With corrected Table of Contents

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A Revision of the Malagasy Ants Belonging to Genus *Monomorium* Mayr, 1855 (Hymenoptera: Formicidae)

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In this revision of the Malagasy *Monomorium* ant fauna, thirty-six species are recognized, nineteen of them here described as new. The new species are *Monomorium adiastolon*, sp. nov., *M. aureorugosum*, sp. nov., *M. bifidoclypeatum*, sp. nov., *M. chnodes*, sp. nov., *M. clarinodis*, sp. nov., *M. denticulus*, sp. nov., *M. ferodens*, sp. nov., *M. fisheri*, sp. nov., *M. flavimembra*, sp. nov., *M. gongromos*, sp. nov., *M. infuscum*, sp. nov., *M. lepidum*, sp. nov., *M. micrommaton*, sp. nov., *M. nigricans*, sp. nov., *M. notorthotenes*, sp. nov., *M. platynodis*, sp. nov., *M. robertsoni*, sp. nov., *M. versicolor*, sp. nov., and *M. xuthosoma*, sp. nov. Five species (four described from African material) pass into synonymy: *M. leopoldinum* Forel 1905 with *M. madecassum* Forel 1892, *M. binatu* Bolton 1987, *M. exchao* Santschi 1926 and *M. imerinense* Forel 1892 with *M. termitobium* Forel 1892 and *M. valtinum* Bolton 1987 with *M. hanneli* Forel 1907. Seventeen species remain unchanged. *Monomorium minutissimum* Santschi 1937 is transferred from synonymy under *Monomorium mictile* Forel 1910 to become a junior synonym of *Monomorium exiguum* Forel 1894. The Malagasy species are distributed among seven species groups. Previously recognized in the literature are the *destructor*-, *hanneli*-, *latinode*-, *monomorium*- and *salomonis*- groups. The *hildebrandti* species group comprises six new species as well as those formerly assigned to the *fossulatum* species group. (Prior to this revision, *fossulatum* Emery 1895 was relegated to synonymy under *sechellense* Emery 1894, and *hildebrandti* Forel 1892 is the earliest described species in this group.) The *shuckardi* species group, here erected, appears to be unique to Madagascar, and comprises a group of four Malagasy *Monomorium* with several plesiomorphic characters. A key to workers of the 36 Malagasy *Monomorium* species is provided.

TABLE OF CONTENTS

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Genus *Monomorium* Mayr

Introduction

Monomorium is one of the more significant genera of myrmicine ants. Not only does the genus have endemic representatives in all major land masses, but those of its species with tramp tendencies have been spread by human commerce to countries that do not have a native *Monomorium* fauna (McGlynn 1999) and in those countries can often be considered pests. In his Catalogue of the world's ant species, Bolton (1995) listed a world total of 293 species for the genus. Since that time broad revisionary studies have added additional species: 43 have been described from Australia (Heterick 2001; Heterick 2003) and 30 from Arabia (Collingwood and Agosti 1996). Other research has also resulted in the description of new taxa, including that of two new *Monomorium* from Brazil (Fernandez, in press), two from China (Zhou 2001) and one from Japan (Terayama 1996) and southern Europe respectively (Radchenko 1997). Two species have also been transferred to genus *Monomorium* from *Antichthonidris* (synonymy Heterick 2001). Allowing for loss of other species-level names due to synonymy arising from the work of the abovementioned authors, the current world tally stands at 359 species.

The classic text for information on the *Monomorium* species of tropical Africa has been Bolton's (1987) monograph. In this work, Bolton alluded to one Malagasy *Monomorium* species-group with a very primitive palp formula (PF) of 5,3 and mentioned in his discussion of individual species several whose distribution included Madagascar. However, he made no attempt to provide a description of the indigenous *Monomorium* fauna of Madagascar, which lay outside the monograph's terms of reference, in its own right. This work attempts to provide a comprehensive survey of the *Monomorium* species of Madagascar, and is part of an ongoing effort to inventory and describe the life forms of this fascinating and biodiverse large island. Keys are provided here to enable researchers to identify workers of endemic Malagasy *Monomorium* as well as those introduced to the island.

Monomorium: a genus badly in need of reinterpretation.— Unlike the case with a number of myrmicine genera that have a clearly defined diagnosis based on a few salient characters, the concept of the genus *Monomorium* in recent years has ballooned to the point where it has become unwieldy, and in great need of redefinition. The genus, as it stands at the moment, lacks clearly defined autapomorphies. A complete reappraisal of *Monomorium* is not possible in this paper, partially because this is intended as a monograph of a regional fauna rather than a review of the genus

on a world basis, and partially because such a redefinition will require examination of reproductive and worker castes of all the known species groups. Genitalic characters, particularly of the males, and generation of molecular sequences should be a mandatory part of the analysis. As it is at the moment, *Monomorium* has become almost a *meta*-genus that is continuing to swallow up previously discrete genera. Since 1987 these have included *Chelaner* and *Syllophopsis* (Bolton 1987), *Antichthonidris* (Heterick 2001) and *Epelysidris*, *Nothidris* and *Phacota* (Fernandez, in press). I report in this work on a Malagasy species in which the worker has a PF of 3,2, a condition in *Monomorium* previously recorded only for males of two species formerly placed in *Antichthonidris* (Snelling 1975; Heterick 2001). Interestingly, this new species is not an isolated taxon, but evidently a member of a significant Afrotropical and Malagasy species group (the *M. hildebrandti* species group) in which all the other known members have a PF of 2,2. The change in the diagnosis of *Monomorium* brought about by this and other recent discoveries (e.g., see Heterick 2003, Fernandez, in press) means that the autonomy of the small solenopsidine genera *Anillomyrma*, *Megalomyrmex* and, possibly, *Bondroitia* is under threat. Genera linked with *Solenopsis* and with *Allomerus*, which have a broader suite of distinctive anatomical features than the abovementioned (see Bolton 1987 for details of shared characters), stand somewhat further apart from the current concept of *Monomorium* and are likely to remain so.

SYSTEMATICS

Taxonomic background of Malagasy *Monomorium*

The first described *Monomorium* species, the tramp species now known as *Monomorium pharaonis*, was placed in the then portmanteau genus *Formica* as '*Formica pharaonis*' (Linnaeus 1758). The genus *Monomorium* originated with Mayr in 1855. An account of the general history of the various generic and subgeneric names now synonymized under *Monomorium* is given in Bolton (1987) and so is not reproduced here. The later synonymization of *Antichthonidris*, *Epelysidris*, *Nothidris* and *Phacota* is mentioned above.

Six taxa assigned to *Monomorium* have been described from material collected from Madagascar. *Monomorium hildebrandti*, *Monomorium imerinense* and *Monomorium madecassum* were described by Forel in the same publication as supposed races of *Monomorium minutum* Mayr (Forel 1892c). All three taxa were raised to full species by Dalla Torre (Dalla Torre 1893). Also in 1892, in a separate publication (Forel 1892b), Forel described *Monomorium termitobium* as a species in its own right. *Monomorium shuckardi* was published by this author three year later (Forel 1895). In 1922, Emery positioned this latter species under the subgenus *Notomyrmex* in which similar South American and Australian forms had already been placed. *Notomyrmex* was raised to genus by Kusnezov in 1957, but reduced to a synonym of *Chelaner* by Ettershank in 1966 (*Chelaner* becoming in turn a junior synonym of *Monomorium* with Bolton's 1987 revision). In Ettershank's work, non-Australasian taxa previously incorporated under *Notomyrmex* were separated from the new genus of *Chelaner*, and the species *shuckardi* was returned to *Monomorium*. The final *Monomorium* species described from Madagascar was *Monomorium sakalavum* (Santschi 1928). In addition to the above taxa, four *Monomorium* species described from material collected elsewhere have been recorded from Madagascar, namely *Monomorium destructor* (Jerdon) (Mamet 1954; Bolton 1987; Fisher 2003), *Monomorium pharaonis* (Fisher 2003) *Monomorium robustior* Forel (Wheeler 1922; Bolton 1987; Fisher 2003) and *Monomorium subopacum* Smith (Bolton 1987; Fisher 2003). In terms of the smaller islands in the Malagasy region, Mamet (1954) lists *M. destructor* and *Monomorium floricol*a (Jerdon) from Mauritius, *M. floricola* from Reunion, and *Monomorium elongatum* Smith and *M. floricola* (as *M. impressum*, now a synonym of *M. florico-*

la) from Rodriguez. Of these species only *M. elongatum*, from Rodriguez, was described from material collected from the region.

In general, *Monomorium* workers and queens can be separated from other Malagasy myrmicines by a combination of their eleven or twelve-segmented antenna with three-segmented club, lack of antennal scrobes, presence of distinct frontal lobes, lack of spines or sharp denticles on the propodeum and nodes, and, in most specimens, the presence of a single anteromedian clypeal seta. Some *Cardiocondyla* species and occasional specimens of a few species of *Nesomyrmex* also have an anteromedian clypeal seta. However, *Cardiocondyla* possesses a dentate propodeum, the postpetiole is much larger than the petiole in dorsal view, and the clypeus forms a raised, projecting shelf that covers the base of the mandibles, and in *Nesomyrmex* the central seta is very short and unobtrusive - unlike that of *Monomorium*. Those *Nesomyrmex* workers that possess the median clypeal seta also have a rather angular mesosoma and low node, unlike Malagasy *Monomorium*. The petiole does not bear a large, plate-like anteroventral process in *Monomorium*, nor does the sting possess a membranous extension at its apex. The masticatory margin of the mandible has a maximum of five distinct teeth (though sometimes an additional tiny denticle is present because of the bifurcation of a tooth). In the reproductive wing, the vein RS curves towards but does not meet the anterior wing margin to form a closed radial cell.

A summary of what was known about the *Monomorium* fauna of Madagascar and associated islands before the commencement of this project is provided below. 'from inspection' refers to placement of a taxon in a particular species group as a result of examination of material during this project. These taxa had not been assigned to a species group or category prior to this project, although an available group did exist. No group was available for *Monomorium shuckardi* Forel, and I have not seen material belonging to *Monomorium elongatum* Smith. (Nb: With the exception of the *M. hildebrandti* species group, the groups mentioned are those recognized by Bolton (1987) in relation to the Afrotropical fauna):

TAXON	DISTRIBUTION
***Monomorium destructor* group**	
Monomorium destructor (Jerdon)	Madagascar, Mauritius
Monomorium robustior (Forel)	Madagascar
***Monomorium hildebrandti group* (= *M. fossulatum* group)**	
Monomorium hildebrandti Forel (from inspection)	Madagascar
***Monomorium monomorium* group**	
Monomorium floricola (Jerdon)	Mauritius, Reunion, Rodriguez
Monomorium imerinense Forel	Madagascar
Monomorium madecassum Santschi	Madagascar
Monomorium sakalavum Santschi (from inspection)	Madagascar
Monomorium termitobium Forel (from inspection)	Madagascar
***Monomorium salomonis* group**	
Monomorium pharaonis (L.)	Madagascar
Monomorium subopacum Smith	Madagascar
Unassigned	
Monomorium elongatum Smith	Rodriguez
Monomorium shuckardi Forel	Madagascar

Monomorium salomonis (L.) has also been listed as occurring in Madagascar (Fisher 1997 (citing Wheeler 1922: 870), McGlynn 1999; Fisher 2003). The occurrence of *Monomorium salomonis* in Madagascar is doubtful.

SYNONYMIC LIST OF MALAGASY SPECIES OF *MONOMORIUM*

***shuckardi* group**
- ***clarinodis*** Heterick, sp. nov.
- ***notorthotenes*** Heterick, sp. nov.
- ***robertsoni*** Heterick, sp. nov.
- ***shuckardi*** Forel

***destructor* group**
- ***destructor*** (Jerdon)
  - *basale* Smith (‘*Myrmica basalis*’)
  - *ominosum* Gerstäcker (‘*Myrmica ominosa*’)
  - *atomarium* Gerstäcker (‘*Myrmica atomaria*’)
  - *gracillimum* Smith (‘*Myrmica gracillima*’)
  - *vexator* Smith (‘*Myrmica vexator*’)
- ***robustior*** Forel

***salomonis* group**
- ***pharaonis*** (L.)
  - *antiguense* Fabricius (‘*Formica antiguensis*’)
  - *domesticum* Shuckard (‘*Myrmica domestica*’)
  - *minutum* Jerdon (‘*Atta minuta*’)
  - *vastator* Smith (‘*Myrmica vastator*’)
  - *fragile* Smith (‘*Myrmica fragilis*’)
  - *contiguum* Smith (‘*Myrmica contigua*’)
- ***subopacum*** (Smith)
  - *glyciphilum* Smith (‘*Myrmica glyciphila*’)
  - *mediterraneum* Mayr
  - *salomonis* subsp. *subopacum* var. *senegalensis* Santschi (unavailable name) (unnecessary replacement names *claveaui* Emery and *santschiellum* Wheeler also unavailable)
  - *salomonis* subsp. *planidorsum* Emery (‘*Monomorium salomonis* subsp. *planidorsa*’)
  - *surcoufi* Santschi (‘*Paraphacota surcoufi*’)
  - *cabrerai* Santschi (‘*Paraphacota cabrerai*’)
  - *cabrerai* st. *obscuripes* Santschi (‘*Paraphacota cabrerae* [sic] st. *obscuripes*’)
  - *subopacum* var. *intermedium* Santschi
  - *subopacum* var. *apuleii* Santschi
  - *salomonis* subsp. *subopacum* st. *liberta* Santschi (unavailable name)
  - *subopacum* var. *ebraicum* Menozzi
  - *subopacum* var. *adoneum* Santschi
  - *subopacum* subsp. *italica* Baroni Urbani
- ***willowmorense*** Bolton
  - *salomonis* r. *herrero* [sic] var. *willowmorensis* Forel (unavailable name)
  - *salomonis* r. *herrero* [sic] var. *belli* Forel (unavailable name)

***latinode* group**
- ***latinode*** **Mayr**
  - *latinode* var. *bruneum* Emery
  - *voeltzkowi* Forel

***monomorium* group**
- ***bifidoclypeatum*** **Heterick, sp. nov.**
- ***chnodes*** **Heterick, sp. nov.**
- ***denticulus*** **Heterick, sp. nov.**
- ***exiguum*** Forel
  - *exiguum* var. *bulawayense* Forel (‘*Monomorium exiguum* var. *bulawayensis*’)
  - *faurei* Santschi

exiguum r. *flavescens* Forel
minutissimum Santschi, **syn. n.**
***flavimembra* Heterick, sp. nov.**
floricola (Jerdon)
cinnabari Roger
poecilum Roger
specularis Mayr
impressum Smith
floricola var. philippinense Forel ('*Monomorium floricola* var. *philippinensis*')
floricola var. *furinum* Forel ('*Monomorium floricola* var. *furina*')
floreanum Stitz
angusticlava Donisthorpe
***lepidum* Heterick, sp. nov.**
madecassum Forel
minutum var. *leopoldinum* Forel, **syn. n.**
explorator Santschi
aequum Santschi
estherae Weber
***micrommaton* Heterick, sp. nov.**
***nigricans* Heterick, sp. nov.**
***platynodis* Heterick, sp. nov.**
sakalavum Santschi
termitobium Forel
minutum r. *imerinense* Forel, **syn. n.**
exchao Santschi **syn. n.**
binatu Bolton **syn. n.**
***versicolor* Heterick, sp. nov.**
***xuthosoma* Heterick, sp. nov.**

***hanneli* group**
hanneli Forel
moestum Santschi
valtinum Bolton **syn. n.**

***hildebrandti* group**
***adiastolon* Heterick, sp. nov.**
***aureorugosum* Heterick, sp. nov.**
cryptobium (Santschi)
***ferodens* Heterick, sp. nov.**
***fisheri* Heterick, sp. nov.**
***gongromos* Heterick, sp. nov.**
hildebrandti Forel
***infuscum* Heterick, sp. nov.**
modestum Santschi
modestum var. *boerorum* Santschi
modestum var. *transwaalense* Emery ('*Monomorium modestum* (*Syllophopsis*) *modestum transwaalensis*') (first replacement name)
modestum var. *smutsi* Wheeler (unnecessary second replacement name)
sechellense Emery
fossulatum subsp. *sechellense* Emery
sechellense Bolton (*sechellense* has priority over *fossulatum*)

Materials and Methods

Material examined

Most specimens examined were part of the very extensive collection of ants gathered from Madagascar over a number of years by Brian Fisher and his team, and curated in the California Academy of Sciences (CAS) Insect Collection. Where, under the subheading 'Other material examined', no institution is indicated by parentheses at the end of an item, a (CAS) holding can be assumed. Pinned *Monomorium* specimens from the Harvard Museum of Comparative Zoology (MCZ) and University of California-Davis (UCDC) were also examined. Specimens were initially sorted phenotypically. However, in view of the extreme variability of some taxa, both in terms of color and morphology, wet material belonging to these problematic taxa was forwarded to Guelph University for DNA molecular analysis sequencing cytochrome oxidase (COI) in order to evaluate their species status more accurately. At the time of writing this program has yet not produced publishable results, but if completed, the results of this analysis will be reported elsewhere. [Note: '1×2' (with the appropriate caste symbol) refers to one pin bearing two specimens; '2×1' (also with appropriate caste symbol) refers to two separate pins, each bearing a specimen.]

Distribution data

Geographic data from individual specimen labels were used to generate distribution maps. The mapping program used was ArcView GIS 3.3. Along with the taxonomic methods mentioned above, these maps were sometimes found to be useful in differentiating between very similar species on the basis of their biogeography.

Sources of borrowed material

The following institutions provided material. An asterisk (*) denotes collections containing types.

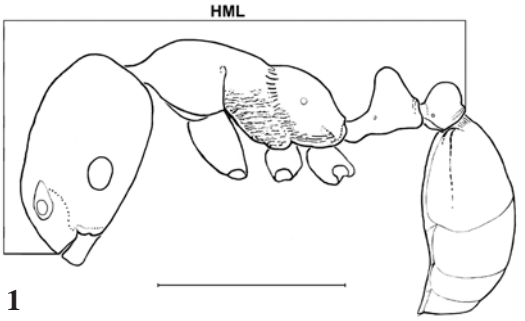
BMNH	Entomology Department, Natural History Museum, London, UK*
CAS	California Academy of Sciences, San Francisco California., USA*
MCSN	Museo Civico di Storia Naturelle 'G. Doria', Genoa, Italy*
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts., USA*
MHNG	Musée d'histoire naturelle, Genève, Switzerland*
NHMB	Musée d'histoire naturelle, Basel, Switzerland*
NMW	Naturhistorisches Museum, Wien, Austria*
UCDC	University of California-Davis, Davis, California, USA
OXUM	Hope Entomological Collections, Oxford Museum of Natural History, Oxford, UK*

Use of DELTA program for generating natural language descriptions

Standardized descriptions of each Malagasy *Monomorium* species were generated using the DELTA (DEscription Language for TAxonomy) computer program (Dallwitz, Paine, and Zurcher 2000). The procedure followed is outlined in Heterick (2001). In the current project, also utilizing only morphological characters, there were 57 worker characters, 43 queen characters, and 32 male characters.

Worker characters used in creating natural language descriptions (character numbers in brackets) (Figs. 1–5, 13):

