 9 and 11. Character 8 remains as one whose plesiomorphic state is indeterminate at this level.

*Glamyromyrmex* belongs to the smithistrumiform dacetines (Brown, 1953; Bolton, 1983), a group of sixteen genera diagnosed together as those members of the tribe Dacetini which have the eyes situated ventrolaterally on the head within or beneath the scrobes, have the antennae 6- or 4-segmented with the apical antennomere much the longest of the funicular segments, have the palp formula 1,1 and lack an apical fork of spini-form teeth on the mandibles. Throughout all the smithistrumiform genera characters 1, 3, 4 and 10 of *Ishakidris* are universally absent. Of those given above as apomorphies for *Glamyromyrmex* numbers 2, 5, 9 and 11 are also present throughout the smithistrumiform genera. (Character 6 is generally so but some have the antennae reduced to only 4 segments; character 7 is variably developed.) Away from *Glamyromyrmex* also the habitus of the smithistrumiform genera is markedly different from that of *Ishakidris*. In particular, of the characters listed at the beginning of this section as corresponding between *Ishakidris* and *Glamyromyrmex*, numbers 2, 5 and 6 are generally absent in other smithistrumiform genera, and numbers 3, 4, 7 and 8 constitute

part of the diagnosis of the smithistrumiform genus-group or of the Dacetini as a whole. Character 1 is the only remaining correspondence, but the reduced apical tooth appears almost certainly acquired convergently as the mandibles have no other correlating detailed structures.

These considerations imply most strongly that the apparent similarity of *Ishakidris* and *Glamyromyrmex* is superficial and the result of convergence, and that the two genera do not share a close phylogenetic relationship.

#### Relationship with *Tatuidris* Brown & Kempf

Discounting the forms mentioned above and *Pilotrochus*, discussed below, the only other myrmicine genus which resembles *Ishakidris* to any degree is *Tatuidris* Brown & Kempf (1967), which is known from El Salvador and Mexico. The resemblance is however very quickly analysed as superficial, as in *Tatuidris* the heavy mandibles are bidentate apically but otherwise lack teeth, the palp formula is 1,2, the eyes are situated at the posteriormost apices of the scrobes, the propodeum is unarmed and the middle and hind tibiae have pectinate spurs present. Apart from these telling characters the construction of the petiole and postpetiole is radically different in *Tatuidris*, where the short thick sessile petiole which has a very large deep ventral process is followed by a postpetiole which is short, deep and very broad, and broadly attached to the gaster. Brown & Kempf (1967) included *Tatuidris* in the tribe Agroecomyrmecini, along with the fossil genera *Agroecomyrmex* Wheeler and *Eulithomyrmex* Carpenter. They noted the superficial similarity of *Tatuidris* with *Phalacromyrmex* and *Glamyromyrmex* but dismissed any suspicion of true phylogenetic relationship, concluding that *Tatuidris* 'is very strongly isolated among living ant genera, though clearly a myrmicine'.

#### Relationship with *Pilotrochus* Brown

*Pilotrochus* Brown (1977) is a very strange myrmicine ant known only from a single worker specimen collected in a Berlese sample of forest litter and humus along the road to Anosibé, 33 km south of Moramanga in east central Madagascar. The single species, *P.*

*besmerus* Brown, has 7 large teeth alternating with denticles on the mandibular masticatory margin, of which the apical tooth is smaller than the basals. The antennae are 8-segmented and the funiculus ends in a strong 2-segmented club. The frontal carinae are far apart and expanded, and large deep scrobes are present which have the eyes situated ventrolaterally. The propodeal spiracle is close to the margin of the declivity and tibial spurs are absent. The petiole is curved-clavate and it and the postpetiole in general are similar to *Ishakidris*. The apparently glandular mesopleural organ seen in *Ishakidris* is much more strikingly developed in *Pilotrochus* and is roughly circular, though apparently not subtended by the open groove seen in *Ishakidris*.