Head (Figs. 2, 4–5, 13).— Appearance and pilosity of the head capsule (1–3), eye size, position and shape (4–8), antenna appearance and count (9–12), appearance of clypeus and lower frons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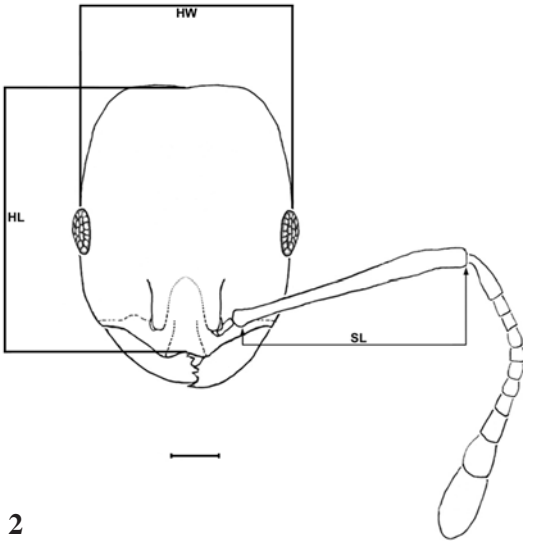
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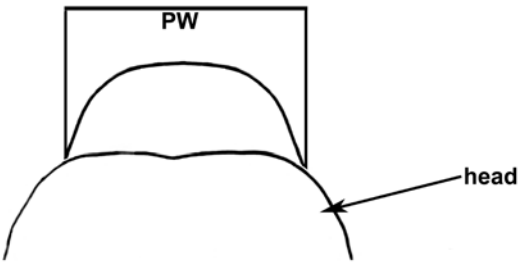
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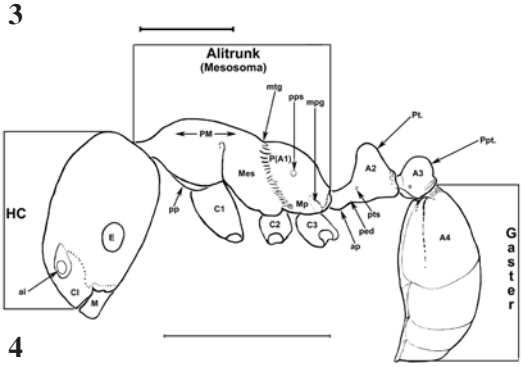
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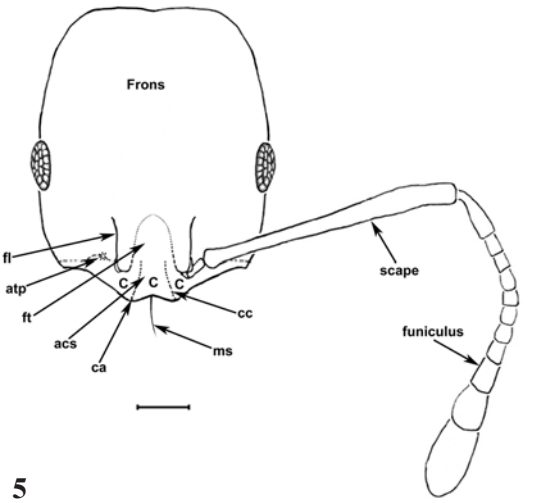
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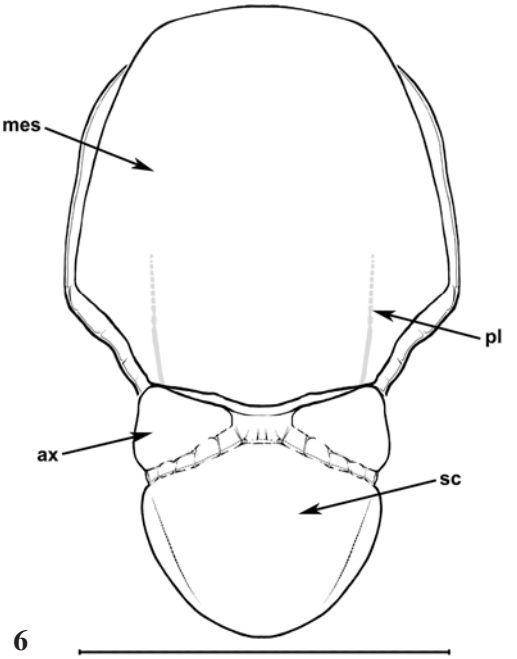
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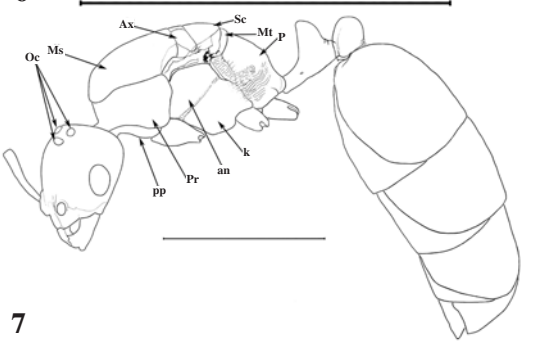
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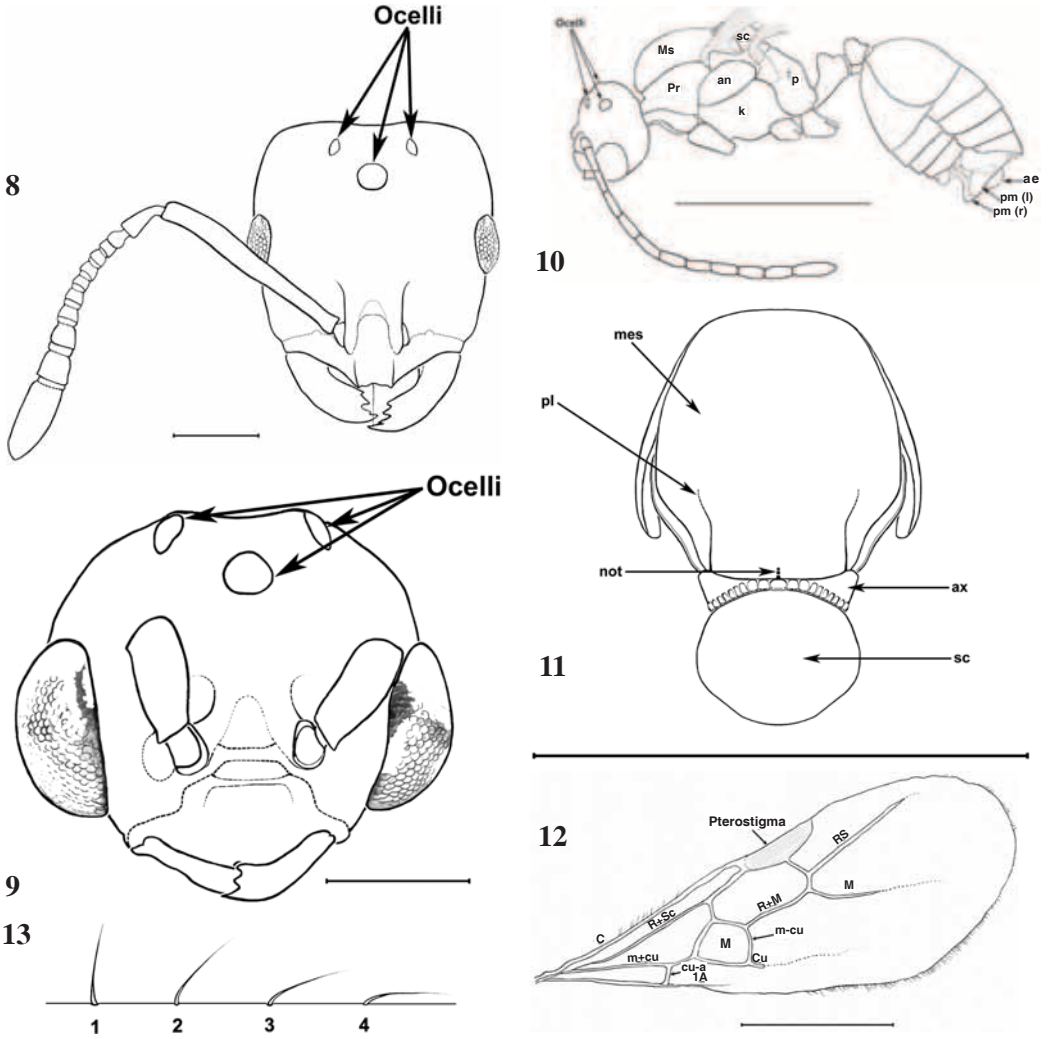

FIGURES 1–13. **Figures** 1–3: Measurements used in this study (*M. sakalavum* worker) (1) HML, length of head +mesosoma (alitrunk)+petiole+postpetiole; (2) HL, head length; HW, head width; SL, scape length; (3) PW, promesonotal width. (Pilosity is omitted in Figs. 1-12.) Scale bars: Fig 1 = 0.5 mm; Figs 2–3, = 0.1mm. **Figure** 4. Profile of *M. sakalavum* worker. A1-4, abdominal segments; ai, antennal insertion; ap, anteroventral process; E, eye; HC, head capsule; Mes, mesopleuron (Nb. In some species, the mesopleuron may be divided by a furrow into an upper anepisternum and a lower katepisternum); Mp, metapleuron; mpg, metapleural gland bulla; mtg, metanotal groove; P, propodeum (= first abdominal segment); ped, peduncle of petiole; PM, promesonotum; pp, propleuron; pps, propodeal spiracle; Ppt, postpetiole; Pt, petiole; pts, petiolar spiracle. Scale bar = 0.5 mm. **Figure** 5. Full-face view of head of *M. sakalavum* worker. acs, anteromedian clypeal sector; C, clypeus; ca, clypeal angle (may be produced as denticle or tooth); cc, median clypeal carina; f, funiculus of antenna; fl, frontal lobe; frons, frons of head capsule; ft, frontal triangle; ms, median seta; scape, scape of antenna. Scale bar = 0.1 mm. **Figure** 6. Dorsal view of *M. sakalavum* queen thorax. Scale bar = 0.5 mm. **Figure** 7. Profile of *M. sakalavum* queen. an, anepisternum; ax, axilla; k, katepisternum; Ms, mesoscutum; Mt, metanotum; Oc, ocelli; P, propodeum; pp, propleuron; Pr, pronotum; Sc, scutellum. Scale bar = 1 mm. **Figure** 8. Full-face view of head of *M. sakalavum* queen. Scale bar = 0.2 mm. **Figure** 9. Full-face view of head of *M. sakalavum* male. Scale bar = 0.2 mm. **Figure** 10. Profile of *M. sakalavum* male. ae, aedeagus; An, anepisternum; ax, axilla; k, katepisternum; Ms, mesoscutum; P, propodeum; pm (l), left paramere; pm (r), right paramere; Pr, pronotum. Scale bar = 1 mm. **Figure** 11. Dorsal view of *M. sakalavum* male thorax. ax, axilla; mes, mesosoma; not, notaulus (vestigial here); pl, parapsidal line; sc, scutellum. Scale bar = 1 mm. **Figure** 12. Wing of *M. fisheri* showing the maximum complement of wing veins found in *Monomorium*. Scale bar = 1 mm. **Figure** 13. Inclination of a seta on body surface (terms used are taken from Dubois 1986). 1, erect; 2, suberect 3, decumbent 4, appressed.

(13–17), labial and maxillary segment count (18), and characteristics of the mandibles (19–22) were all characters used to create a morphological profile for the worker of each species.

MESOSOMA (Figs. 1, 3–4, 13).— In the same way, the appearance and pilosity of the promesonotum (23–27), the degree of impression of the mesonotal groove (28), and the appearance and pilosity of the propodeum and metapleuron (29–37) were also selected.

PETIOLE AND POSTPETIOLE (Figs. 1, 4).— The appearance of the petiole and postpetiole was scored, also the morphometric relationships between node face and node in profile, node height and postpetiole height and postpetiole height and length (38–48).

OTHER CHARACTERS (Fig. 13).— Those selected included pilosity of the first gastral tergite, color and presence or absence of worker polymorphism (49–50).

MEASUREMENTS OF GROSS MORPHOLOGY.— Seven measurements of the gross morphology were taken for the worker, these being expressed in millimeters (51–57). The head-mesosoma-petiole-postpetiole length (HML) (Fig. 1) was preferred to a total length measurement, since the gaster in myrmicine ants can be either distended or shrunk in individual specimens, resulting in an inordinately large variance in length readings. The first component of the HML is the head length (see following), followed by a modified Weber's length (WL). For the latter, a measurement was taken from the anterior base of the promesonotal hump (i.e., where the vertex of the head capsule would reach if the ant's head was tilted right back) to the apex of the metapleural lobe. The third component is the length of the combined petiole and postpetiole (measured from the apex of the metapleural lobe to the posterior margin of the postpetiole). These measurements were performed with the body of the ant viewed in profile. Head length (HL) (Fig. 2) is here defined as the length of the head capsule in full-face view as measured by a straight line from the midpoint of the anteromedian clypeal margin to the midpoint of the margin of the vertex. Head width (HW), also calculated with the ant in full-face view, involved measuring the maximum width of the head of the ant, disregarding the bulge made by the compound eyes. In most cases maximum width was just posteriad of the eyes. The cephalic index (CeI) was determined by the formula:

$$CeI = HW/HL \times 100$$

Antennal scape length (SL) (Fig. 2) is the maximum length of the scape, excluding the condylar bulb and its associated neck. The right scape was measured, except where this organ was missing or damaged, in which case the left scape was measured instead. The scape index (SI) was determined by the formula:

$$SI = SL/HW \times 100$$

The promesonotal width (PW) (Fig. 3) is the maximum width of the promesonotum viewed from the front, from a slightly elevated position so that the broadest extent of the promesonotum is visible.

NB. Measurements were obtained from dried, pointed specimens. These were examined under a stereomicroscope fitted with an ocular micrometer. Measurements were made to 0.01 mm. Provided that number was available, at least twenty worker specimens from each species were measured, many more in the case of problematic taxa. The maximum number of queens and males that could be reliably associated with the workers of a given species was also measured, this usually being less than twenty except for a few taxa like *M. termitobium* where the number of reproductives was very large. Drawings (Figs 1–13) were made by manipulation and overdrawing of images obtained from a Leica M420 microscope linked to an Automontage (Syncroscopy) program and imported into Adobe Photoshop 7.0.

QUEEN CHARACTERS (Figs. 6–8, 12): Characters selected for the head (1–7), propodeum (14–20), petiole and postpetiole (24–32), pilosity of the first gastral tergite (33) and color (34) were as for the worker. Gross measurements (37–43) were also carried out in the same way as those for

the worker. Characters of the thorax differ from those of the conspecific worker, however, because of the presence of wings in the queen for part of her life history. These additional characters related to the appearance and pilosity of the combined pronotum, mesoscutum and mesopleuron, including degree of separation of the axillae (8–13) and the venation of the wing (21–23). Additional characters concerned presence or absence of brachypterous queens (35) and ergatoid or worker-queen intercastes (36).

MALE CHARACTERS (Figs. 9–10, 12): Seven characters were chosen for the male head, these including head-mesosoma width ratio, appearance of the frons and compound eyes, the position of the lower margin of the compound eye in relation to the posterior margin of the clypeus, the appearance of the ocelli, the ratio of the first segment of the antennal funiculus to the second segment, and the number of teeth and denticles. The mesosoma characters (8–12) were the profile and appearance of the pronotum + mesoscutum + mesopleuron, the appearance of the parapsidal furrows and notauli, and the degree of separation of the axillae. Wing vein characters (13–15) were as for the queen. Petiole and post-petiole characters (16–23), pilosity of the first gastral tergite (24), color (25) and gross morphological measurements (26–32) were as for the worker and queen.

GENUS *MONOMORIUM* MAYR

Monomorium Mayr 1855:452. Type-species: *Monomorium monomorium* Bolton (replacement name for *Monomorium minutum* Mayr, 1855:453, a junior secondary homonym of *Atta minuta* Jerdon 1851:105 [= *M. pharaonis* (L.) 1758: 580]); by monotypy (Bolton 1987:287).

Phacota Roger 1862a: 260. Type-species: *Phacota sichelii*, by monotypy. *Phacota* junior synonym of *Monomorium*: Ettershank 1966:82, syn. rev. Bolton 1987:281. [Synonymy by Fernandez (in press) 2.]

Nothidris Ettershank 1966:105. Type species: *Monomorium latastei* by original designation. [Synonymy by Fernandez (in press) 2.]

Antichthonidris Snelling 1975:5. Type-species: *Monomorium denticulatum*, by original designation. [Synonymy of genus by Heterick 2001:361 without species-level nomenclatural changes, synonymy of *A. denticulata* Fernandez (in press) 2.]

Epelysidris Bolton 1987:279. Type-species: *Epelysidris brocha*, by original designation. [Synonymy by Fernandez (in press) 2.]

(For synonymy in the genus *Monomorium* prior to 1988, see Bolton, 1987:287-288.)

DIAGNOSIS OF WORKER OF MALAGASY SPECIES.— Minute to moderate (total length approximately 1.5–4.5 mm) monomorphic to polymorphic myrmicine ants. Palp formula 5,3, 3,3 3,2, 2,2 or 1,2. Mandible smooth or longitudinally striolate, with three to six teeth and denticles, apical tooth always much larger than the preceding tooth; basal tooth often reduced to a small or minute denticle or angle but enlarged in one species, basal tooth often separated by a diastema from remainder of the dentition in members of the *M. hildebrandti* group; mandibular shape triangular, linear-triangular, or strap-like with inner and outer edges parallel or nearly so. Median clypeal seta conspicuous in most Malagasy species and positioned at or slightly above a distinct anteromedian clypeal margin except in *M. hildebrandti* group, where it is positioned on underside of a protruding shelf, near to the true anteromedian clypeal margin; paired setae (one often shorter than the other) straddling midpoint of anteromedian clypeal margin present in some large workers of *M. aureorugosum*, *M. fisheri* and *M. infuscum* and some queens of *M. fisheri*. Clypeus raised medially, usually bicarinate, though carinae may be obscure or in form of multiple weak ridges; in full-face view, the anteromedian clypeal margin often narrow and projecting, but this sector broad and abruptly declivous (i.e., when viewed in profile) in several members of *M. monomorium* and *M. hildebrandti* groups. Frontal carinae straight or diverging slightly posteriad, absent behind frontal lobes. Frontal lobes weakly sinuate or more-or-less parallel in full-face view. Antennal scrobes absent. Antennae

11- to 12-segmented; club usually with three distinct segments, sometimes four, or without a distinct club, but club never two-segmented. Eyes often reduced (sometimes to one or two ommatidia) in *M. hildebrandti* group, small to fairly large in other groups; in full-face view, eyes generally set at about midline of head capsule, or slightly above or below, but occasionally set well into anterior sector of head capsule; in profile, eyes usually set at about midline or behind midline of head capsule, rarely in front of midline; eye shape usually elliptical, with more pronounced curvature of the inner margin, but can be elongate or ovoid and narrowed to a point anteriad.

Mesosoma with standing setae in most groups, these setae lacking in some members of *M. salomonis* group; standing setae short and bristle-like in members of *M. shuckardi* group. Metanotal groove most commonly deeply impressed, but weakly impressed, vestigial or absent in some taxa. Propodeal dorsum rounded onto declivitous surface, weakly or strongly angulate or armed with short denticles, spines lacking in Malagasy species; standing propodeal setae absent in some cases. Propodeal spiracle distinctly circular or nearly so, usually situated at about midlength, but placed anteriad or posteriad of midlength in some taxa, and close to propodeal dorsum in members of *M. shuckardi* group. Metapleural glands of moderate to small size, never hypertrophied. Propodeal lobes often small to vestigial, rarely acute-angled and prominent. Fore coxae larger than middle or hind coxae. Petiolar peduncle often with small anteroventral flange or protuberance, but this feature vestigial in many species. Petiolar spiracle well in front of node in several endemic species, slightly in front of or in anterior sector of node in remaining taxa, often rather dorsally situated. Petiolar node shape ranging from low and broadly conical or tumular to cuneate and strongly tapered, thick and asymmetrical in profile in some members of *M. hildebrandti* group, but never regularly cuboidal in Malagasy species; underside of node and peduncle commonly with fine, transverse rugulae in larger species of *M. hildebrandti* group. Anteroventral margin of postpetiolar sternite often conspicuous, this feature reduced or absent in members of *M. destructor*, *M. pharaonis* and *M. monomorium* groups. Gaster dorsoventrally compressed, with blunt lateral carinae on gastral tergites. Sting not prominent in Malagasy species.

Diagnosis of queen of Malagasy species.— Larger than conspecific worker, but not greatly so in some taxa. Palp formula, number of mandibular teeth and denticles and number of antennal segments as for conspecific worker. Ocellar triangle of three ocelli typical, but posterior ocelli may occasionally be reduced in size. Eyes large, generally elliptical, sometimes with a concavity in upper outer margin, but circular, semi-circular and ovoid eye shapes also occur.

Seen in profile, mesoscutum ranges from broadly convex to convex anteriad and flattened or even faintly sinuate posteriad. Mesoscutal pilosity always present. Pronotum, mesoscutum and mesopleuron often smooth and shining, but may be striolate or punctate to a greater or smaller degree; mesopleuron always divided by transverse furrow into upper anepisternum and lower katepisternum. Length-width ratio of mesoscutum and scutellum from near 7:3 to about 3:2. Axillae mostly well separated but may be contiguous or even reduced to a strip of thin cuticle, each individual axilla being indistinct. Metapleural sculpture most commonly in form of longitudinal striolae or striae, propodeum often unsculptured except for costulae on declivitous face, but where present frequently more marked than in conspecific worker. Dorsal propodeal face characteristically sloped, often almost vertical. Propodeal processes, where present, in form of small denticles or flanges, at most. Wing veins tubular and sclerotised in *M. notorthotenes*, *M. hanneli*, and in *M. hildebrandti* group, predominantly weak and depigmented in most *M. monomorium* group species, though wing veins are darkly pigmented without accompanying sclerotization in some species. Cross-vein m-cu present in all queens of *M. hildebrandti* group, in all *M. notorthotenes* queens and some *M. hanneli* queens, absent in other *M. hanneli* queens, rarely present in reproductives of *M. destructor* group (per Bolton 1987), and always absent in reproductives of *M. monomorium* and *M.*

salomonis groups (information on the latter coming from Bolton 1987). Cross-vein cu–a always present in *M. notorthotenes*, *M. hanneli* and all members of *M. hildebrandti* group, always absent as a distinct vein in members of *M. monomorium* group (very rarely present as a vague shadow). (Alate queens seen only for *M. hanneli*, and M. *hildebrandti*, *M. monomorium* and *M. shuckardi* groups.) Petiole as for that of conspecific worker. No brachypterous queens seen among Malagasy *Monomorium*. Ergatoid females seen for both *M. hildebrandti* and *M. monomorium* groups.

Diagnosis of male of Malagasy species.— I have seen males only for *M. notorthotenes*, *M. hanneli* and the *M. hildebrandti* and *M. monomorium* groups, and can associate males with just 12 of the 36 Malagasy *Monomorium* species identified in this work. This is too incomplete a record for a proper diagnosis to be made, but of those males seen, all, except members of the *M. salomonis* group, possess conspicuous, often turreted ocelli. The compound eyes are almost invariably protuberant, tending to elongate in some species. The wing of the male, on the other hand, generally has the same venation as the conspecific female, but vein cu–a is lacking in all males of *M. notorthotenes* and *M. hanneli*. The males of the endemic *M. notorthotenes* are very small in relation to the conspecific queen, even smaller than many workers of this species, and have a distinctly fly-like *habitus*. Identified males of the *M. hildebrandti* group are also relatively small in relation to the queen and approximately the same size or smaller than the worker. However, the size disparity between queen and male is much less among *M. monomorium* group reproductives, in contrast to the often minute workers, e.g. the HML of the *Monomorium madecassum* queen is 3.01–3.12 mm, compared with 2.80–2.84 mm for the male. (By way of contrast, the HML for the *M. madecassum* worker is only 1.14–1.27 mm).

Malagasy species groups recognized as a result of this project

Despite the fact that Madagascar was separated from Africa in the late Jurassic about 165 MYBP, and from India only 88 MYBP (Krause 2003), the Malagasy *Monomorium* fauna has strong African affinities, and shares a number of species with eastern and southern Africa. However, several shared taxa have their distribution primarily in the middle and western parts of Africa. By way of contrast, the Malagasy representatives of another myrmicine genus, *Pyramica*, have much more decidedly Asian affinities (Fisher 2003).

Of most interest are four species of a group restricted to Madagascar that has not been previously categorized. I have called this the *Monomorium shuckardi* species group after the only member described prior to this work. Members of this group possess some of the most plesiomorphic characters known for the genus *Monomorium*, most notably a PF of 5,3. The placement of the petiolar spiracle well anteriad of the node and near to the midlength of the petiole is also a primitive feature shared only with a few Australian species in the *M. bicorne*, *M. insolescens* and *M. kilianii* species groups (Heterick 2001), and with members of the *M. scabriceps* group (Bolton 1987). However, other morphological features suggest a relationship at a basal level with the *Monomorium destructor* and *Monomorium salomonis* groups. These include the specialized small males (albeit, only known for *Monomorium notorthotenes* Heterick, sp. nov.) also found in the *M. destructor* group (Bolton 1987), and the finely microreticulate or striolate body sculpture and lack of standing setae on the propodeum, both characteristic of various members of the *M. salomonis* group. All members of the *M. shuckardi* species group also share a sculptured mandible with the other two groups, the sculpture in this case being predominantly longitudinal striolae or striae. Virtually all collections have been in the south of the island, in Toliara Province.

Two other groups found naturally on Madagascar are the *M. hanneli* and *M. hildebrandti* groups. The *M. hanneli* group (one Malagasy species) is otherwise restricted to West Africa and

Kenya, but members of the *M. hildebrandti* group (ten Malagasy species) in which the eye is reduced to one or two ommatidia are also widespread in Africa, Indo-Australia, Australasia, and the Pacific (Wilson and Taylor 1967; Heterick 2001). *Monomorium subcoecum* (not found in Madagascar) was described by Emery from the Antilles, in the Caribbean (Emery 1894b). However, whereas these two entities appear to constitute only a minor fraction of the African *Monomorium* fauna (with the exception of the widespread *Monomorium cryptobium*), several of the species recognized in this work are abundant and widespread throughout Madagascar. As understood in this work, the *M. hildebrandti* species group includes those species placed by Bolton in the *M. fossulatum* species group. The name *hildebrandti* is here preferred as the designation of this group because this was the earliest named species, and the name '*fossulatum*' has been synonymized under *sechellense* (Bolton 1995).

Monomorium hanneli bears a strong superficial resemblance to members of the *M. hildebrandti* group in which the clypeal carinae are well-developed and the clypeus is projected forward. The appearance of the mesosoma is also similar, if not identical, and the compound eye in workers of *M. hanneli* and workers of most *M. hildebrandti* group species is reduced. However, as Bolton (1987) correctly adjudges, the appearance of both groups is due to convergence. The most highly visible way workers of the two groups are separable is the appearance of the smooth, vertically attenuate node and the smooth, elevated postpetiole found in the *M. hanneli* group. A slightly more subtle but equally important difference is in the placement of the median seta, which, with the ant in full-face view, is set at or slightly above the midpoint of the true anteromedian clypeal margin in *M. hanneli* and its African relatives (i.e., *M. guineense*, *M. invidium* and *M. jacksoni*), and well underneath a protrusive ledge in those members of the *M. hildebrandti* group with a projecting clypeus. The wing is more strongly sclerotized in those members of the *M. hildebrandti* group that I have seen than it is in *M. hanneli*, and all of the former possess vein m–cu, whereas that vein is missing in *M. hanneli* males and at least some queens.

While the workers of most members of the *M. hildebrandti* group have eyes that are comparatively very small, usually being less than the greatest width of the antennal scape, this is not a universal trait. The general reduction in the size of the worker eye is perhaps a function of a cryptic or mainly subterranean lifestyle, since the colonies of most species in this group appear to favour rotting wood and leaf mould. Transverse ventral rugulae found under the petiole of the medium-size and larger species are absent from the small workers of *M. cryptobium*, *M. ferodens*, *M. modestum* and *M. sechellense*. Very smooth workers of some populations of *M. hildebrandti* also lack these rugulae. Apart from the almost total loss of vision, the species formerly recognized as belonging to the *fossulatum* group (including all those formerly placed in the genus *Syllophopsis*) share a gestalt common to *M. hildebrandti* and its allies. The very large *Monomorium aureorugosum* and *Monomorium infuscum* workers have distinctively triangular mandibles, well-separated antennal lobes and are heavily sculptured, but share the same petiolar structure (including the fine, transverse, ventral petiolar rugulae and asymmetrical nodal dorsum) of other large members of the species group. *Monomorium ferodens* has an aberrant PF of 3,2, but otherwise clearly belongs here. In summary, this group has the following shared worker apomorphies: (1) smooth, linear-triangular mandibles with a strongly oblique masticatory margin (except for *M. aureorugosum* and *M. infuscum*), (2) an anteromedian clypeal seta (more rarely, paired setae) positioned well under a protrusive ledge, and (3) a primitively asymmetrical dorsum to the petiolar node. Reduced eyes and transverse, ventral petiolar rugulae are also found in many *M. hildebrandti* group species. Workers of most species in this group share with the *M. hanneli* group and several members of the *M. monomorium* group narrowly separated frontal lobes.

The *M. destructor* and *M. salomonis* species groups are represented by few species, and these

are mainly tramp ants. Within the *M. destructor* group, *Monomorium destructor* is adventive to the island, having been brought across by human commerce at some time in the past, but the widespread distribution of *Monomorium robustior* suggests endemicity (thus also Bolton 1987). Within the *M. salomonis* group, *Monomorium pharaonis* and *Monomorium subopacum*, members of different complexes but with similar tramp tendencies, have clearly been introduced. The presence of *Monomorium willowmorense*, known from one worker collected from the north-east coast, is more puzzling. The monotypic *Monomorium latinode* species group is represented by *M. latinode*, which also has tramp tendencies, and is well-dispersed across the Indo-Australian region (Bolton 1987).

Monomorium monomorium species group members found in Madagascar are often abundant, but are not particularly diverse compared with the Afrotropical fauna, only 15 species being recognized here. It should be said, however, that the variability of several nominal species like *M. termitobium* is so great that molecular-based systematics is probably needed to give the taxonomy strong definition. Some of the taxa appear to belong to complexes identified by Bolton (1987), while others seem not to be closely related to members of the group found on the African mainland. Of the described species, *M. madecassum* is clearly referable to Bolton's *leopoldinum* complex, albeit *M. leopoldinum* itself becomes a junior synonym of *M. madecassum* in this work. *Monomorium exiguum* and *M. floricola* were placed in the *boerorum* complex by Bolton, but this was confessedly for convenience, and even aside from the difference in antennal count (i.e., 11 antennomeres in *M. exiguum* and 12 in *M. floricola*), the queens of the two species do not appear very similar. *Monomorium exiguum* is actually closely related to the Afrotropical *Monomorium rosae* (see my comments under the former). The other *Monomorium* with an 11-segmented antenna, *M. nigricans*, is of uncertain affinities, but may also belong to the *M. exiguum* complex.

Monomorium termitobium is here regarded as the senior synonym of *M. binatu*, *M. exchao* and *M. imerinense*. Through *M. binatu* and *M. exchao*, *M. termitobium* (along with the apparently closely related *M. xuthosom*a and *M. sakalavum*) is associated with Bolton's *rhopalocerum* complex, but as here conceived, the morphological parameters of that complex far exceed those designated by Bolton. Workers of *Monomorium micrommaton* and *M. chnodes* bear a close resemblance to hirsute, yellow workers of *M. termitobium*. The queen of *M. micrommaton* is relatively large, with a proportionately massive mesosoma and a broad, cordate head, quite different characters from those of the queen of *M. termitobium*. *Monomorium chnodes* possesses a square propodeum (unlike that seen in any workers of *M. termitobium*) with a large propodeal spiracle, and some queens and workers have a five-toothed mandible — a feature otherwise unknown in the *M. monomorium* species group. However, preliminary molecular data place *Monomorium chnodes* close to *M. platynodis*, and both species possess a very short clypeus that, when seen in profile, descends towards the arc of the mandibles at almost 90 degrees. *Monomorium platynodis*, in fact, may represent a radiation derived from *M. chnodes*, with a reduction in the size and dentition of the mandible.

In *Monomorium chnodes*, *M. flavimembra*, *M. lepidum*, *M. platynodis,* and *M. versicolor*, the clypeal carinae are obsolete or only weakly defined and the anteromedian clypeal margin is depressed and moderately to strongly declivous when seen in profile — in the case of *M. chnodes* and *M. platynodis* being almost vertical, as mentioned above. In four of these species, the fourth (i.e., basal) tooth is greatly reduced or absent. Only *M. chnodes* has a strongly defined basal tooth. In *M. chnodes*, *M. flavimembra,* and *M. lepidum*, the petiolar node is more-or-less conical and the postpetiole is rounded, but in *M. platynodis* and *M. versicolor* the nodes are high and the petiolar node is strongly cuneate. The group is here called the *flavimembra* complex. *Monomorium bifidoclypeatum* is very similar to these species and almost certainly also belongs to this complex. *Monomorium denticulus* is a small member of the *M. schultzei* complex but does not appear to be conspecific with any of the described African forms.

Key to Malagasy *Monomorium* workers

1. Antenna 11-segmented (*M. monomorium* species group) 2
1'. Antenna 12-segmented (various species groups) 3
2. Metanotal groove weakly impressed; in profile, propodeum rather elongate and petiolar node always conical, its dorsum tapered (depigmented yellow to brown) (Figs. 51–52) . . . . . *M. exiguum* Forel
2'. Metanotal groove strongly impressed; in profile, propodeum evenly rounded and petiolar node may be thick, broadly rounded (dark reddish-brown to black) (Figs. 65–66) . . . . . *M. nigricans* Heterick, sp. nov.
3. Palps long (PF 5,3); propodeum usually lacking standing setae, where present these short and fine; occipital carina strongly defined and conspicuous along rear margin of head when head viewed in profile; mandible armed with five distinct teeth (*M. shuckardi* species group) 4
3'. Palps shorter (PF 3,3 or less); propodeum usually with standing setae, but if these lacking, then mandible armed with four teeth, or with three distinct teeth and a small to minute denticle or angle; occipital carina vestigial or short, not conspicuous along rear margin of head when head viewed in profile 7
4. Head and mesosoma finely striolate; in profile, propodeum without a distinct angle between its dorsal and declivitous faces (Fig. 37) . . . . . *M. robertsoni* Heterick, sp. nov.
4'. Head and mesosoma finely striolate-microreticulate, microreticulate-punctate with or without unsculptured areas, or head and dorsum of mesosoma smooth and shining; propodeum in profile with blunt to sharply defined propodeal angle 5
5. Antennal scape very long, extending beyond vertex of head capsule (SI 113–132) larger (HW 0.62–0.72 mm), depigmented yellow ants (Figs. 85–86) . . *M. notorthotenes* Heterick, sp. nov.
5'. Antennal scape shorter, barely or not attaining vertex (SI 90–108); if yellowish, then much smaller (HW 0.35–0.47 mm compared with 0.62–0.72 mm) 6
6. In full-face view, frons of head capsule densely microreticulate-punctate; generally larger species (HW 0.46–0.72 mm, usually 0.55 mm<) (Figs. 38–39) . . . . . *M. shuckardi* Forel
6'. In full-face view, frons of head capsule finely striolate-microreticulate or smooth and shining; generally smaller species (HW 0.35–0.47 mm compared with 0.46–0.72 mm, usually 0.55 mm ≥); (Figs. 35–36) . . . . . *M. clarinodis* Heterick, sp. nov.
7. Mandible distinctly longitudinally striate, maximum number of teeth four 8
7'. Mandible smooth and shining, except for piliferous pits, with three to five teeth 12
8. In full-face view, frons of head capsule smooth, with exception of piliferous punctures, fine rugulae on vertex (*M. destructor*) and fine, circular striolae around antennal insertions (*M. destructor* species group) (e.g., Fig. 41) 9
8' In full-face view, frons of head capsule sculptured, sculpture varying from superficial reticulation to shagreenate-punctate (*M. salomonis* species group) (e.g., Fig. 43) 10
9. Head and mesosoma brown to dark brown . . . . . *M. robustior* Forel
9'. Head and mesosoma yellow to light brownish-yellow . . . . . *M. destructor* (Jerdon)
10. Mesosoma possessing one or more pairs of erect and/or sub-erect setae (Fig. 91) . . . . . *M. pharaonis* (L.)
10'. Mesosoma without standing setae 11
11. In full-face view, frons of head capsule shining, with surface sculpture confined to faint reticulation, the vertex more noticeably shagreenate; scape shorter (SI < 100) . . . . . *M. willowmorense* Bolton
11'. In full-face view, frons of head capsule opaque, reticulate to shagreenate-punctate; scape longer (SI 100 >) (Figs. 42–43) . . . . . *M. subopacum* (Smith)

12. Either frontal lobes separated by a strip of posterior sector of clypeus that is clearly wider than either of them, *or*, if frontal lobes closely approximated, metanotal groove strongly indented and propodeum smooth; propodeal dorsum rounding into declivitous face without distinct angle; propodeal denticles always absent; fine, transverse ridges always absent from underside of petiolar peduncle and node; anteroventral postpetiolar process commonly vestigial or absent, rarely an inconspicuous lip and prominent only in *M. latinode* (e.g., Fig. 94). 13

12'. Frontal lobes usually closely approximated, and separated by a strip of posterior sector of clypeus that is narrower than either of them, *or*, if frontal lobes well separated, and metanotal groove deeply impressed, then propodeal dorsum meeting declivitous face at a distinct angle; propodeum often armed with flanges or denticles; several to many fine, transverse ridges present on underside of petiolar peduncle and node; anteroventral postpetiolar process usually distinct as sharp angle, conspicuous lip or spur (*M. hanneli* and *M. hildebrandti* species groups.) (e.g., Fig. 102) 26

13. Mandible armed with five teeth; PF 3,3; propodeum elongate, its dorsum and sides finely and densely striolate (*M. latinode* species group) (Figs. 44–45). . . . . *M. latinode* Mayr

13'. Mandible armed with three or four teeth (five teeth very rarely present in *M. chnodes*); PF 2,2 or 1,2; propodeum not as above, usually smooth on dorsum and sides (*M. monomorium* species group). 14

14. In full-face view, clypeus strongly bidentate, each clypeal carina terminating in a sharp angle or denticle, the anteromedian clypeal margin between the clypeal projections often straight; eyes large, eye length between $\frac{1}{4}^{th}$ and $\frac{1}{5}^{th}$ length of side of head capsule (body of ant concolorous yellow or brown, gaster may be slightly darker shade than mesosoma) (e.g., Fig. 90) 15

14'. In full-face view, clypeus usually weakly emarginate to weakly convex, if clypeus tending to bidentate then anteromedian margin of clypeus usually indented between anteromedian clypeal projections, body of ant is distinctly bicolored or eye is smaller, eye length $\frac{1}{5}^{th}$ < length of side of head capsule (eg. Fig. 54) 16

15. Propodeal spiracle very large, ≈ same width as antennal segments a3–9; petiolar node higher, tending to cuneate (Figs. 59–60) . . . . . *M. madecassum* Forel

15'. Propodeal spiracle minute, pinhole-like, width << antennal segments a3–9; petiolar node lower, conical (Fig. 50). . . . . *M. denticulus* Heterick, sp. nov.

16. Mandible *always* clearly armed with three teeth with no trace of a smaller, basal tooth or denticle. 17

16'. Mandible characteristically armed with four teeth, albeit basal tooth may be reduced to a minute, offset denticle or angle (rarely absent in individuals of *M. flavimembra*, whose workers have a bright reddish- or yellowish-brown body and yellowish appendages), rarely with five teeth (some *M. chnodes*) 18

17. In profile clypeus sloping towards mandibles at acute angle; in full-face view clypeus projecting forward so that its anterior margin adjoins or partially obscures basal margin of mandibles; metanotal groove deeply impressed but almost always without broad cross-ribs; variously colored from orange to dark reddish-black or bicolored, but where head is light colored, antennal scape is conspicuously darker than head capsule (Figs. 67–68) . . . . . *M. versicolor* Heterick, sp. nov.

17'. In profile, clypeus almost at right angle to mandibles; in full-face view, anterior margin of clypeus largely straight, clypeus not projecting forward, leaving a gap between clypeus and mandibles; metanotal groove deeply impressed, broad cross-ribs always present; concolorous orange, with antennal scape of same color as head capsule (Figs. 63–64) . . . . . *M. platynodis* Heterick, sp. nov.

18. Head and gaster uniformly dark brown to black, contrasting with yellowish or bicolored yellow-and-brown mesosoma; petiolar node low, broadly conical to tumular, scarcely higher than postpetiole (Figs. 55–56) . . . . . *M. floricola* (Jerdon)

18'. Either concolorous, or head and gaster not both uniformly dark in color with a lighter colored mesosoma; petiolar node variable but usually distinctly higher than postpetiole. 19

19. In profile, mesosoma straight and at higher level than propodeum; propodeal spiracle very large, ≈ diameter of antennal segments a3–a9; five teeth occasionally present, all non-apical mandibular teeth usually of same size; propodeum short, about as long as high; antennal scape relatively short (SI 67–76) (densely hairy, bright yellow ants) (Figs. 48–49) . . . . . *M. chnodes* Heterick, sp. nov.

19'. In profile, mesosoma, if straight, on same level as propodeum; propodeal spiracle generally smaller, commonly pinhole-like; maximum of four teeth, basal tooth frequently distinctly smaller than other non-apical teeth and reduced to minute denticle or angle in several taxa; propodeum usually longer than high; antennal SI usually 80>. 20

20. In full-face view, antennal scapes very long, scapes normally reaching or even slightly exceeding vertex of head capsule (SI 100 >), in rare, very small individuals with scape index slightly less than 100, head darker than mesosoma; profile of combined mesosoma and propodeum straight (except for indentation of metanotal groove), propodeum elongate with indistinct angle between propodeal dorsum and its declivitous face; mesosoma often with 8> pairs of setae; mesopleuron usually with distinct sculpture, often reticulate-punctate (reddish-brown ants which normally have darker head and gaster) (Figs. 1–4). . . . . *M. sakalavum* Santschi

20'. In full-face view, antennal scapes usually shorter, if exceeding vertex, and profile of combined mesosoma and propodeum straight, then mesopleuron smooth, or head of same color intensity as mesosoma and mesosoma with only three prominent pairs of standing setae, or propodeum rounded in a convex curve towards its declivitous face 21

21. With combination of: head and mesosoma brownish-yellow to orange (normally concolorous, head may be of slightly darker shade than mesosoma), gaster brown; clypeus projected forward, clypeal carinae strongly developed and moderately divergent anteriad; propodeal spiracle relatively large, ≈ diameter of antennal segments a3–a9; in profile, postpetiole visibly higher than wide (Fig. 69) . . . . . *M. xuthosoma* Heterick, sp. nov.

21'. Without this combination of characters (similar species most easily distinguished by smaller, pinhole- like propodeal spiracle, or rounded postpetiole which is as high as wide, or weakly developed or indistinct clypeal carinae) 22

22. In full-face view, clypeal carinae well developed and strongly divergent anteriad, anteromedian clypeal margin straight and broad, sometimes reaching almost to genae; in profile, clypeus meeting mandibles at angle of ≈ 90°; petiolar node often very small and low for size of ant, with a distinct ventral lobe in some specimens; head rather broad (CeI 86–94) (gracile, yellow or brown species) (Figs. 46–47) . . . . . *M. bifidoclypeatum* Heterick, sp. nov.

22'. In full-face view, if clypeal carinae well developed, then clypeus with carinae sub-parallel or only slightly divergent, or, if anteromedian clypeal margin straight and broad, then clypeal carinae obsolete or only weakly developed. 23

23. Concolorous reddish-brown to yellowish-brown species with yellow to brownish-yellow appendages, clypeus also yellowish, in contrast with color of head capsule; clypeal carinae obsolete or feebly indicated, clypeus only weakly projected forward and depressed medially, anteromedian clypeal margin broad and straight to weakly emarginated (Figs. 53–54) . . . . . *M. flavimembra* Heterick, sp. nov.

23'. Either color pattern not as above, or clypeal carinae distinct, anteromedian clypeal margin nar-

row, and clypeus strongly projected forward. 24

24. Bicolored species with head and mesosoma yellow to orange, gaster brown to shining black, sometimes with paler, yellowish or orange area at base of first gastral tergite; in full-face view, clypeal carinae weak or obsolete, anteromedian clypeal margin broad and straight or slightly emarginate; head generally broader (CeI 82–88); basal tooth reduced to minute angle and strongly offset (Figs. 57–58) . . . . . *M. lepidum* Heterick, sp. nov.

24'. Concolorous yellow or brown to bicolored yellow and brown or black, but if bicolored as above, then clypeal carinae distinct in full-face view, often sharply defined and sub-parallel, anteromedian clypeal margin narrow, its outline slightly convex, straight or concave; head of these bicolored specimens generally narrower (CeI 74–83); basal tooth variably developed, but usually a distinct denticle (several specimens may need to be examined as mandibular teeth are sometimes abraded) 25

25. Eye very small (8 ommatidia <), its diameter ≤ greatest width of antennal scape; in profile, clypeus broadly convex, angle formed by anterior clypeal margin usually indistinct; in full-face view clypeus bulbous, clypeal carinae weakly developed and frontal carinae separated by barely greatest width of antennal scape (hairy, concolorous, depigmented yellow ants) (Figs. 61–62) . . . . . *M. micrommaton* Heterick, sp. nov.

25'. Eye almost always larger (10 ommatidia ≥), its diameter > greatest width of antennal scape (extremely rarely, eye small with some ommatidia reduced in size , in which case gaster and sometimes head have brownish tinge, totally lacking in *M. micrommaton*); in profile, descending outline of clypeus in most cases sloping rather than broadly convex, with distinct angle at anterior clypeal margin; in full-face view, clypeus usually less bulbous and clypeal carinae often weakly to strongly developed; frontal carinae most commonly separated by more than width of antennal scape at its widest point (body color highly variable, ranging from pale yellow through various shades of brown to chocolate or bicolored yellow or orange and brown/black) (Fig. 93–94). . . . . *M. termitobium* Forel

26. In full-face view, clypeus projected forward with well-defined clypeal carinae, median seta positioned at or slightly posteriad of (i.e., above) the projecting anteromedian clypeal margin; petiolar node smooth, thin, tapered and often scale-like; postpetiole elevated, smooth, usually distinctly higher than wide; underside of petiolar peduncle and node smooth, without hint of fine, transverse ridges (concolorous yellow to tawny-orange species) (*M. hanneli* species group) (Fig. 70–71). . . . . *M. hanneli* Forel

26'. In full-face view, either clypeus not projected forward with strong carinae, or anteromedian seta set well anteriad of (i.e., underneath) apparent anteromedian clypeal margin; petiolar node variable but never thin, tapered and scale-like; postpetiole usually rounded, if elevated and distinctly higher than wide, then strongly sculptured; underside of petiolar peduncle with several to many fine, transverse ridges in medium-sized and larger species (*M. hildebrandti* species group) 27

27. PF 3,2; four mandibular teeth, apical tooth twice as large as t3, sharp and downcurved (depigmented, pale yellow species) (Fig. 77) . . . . . *M. ferodens* Heterick, sp. nov.