Despite these similarities there are a number of important characters in which *Pilotrochus* differs from both *Ishakidris* and *Phalacrotermes*. For instance, the mandibles are not strongly arched-downcurved as in the last two and the labrum is thickly linguiform rather than bilobate. The frontal carinae are excavated immediately behind the narrow lateral portions of the clypeus and do not flank it laterally, so that in full-face view the anterolateral corners of the head are formed by the lateral portions of the clypeus as is usual in myrmicines. The propodeum is unarmed, lacking the lamellate spines characteristic of *Phalacrotermes* and *Ishakidris*.

Having considered the diagnostic characters of *Pilotrochus*, *Phalacrotermes* and *Ishakidris*, and taking into account the shortage of material in all three genera (including a complete lack of sexual and immature forms), I presently suspect that the similarities outweigh the differences sufficiently to imply a distant common origin for all three. In particular I am impressed by the construction of the mandibles, antennae and pedicel segments, which are suspected of being synapomorphies rather than convergently acquired characters. If *Ishakidris* and *Phalacrotermes* are indeed related to *Pilotrochus* then the obvious corollary is that *Pilotrochus* split from the parent stock much earlier than *Ishakidris* and *Phalacrotermes*, which resemble each other much more closely than either one resembles *Pilotrochus*. In summary then, whilst *Pilotrochus* is not immediately related to *Phalacrotermes* and *Ishakidris*, it may well be associated at a

higher level of classification and the three together may represent relicts of a once much more common and widespread fauna.

It would probably be safe to designate a tribal-group name to hold these three genera but, as the existing tribal-level classification within the Myrmicinae is in such a decrepit state, I can see no advantage to adding yet another formal name to the confusion. Consequently I propose an informal genus-group, the *Phalacrotermes*-group, to hold these three genera until such time as a functional tribal classification of the Myrmicinae can be achieved.

Myrmicine ants belonging to the *Phalacrotermes*-group are diagnosed by possessing the following suite of characters in combination in the worker.

- 1 Large to massive downcurved mandibles on which the teeth or denticles alternate in size from basal to preapical tooth.
- 2 Ten or more teeth present (of all sizes) on masticatory margin of mandible, of which the apical tooth is not clearly the largest.
- 3 Mandibles lacking a basal lamella.
- 4 Palp formula 3,2 or 2,2 (unknown in *Pilotrochus*).
- 5 Antennae 8-, 9- or 11-segmented, the flagellum ending in a sharply defined club of 2 segments.
- 6 Ventral surface of head without a post-buccal transverse groove or impression.
- 7 Frontal carinae very far apart and expanded, forming the dorsal margins of deep and extensive scrobes.
- 8 Clypeus broad and broadly inserted between the frontal carinae.
- 9 Eyes situated ventrolaterally within or marginal to the scrobal area.
- 10 Alitrunk fused and the propodeal spiracle situated close to the margin of the declivity (discounting any propodeal lamellae which may be present).
- 11 Petiole pedunculate anteriorly, the petiole and postpetiole lacking spongiform or lamelliform appendages.
- 12 Middle and hind tibiae without spurs.

By exclusion any myrmicine worker ant which does not possess all of these characters in combination is not a member of the *Phalacrotermes*-group.

#### Key to genera of the *Phalacrotermes*-group (workers)

- 1 Antennae with 8 segments, Frontal carinae not flanking lateral portions of clypeus. Labrum linguiform. (Madagascar) . . . *Pilotrochus* Brown

- Antennae with 9 or 11 segments. Frontal carinae flanking lateral portions of clypeus. Labrum deeply bilobate . . . . . 2
- 2 Antennae with 11 segments. Occipital corners rounded. Base of first gastral sternite not carinate medially. Palp formula 3,2. (Brasil)

*Phalacromyrmex* Kempf

- Antennae with 9 segments. Occipital corners acute. Base of first gastral sternite carinate medially. Palp formula 2,2. (Sarawak)

*Ishakidris* Bolton

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