27'. PF 2,2; four or five mandibular teeth, with apical tooth usually same size as t3; sometimes with broad base but never downcurved (color variable, often brown, bright yellow-orange or bicolored) 28

28. Promesonotum, petiolar node and postpetiole coarsely striate; in full-face view, mandibles broadly triangular with at least five distinct teeth arranged vertically on masticatory margin, additional denticle may be present; eye size moderate, diameter of eye ≈ equal to greatest width of antennal scape (very large, blackish-red or orange-and-yellow ants with HW > 0.85 mm,

often >1mm). 29
28'. Promesonotum and petiolar node, at least, without coarse striae; either smooth, or with weak striolae posteriad (promesonotum) or with faint, lateral, longitudinal striolae (petiolar node); in full-face view, mandibles linear-triangular in most specimens, number of teeth and denticles four to five, but four is most common; HW 85 <, except in very large workers of M. fisheri, in which eye is very small (eye width < greatest diameter of antennal scape.) 30
29. Blackish-red species; average scape length shorter (SI 92–99) . . . . . *M. infuscum* Heterick, sp. nov.
29'. Orange species; average scape length longer (SI 98–103) (Figs. 73–74) . . . . . *M. aureorugosum* Heterick, sp. nov.
30. Eye point-like, consisting of one or two ommatidia (small, depigmented, yellow species). . 31
30'. Eye often small, but of normal appearance, consisting of four ommatidia ≥ 33
31. Mesopleuron microreticulate (Figs. 82–83) . . . . . *M. sechellense* Emery
31'. Mesopleuron smooth 32
32. In profile, metanotal groove deeply impressed; propodeal angle distinct with clear separation of dorsal and declivitous faces; smaller ants (HW 0.27–0.30 mm) (Figs. 75–76) . . . . . *M. cryptobium* Santschi
32'. In profile, metanotal groove usually weakly impressed; propodeal angle indistinct, propodeum without clear separation of dorsal and declivitous faces; larger ants (HW 0.36–0.42 mm) (Figs. 80–81) . . . . . *M. modestum* Santschi
33. In full-face view, humeri of promesonotum armed with a small, bluntly rounded angle, tubercle or rugosity . . . . . *M. gongromos* Heterick, sp. nov.
33'. In full-face view humeri of promesonotum not armed with a small, bluntly rounded angle, tubercle or rugosity, though they may be flattened and project as flanges over sides of mesopleuron 34
34. With combination of: eyes relatively large (eye width ≥ greatest width of antennal scape, and number of ommatidia ≥ 16); postpetiole attenuated anteriad; weak, longitudinal striolae nearly always present on sides of petiole; maximum of four mandibular teeth and denticles; promesonotum always smoothly rounded on to humeri (HW 0.63–0.70 mm; SI 88–100) (Fig. 72). . . . . *M. adiastolon* Heterick, sp. nov.
34'. Without above combination of characters (eyes usually small, eye width < greatest width of antennal scape, other characters vary with species) 35
35. Petiolar node thick, posterior face descending at right angle to petiole, dorsum broadly rounded and sides lacking longitudinal striolae; five mandibular teeth and denticles often present; promesonotum flattened and projecting as flange in smooth, shining specimens; anteromedian margin of clypeus indented, straight or narrowly convex with indistinct clypeal carinae; propodeal angle always square, lacking short denticles; nest series show allometric monophasy, some southern populations distinctly polymorphic with large-headed major workers; average size larger (HL 0.64–1.23 mm; HW 0.50–1.26 mm) (Figs. 78–79) . . . . . *M. fisheri* Heterick, sp. nov.
35'. Petiolar node usually distinctly asymmetrical or narrow tending to cuneate, if node thick and erect, then often finely longitudinally striolate with dorsum narrowly rounded and posterior surface distinctly sloping at angle of 90° <; maximum of four mandibular teeth or denticles; promesonotum always rounded; anteromedian margin of clypeus straight to indented, extension of clypeal carinae usually forming blunt angles; propodeal angle often armed with short denticles or flanges; nest series monomorphic with, at most, slight variation in size; average size smaller (HL 0.44–0.73 mm; HW 0.36–0.61 mm) (Figs. 101–105). . *M. hildebrandti* Forel

THE SHUCKARDI-GROUP

***Monomorium clarinodis* Heterick, sp. nov.**
Figs. 14, 35–36.

ETYMOLOGY.— Latin '*clarus*' ('shiny') + pl. of '*nodus*' (masc. 'knot')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toliara**, 6.1 km 182 S Marovato 25°35′S, 45°18′E, 20 m. 14.ii.2002, Fisher et al. BLF#5528 /under stone spiny forest/thicket/ CASENT 0453886 (CAS). PARATYPES: **Prov. Toliara** (all specimens with same collection data as holotype): 1☿ (ANIC); 21☿ (BMNH); 21☿ (CAS); 31☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Toliara:** Beza-Mahafaly ['Mahafely'], 27 km E Betioky 23.iv.1997 B.L. Fisher (3☿, 1♀); Cap Sainte Marie, 12.3 km 262 W Marovato 11–15.ii.2002 Fisher *et al*. (6♀); Ehazoara Canyon, 26 km E Betioky 27.iv.1997 B.L. Fisher (1☿); Forêt Beroboka, 5.9 km 131 SE Ankidranoka 12–16.iii.2002 Fisher *et al*. (2☿); Forêt Mahavelo, Isantoria Riv., 5.2 km 44 NE Ifotaka 28.i.–1.ii 2001 B.L. Fisher (16☿); Forêt Tsinjoriaka ['Tsinjoriaky'], 6.2 km 84 E Tsifota 6–10.iii.2002 Fisher *et al*. (16☿); Mahafaly ['Mahafely'] Plateau 6.2 km 74 ENE Itampolo, 21–25.ii.2002, Fisher *et al*. (7☿); Mandarano ['Manderano'], 10.iv.2002, Frontier Project MG030 (1☿); 6.1 km 182 Marovato 14.ii.2002 Fisher *et al*. (1☿); P. N. Ambovo Springs, 29.3 km 4 N Ranohira, 9–14.ii.2003, B.L. Fisher (2☿); P. N. Kirindy Mite, 16.3 km 127 SE Belo sur Mer 6–10.xii.2001 Fisher *et al*. (1☿); P.N. Andohahela, 1.7 km 61 ENE Tsimelahy 16–20.i.2002 Fisher *et al*. (6☿); P.N. Andohahela, 7.6 km 99 E Hazofotsy 12–16.i.2002 Fisher *et al*. (4☿); Tsimanampetsotsa, 6.7 km 130 SE Efoetse, 18–22.iii.2002 B.L. Fisher (8☿); Tsimanampetsotsa, Bemanateza, 23.0 km 131 SE Beheloka, 22–26.iii.2002 B.L. Fisher (1☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons ranging from shining, smooth with almost effaced reticulation to shining and finely punctate-reticulate; pilosity of frons consisting of a few short, thick, erect setae interspersed with short, appressed setulae. Eye moderate, eye width 1–1.5x greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae indicated by multiple weak ridges; anteromedian clypeal margin broadly convex; paraclypeal setae short and thickened, not reaching basal margin of closed mandibles; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 5,3. Mandibular teeth five; mandibles triangular and mainly smooth (weakly striate basally); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t4 (five teeth present).

MESOSOMA: Promesonotum shining and microreticulate, microreticulation reduced on humeri, or, shining and smooth on dorsum, lower mesopleuron strongly punctate; (viewed in profile) promesonotum broadly convex, or, anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae very variable, from one or two to up to a dozen; standing promesonotal setae consisting of short, erect or semi-erect bristles; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove vestigial. Propodeum with reduced sculpture, generally smooth dorsally, metapleuron punctate; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle, but dorsal and declivitous faces separated when seen in profile; standing propodeal setae absent; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer declivitous face of propodeum than metanotal groove. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle laterodorsal and situated well anteriad of petiolar

node; node (viewed in profile) cuneate, vertex rounded; appearance of node shining and faintly microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 1:1; postpetiole shining, with vestigial sculpture; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, short, thick, erect setae interspersed with minute, appressed setulae.

GENERAL CHARACTERS: Color from orange or yellowish with gaster light brown, through to uniform chocolate. Worker caste monomorphic.

HOLOTYPE WORKER MEASUREMENTS: HML 1.55 HL 0.53 HW 0.44 CeI 83 SL 0.40 SI 91 PW 0.32.

OTHER WORKER MEASUREMENTS: HML 1.22–1.57 HL 0.45–0.55 HW 0.35–0.47 CeI 78–87 SL 0.32–0.43 SI 90–97 PW 0.26–0.35 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex always planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on dorsum of pronotum and mesoscutum. Propodeum shining and microreticulate; propodeum distinctly angulate, propodeal angles produced as short denticles; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Propodeal lobes present as vestigial flanges only, or absent.

WING: Wing not seen (queen dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and microreticulate; postpetiolar sternite not depressed, in form of narrow, rectangular projection.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, short, thick, erect setae interspersed with minute, appressed setulae.

GENERAL CHARACTERS: Color brownish-yellow, gaster darker. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 2.29 HL 0.66 HW 0.61 CeI 92 SL 0.52 SI 85 PW 0.52 (n=1).

REMARKS.— This species appears to have a wider distribution than other members of the *M. shuckardi* group, with most specimens being obtained from sifted litter in spiny forest in Toliara Province. The species has also been collected, however, in pitfall traps, from under a stone and from within a rotten log in tropical dry forest. Workers are very variable in appearance, and range from

shining with largely effaced sculpture on the frons and most of the promesonotum to uniformly granulose-reticulate on the mesosoma with a striolate-reticulate frons, the latter form resembling members of the *M. salomonis* species group. Color is similarly variable, and ranges from uniformly pale yellowish or bicolored orange-and-brown to dark chocolate, some of the latter workers exhibiting a rather mottled appearance (not unlike blended white and dark chocolate confectionery). One of the dark workers possesses numerous differences from similarly dark specimens taken in the same pitfall trap. The propodeum is more elongate and positioned relatively lower to the promesonotum so that there is no metanotal groove, the eye is slightly larger, the appendages are longer, and there is more extensive sculpture and erect pilosity. In other, respects, however, it conforms to the *habitus* of the other dark workers. This specimen does not appear to be an ergatoid, and the reason for the aberrant appearance is not known.

***Monomorium notorthotenes* Heterick, sp. nov.**
Figs. 14, 85–89.

ETYMOLOGY.— Greek '*noton*' (neut. 'back') + '*orthotenes*' ('stretched out')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toliara**, Rés Cap Sainte Marie 14.9 km 261 W Marovato 25°36′S, 45°09′E, 160 m. 13–19.ii.2002, Fisher et al. BLF# 5740/under stone spiny forest/thicket/ CASENT 0002257 (CAS). PARATYPES: **Prov. Toliara** (all specimens with same collection data as holotype): 1×2☿ (one with head missing) (ANIC); 1×2☿ (BMNH); 1♀+2♂ (5741) (CAS); 2☿+1♀ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Toliara:** Cap Sainte Marie 14.9 km 261 W Marovato, 13–19.ii.2002, Fisher et al. (23☿, 4♀, 3♂); Forêt Tsinjoriaka ['Tsinjoriaky'], 6.2 km 84 E Tsifota 6–10.iii.2002 Fisher *et al*. (27☿, 6♀, 6♂); 4.4 km 148 SSE Lavanono, 17.ii.2002, Fisher *et al*. (37☿, 4♀, 4♂); Mahafaly ['Mahafely'] Plateau 6.2 km 74 ENE Itampolo, 21–25.ii.2002, Fisher *et al*. (48☿, 4♀, 3♂); Tsimanampetsotsa, Bemanateza, 23.0 km 131 SE Beheloka, 22–26.iii.2002 B.L. Fisher (15☿, 1♀).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar; frons shining and finely striolate and microreticulate; pilosity of frons consisting mainly of short, appressed setulae with a few stout, erect and semi-erect setae on vertex. Eye large, eye width 1.5× greater than greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club four-segmented. Clypeal carinae indistinct; anteromedian clypeal margin broadly convex; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 5,3. Mandibular teeth five; mandibles triangular and striate; masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t4 (five teeth present).

MESOSOMA: Promesonotum shining and microreticulate throughout; (viewed in profile) promesonotum broadly convex; promesonotal setae seven to twelve; standing promesonotal setae consisting of short, erect or semi-erect bristles; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove weakly impressed, with faint costulae or costulae lacking. Propodeum shining and microreticulate; propodeal dorsum convex; propodeum smoothly rounded or with indistinct angle, but dorsal and declivitous faces separated when seen in profile; standing propodeal setae absent; appressed propodeal setulae abundant, particularly on dorsum of propodeum; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle laterodorsal and situated well anteriad of petiolar

node; node (viewed in profile) conical, vertex tapered; appearance of node shining and distinctly microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 1:1 and 3:4; height–length ratio of postpetiole between 1:1 and 3:4; postpetiole shining and microreticulate; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, short, thick, erect setae interspersed with minute, appressed setulae.

GENERAL CHARACTERS: Color depigmented ochre. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 2.77 HL 0.88 HW 0.76 CeI 86 SL 0.86 SI 113 PW 0.49.

OTHER WORKER MEASUREMENTS: HML 2.39–2.80 HL 0.75–0.90 HW 0.62–0.78 CeI 81–86 SL 0.82-0.96 SI 115–132 PW 0.42–0.50 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex always planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin;. (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on dorsum of pronotum and mesoscutum. Propodeum shining and microreticulate; propodeum distinctly angulate, propodeal angles produced as short denticles; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as vestigial flanges only, or absent.

WING: Wing veins tubular and strongly sclerotised; vein m–cu present as an entire vein enclosing first discoidal cell; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and microreticulate; postpetiolar sternite not depressed, in form of narrow, rectangular projection.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, short, thick, erect setae interspersed with minute, appressed setulae.

GENERAL CHARACTERS: Color brownish- yellow, gaster darker. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 3.98–4.39 HL 1.14–1.21 HW 1.11–1.23 CeI 95–103 SL 1.00–1.09 SI 85–98 PW 0.90–1.04 (n=13).

MALE DESCRIPTION.— HEAD: (In full-face view) head width-mesosoma width ratio between 4:3 and 1:1; frons finely micropunctate. Compound eyes protuberant and elliptical; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 2:3 and 1:2. Maximum

number of mandibular teeth and denticles three.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining and mainly smooth, vestigial striolae, if present, confined to lower katepisternum; parapsidal furrows vestigial or absent; notauli absent; axillae separated by width of at least one axilla.

WING: Wing veins tubular and strongly sclerotised; vein m–cu absent; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) evenly tumular; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole about 3:4; postpetiole shining and smooth.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, semi-erect setae.

GENERAL CHARACTERS: Color a depigmented ochre.

MALE MEASUREMENTS: HML 2.01–2.23 HL 0.46–0.53 HW 0.48–0.54 CeI 94–106 SL 0.11–0.14 SI 21–26 PW 0.58–0.71 (n=15).

REMARKS.— This species appears to be restricted to spiny forest and associated thickets in coastal localities in the extreme south and south-west of Madagascar. Collections have been made from colonies under stones, or of foraging workers. Workers of the species are much more uniform in appearance than those of *Monomorium clarinodis* but, apart from their larger size and longer antennae, closely resemble pale workers of that ant. Superficially, workers of this species may be confused with *Aphaenogaster* because of their elongate bodies and spindly appendages.

Monomorium robertsoni **Heterick, sp. nov.**
Figs. 14, 37.

ETYMOLOGY.— In honour of Dr. Hamish Robertson (South African Museum).

MATERIAL EXAMINED.— HOLOTYPE: **Prov. Toliara**, Ranobe, 23°02′03″S, 43°36′43″E, 30 m., 13–19.ii.2002, Frontier Project, MGF056/sifted litter spiny forest/thicket/ CASENT 0003501 MGF056(5) (CAS). PARATYPES: **Prov. Toliara**: one ☿ with same collection data as holotype, collection code MGF054 (MCZ); two ☿'s, Mandarano ['Manderano'], 23°31′38″S, 44°05′15″E, 70m, 10.v.2002 Frontier Project, MGF030/ sifted litter gallery forest (1☿ - CAS) (1☿ - BMNH).

OTHER MATERIAL EXAMINED: Ifaly, 17.ix.1993 W.E. Steiner and R. Andriamasimanana (4☿) (MCZ).

WORKER DESCRIPTION.— HEAD: Head square; vertex planar; frons finely striolate throughout; pilosity of frons a mixture of well-spaced, erect and semi-erect setae interspersed with appressed setulae only. Eye large, eye width 1.5x greater than greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head. Antennal segments 12; club three-segmented. Clypeal carinae indistinct; anteromedian clypeal margin broadly convex; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 5,3. Mandibular teeth five; mandibles triangular and striate; masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t4 (five teeth present).

MESOSOMA: Promesonotum finely striolate throughout; in profile broadly convex anteriad, convexity reduced posteriad; promesonotal setae seven to twelve; standing promesonotal setae consisting of short, erect or semi-erect bristles; appressed promesonotal setulae few, mainly on dorsum of promesonotum. Metanotal groove vestigial. Propodeum uniformly finely striolate; propodeal dorsum flat throughout most of its length; always smoothly rounded, no separation between dorsal and declivitous faces when seen in profile; standing propodeal setae absent; appressed propodeal setae

very scarce or absent; propodeal spiracle nearer declivitous face of propodeum than metanotal groove; vestibule of propodeal spiracle absent or not visible; propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle laterodorsal and situated slightly anteriad of petiolar node. Node (viewed in profile) conical, vertex tapered; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1. Anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent. Height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 1:1; postpetiole shining and smooth; postpetiolar sternite depressed near its junction with gaster, and sloping anteriad at angle of 45–60 to form large conspicuous lip at its anterior end.

GASTER: Pilosity of first gastral tergite consisting mainly of short, appressed setulae, together with a few erect and semi-erect setae.

GENERAL CHARACTERS: Color of head, mesosoma and nodes orange, legs, mandibles and apical portion of gaster straw-colored, basal portion of gaster brown. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.50 HL 0.53 HW 0.45 CeI 86 SL 0.45 SI 100 PW 0.32.

PARATYPE WORKER MEASUREMENTS: HML 1.50–1.82; HL 0.53–0.61; HW 0.45–0.54; CeI 83–88; SL 0.45–0.52; SI 97–104; PW 0.32–0.40 (n=3).

OTHER WORKER MEASUREMENTS: HML 1.49–1.67; HL 0.52–0.58; HW 0.43–0.49; CeI 81–84; SL 0.44–0.51; SI 99–107; PW 0.32–0.36 (n=4).

REMARKS.— This species appears to have a very restricted distribution. The few known specimens are all workers, and have been collected from Ifaly, Mandarano and Ranobe in south-western Toliara Province. Collections have been made in sifted litter in spiny forest and associated thickets, in a pitfall trap at the base of a baobab, and in a malaise trap. The latter capture suggests this species may forage arboreally. *Monomorium robertsoni* is characterized by its low propodeum, which lacks a separate dorsal and declivitous face, and by its finely striolate exoskeleton.

Monomorium shuckardi Forel

Figs. 14, 38–39.

Monomorium shuckardi Forel 1895:251. holotype, MADAGASCAR: Moramanga (MHNG) [examined].
Monomorium (*Notomyrmex*) *shuckardi* Emery 1922: 170.

MATERIAL EXAMINED— HOLOTYPE: Madagascar, Moramanga, coll. [F.] Sikora (MHNG). (NB. The symbol used in the original publication is that for the worker, i.e., "☿", but in fact, the specimen is a queen. That a dealated queen is here described rather than a worker is evident from Forel's use of the term 'scutellum', and also his mention of propodeal 'teeth', which are not found in the worker. The total specimen length given by Forel for the type specimen agrees exactly with my own measurement, and given that there is no indication in the published description that any other specimens were examined by Forel, a holotype status fixed by monotypy (Code 73.1.2) is here assumed.).

OTHER MATERIAL EXAMINED: **Prov. Toliara:** 18 km NNW Betroka, 29.xi.–24.xi.1994 M. A. Ivie & D. A. Pollock (30☿, 1♀) (MCZ); Forêt Mahavelo, Isantoria Riv., 5.2 km 44 NE Ifotaka 28.i.–1.ii 2001 B.L. Fisher (6☿); Mahafaly ['Mahafely'] Plateau, 6.2 km 74 ENE Itampolo 21–25.ii.2002 B.L. Fisher (2☿); Reserve Berenty, 9.ii.1993 P.S. Ward (3☿); (MCZ) (4☿) (UCDC); Tsimanampetsotsa, Bemanateza, 23.0 km 131SE Beheloka, 22–26.iii.2002 B.L. Fisher (4☿).

WORKER DESCRIPTION.— HEAD: Head square; vertex planar or weakly concave; frons shining and densely microreticulate; pilosity of frons consisting of a few short, thick, erect setae interspersed with short, appressed setulae; Eye large, eye width 1.5x greater than greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set anteriad of midline of head capsule; eye elliptical, curvature of inner eye margin may be more

pronounced than that of its outer margin. Antennal segments 12; antennal club four-segmented. Clypeal carinae indicated by multiple weak ridges; anteromedian clypeal margin broadly convex; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits equidistant from antennal fossae and mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 5,3. Mandibular teeth five; mandibles triangular and striate; masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t4 (five teeth present).

MESOSOMA: Promesonotum shining and microreticulate throughout; (viewed in profile) anterior promesonotum smoothly rounded anteriad, thereafter more-or-less flattened, promesonotum raised well above propodeum; promesonotal setae greater than twelve; standing promesonotal setae consisting of short, erect or semi-erect bristles; appressed promesonotal setulae few, mainly on dorsum of promesonotum. Metanotal groove vestigial. Propodeum shining and densely microreticulate, with distinct striolae on metapleuron; propodeal dorsum slightly elevated anteriad and sloping away posteriad, or, sloping posteriad and depressed between raised propodeal angles; when seen obliquely, propodeum smoothly rounded or with indistinct angle, but dorsal and declivitous faces separated when seen in profile; standing propodeal setae decumbent and short, rarely also with very short erect and suberect setae; appressed propodeal setulae abundant, particularly on dorsum of propodeum; propodeal spiracle nearer declivitous face of propodeum than metanotal groove. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

POSTPETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node. node (viewed in profile) cuneate, vertex rounded, or, conical, vertex rounded; appearance of node shining and faintly microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole about 1:1; postpetiole shining and microreticulate; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting mainly of short, appressed setulae, together with a few erect and semi-erect setae.

GENERAL CHARACTERS: Color orange, head slightly to moderately darker, gaster chocolate. Worker caste monomorphic.

OTHER WORKER MEASUREMENTS: HML 1.51–2.32 HL 0.53–0.78 HW 0.45–0.72 CeI 84–95 SL 0.46–0.71 SI 94–105 PW 0.27–0.49 (n=16).

QUEEN DESCRIPTION (holotype).— HEAD: Head oval; vertex convex; frons shining and finely longitudinally striolate and microreticulate; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; sides of mesoscutum and mesopleuron faintly longitudinally striolate, dorsum of mesoscutum mainly smooth; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2. Axillae narrowly separated (i.e., less than width of one axilla). Standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mesoscutal and mesopleural setulae few, mainly on dorsum of pronotum and mesoscutum. Propodeum shining and densely striolate over whole surface; distinctly angulate, propodeal angle sharp; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; stand-

ing propodeal setae consisting of a few decumbent setae only; appressed propodeal setulae well-spaced and sparse; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges.

WING: Wing not seen (queen dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node, in profile cuneate, vertex tapered; appearance of node shining and microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1. Anteroventral petiolar process present as a thin flange tapering posteriad; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining and microreticulate; postpetiolar sternite not depressed, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color ferruginous. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

HOLOTYPE MEASUREMENTS: HML 3.16 HL 0.81 HW 0.88 CeI 109 SL 0.79 SI 89 PW 0.82.

OTHER QUEEN MEASUREMENTS: HML 3.34 HL 0.88 HW 0.86 CeI 98 SL 0.74 SI 86 PW 0.76 (n=1).

REMARKS.— Worker specimens are readily separable from other members of the *M. shuckardi* group by the densely microreticulate sculpture of their frons. The worker of this species also bears a superficial resemblance to that of *Monomorium subopacum*, but can be distinguished from it by a number of features, apart from those mentioned in the key, including the presence of erect setae on the promesonotal dorsum, the elongate petiolar peduncle, the anterior placement of the petiolar spiracle and the placement of the propodeal spiracle (more dorsal and nearer propodeal declivity compared with more lateral and nearer metanotal groove). Populations are fairly widespread in dry, spiny forest regions in Toliara Province. Like many other Malagasy *Monomorium*, this species will make opportunistic use of dead twigs above ground for its nests. Other specimens have been collected in pitfall traps, under stones and as ground foragers. Oddly enough, the holotype queen is recorded as having being collected by Sikora in Moramanga, Toamasina Province, hundreds of kilometers from its known current range. This record may be in error, as the vegetation community of Moramanga is very different from that to which this species seems adapted.

THE *DESTRUCTOR*-GROUP

***Monomorium destructor* (Jerdon)**

Figs. 15, 40–41.

Atta destructor Jerdon 1851:105. Syntype ☿'s, INDIA [no types known to exist].
Monomorium destructor (Jerdon): Dalla Torre 1893:66.
Monomorium (*Parholcomyrmex*) *destructor* (Jerdon): Wheeler, W.M. 1922: 874.
Myrmica basalis Smith 1858:125. Syntype ☿ (lectotype here designated), SRI LANKA (BMNH) [examined].
Monomorium basale (Smith): Mayr 1865:92. Syn. under *M. destructor* (Jerdon): Forel 1894a: 86.
Myrmica ominosa Gerstäcker 1859:263. Syntype ☿'s MOZAMBIQUE [no types known to exist].
Monomorium ominosum (Gerstäcker): Roger 1863b:31. Syn. under *M. destructor* (Jerdon): Dalla Torre 1893: 66.
Myrmica atomaria Gerstäcker, 1859:263. Syntype ☿'s MOZAMBIQUE [no types known to exist]. Syn. under *M. ominosum* (Gerstäcker): Roger 1863b:31.
Myrmica gracillima Smith 1861a:34. Holotype ☿ ISRAEL [type presumed lost]
Monomorium gracillimum (Smith): Mayr 1862:753.

Monomorium (*Parholcomyrmex*) *gracillimum* (Smith): Emery 1915b:190.
Monomorium destructor r. *gracillimum* Forel 1913a:437. Syn. under *M. destructor* (Jerdon): Bolton 1987:324.
Myrmica vexator Smith 1861b:47. Syntype ☿'s (lectotype here designated) INDONESIA: Ternate Isl. (OXUM) [examined]. Syn. under *M. destructor* (Jerdon): Donisthorpe 1932:468.

MATERIAL EXAMINED.— ***M. basale***: LECTOTYPE: ☿, Sri Lanka ("Ceylon"), no collector named (BMNH). The ant on the LHS (seen from the rear) on a rectangle containing three syntype workers is designated the lectotype for *Monomorium basale*, so that the name can be fixed. This and other early collections of *Monomorium destructor* were given separate species-level names, presumably on the basis of quite minute differences in color or morphology, and, possibly, their provenance. The antennal club in *M. basale* is described by Smith as 'dark fuscous', and the termination of the flagellum in *M. vexator* as 'slightly fuscous', otherwise their respective descriptions by Smith read much the same. PARALECTOTYPES: Two workers on the same card rectangle as the lectotype (BMNH). No attempt has been made to separate the carded specimens, which are damaged and fragile. ***M. vexator***: LECTOTYPE: ☿, J. Smith. (OXUM) (The collection locality, which does not appear on the labels but in the publication, is Ternate Island, [Indonesia.]) The middle ant of the three carded syntype specimens is here designated the lectotype to fix the name of this taxon. *Monomorium destructor*, because of its ubiquity and its allometric variation, has attracted half-a-dozen synonyms. PARALECTOTYPES: Two workers on the same card rectangle as the lectotype (OXUM). Carded specimens as above.

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** 10km NE Antsiranana, 14.ii.1991, G.A. Alpert (14☿) (MCZ); 15km NE Antsiranana, 14.ii.1991, G. A. Alpert (2☿); (MCZ); 3 km S Namakia, 19.iii.1993 P. Rabeson (2☿, 2♂) (MCZ). **Prov. Mahajanga:** Mahavavy River, 6.2 km 145 SE Mitsinjo 1–5.xii.2002 Fisher *et al.* (10☿); Mahavavy River, 10.6 km 148 SSE Mitsinjo 4.xii.2002 Fisher *et al.* (9☿); P. N. Namoroka, 17.8 km 329 WNW Vilanandro, 12.ii.2002 Fisher *et al.* (1☿).

WORKER DESCRIPTION.— HEAD: Head square; vertex planar or weakly concave; frons longitudinally finely striolate anteriad (striolae curving inwards around antennal insertions), smooth and shining posteriad, except for a few transverse rugulae on upper vertex; pilosity of frons consisting mainly of appressed and decumbent setulae with a few erect setae on vertex. Eye large, eye width 1.5× greater than greatest width of antennal scape to moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae indicated by multiple weak ridges; anteromedian clypeal margin broadly convex to straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Weak psammophore present. Palp formula 2,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, striate; masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, lower mesopleuron strongly punctate; (viewed in profile) promesonotum broadly convex anteriad, convexity reduced posteriad; promesonotal setae seven to twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum uniformly finely striolate, some punctation on metapleuron; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle; standing propodeal setae variable in number and arrangement, when present usually one prominent pair at propodeal angles or at midlength, with other shorter setae very sparse or absent; appressed propodeal setulae well-

spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct in some specimens. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral or laterodorsal and situated within anterior sector of petiolar node or just at front of node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 1:1 and 3:4; height–length ratio of postpetiole between 4:3 and 3:4; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

MESOSOMA: Color yellow-orange to brownish-orange, gaster chocolate with or without yellowish area on anterior sector of first gastral tergite. Worker caste monophasically allometric, i.e., with variable size, but not morphology among workers from same nest.

LECTOTYPE MEASUREMENTS (*M. basale*): HML 1.70 HL 0.66 HW 0.58 CeI 88 SL 0.48 SI 83 PW 0.34.

LECTOTYPE MEASUREMENTS (*M. vexator*): HML 1.78 HL 0.68 HW 0.62 CeI 91 SL 0.50 SI 81 PW 0.36.

OTHER WORKER MEASUREMENTS (non-types): HML 1.31–1.92 HL 0.49–0.76 HW 0.38–0.68 CeI 78–89 SL 0.39–0.52 SI 76–103 PW 0.25–0.40 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits and striolae around antennal sockets, frontal carinae and below the eyes, and fine rugulae near posterior margin of vertex; frons consisting mainly of decumbent setae, with two longitudinal, parallel rows of erect setae straddling the midline. Eye elongate, elliptical and oblique; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 7:3 and 2:1. Axillae a strip of thin cuticle separating mesoscutum and scutellum, each individual axilla indistinct. Standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae abundant, particularly on mesoscutum. Propodeum shining and smooth, with a few weak striolae on metapleuron; always smoothly rounded; propodeal dorsum convex; standing propodeal setae consisting of one pair anteriad, with or without another pair posteriad; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as vestigial flanges only, or absent.

WING: Wing not seen (queen dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; (viewed in profile) node conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1. Anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining, with vestigial sculpture; postpetiolar sternite with anterior and posterior margins convergent, forming a narrow wedge.

GASTER: Pilosity of first gastral tergite consisting mainly of appressed setae with a few erect and semi-erect setae.

GENERAL CHARACTERS: Color of foreparts tawny-yellow, gaster brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 3.22–3.46 HL 0.83–0.84 HW 0.76–0.80 CeI 92–95 SL 0.60–0.62 SI 78 PW 0.68–0.89 (n=2).

REMARKS.— *Monomorium destructor* is very similar to the closely related *Monomorium robustior*, but is lighter in color and the eyes tend to be less elongate. Workers within nests also show more allometric variation than is found in *M. robustior*. Samples of this tramp species have been taken in tropical dry forest in north and north-western Madagascar in the Antsiranana and Mahajanga Provinces, where they have been collected under stones, from a dead branch and by sweeping. Populations also may be expected to occur generally in severely damaged habitats in these regions.

Monomorium robustior Forel

Figs. 15, 90.

Monomorium gracillimum r. *robustior* Forel 1892a:352. Syntype ☿'s (lectotype here designated), SOMALIA (MHNG) [examined]. [NB. Misspelled as *Monomorium gracillimum* r. *robustius* Forel 1894b:228.]
Monomorium (*Parholcomyrmex*) *gracillimum* r. *robustior* Wheeler W.M. 1922:875.
Monomorium robustior Forel: Bolton 1987:328.

MATERIAL EXAMINED.— LECTOTYPE: ☿, Somalia, C. Keller (MHNG). A lectotype has been chosen to fix the name for the species, which was originally described as simply a race of *Monomorium gracillimum*, itself now a synonym for *Monomorium destructor*. The specimen, originally on a pin holding three pointed specimens, has been transferred to a single pin, along with the original labels and a lectotype label. PARALECTOTYPES: Two pins with 12 and 13 workers, respectively, data the same as for the lectotype (MHNG). Photocopies of the original labels have been affixed to the pin with the two specimens.

OTHER MATERIAL EXAMINED: **Prov. Antananarivo:** Antananarivo, 14.xi.1990 P. S. Ward (2☿) (MCZ); Lac Alarobia ['Alarobie'], 10 km NE Antananarivo 10.iii.1991, G.D. Alpert (2☿) (MCZ). **Prov. Fianarantsoa:** Forêt Analalava, 29.6 km 280 W Ranohira 1–5.ii.2003 Fisher *et al*. (1☿). **Prov. Mahajanga:** Station Forestière Ampijoroa, 22.xi.1990 (2☿) (MCZ). **Prov. Toliara:** 18 km NNW Betroka, 29.xi.–4.xii.1994 M.A. Ivie & D.A. Pollock (8☿) (MCZ); Ehazoara Canyon, 26 km E Betioky 27.iv.1997 B.L. Fisher (8☿); Forêt Mahavelo, Isantoria Riv., 5.2 km 44 NE Ifotaka 28.i.–1.ii 2001 Fisher *et al*. (37☿); Forêt Mite, 20.7 km 29 WNW Tongobory 27.ii–3.iii. 2002 Fisher *et al*. (79☿); Mahafaly Plateau, 6.2 km 74 ENE Itampolo 21–25.ii.2002 Fisher *et al*. (10☿); Rés. Berenty, Forêt Bealoka, 14.6 km 329 NNW Amboasary 3–8.ii.2002 Fisher *et al*. (3☿); Res. Beza Mahafaly ['Mahafely'], 18.xi.1984 R. L. Brooks (17☿) (MCZ); Tsimanampetsotsa, Bemanateza, 23.0 km 131SE Beheloka, 22–26.iii.2002 Fisher *et al*. (14☿).

WORKER DESCRIPTION.— HEAD: Head square; vertex planar or weakly concave; frons longitudinally finely striolate anteriad (striolae curving inwards around antennal insertions), smooth and shining posteriad; pilosity of frons consisting of abundant, incurved, appressed setulae only. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule to set below midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; eye elongate with or without eye narrowed to point anteriad. Antennal segments 12; antennal club three-segmented. Clypeal carinae indistinct; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore present. Palp formula 2,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, striate; masticatory margin of mandibles strongly oblique;

basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, lower mesopleuron strongly punctate; (viewed in profile) promesonotum broadly convex; promesonotal setae seven to twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum with sculpture reduced dorsally, metapleuron punctate; propodeal dorsum slightly elevated anteriad and sloping away posteriad, propodeal angles not raised; propodeum angulate, propodeal angle blunt; length ratio of propodeal dorsum to its declivity about 1:1; standing propodeal setae consisting of two or more pairs of longer, suberect setae near propodeal angles, with shorter setae anteriad; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth with vestigial microreticulation anteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole about 1:1; sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, short, thick, erect setae interspersed with minute, appressed setulae.

GENERAL CHARACTERS: Color brown, gaster chocolate. Worker caste monomorphic.

LECTOTYPE MEASUREMENTS: HML 1.83 HL 0.68 HW 0.68 CeI 100 SL 0.56 SI 82 PW 0.38.

OTHER WORKER MEASUREMENTS (non-types): HML 1.65–1.97 HL 0.62–0.76 HW 0.64–0.75 CeI 95–103 SL 0.51–0.61 SI 75–85 PW 0.36–0.46 (n=20).

REMARKS.— *Monomorium robustior* has a wider known distribution than *M. destructor* in Madagascar, mainly in more southerly regions (Antananarivo, Fianarantsoa, Mahajanga and Toliara Provinces). Specimens have been collected by a variety of means in dry tropical and spiny forest. In Africa, this species has been recorded from Kenya and Somalia (Bolton 1987).

THE *SALOMONIS*-GROUP

***Monomorium pharaonis* (Linnaeus)**

Figs. 16, 91–92.

Formica pharaonis L. 1758:580. Syntype ☿'s, EGYPT [whereabouts of type material unknown]

Monomorium pharaonis (L.): Mayr 1862:752.

Formica antiguensis Fabricius 1793:357. Syntype ☿, WEST INDIES: Antigua [whereabouts of type material unknown]. Syn. under *M. pharaonis* (L.): Roger 1862b: 294.

Myrmica domestica Shuckard 1838:627. Syntype ☿'s, , GREAT BRITAIN: London [no types known to exist]. Syn. under *M. pharaonis* (L.): Roger 1862b:294.

Atta minuta Jerdon 1851:105. Syntype ☿'s, INDIA [no types known to exist]. Syn. under *M. pharaonis* (L.): Emery 1892:165.

Myrmica vastator Smith 1857:71. Syntype ☿'s (lectotype here designated), SINGAPORE (OXUM) [examined].

Monomorium vastator (Smith): Mayr 1886:359. Syn. under *M. destructor* (Jerdon): Dalla Torre 1893: 66. Syn. under *M. pharaonis* (L.): Donisthorpe 1932:449.

Myrmica fragilis Smith 1858:124. Syntype ☿'s (lectotype here designated), SINGAPORE (BMNH) [examined]. Syn. under *M. pharaonis* (L.): Mayr 1886:359.

Myrmica contigua Smith 1858:125. Holotype , SRI LANKA (BMNH) [examined]. Syn. under *M. pharaonis* (L.): Mayr 1886:359.

MATERIAL EXAMINED.— ***M. vastator***: LECTOTYPE: ☿, Singapore, J. Smith (OXUM). Four syntype workers are carded, two above and two below, on the one pin. The worker on the lower left-hand side (viewed from the rear of the pin) is here designated a lectotype to fix the name '*vastator*' in the interests of stability. *Monomorium pharaonis* belongs to a small complex of closely related ants, and was also confused with *Monomorium destructor* by early researchers (Bolton 1987). PARALECTOTYPES: Three workers, same data as the lectotype (OXUM). (The lectotype and three paralectotypes are covered with a uniform, thin layer of glue and cannot be separated.). ***M. fragile***: LECTOTYPE: ☿, Singapore, J. Smith (BMNH). Four syntype workers carded on one rectangle. The worker on the lower right (viewed from the rear) is here designated a lectotype to fix the name '*fragile*' in the interests of nomenclatural stability. PARALECTOTYPES: Three workers, same data as the lectotype (BMNH). (The lectotype and three paralectotypes are glued and could not be separated without serious risk of damage.). ***M. contiguum***: HOLOTYPE: ♀, Ceylon. J. Smith (BMNH).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (1☿); Sambava, 7.xi.1992 Solomon (1♀) (MCZ). **Prov. Fianarantsoa:** Ranomafana NP, Talatakely 14.iv.1998 M.E. Irwin & E.I. Schlinger (4☿). **Prov. Mahajanga:** P.N. Ankarafantsika, Ankoririka, 10.6 km 13 NE Tsaramandroso 9–14.iv.2001 Rabeson *et al*. (1☿).

WORKER DESCRIPTION.— HEAD: Head oval; vertex weakly convex; frons shining and finely striolate and microreticulate; pilosity of frons consisting of a few short, thick, erect setae interspersed with short, appressed setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae indicated by multiple weak ridges; anteromedian clypeal margin broadly convex; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles with sub-parallel inner and outer margins, striate; masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and microreticulate throughout; (viewed in profile) promesonotum broadly convex; promesonotal setae two to six; standing promesonotal setae consisting of very short, incurved decumbent setae only; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and microreticulate; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as blunt-angled flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node shining and distinctly microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process present as a thin flange tapering posteriad; ventral petiolar lobe present; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 1:1; postpetiole shining and microreticulate; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae

interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color yellowish, gastral tergites with brown infuscation in basal sector. Worker caste monomorphic.

LECTOTYPE MEASUREMENTS (*M. vastator*): The physical condition and alignment of the worker does not permit ready measurements.

LECTOTYPE MEASUREMENTS (*M. fragile*): HML 1.52 HL 0.56 HW 0.42 CeI 75 SL 0.48 SI 114 PW 0.23.

OTHER WORKER MEASUREMENTS: HML 1.39–1.48 HL 0.53–0.56 HW 0.42–0.45 CeI 78–81 SL 0.45–0.49 SI 105–111 PW 0.22–0.28 (n=8).

QUEEN DESCRIPTION.— HEAD: Head square; vertex always planar; frons matt and uniformly reticulate-punctate; frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; eyes (in full-face view) set at about midpoint of head capsule; eyes (viewed in profile) set around midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron uniformly reticulate-punctate, punctations tending to form fine striolae on dorsum of mesoscutum; length-width ratio of mesoscutum and scutellum combined between 7:3 and 2:1. Axillae narrowly separated (i.e., less than width of one axilla). Standing pronotal/mesoscutal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed pronotal, mescoscutal and mesopleural setulae well-spaced over entire surface. Propodeum uniformly reticulate-punctate; always smoothly rounded; propodeal dorsum convex; standing propodeal setae consisting of two or more pairs of prominent setae anteriad, with a few decumbent setae around declivitous face; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as bluntly angled flanges.

WING: Wing not seen (queen dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node matt and reticulate-punctate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1. Anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole about 4:3; postpetiole matt and reticulate-punctate; postpetiolar sternite forming a narrow wedge-shaped projection through strong convergence of its anterior and posterior ends.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color orange-yellow, gaster brown, with large, yellow sector at apex of first tergite. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

HOLOTYPE MEASUREMENTS (*M. contiguum*): HML 2.43 HL 0.68 HW 0.63 CeI 93 SL 0.62 SI 98 PW 0.73.

OTHER QUEEN MEASUREMENTS: HML 2.37 HL 0.66 HW 0.62 CeI 94 SL 0.58 SI 94 PW 0.52 (n=1).

REMARKS.— One of several tramp species in the *M. destructor* and *M. salomonis* groups found in Madagascar, *M. pharaonis* has recently been recorded from tropical dry forest and secondary rainforest. However, because of its anthropophilic nature, this ant probably has a wider distribution in Madagascar than these few (non-urban) records suggest.

***Monomorium subopacum* (Smith)**
Figs. 16, 42–43.

Myrmica subopaca Smith 1858:127.
Monomorium subopacum (Smith): Mayr 1862:753. Syntype ☿'s, 's, (lectotype here designated) MADEIRA (BMNH) [examined].
Monomorium (*Xeromyrmex*) *subopacum* (Smith): Wheeler W.M. 1922:871.
[*Xeromyrmex* a junior synonym of *Monomorium*: Ettershank 1966:82].
Myrmica glyciphila Smith 1858: 125. Syntype ☿'s, (lectotype here designated) Sri Lanka (BMNH) [examined]. Syn. under *M. subopacum* (Smith): Bolton 1987:360.
Monomorium mediterraneum Mayr 1861:72 (diagnosis in key). Syntype ☿ (see comments below - lectotype here designated) Spain: Cadiz (NMW) [examined]. Syn. under *M. subopacum* (Smith): Mayr 1862:763.
Monomorium (*Xeromyrmex*) *salomonis* subsp. *subopacum* var. *senegalensis* Santschi 1913: 306 Syntype ☿'s, SENEGAL: Saint-Louis (NHMB) [not seen] [Unavailable name]. Syn. under *M. subopacum* (Smith): Bolton 1987: 360 (along with proposed replacement names *claveaui* Emery 1922:178 and *santschiellum* Wheeler, W.M. 1922: 872). See also comment under *liberta*, below.
Paraphacota surcoufi Santschi 1919a:90, fig. 1. Syntype ♂'s (lectotype here designated), ALGERIA: Biskra (NHMB) [examined].
Monomorium subopacum v. *surcoufi* Santschi 1927:243. Syn. under *M. subopacum* (Smith): Bolton 1987:360.
Paraphacota cabrerai Santschi 1919b:405, fig. 1. Holotype ♂, CANARY ISL: Tenerife, Laguna (NHMB) [examined].
Monomorium subopacum var. *cabrerai* Santschi 1927:241. Syn. under *M. subopacum* (Smith): Bolton 1987:360.
Paraphacota cabrerae [sic] st. *obscuripes* Santschi 1921a:169. Syntype ♂'s (lectotype here designated), CANARY ISL., Tenerife, Bajamar (NHMB) [examined]. Syn. under *M. subopacum* Santschi 1927:241.
Monomorium (*Xeromyrmex*) *subopacum* var. *intermedium* Santschi 1927:242 Syntype ♂'s (see comments below—lectotype here designated), CANARY ISLANDS, Haria, Lanzarote (MCZ) [examined]. [First available use of *Monomorium* (*Xeromyrmex*) *salomonis* subsp. *subopacum* var. *intermedium* Wheeler 1927:108; unavailable name]. Syn. under *M. subopacum* (Smith): Hohmann et al. 1993:155.
Monomorium (*Xeromyrmex*) *subopacum* var. *apuleii* Santschi 1927:243. Syntypes ☿, ♀, ♂, TUNISIA: Hammamat (?NHMB) [not seen].
Monomorium (*Xeromyrmex*) *subopacum* var. *liberta* Santschi 1927:243. [First available use of *Monomorium* (*Xeromyrmex*) *salomonis* subsp. *subopacum* st. *liberta* Santschi 1921c:170; unavailable name]. Syn. under *M. subopacum* Bolton 1987: 360. (NB. *M. liberta* syntypes are same specimens as *senegalensis* above).
Monomorium (*Xeromyrmex*) *subopacum* var. *ebraicum* Menozzii 1933:62. Syntypes ☿, ♂, ISRAEL: Tel Aviv (?Instituto di Entomologia, Universitá di Bologna "Guido Grandi" [IEGG]) [not seen]. Nominal subspecies of *M. subopacum* Bolton 1995:261.
Monomorium (*Xeromyrmex*) *subopacum* var. *adoneum* Santschi 1936:41, fig. 22 [spelled "*adonis*" under fig.]. Syntype ☿'s, LEBANON: Djbeil ou Djbla (?NHMB) [not seen]. Nominal subspecies of *M.subopacum* Bolton 1995:258.
Monomorium (*Xeromyrmex*) *subopacum* subsp. *italica* Baroni Urbani 1964:154, figs. 2–3. Holotype ☿, ITALY: Gambarie (not seen) (Museo Civico di Storia Naturale di Verona [MSNV]) [not seen]. Syn. under *M. subopacum* (Smith): Baroni Urbani 1968:450.

MATERIAL EXAMINED.— *M. subopacum*: LECTOTYPE: ☿, Madeira, T.V. Wollaston (BMNH). In view of the subtle differences that separate genuine good species in the *M. salomonis* group, I am designating a lectotype to fix the name '*subopacum*', the type worker material of which is a richer reddish brown than the type material for *M. glyciphilum*. The syntype material is on a single card rectangle. The lectotype worker is the third worker from the RHS, seen from the rear. PARALECTOTYPES: Three workers and three queens, carded on the same rectangle as the holotype (BMNH). No attempt has been made to separate the ants. ***M. glyciphilum***: LECTOTYPE: ☿, Sri Lanka ("Ceylon"), no collector named (BMNH). The syntype material seen (three carded workers) is darker than that of *M. subopacum*. The lectotype is the RHS specimen (seen from the rear). The rationale for choosing a lectotype is given above under *M. subopacum*. PARALECTOTYPES: Two workers on the

same card as the lectotype (BMNH). No attempt has been made to separate the workers. ***M. mediterraneum***: LECTOTYPE: I have seen five specimens labeled 'type' (NMW). These comprise four workers and one queen. The collection locality reads 'Rotes Meer' (Red Sea), collector (the queen, at least) Frauenfeld (handwritten label). I have also inspected four additional workers, not labeled 'type'. One worker, from Cadiz (Spain), coll. (?)Rogenhofer (partly illegible handwriting), (NMW) also possesses a label indicating it was seen by Mayr in 1862, and I think it reasonable to assume it was one of the specimens, possibly a *M. mediterraneum* syntype, examined by that researcher when he synonymized *mediterraneum* with *subopacum* in the same year. A third label reads '*Monom. subopacum* det. Mayr'. Two of the remaining workers carry only the determination label, while the third has an additional slip: 'Frfld Rothes [*sic*] Meer 1855'. The label data presents a conundrum: all nine workers are not only morphologically identical but have been mounted in identical fashion; i.e., one ant glued lengthwise at the end of a point so its head overhangs the apex of the triangle. Even the points, pins and glue are identical. The queen is mounted in similar fashion. The handwriting on the four specimens not designated 'type', however, is that of a different person to the one who labeled the five specimens designated 'type'.

There are not sufficient data in either Mayr's original description or on the labels to answer the question of the type status of these specimens definitively. Mislabeling, possibly by an assistant, also appears to have occurred. The original description, however, does reveal that Mayr examined one queen and multiple workers from southern Spain. In the interests of the stability of the name *mediterraneum*, and based on the likelihood that it is in fact part of the original type series, I am designating the Cadiz specimen a lectotype. ***Monomorium surcoufi***: LECTOTYPE: ♂, Algeria, Biskra, August 1919, at light ('à la lumiere') (NHMB – Reg. No. 213). The lectotype (top rectangle) fixes the name for this taxon in which the clypeus and male reproductive structures are said by Santschi to differ from those of *M. cabrerai* which has similarly colored legs. PARALECTOTYPE: ♂, on same pin as the lectotype and with same data (NHMB – Reg. No. 213). ***Monomorium cabrerai***: HOLOTYPE: ♂, Canary Isl., Tenerife, Laguna, 25.VII.1903. [Published collector A. Cabrera y Diaz] (NHMB – Reg. No. 213). This male was designated a 'holotype' by Bolton (1987), and since the length is given as single measurement, it seems clear no other specimens were examined. Bolton's 1987 revision is therefore deemed to have given this specimen support for a holotype status (Code 73.1.2). Nb.: the labels on both this specimen and the type specimens of its putative subspecies '*obscuripes*' read '*cabrerae*', but in the published description of the former the rendition is *M.* '*cabrerai*' and that of the supposed subspecies is '*M. cabrerae*'. All of this is part of the general confusion and inconsistent taxonomy that has bedeviled this species. Since the worker after whom the ant was named was presumably a male (the Christian name of A. Cabrera y Diaz was 'Anatael'), '*cabrerai*' should be the correct spelling, and is followed here. However, researchers have generally adopted '*cabrerae*', as per the labels (e.g., Wheeler 1922; Bolton 1995 – but see Bolton 1987). ***Monomorium cabrerai obscuripes***: LECTOTYPE: ♂, Canary Isl., Tenerife, Bajamar, 10.X.1909, A. Cabrera (NHMB – Reg. No. 213). The designation of a lectotype fixes the name for this taxon in which the male has uniformly dark legs. PARALECTOTYPE: ♂, same locality as lectotype, 20.IX.1909 (NHMB – Reg. No. 213). ***Monomorium subopacum intermedium***: LECTOTYPE: ☿, Canary Islands, Haria, Lanzarote, 1000 ft, 8 Jan. 1925 ['8. 1. 25'] W.M. Wheeler. MCZ cotype [syntype] 3–5 20875 (MCZ). The lectotype fixes the taxon name for populations of *M. subopacum* found on the Canary Islands. The lectotype worker has been repinned with the original labels. The subgenus *Xeromyrmex* represents an outmoded way of looking at *Monomorium* species related to the *M. salomonis* group, and the possibility of its use being revived is highly remote, to say the least (see Bolton 1987), even if *intermedium* is brought out of synonymy in the future. PARALECTOTYPES: Ten workers (several damaged) with the same collection data as the lectotype (MCZ). Two workers, originally on the same pin as the lectotype, have been repinned with photocopies of the original labels. NB. The original syntype series of 43 workers included a worker of another species, whose appearance agrees with the description of *Monomorium medinae* Forel (type material not seen). This is a member of the *M. salomonis* group, endemic to the Canary Islands (Bolton 1987), in which the body sculpture of the worker is largely effaced. I have repinned this worker with photocopies of the original labels and an additional label stating that it does not belong to the taxon *Monomorium subopacum* var. *intermedium* Santschi.

OTHER MATERIAL EXAMINED: **Prov. Toliara:** Sakaraha, 15.ii.1993 P.S. Ward 11937.5773/4 (3☿) (MCZ) 11937 (3☿) (UCDC) 11932 (3☿) (UCDC).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and finely microreticulate; pilosity of frons consisting of abundant, incurved, appressed

setulae only. Eye large, eye width 1.5× greater than greatest width of antennal scape; eyes (in full-face view) set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; club three-segmented. Clypeal carinae indicated by multiple weak ridges; anteromedian clypeal margin emarginate, clypeal carinae terminating in blunt angles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles with sub-parallel inner and outer margins, striate; masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and microreticulate throughout; in profile broadly convex anteriad, convexity reduced posteriad; promesonotal setae absent; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove weakly to strongly impressed, with distinct transverse costulae. Propodeum shining and microreticulate; propodeal dorsum flat throughout most of its length; angulate, propodeal angle blunt; length ratio of propodeal dorsum to its declivity between 2:1 and 4:3; standing propodeal setae absent; appressed propodeal setulae well-spaced and sparse; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; vestibule of propodeal spiracle absent or not visible; propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral or laterodorsal and situated within anterior sector of petiolar node. Node (viewed in profile) cuneate, vertex rounded, or, conical, vertex rounded; appearance of node shining and distinctly microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4. Anteroventral petiolar process present as a thin flange tapering posteriad; ventral petiolar lobe present, but weakly developed to vestigial. Height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole between 1:1 and 3:4; postpetiole shining and microreticulate; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting mainly of short, appressed setulae, together with one to several pairs of erect and semi-erect setae.

GENERAL CHARACTERS: Color mesosoma, nodes and legs orange-yellow, head and antennae brown, gaster dark brown. Worker caste monomorphic.

LECTOTYPE MEASUREMENTS (*M. subopacum*): HML 1.81 HL 0.67 HW 0.54 CeI 81 SL 0.56 SI 104 PW 0.35.

LECTOTYPE MEASUREMENTS (*M. glyciphilum*): HML 2.03 HL 0.72 HW 0.60 CeI 83 SL 0.62 SI 104 PW 0.39.

LECTOTYPE MEASUREMENTS (*M. mediterraneum*): HML 1.92 HL 0.70 HW 0.55 CeI 79 SL 0.58 SI 105 PW 0.36.

LECTOTYPE MEASUREMENTS (*M. subopacum intermedium*): HML 1.93 HL 0.71 HW 0.58 CeI 82 SL 0.59 SI 102 PW 0.36.

OTHER WORKER MEASUREMENTS (non-types): HML 1.77–2.12 HL 0.64–0.73 HW 0.52–0.61 CeI 80–85 SL 0.54–0.64 SI 104–108 PW 0.34–0.42 (n=9).

QUEEN DESCRIPTION (based on three paralectotype queens of '*Monomorium subopacum*' and one queen of '*Monomorium mediterraneum*').— HEAD: Head square; vertex always planar; frons shining and finely longitudinally striolate and microreticulate; pilosity of frons consisting of well-spaced appressed setulae only. Eye roundly elliptical; in full-face view, eyes set above midpoint to of head capsule; in profile, eyes set posteriad of midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; prono-

tum, mesoscutum and mesopleuron uniformly finely punctate-microreticulate; length-width ratio of mesoscutum and scutellum combined between 2:1 and 3:2. Axillae narrowly separated (i.e., less than width of one axilla). Standing pronotal/mesoscutal setae sparse or absent; appressed pronotal, mescoscutal and mesopleural setulae well- spaced over entire pronotum/mesonotum. Propodeum entirely microreticulate-striolate; propodeum smoothly rounded or with indistinct angle; propodeal dorsum slightly elevated anteriad and sloping away posteriad, propodeal angles not raised; standing propodeal setae absent; appressed propodeal setulae well-spaced and sparse; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges or bluntly angled flanges.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node, in profile, cuneate, vertex rounded; appearance of node matt and microreticulate, rugose posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1. Anteroventral petiolar process present as a thin flange tapering posteriad; height ratio of petiole to postpetiole between 3:2 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and microreticulate; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of long, appressed setae and one or two semi-erect setae, or, standing setae completely absent.

GENERAL CHARACTERS: Color tawny, variegated brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 3.13–3.43; HL 0.91–0.92; HW 0.79–0.86; CeI 89–93; SL 0.70–0.79; SI 89–92; PW 0.68–0.74 (n=4).

MALE.— I have only seen damaged male specimens (lectotypes for the taxa *Monomorium surcoufi*, *M. cabrerai* and *M. cabrerai obscuripes*). As there has been controversy over the assignment to *M. subopacum* of at least the males of *Monomorium cabrerai obscuripes* and the other males are tattered and lack body parts, no formal description of the abovementioned males is included here.

MALE TYPE MEASUREMENTS: LECTOTYPE MEASUREMENTS (*Monomorium surcoufi*): HL 0.88 HW 0.98 CeI 111. (NB. Lectotype lacks antennae, postpetiole and gaster). HOLOTYPE MEASUREMENTS (*Monomorium cabrerai*): HML (Holotype lacks postpetiole and gaster) HL 0.89 HW 0.96 CeI 108 SL 0.29 SI 30 PW 1.00. LECTOTYPE MEASUREMENTS (*Monomorium cabrerai obscuripes*): HML 3.17 HL 0.79 HW 0.86 CeI 109 SL 0.30 SI 35 PW 0.80.

REMARKS.— Bolton (1987) recognized this species from Madagascar on the basis of a short series from Maevatanana ("Maevantanara"); however, there are no Malagasy specimens in the CAS, despite the huge amount of *Monomorium* material collected by Brian Fisher and his teams since the early 1990s. The Malagasy component in the description and measurements provided above includes details from six specimens held at UCDC and three specimens from the same series held at MCZ. *Monomorium subopacum* is very similar to *Monomorium willowmorense* (below), but those worker specimens I have seen of the former can be distinguished from *M. willowmorense* by their finely granulate-reticulate frons, uniformly sculptured promesonotal humeri and a longer antennal scape (SI > 100 in *M. subopacum* and < 100 in *M. willowmorense*). Nonetheless, the differences that separate the two are small, and in view of the variability to be found in *M. subopacum* (note the voluminous entries above!) I would not be surprised if molecular–based investigations resulted in *M. willowmorense* being added to the already overburdened synonymic list for *M. subopacum*.

Several of the synonyms are those of taxa originally described from males. The spurious genus '*Paraphacota*' incorporated three such taxa, and what appears to me to be two distinct species. The

male of *Monomorium surcoufi* and that of *M. cabrerai* are obviously identical, and easily recognized by their long, bicolored legs and completely hyaline wings. On the other hand, the male of *Monomorium cabrerai obscuripes* has relatively shorter, uniformly dark legs and brown wing veins. I have not seen nest material of *Monomorium subopacum* that has included males, but Bolton (1987) was in no doubt that the descriptions of *M. surcoufi* and *M. cabrerai* were based on ordinary males of *M. subopacum*. He followed Santschi in also placing *M. cabrerai obscuripes* under *M. subopacum* but allowed that it could be the male of *M. medinae* Emery, a Canary Islands endemic, a view first broached by Wheeler (1927). Hohmann *et al*. (1993) included the two *cabrerai* taxa under *Monomorium medinae*, but omitted *Monomorium surcoufi*. This seems to me an odd judgement, and, indeed, Bolton (1995) did not mention these authors at all in relation to '*Paraphacota*', but continued to consign all three taxa to synonymy under *Monomorium subopacum*. (NB. Dr. Xavier Espadaler [pers. commun.] also places *M. cabrerai* under *M. subopacum*, leaving *M. cabrerai obscuripes* as an unresolved puzzle, but has indicated that none of the males originally placed under '*Paraphacota*' belongs to *Monomorium medinae*.)

Monomorium subopacum, like *Monomorium pharaonis*, is something of a tramp, and its occurrence in Madagascar and other regions well away from its natural area of occurrence is certainly due to human activities (Bolton 1987).

Monomorium willowmorense Bolton

(Fig. 16)

Monomorium willowmorense Bolton 1987:364, fig. 54. SOUTH AFRICA: Willowmore (BMNH, MHNG) [material pertaining to '*willowmorensis*' and '*belli*' examined].

Monomorium salomonis r. *herrero* var. *willowmorensis* Forel 1914:245 [unavailable name]. Syntype ☿'s, SOUTH AFRICA: Willowmore (BMNH, MHNG).

Monomorium salomonis r. *herrero* var. *belli* Forel 1914:245 [unavailable name]. Syntype ☿'s (lectotype for the taxon '*willowmorense*' here designated from the '*belli*' material [MHNG], the remaining '*belli*' and '*willowmorense*' material becoming paralectotypes) SOUTH AFRICA: Willowmore (BMNH, MHNG, MCZ).

MATERIAL EXAMINED.— LECTOTYPE: ☿ (unavailable name "*belli*"), South Africa, Cape Province, Willowmore, 8. 1. 1914 [G.] Arnold (MHNG). A lectotype has been chosen to fix the name, '*Monomorium willowmorense*' for the taxon, which is morphologically similar to *M. subopacum*. The specimen, originally on a pin holding three pointed specimens, has been transferred to a single pin and the original labels and a lectotype label have been appended to that pin. PARALECTOTYPES: (i) Two workers ("*belli*"), data the same as for the lectotype (MHNG). Repinned with photocopies of the original labels. (ii) Two workers ("*belli*") on separate pin, data as for lectotype (MHNG). (iii) Five workers (unavailable name "*willowmorensis*"), on two separate pins (i.e., 12 (both damaged) + 13) coll. 1.1.1914, otherwise data same as for lectotype (MHNG). (NB. The measurements of twelve workers from the then syntype series are provided in Bolton 1987).

OTHER MATERIAL EXAMINED: **Prov. Toamasina:** S.F. Tampolo, 10 km NNE Fenoarivo Atn. 10.iv.1997 B.L. Fisher (1 ☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and finely striolate and microreticulate; pilosity of frons consisting of abundant, incurved, appressed setulae only. Eye large, eye width 1.5× greater than greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin broadly convex; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp for-

mula 2,2. Mandibular teeth four; mandibles with sub-parallel inner and outer margins, striate; masticatory margin of mandibles strongly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and microreticulate, microreticulation reduced on humeri; (viewed in profile) promesonotum broadly convex anteriad, convexity reduced posteriad; promesonotal setae absent; standing promesonotal setae consisting of three pairs of longer, incurved, erect or semi-erect setae with occasionally a shorter seta between first anterior pair; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and densely microreticulate, distinct striolae present on metapleuron; propodeal dorsum slightly elevated anteriad and sloping away posteriad, propodeal angles not raised; propodeum angulate, propodeal angle blunt; standing propodeal setae absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and faintly microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process present as a thin flange tapering posteriad; ventral petiolar lobe present; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole about 1:1; postpetiole shining and microreticulate; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting mainly of short, appressed setulae, together with a few erect and semi-erect setae.

GENERAL CHARACTERS: Color reddish- brown, gaster chocolate. Worker caste monomorphic.

LECTOTYPE MEASUREMENTS: HML 1.54, HL 0.60, 0.49, CeI 82, SL 0.46, SI 94, PW 0.32.

OTHER WORKER MEASUREMENTS: HML 1.50 HL 0.60 HW 0.47 CeI 78 SL 0.45 SI 96 PW 0.31 (n=1).

REMARKS.— One worker of this otherwise South African species is known from Toamasina Province.

THE *LATINODE*-GROUP

Monomorium latinode **Mayr**

Figs. 16, 44–45.

Monomorium latinode Mayr 1872:152. Syntype ☿ (lectotype here designated), MALAYSIA: Sarawak, Borneo (BMNH) [material examined].

Monomorium latinode var. *bruneum* Emery 1893:243. Syntype ☿'s (lectotype here designated), SRI LANKA: Kandy (MCSN) [material examined]. Syn. under *Monomorium latinode* Mayr: Bolton 1987:429.

Monomorium voeltzkowi Forel 1907b:78. Syntype ☿'s (lectotype here designated), Tanzania: Chake-Chake, Pemba (MHNG) [material examined]. Syn. under *Monomorium latinode* Mayr: Bolton 1987:429.

MATERIAL EXAMINED.— ***M. latinode***: LECTOTYPE: ☿, Borneo Sarawak (Malaysia), G. Doria (BMNH). A single carded worker labeled syntype is here designated lectotype to fix the name for populations of *M. latinode*, which has a more convex outline to the vertex than *M. latinode bruneum* or *M. voeltzkowi*. Other syntype specimens may still exist (seen by Bolton in 1987), and THESE SHOULD BE TREATED AS PARALECTOTYPES. ***M. latinode bruneum***: LECTOTYPE: ☿, Ceylon, Kandy, [E.] Simon (MCSN). Label data reads '*bruneum*', but published name is *bruneum*. A lectotype has been chosen to fix the name for the taxon, which is darker than typical *M. latinode*. The specimen, originally on a pin holding four carded specimens, has been transferred to a single pin and the original labels and a lectotype label have been appended to that pin.

PARALECTOTYPES: Three workers, data the same as for the lectotype, photocopies of original labels attached (MCSN). ***M. voeltzkowi***: LECTOTYPE: ☿, Chake-Chake, Pemba, "East Africa" [Tanzania] (MHNG). A lectotype has also been chosen to fix the name *voeltzkowi*, whose proportions were thought by Forel to differ from those of *M. latinode*. The lectotype has been repinned as above. PARALECTOTYPES: (i) One worker, data the same as for the lectotype, photocopies of original labels attached (MHNG). (ii) Three workers, data as for the lectotype (MHNG).

OTHER MATERIAL EXAMINED: COMOROS ISLANDS: Mayotte, Majimbini, 21.vii.1998 R. Jocqué (2☿). MADAGASCAR: **Prov. Antsiranana:** Nosy Be, 2 km ENE Andoany (= Hellville), 1.v.1989 P.S. Ward (6☿) (MCZ). **Prov. Fianarantsoa:** 3km S Namakia, 5.iv.1993 P. Rabeson (96☿) (MCZ).

WORKER DESCRIPTION.— HEAD: Head oval; vertex weakly convex; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin straight, or, emarginate, clypeal carinae terminating in blunt angles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 3,3. Mandibular teeth five; mandibles triangular and smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth smaller than t4 (five teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, entire lower mesopleuron distinctly striolate; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed promesonotal setulae very sparse or absent. Metanotal groove vestigial. Propodeum uniformly finely striolate; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle; standing propodeal setae numerous, wholly or mainly erect or suberect, without conspicuous paired setae evident; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct in some specimens. Propodeal lobes present as blunt-angled flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; postpetiolar sternite depressed near its junction with gaster, and sloping anteriad at angle of 45–60 to form large conspicuous lip at its anterior end.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color head, mesosoma and appendages brownish-yellow, gaster brown. Worker caste monophasically allometric, i.e., with variable size, but not morphology among workers from same nest.

LECTOTYPE MEASUREMENTS (*M. latinode*): HML 2.02 HL 0.72 HW 0.59 CeI 81 SL 0.60 SI 103 PW 0.42.

LECTOTYPE MEASUREMENTS (*M. latinode bruneum*): HML 2.03 HL 0.73 HW 0.59 CeI 81 SL 0.56 SI 95 PW 0.46.

LECTOTYPE MEASUREMENTS (*M. voeltzkowi*): HML 1.66 HL 0.60 HW 0.46 CeI 77 SL 0.46 SI 100 PW 0.36.

OTHER WORKER MEASUREMENTS (non-types): HML 1.83–2.29 HL 0.65–0.83 HW 0.52–0.73 CeI 79–88 SL 0.50–0.62 SI 85–98 PW 0.38–0.49 (n=20).

REMARKS.— This species, currently the sole member of the *M. latinode* group, has an appearance somewhat suggestive of taxa from the Australasian *M. rubriceps* species group. However, none of the latter has a PF of 3,3, and this count may represent an ancestral plesiomorphy, if indeed the ant is a member of that group. Certainly, the species has no close connections with the remaining African and Malagasy *Monomorium* fauna. The type specimens for the nominal taxa currently associated with *M. latinode* (i.e., '*M. latinode*', '*M. latinode bruneum*' and '*M. voeltzkowi*') show variation in color and size, and the lectotype of *M. latinode* also exhibits some differences in the appearance of the head capsule. Apart from an excellent series from the Province Fianarantsoa and a small number from Province Antsiranana (MCZ) from tropical and lowland rainforest, I have seen no other Malagasy material pertaining to this tramp species. Malagasy specimens have been collected on low vegetation and on the ground.

THE *MONOMORIUM*-GROUP

***Monomorium bifidoclypeatum* Heterick, sp. nov.**
Figs. 17, 46–47.

ETYMOLOGY.— Latin '*bifidus*' ('split into two parts') +'*clypeatus*' ('provided with a shield')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Antsiranana**, RS Manongarivo 17.3 km 218 SW Antanambao 1580 m 14°01′3″S, 48°25′1″E, 160 m. 27.x.1998, B.L. Fisher 1972# /beating low vegetation montane rainforest/ 1972(05)–1 (CAS). PARATYPES: **Prov. Antsiranana:** (all specimens with same collection data as holotype): 1☿ (ANIC); 1☿ (BMNH); 1♀ (CAS); 1☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** R. S. Manongarivo, 17.3 km 218 SW Antanambao 27.x.1998 B.L. Fisher (1☿); R.S. Manongarivo, 20.4 km 219 SW Antanambao 3.xi.1998 B.L. Fisher (6☿). **Prov. Fianarantsoa:** 36 km S Ambalavao, Res Andringitra 29.x.1993 B.L. Fisher (1☿).

WORKER DESCRIPTION.— HEAD: Head square, or rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye large, eye width 1.5× greater than greatest width of antennal scape, to moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; Antennal segments 12; antennal club three-segmented. Clypeal carinae always well-defined; anteromedian clypeal margin straight between strongly divergent clypeal carinae, clypeus descending almost vertically to arc of mandibles and sometimes transversely carinate below level of antennal insertions; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae, or, approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex; promesonotal setae seven to twelve; standing promesonotal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct in some specimens. Propodeal lobes present as rounded flanges, or, present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered, or, conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 3:4 and 2:3; anteroventral petiolar process present as a thin flange tapering posteriad, or, absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole about 1:1; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color yellow to light brown, gaster often darker than head and mesosoma. Worker caste monomorphic.

HOLOTYPE: HML 1.22 HL 0.47 HW 0.42 CeI 88 SL 0.34 SI 82 PW 0.25.

OTHER WORKER MEASUREMENTS: HML 1.07–1.47 HL 0.43–0.55 HW 0.37–0.52 CeI 86–94 SL 0.32–0.44 SI 85–92 PW 0.21–0.29 (n=9).

QUEEN DESCRIPTION.— HEAD: Head square; vertex weakly concave or planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length-width ratio of mesoscutum and scutellum combined about 3:2; axillae separated by width of at least one axilla; standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining and smooth, with a few distinct striolae on metapleuron; propodeum always smoothly rounded; propodeal dorsum convex; standing propodeal setae consisting of one pair of prominent setae anteriad, with a few smaller, erect to decumbent setae on and around dorsal and declivitous faces; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as vestigial flanges only, or absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process present as a thin flange tapering posteriad; height ratio of peti-

ole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining, with vestigial sculpture; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

WING: Wing not seen (queen dealated).

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color yellow or yellowish-brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 2.18 HL 0.61 HW 0.58 CeI 95 SL 0.48 SI 83 PW 0.44 (n=1).

REMARKS.— This species appears to belong to a complex of very similar ants in which the head of the worker is relatively broad and the body is shiny and somewhat streamlined. *Monomorium bifidoclypeatum* has strongly defined clypeal carinae, and the anteromedian sector of the clypeus is depressed so that it forms an almost vertical, triangular plate. Seen in profile, the clypeal angle is approximately 90º. In other members of this complex, however, the clypeal carinae are poorly developed or obsolete, although the general conformation of the clypeus is the same. *Monomorium bifidoclypeatum* also has a distinct basal mandibular tooth, this anatomical feature being much reduced or even absent in the other species, except for *M. chnodes*. The sole known queen is rather similar in appearance to queens of *M. termitobium* (typical form). All but one of the specimens I have seen come from Antsiranana Province, where they were collected by beating low vegetation or by sifting litter from montane rainforest. One worker was collected as a forager in montane rainforest in Andringitra Reserve, Fianarantsoa Province.

Monomorium chnodes Heterick, sp. nov.

Figs. 17, 48–49.

ETYMOLOGY.— Greek '*chnodes*' ('downy')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toamasina**, Mont Akirindro 7.6 km 341 NNW Ambinanitelo 15°17′3″S, 49°32′9″E 600 m, 17–21.iii.2003, Fisher *et* al. BLF8250/ sifted litter rainforest/ CASENT 0025716 8250(50) (CAS). PARATYPES: **Prov. Toliara** (all specimens with same collection data as holotype; one worker with collection code 8250, other specimens with collection code 8322): 13☿ (ANIC); 13☿ (BMNH); 1♀ (CAS); 13☿ + 1♀ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Toliara:** 6.9 km NE Ambanizana 2.xii.1993 B.L. Fisher (9☿, 2♀). **Prov. Toamasina:** Mont. Akirindro, 7.6 km 341 NNW Ambinanitelo 17–21.iii.2003 Fisher *et* al. (25☿, 6♀); Mont Anjanaharibe, 18.0 km 21 NNE Ambinanitelo 8–12.iii.2003 Fisher *et al*. (32☿, 6♀); Mont Anjanaharibe, 19.5 km 27 NNE Ambinanitelo 12–16.iii.2003 Fisher *et al*. (16☿, 6♀).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae indistinct; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth five, or, four; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t4 (five teeth present), or, approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) anterior promesonotum smoothly rounded anteriad, thereafter more-or-less flattened, promesonotum raised well above propodeum; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, metapleuron with a few weak striolae; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole about 3:2; height–length ratio of postpetiole between 1:1 and 3:4; postpetiole shining and smooth; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina, or, without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color yellow. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.11 HL 0.42 HW 0.34 CeI 81 SL 0.23 SI 68 PW 0.23.

OTHER WORKER MEASUREMENTS: HML 1.05–1.19 HL 0.41–0.44 HW 0.34–0.37 CeI 79–88 SL 0.23–0.27 SI 67–76 PW 0.23–0.27 (n=20).

QUEEN DESCRIPTION.— HEAD: Head oval; vertex weakly concave or planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule;

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining and smooth, with a few distinct striolae on metapleuron; propodeum smoothly rounded or with indistinct angle; propodeal dorsum convex; standing propodeal setae consisting of two or more pairs of prominent setae anteriad, often with another pair of prominent setae posteriad, along with shorter, decumbent setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum. Propodeal lobes present as vestigial flanges only, or absent.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile)

between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining and smooth; postpetiolar sternite not depressed, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color bright yellow. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 1.46–1.58 HL 0.45–0.51 HW 0.40–0.44 CeI 83–89 SL 0.28–0.33 SI 67–76 PW 0.29–0.35 (n=12).

REMARKS.— Despite a resemblance to workers from some populations of *M. termitobium*, *M. chnodes* has several distinct features that place it apart from other small Malagasy *Monomorium* in the *M. monomorium* group. The shape of the mandible tends towards linear-triangular, not unlike that seen in the *M. hanneli* species group, and the dentition consists of four, occasionally five teeth or denticles of approximately equal size. The spiracle of the propodeum is large, as is that of the petiole, and the body and head are covered in abundant, downy setae. Nonetheless, molecular indicators place *M. chnodes* right within populations of what are here regarded as *termitobium*, and also close to *M. platynodis*. *Monomorium chnodes* has a restricted distribution in the Ambinanitelo region in Toamasina Province where workers and queens have been taken in sifted litter, from rotten logs and in pitfall traps in montane rainforest. This species also appears to have an association with the plant family Melistomataceae, which could be worthy of research.

Monomorium denticulus Heterick, sp. nov.

Figs. 17, 50.

ETYMOLOGY.— Latin dim. of '*dens*' (masc. 'tooth').

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Mahajanga**, P. N. Ankarafantsika, Ankoririka, 10.6 km 13º NE Tsaramandroso 16º16′S, 47º3′E 210 m, 9–14.iv.2001 E. Rabeson *et al*. BLF 3664/ sifted litter tropical dry forest/ CASENT 0470359 3664(11) (CAS). PARATYPES: **Prov. Mahajanga** (all specimens with same collection data as holotype, one worker with collection code 3664, three workers with collection code 3662): 1☿ (BMNH); 13☿ (MCZ). OTHER MATERIAL EXAMINED: **Prov. Fianarantsoa:** P. N. Isalo, Ambovo Springs, 29.3 km 4 N Ranohira 9–14.ii.2003 Fisher *et al*. (1☿). **Prov. Mahajanga:** P. N. Baie de Baly, 12.4 km 337 NNW Soalala 26–30.xi.2002 Fisher *et* al. (1☿). **Prov. Toliara:** Forêt Beroboka, 5.9 km 131 SE Ankidranoka 12–16.iii.2002 Fisher *et al*. (1☿); Forêt Tsinjoriaka ['Tsinjoriaky'], 6.2 km 84 E Tsifota 6–10.iii.2002 Fisher *et al*. (1☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye large, eye width 1.5× greater than greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule to set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae always well-defined; anteromedian clypeal margin emarginate or straight, clypeal carinae terminating in small denticles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 2,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits);

masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex anteriad, convexity reduced posteriad; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae very sparse or absent. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum convex; propodeum smoothly rounded or with indistinct angle; standing propodeal setae consisting of one prominent pair anteriad and a less prominent pair posteriad, smaller, decumbent setae few or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum to equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as rounded flanges to present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered, or, conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 3:4; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole between 4:3 and 3:4; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color yellow to brown. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.14 HL 0.43 HW 0.35 CeI 80 SL 0.35 SI 101 PW 0.22.

OTHER WORKER MEASUREMENTS: HML 1.01–1.29 HL 0.40–0.48 HW 0.32–0.38 CeI 76–84 SL 0.31–0.38 SI 88–106 PW 0.21–0.25 (n=7).

REMARKS.— *Monomorium denticulus* is the only member of the otherwise exclusively Afrotropical *M. schultzei* species complex represented in Madagascar. This ant is smaller than *M. schultzei* and is separable from other members of the complex by virtue of its shallow metanotal groove with short cross-ribs, its pinhole-like propodeal spiracle and its distinct clypeal denticles. The elongate mesosoma bears a superficial resemblance to that of *M. exiguum*. This yellow or brown species is distributed in a surprising variety of habitats in three provinces in Madagascar, but colonies appear to be very rare, being represented by a handful of workers. These have been collected in pitfall traps or from sifted litter in *Uapaca* woodland, tropical dry forest, spiny forest and rainforest.

Monomorium exiguum **Forel**

Figs. 18, 51–52.

Monomorium exiguum Forel 1894a:85. Syntype ☿'s (lectotype here designated), ETHIOPIA: (locality on label now illegible, but given as 'Südabessinien' in Bolton 1987) (MHNG) [examined].

Monomorium (*Martia*) *exiguum* Forel 1913b:351.

Monomorium (*Lampromyrmex*) *exiguum* Forel: Wheeler W.M. 1922:876.

Monomorium (*Mitara*) *exiguum* var. *bulawayensis* [*sic*] Forel 1913c:217. Syntype ☿'s (lectotype here designated), ZIMBABWE: Bulawayo (MHNG) [examined].

Monomorium (*Lampromyrmex*) *exiguum bulawayensis* Forel: Wheeler, W.M. 1922:876. Syn. under *Monomorium exiguum* Forel: Bolton 1987:388.

Monomorium (*Mitara*) *faurei* Santschi 1915: 260, fig. 10 (☿). Syntype ☿'s (lectotype here designated), GABON (MHNG) [examined].

Monomorium (*Lampromyrmex*) *faurei* Santschi: Wheeler, W.M. 1922:876. Syn. under *Monomorium exiguum* Forel: Bolton 1987:388.

Monomorium (*Mitara*) *exiguum* r. *flavescens* Forel 1916:418. Syntype ☿'s, DEMOCRATIC REPUBLIC OF CONGO: St. Gabriel, Stanleyville (MHNG) [examined].

Monomorium (*Lampromyrmex*) *exiguum flavescens* Forel: Wheeler, W.M. 1922:876. Syn. under *Monomorium exiguum* Forel: Bolton 1987:388.

Monomorium minutissimum Santschi 1937:225, figs. 27, 28. Syntype ☿ (lectotype here designated), ANGOLA, Ebanga Rd. (NHMB) [examined]. syn. n. Syn. under *Monomorium mictile* Forel: Bolton 1987:388.

MATERIAL EXAMINED.— ***M. exiguum***: LECTOTYPE: ☿, Ethiopia, Ilg (MHNG). In view of the variability, particularly in color, that led researchers to erect new 'varieties' for this species, a lectotype has been chosen for *M. exiguum* that fixes the species name for populations with dark, longer-headed specimens that have the characteristics mentioned in the original description. This particular specimen has been glued in the normal way, dorsal surface uppermost. PARALECTOTYPE: ☿, same data as lectotype, here designated for a specimen that has been pointed on the same pin as the lectotype and glued on its back. This specimen has been repinned with photocopies of the original labels (MHNG). ***M. exiguum bulawayense*** (corrected ending): LECTOTYPE: ☿, Zimbabwe, Arnold (MHNG). The lectotype fixes this name for populations with dark, shorter headed specimens as mentioned in the description for *M. exiguum bulawayense*. The carded lectotype specimen is the one glued on the RHS of the card (the head of the LHS specimen is damaged). PARALECTOTYPE: ☿, same data as lectotype (MHNG). (No effort has been made to separate the fragile, carded lectotype and paralectotype.). ***M. faurei***: LECTOTYPE: ☿, Gabon, F. Faure, 1914 (NHMB Reg. No. 203). The lectotype fixes the name for populations of *M. exiguum* with a slightly bicolored appearance (i.e., yellowish-brown head and gastral apex and yellowish mesosoma, nodes, appendages and gastral base. The sides of the gaster in this form are often infuscated). The carded lectotype is the single specimen on the top card rectangle on a pin holding three rectangles. PARALECTOTYPES: (i) Four carded workers, same data as the lectotype (bottom two rectangles) (NHMB). (ii) One worker and two detached worker heads mounted between two cover clips, these held by a pinned slip of cardboard, 'Guinea fr.' [Guinea], Mamou, Silvestri (NHMB). ***M. exiguum flavescens***: LECTOTYPE: ☿, Democratic Republic of Congo: St. Gabriel, Stanleyville, Kohl (MHNG). The lectotype fixes the name for populations with relatively pale workers with a strongly constricted mesosoma as mentioned in the description of *M. exiguum flavescens*. PARALECTOTYPE: (i) One worker, same data as lectotype (MHNG). This paralectotype has been removed from the same pin as the lectotype and repinned with photocopies of the original labels. (ii) Two workers, same data as the lectotype (MNHG). ***M. minutissimum***: LECTOTYPE: ☿, Angola, Ebanga Rd., A. Monard, 16.xi.1932 (NHMB – Reg. No. 207). The lectotype fixes the name for populations of this taxon, which appears to be essentially the same as *M. faurei*, though said by Santschi to have a more deeply incised metanotal groove. The lectotype is headless. (NB. This specimen is described as a 'holotype' by Bolton (1987), but Santschi clearly examined more than one specimen as is indicated by the range of body length given in his description. However, no other syntype specimens are known to still exist.).

OTHER MATERIAL EXAMINED: **Prov. Antananarivo:** Rés Ambohitantely, 24.1 km 59 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (1☿); Ambohitantely, 20.9 km 72 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (4☿). **Prov. Antsiranana:** Montagne Français, 7.2 km 142 SE Diego Suarez 22–28.ii.2001 Fisher *et al*. (1☿); Résérve Ambre, 3.5 km 235 SW Sakaramy 26–31.i.2001 Fisher *et al*. (1☿); Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (1☿) 6–20.iii.2001 R. Harin Hala (6♂). **Prov. Fianarantsoa:** 28 km SSW Ambositra, Ankazomivady 9.i.1998 (4☿, 1♀), 11.i.1998 (3♀), 14.i.1998 (1☿) B.L. Fisher. **Prov. Mahajanga:** P. N. Ankarafantsika, Ampijoroa, 40 km 306 NW Andranofasika 26–31.iii.2001 Fisher *et al*. (2☿); P. N. Ankarafantsika, Ampijoroa, 5.4 km 331 NW Andranofasika 26–31.iii.2001 Rabeson *et al.* (26☿, 1♀); P. N. Ankarafantsika, Ankoririka, 10.6 km 13 NE Tsaramandroso 9–14.iv.2001 Rabeson *et al*. (9☿); P. N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (5♂); P. N. Tsingy de Bemaraha, 10.6 km 123 ESE Antsalova 16–20.xi.2001 Fisher *et al*. (4☿). **Prov. Toamasina:** SF Tampolo, 10 km NNE Fenoarivo Atn. 10.iv.1997 B.L. Fisher (1☿). **Prov. Toliara:** Beza-Mahafaly, 27 km E Betioky 23.iv.1997 B.L. Fisher (49☿, 7♀); Cap Sainte Marie, 12.3 km 262 W Marovato 11–15.ii.2002 Fisher *et al*. (6♀); Cap Sainte

Marie, 14.9 km 261 W Marovato 13–19.ii.2002 Fisher *et al*. (3☿); Forêt Mahavelo, Isantoria Riv., 5.5 km 37 NE Ifotaka 31.i.2002 Fisher *et al*. (59☿, 7♀); Forêt de Petriky, 12.5 km W 272 Tolagnaro 22.xi.1998 B.L. Fisher (3☿); Mahafaly Plateau, 6.2 km 74 ENE Itampolo 25.ii.2002 Fisher *at al*. (7♂); P. N. Kirindy Mite, 16.3 km 127 SE Belo sur Mer 6–10.xii.2001 Fisher *et al*. (3♀); P. N. Andohahela, 1.7 km 61 ENE Tsimelahy 16–20.i.2002 Fisher *et al*. (40☿, 7♀); 2.7 km WNW Ste Luce, 9–11.xii.1998 B.L. Fisher (1☿); Vohibasia Forest, 59 km NE Sakaraha 13 i. 1996 B.L. Fisher (6☿).

WORKER DESCRIPTION.— HEAD: Head rectangular, vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 11; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 2,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened; promesonotum on same plane as propodeum, promesonotal setae seven to twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae, or, metanotal groove vestigial. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole about 1:1; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color variable, pale yellow to brown. Worker caste monomorphic.

LECTOTYPE WORKER MEASUREMENTS (*M. exiguum*): HML 0.93 HL 0.36 HW 0.28 CeI 78 SL 0.22 SI 79 PW 0.18.

LECTOTYPE WORKER MEASUREMENTS (*M. exiguum bulawayense*): HML 1.00 HL 0.39 HW 0.32 CeI 81 SL 0.26 SI 83 PW 0.20.

LECTOTYPE WORKER MEASUREMENTS (*M. faurei*): HML 0.88 HL 0.35 HW 0.29 CeI 83 SL 0.22 SI 76 PW 0.18.

LECTOTYPE WORKER MEASUREMENTS (*M. exiguum flavescens*): HML 0.89 HL 0.36 HW 0.30 CeI 82 SL 0.22 SI 75 PW 0.18.

LECTOTYPE WORKER MEASUREMENTS (*M. minutissimum*): No measurements taken as lectotype is headless.

OTHER WORKER MEASUREMENTS (non-types): HML 0.79–0.97; HL 0.33–0.39 HW 0.26–0.29 CeI 73–81 SL 0.22–0.26 SI 81–93 PW 0.16–0.20 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, margin sometimes shallowly concave; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length-width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae contiguous, or nearly so; standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeum smoothly rounded or with indistinct angle; propodeal dorsum convex; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as vestigial flanges only, or absent.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining, with vestigial sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 2:1 and 1:1; anteroventral petiolar process present as a thin flange tapering posteriad; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and weakly striolate posteriad; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial (NB. May be confused with rear margin of postpetiolar sternite, which does project as a spur, length of sternite being much reduced).

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color yellowish-brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes seen.

QUEEN MEASUREMENTS: HML 1.55–2.00 HL 0.45–0.55 HW 0.39–0.54 CeI 83–98 SL 0.34–0.42 SI 75–90 PW 0.28–0.55 (n=19).

MALE DESCRIPTION.— HEAD: (In full-face view) head width-mesosoma width ratio between 1:1 and 3:4; frons finely micropunctate. Compound eyes protuberant and elliptical tending to elongate; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 1:1 and 3:4. Maximum number of mandibular teeth and denticles three.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; parapsidal furrows vestigial or absent; notauli absent; axillae widely separated (i.e., by width of at least one axilla), axilla fused with scutellum to narrowly separated (i.e., less than width of one axilla).

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) conical, vertex tapered, appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 1:1 and 3:4; height–length ratio of postpetiole between 2:1 and 4:3; postpetiole shining, with vestigial sculpture.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color light to medium brown, appendages pure brown to off-white.

MALE MEASUREMENTS: HML 1.37–1.96 HL 0.41–0.51 HW 0.42–0.48 CeI 102–116 SL 0.10–0.19 SI 24–34 PW 0.44–0.66 (n=11).

REMARKS.— *Monomorium exiguum* ranges throughout Madagascar, but is most abundant in Toliara Province, where is it is often among the most commonly collected *Monomorium* in sifted litter samples. Interestingly, the paler '*flavescens*' and '*bulawayense*' forms also occur in Madagascar, along with *M. exiguum* sensu stricto. In the taxon *faurei* the head is darker than the mesosoma, and the gaster is pale with darker infuscation on its basal half, as well as on the sides of the first gastral tergite. This variant, too, is quite common on Madagascar. *Monomorium exiguum* workers from Madagascar tend to have a slightly more tapered petiolar node than their counterparts on the African mainland.

Based on comparative type material I have seen, *Monomorium exiguum* is part of a complex that includes, at least, the exclusively African *Monomorium mictile* Forel, *Monomorium rosae* Santschi and *Monomorium taedium* Bolton. An 11-segmented antenna, an elongate and flattened head capsule, weakly developed clypeal carinae, a dorsally rather flattened rather than evenly convex propodeum and the low, strongly conical form of the petiole are common to all of these taxa. *Monomorium rosae* is placed in a different complex by Bolton (1987) on the basis of the appearance of the worker postpetiole, but in actual fact, the shape of the postpetiole in larger, darker specimens of *Monomorium exiguum* approaches that of *M. rosae*, if it is not identical. The degree of obliqueness seen in the posterior face of the postpetiole appears to be proportional to the size of the worker, rather than a distinct feature at the species level, let alone the species-complex level, in all three species mentioned above.

The distinction between the above four species, if indeed it truly exists, is minimal. In appearance the workers form a continuum, with the bright yellow *M. mictile* being the smallest species and the very dark *M. rosae* the largest. To give just one instance, the relevant measurements supplied by Bolton (1987) for *M. exiguum* (40 specimens) and *M. rosae* (12 specimens) certainly give this reviser pause for thought! With *M. exiguum* in regular font, *M. rosae* in bold, these read: TL (i.e., total length); 1.5–1.7/**1.6–2.0** HL 0.36–0.42/**0.42–0.50**, HW 0.28–0.32/**0.33–0.40** CI (=CeI) 74–80/**76–82** SL 0.22–0.27/**0.28–0.35** SI 74–84/**85–94** PW 0.17–0.21/**0.21–0.25** AL (i.e., mesosoma length) 0.36–0.44/**0.42–0.56**. Apart from the larger size, the only real difference that I can discern between a *M. rosae* Santschi syntype from the Democratic Republic of Congo and large, brown specimens of *M. exiguum* I have seen from Madagascar is the presence of faint sculpture on the lower mesopleuron in *M. rosae*. Fresh *M. rosae* material, which I have not seen, is said by

Bolton to be 'blackish-brown to black'.

Monomorium mictile is separated from *M. exiguum* by Bolton (1987) on the basis of the presence or absence of erect infrahumeral setae. These are supposedly absent in *M. mictile* and long and erect in *M. exiguum*. In fact the setae are present, but short and appressed in *M. mictile*. This particular character does not seem to be useful as a means of separating similar species in the *M. monomorium* species group, at least in Madagascar. Where hundreds or even thousands of workers are available for examination, I have noticed variability in the number, length and alignment of the promesonotal setae, including differences in the length and alignment of the infrahumeral setae. This phenomenon may not be recognizable where only a few, isolated specimens are available for study. For now, I would allow for the separation of *M. mictile* from *M. exiguum*, as all Malagasy specimens I have seen of the latter have erect or semi-erect infrahumeral setae (albeit of different lengths). The same applies to *Monomorium taedium*, for which I have seen three paratype workers. Apart from their somewhat larger size (HW = 0.34 mm) and lack of erect infrahumeral setae they look exactly like brown *M. exiguum*. Interestingly, the postpetiole of the paratype specimens of *M. taedium* is quite globose, as in smaller *M. exiguum*.

As well as six syntypes of *M. mictile*, I have also examined 15 syntype workers of the form *Monomorium exiguum mictile* '*sudanicum*' and the lectotype worker of *Monomorium minutissimus*, both of which taxa Bolton regarded as conspecific with *M. mictile*. The '*sudanicum*' workers are certainly the same species as the *M. mictile* syntypes and share the same uniform, bright yellow coloration, but I differ with Bolton on the identity of the headless lectotype worker of *M. minutissimum*. Leaving aside the absence of the head (which was said by Santschi to be yellowish-brown like the gaster), the morphology of this specimen is identical with that of the *M. faurei* type material, and has the typical coloration of this form of *M. exiguum*. I therefore consider this taxon to be a junior synonym of *M. exiguum* rather than *M. mictile*. (NB. Because of the way the ant is glued on its side to its rectangle, the infrahumeral setae are not readily apparent, and may have been destroyed during the mounting process.)

Monomorium flavimembra Heterick, sp. nov.

Figs. 19, 53–54.

Etymology.— Latin '*flavus*' (yellow) + pl. of '*membrum*' (neut. 'member')

Material examined.— Holotype: ☿, **Prov. Antsiranana**, Réserve Spéciale Ambre, 3.5 km 235 SW Sakaramy 325m, 12 29'S, 49 15'E, 26–31.i.2001, Fisher et al. BLF# 2676 /ex rotten log tropical dry forest/ CASENT 0401520 (CAS). Paratypes: **Prov. Antsiranana** (three workers and three queens collection code 2676, seven workers collection code 2679, otherwise data as for the holotype): 12☿ (ANIC); 1☿ + 12♀ + 12☿ (BMNH); 1☿ (CAS) 1♀ + 12☿ + 2☿ (MCZ). Other material examined: **Prov. Antsiranana:** Montagne Français, 7.2 km 142 SE Diego Suarez 22–28.ii.2001 Fisher *et al*. (2☿); Résérve Spéciale Ambre, 3.5 km 235 SW Sakaramy 26–31.i.2001 Fisher *et al*. (15☿, 1♀); Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (67☿); Rés. Spéc. Ankarana, 13.6 km 192 SSW Anivorano Nord 16–21.ii.2001 Fisher *et al*. (2☿)

Worker description.— Head: Head oval; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae indistinct; anteromedian clypeal margin broadly convex; paraclypeal setae short and thickened, not reaching basal margin of closed mandibles; pos-

teromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex anteriad, convexity reduced posteriad; promesonotal setae seven to twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae very sparse or absent. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as blunt-angled flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered to conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina, or without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color light to dark reddish brown, gaster darker brown, appendages yellowish. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.33 HL 0.48 HW 0.43 CeI 89 SL 0.40 SI 94 PW 0.25.

OTHER WORKER MEASUREMENTS: HML 1.12–1.31 HL 0.41–0.50 HW 0.37–0.43 CeI 83–89 SL 0.34–0.42 SI 89–101 PW 0.23–0.27 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae contiguous, or nearly so; standing pronotal/mesoscutal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron; propodeum shining and smooth, with a few distinct striolae on metapleuron; propodeum smoothly rounded or with indistinct angle; propodeal dorsum flat throughout most of its length; standing propodeal setae consisting of up to a

dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node shining and weakly striolate posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 2:1 and 4:3; postpetiole shining and weakly striolate posteriad; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

WING: Wing not seen (queens dealated).

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color foreparts reddish brown, gaster brown, appendages yellow. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 1.55–1.57 HL 0.51 HW 0.47–0.49 CeI 92–96 SL 0.43–0.45 SI 88–95 PW 0.34–0.35 (n=4).

REMARKS.— *Monomorium flavimembra* is similar in morphology to *M. bifidoclypeatum*, but the anteromedian clypeal sector is only weakly carinate, and the petiolar node is higher and less sharply conical. The basal tooth is usually present as a small obtuse angle but may be absent altogether. The rich, russet color of the upper part of the frons and mesosoma contrasts with the bright yellow clypeus, mandibles and appendages in most specimens, but the legs may have a brownish tinge. The four known queens, all dealated, are very small and ergatoid-like. Queens of more regular proportions (for a *Monomorium* whose workers reach about 2 mm TL) may exist among the unclassifiable CAS *Monomorium* queen material that cannot be associated with workers.

This taxon has a localized distribution in Antsiranana Province, in far northern Madagascar. Workers have been collected in tropical dry forest as ground foragers, in sifted litter and from colonies in wood (rotted logs and twigs) and root mats.

Monomorium floricola (Jerdon)

(Figs. 19, 55, 56)

Atta floricola Jerdon 1851:107. Syntype ☿s, India [no types known to exist].

Monomorium floricola – (Jerdon): Mayr 1879:671.

Monomorium cinnabari Roger 1863a:199. Syntype ☿s, CUBA [whereabouts of type material unknown]. Syn. under *M. floricola* (Jerdon): Wheeler, W.M. 1913:388.

Monomorium poecilum Roger 1863a:199. Syntype ☿s, CUBA [whereabouts of type material unknown]. Syn. under *M. floricola* (Jerdon): Emery 1894b:51.

Monomorium specularis Mayr 1866:09. Syntype ☿s (see comments below – lectotype here designated) SAMOA: Upolu (NMW) [examined]. Syn. under *M. floricola* (Jerdon): Mayr 1879:71.

Monomorium impressum Smith 1876:47. Syntype ♀s, ♂ (lectotype here designated) RODRIGUEZ ISL.: (BMNH) [examined]. Syn. under *M. floricola* (Jerdon): Bolton 1987:88.

Monomorium floricola var. *philippinensis* Forel 1910a: 23. Syntype ☿s, ♀s, PHILIPPINES, Manila, Luzon Isl. (?NHMB) [not seen].

Monomorium floricola philippinense Forel: Bolton 1995

Monomorium floricola var. *furina* Forel 1911:21. Syntype ☿s, SRI LANKA: Peradeniya (?NHMB) [not seen].

Monomorium floricola furinum Forel: Bolton 1995

Monomorium floreanum Stitz 1932:68, fig. 1 (☿). Syntype ☿s, ♀s, GALAPAGOS ISL., Floreana [whereabouts of type material unknown]. Syn. under *M. floricola* (Jerdon): Linsley and Usinger 1966:75.

Monomorium (*Monomorium*) *angusticlava* Donisthorpe 1947:89. Syntype ☿s (lectotype here designated from CAS material), IRIAN JAYA: Maffin Bay (CAS, BMNH) [examined]. Syn. under *M. floricola* (Jerdon): Bolton 1987:88.

MATERIAL EXAMINED.— ***M. specularis***: LECTOTYPE: Two workers from Upolu, Samoa, G. Mayr Collection (NMW), may include one or both of the two syntype workers from the same locality mentioned in Mayr's publication of *M. specularis*. Label data indicates that these specimens were held by the Godeffroy Museum (stated as the repository for the type material by Mayr). Although the label data does not include the word 'type' or its equivalent, I am designating a lectotype to fix the name for the species, as these specimens agree closely with the description of M. *specularis*, and the issue of type status in view of the paucity of available data is otherwise unlikely to be resolved definitively. PARALECTOTYPE: ☿, data as above (NMW). ***M. impressum***: LECTOTYPE: ♀, Rodriguez Island, Gulliver (publ. name of collector) (BMNH). The lectotype is designated to fix the name *impressum* for populations of putative *M. floricola* in which the queen has a dark head and gaster and a very pale mesosoma. The lectotype is on a card rectangle including a second queen and a male, and is the queen on the LHS (seen from the rear). PARALECTOTYPES: One queen and one male on the same card rectangle as the lectotype (BMNH). No attempt has been made to separate these ants. ***M. angusticlava***: LECTOTYPE: The California Academy of Science (CAS) possesses a specimen which bears a red bordered circle reading 'type'. The material received from the BMNH is mounted on pins bearing yellow bordered circles reading 'paratype'. However, Donisthorpe specifically states that he used sixteen workers in describing *M. angusticlava*, so there can be no assumption of a holotype. Since all specimens have the same collecting data, they should be treated as syntypes. I have selected the CAS specimen as a typical worker for this taxon, as it is described. A second worker appears to have been included on the same point, but has been largely destroyed, leaving a postpetiole and gaster. The lectotype details are: ☿, Maffin Bay, Dutch New Guinea (Irian Jaya), E.S. Ross, viii 1944 (CAS). The choice of a lectotype fixes the name for this taxon, which was thought by Donisthorpe to be generally more gracile than *M. floricola*. PARALECTOTYPES: Two pins (12 and 11) of pointed workers and one pin of two separately carded workers. Collection data exactly as for lectotype (BMNH).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** 18 km N Antalaha, Ampahana, Gary D. Alpert (1♀) (MCZ); Nosy Be, Ambatoloaka, 12.viii.1992 Alpert *et al*. (1♀) (MCZ). **Prov. Mahajanga:** P.N. Namoroka, 17.8 km 329 NW Vilanandro 8–12.xi.2002 B.L. Fisher (1☿); P.N. Namoroka, 16.9 km 317 NW Vilanandro 12–16.xi.2002 B.L. Fisher (1☿); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 (2☿). **Prov. Toamasina:** 9.7 km NNE Mahalevona 12.xii.1993 B.L. Fisher (1☿); Mahavavy River, 6.2 km 145 SE Mitsinjo 1–5.xii.2002 B.L. Fisher (12☿). **Prov. Toliara:** Beza-Mahafaly ['Mahafely'], 27 km E Betioky 23.iv.1997 B.L. Fisher (1☿); Forêt Mite, 20.7 km 29 WNW Tongobory 27.ii–3.iii.2002 B.L. Fisher (4☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elongate; Antennal segments 12; antennal club three-segmented. Clypeal carinae always well-defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in small denticles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 1,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, striolae, if present, usually vestigial and confined to lower anterior mesopleuron, in some populations entire lower mesopleuron distinctly striolate; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-

less flattened, promesonotum on same plane as propodeum; promesonotal setae seven to twelve; standing promesonotal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with multiple hair like striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) evenly tumular to roundly conical; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 1:1; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few short, appressed setulae.

GENERAL CHARACTERS: Color head, gaster brown, mesosoma tawny yellow or variegated yellow-and-brown, appendages yellow or yellowish-brown. Worker caste monomorphic.

LECTOTYPE MEASUREMENTS (*M. specularis*): HML 1.09 HL 0.42 HW 0.33 CeI 77 SL 0.28 SI 86 PW 0.20.

LECTOTYPE MEASUREMENTS (*M. angusticlava*): HML 1.15 HL 0.43 HW 0.34 CeI 79 SL 0.29 SI 87 PW 0.21.

OTHER WORKER MEASUREMENTS: HML 1.00–1.21 HL 0.39–0.43 HW 0.31–0.34 CeI 79–85 SL 0.27–0.31 SI 81–90 PW 0.20–0.23 (n=19).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits and striolae around antennal sockets, frontal carinae and below the eyes; frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined about 2:1. Axillae narrowly separated (i.e., less than width of one axilla). Standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining and smooth, metapleuron with a few distinct striolae; propodeum always smoothly rounded; propodeal dorsum convex; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae well-spaced and sparse; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as vestigial flanges only, or absent.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateroventral and situated within anterior sector of

petiolar node; node, in profile conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth to greatest node width about 1:1. Anterior petiolar process absent or vestigial; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color head, gaster brown, mesosoma and nodes yellowish. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

LECTOTYPE MEASUREMENTS (*M. impressum*): HML 1.88 HL 0.72 HW 0.59 CeI 81 SL 0.60 SI 103 PW 0.42.

OTHER QUEEN MEASUREMENTS: HML 1.75–1.88 HL 0.54–0.55 HW 0.44–0.46 CeI 82–85 SL 0.39–0.40 SI 85–89 PW 0.31–0.33.

MALE DESCRIPTION.— HEAD: Head width–mesosoma width ratio between 4:3 and1:1; frons smooth to finely striolate. Compound eyes protuberant and elliptical; margin of compound eye margin of compound eye nearly abutting clypeus. Ocelli weakly turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 3:4 and 2:3. Maximum number of mandibular teeth and denticles three.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum. Parapsidal furrows vestigial or absent; notauli absent. Axillae narrowly separated (i.e., less than width of one axilla).

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node. Petiolar node, (viewed in profile) conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1. Anterior petiolar process absent or vestigial. Height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 2:1 and 3:2; postpetiole shining and microreticulate.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color uniformly brown.

MALE MEASUREMENTS: HML 1.68 HL 0.46 HW 0.50 CeI 109 SL 0.16 SI 0.32 PW 0.44.

REMARKS.— Workers of this species bear a striking resemblance in appearance and morphology to dark-headed, bicolored specimens of *Monomorium termitobium*, but can be distinguished by the combination of a uniformly dark brown or chocolate head *and* gaster. In *M. termitobium* the gaster is not uniformly dark brown or black, although it may be a dingy brownish-yellow or yellow with dark infuscation. The petiolar node in all Malagasy specimens of *M. floricola* that I have seen is also very low and broadly conical to tumular, barely higher than the postpetiole. The ventral surface of the petiole lacks a lobe of any description. *Monomorium termitobium* workers possess a petiolar node that is distinctly higher than the postpetiole, even when it is low conical in shape, and a subpetiolar lobe of varying degrees is always present.

Monomorium floricola, an exotic introduction, has been collected throughout Madagascar, but populations are principally in the drier, western parts of the island. Material in the CAS collection comes mainly from gallery forest, where individual workers have been taken in malaise traps and by beating. One small series has also been collected from an above ground rot pocket in a tree.

***Monomorium lepidum* Heterick, sp. nov.**
Figs. 20, 57–58.

ETYMOLOGY.— Latin '*lepidus*' ('elegant')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Mahajanga**, Forêt de Tsimembo, 11.0 km 346 NNW Soatana, 50 m 19°00′S, 44°27′E, 21–25.xi.2001, Fisher *et al*. BLF/ex dead twig above ground tropical dry forest/ CASENT 0442208 4561 (CAS). PARATYPE: **Prov. Mahajanga** (all specimens with same collection data as holotype): 1☿ (ANIC); 1♀ + 13☿ (BMNH); 1☿ (CAS); 23☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** R. S. Manongarivo, 12.8 km 228 SW Antanambao 11–17.x.1998 B.L. Fisher (9☿); R. S. Manongarivo, 10.8 km 229 SW Antanambao 8.xi.1998 B.L. Fisher (1☿); **Prov. Mahajanga:** Forêt de Tsimembo 11.0 km 346 NNW Soatana 21–25.xi.2001 Fisher *et* al. (4☿); Forêt de Tsimembo 8.7km km 336 NNW Soatana 21–25.xi.2001 Fisher *et* al. (16☿); P.N. Baie de Baly, 12.4 km 337 NNW Soalala 26–30.xi.2002 Fisher *et* al. (27☿, 2♀); P.N. Namoroka, 9.8 km 300 WNW Vilanandro, 4–8.xi.2002 Fisher *et al*. (20☿); P.N. Namoroka, 17.8 km 329 WNW Vilanandro, 8–12.xi.2002 Fisher *et al*. (4☿); P.N. Namoroka, 16.9 km 317 NW Vilanandro, 12–16.xi.2002 Fisher *et al*. (10☿, 1♀); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (24☿); P.N. Tsingy de Bemaraha, 2.5 km 62 E Bekopaka 11–15.xi.2001 Fisher *et al*. (21☿); P.N. Tsingy de Bemaraha, 10.6 km 123 ESE Antsalova 16–20.xi.2001 Fisher *et al*. (3☿); P.N. Zombitse, 19.8 km 84 E Sakaraha 5–9.ii. 2003 Fisher *et al*. (21☿); Res. Bemarivo, 23.8 km 223 SW Besalampy 19–23.xi.2002 Fisher *et al*. (25☿); **Prov. Toliara:** Kirindy, 15.5 km 64 ENE Marofandilia 28.xi–3.xii.2001 Fisher *et al*. (17☿); Rés. Berenty, Forêt Bealoka, 14.6 km 329 NNW Amboasary 3–8.ii.2002 Fisher *et al*. (25☿); Rés. Berenty, Forêt Bealoka, 8.6 km 314 NW Amboasary 6.ii.2002 Fisher *et al*. (3☿); Vohibasia Forest, 59 km NE Sakaraha 13 i. 1996 B.L. Fisher (2☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae partially developed or indistinct; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae; anterior tentorial pits situated nearer mandibular insertions than antennal fossae. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex anteriad, convexity reduced posteriad; promesonotal setae seven to twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae very sparse or absent. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum, or, equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct in some specimens. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petio-

lar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color of foreparts tawny-yellow to orange (postpetiole sometimes darker), gaster chocolate. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.25 HL 0.48 HW 0.40 CeI 84 SL 0.36 SI 90 PW 0.25.

OTHER WORKER MEASUREMENTS: HML 1.09–1.38 HL 0.44–0.54 HW 0.37–0.47 CeI 82–88 SL 0.34–0.42 SI 89–96 PW 0.22–0.29 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits and a few striolae around antennal sockets and frontal carinae; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length-width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron; propodeum shining and smooth, with multiple hair like striolae on metapleuron. Propodeum always smoothly rounded; propodeal dorsum convex; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges; Petiolar spiracle lateral and situated within anterior sector of petiolar node.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: node (viewed in profile) conical, vertex rounded; appearance of node shining and weakly striolate posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and weakly striolate posteriad; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color of foreparts yellow-orange, gaster chocolate. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 1.99–2.34 HL 0.56–0.59 HW 0.55–0.58 CeI 96–105 SL 0.47–0.49 SI 82–86 PW 0.40–50 (n=3).

REMARKS.— This handsome, bicolored species can easily be mistaken for the '*binatu*' form of

M. termitobium, but lacks the sharply defined, narrowly separated clypeal carinae and strongly projecting clypeus of the latter. The proper affinities of this ant lie with *M. flavimembra* and its allies. Workers within a series are of uniform appearance, either bright yellow or orange with a dark brown gaster. The gaster is typically uniformly dark, but the base of the first gastral tergite may be a cloudy brownish-yellow. Sometimes the postpetiole is also dark brown. As with *M. flavimembra*, the basal mandibular tooth is greatly reduced, but is at least represented by a faint angle in all specimens seen.

Monomorium lepidum has a scattered distribution in western and southern parts of the island. Most records have come from Mahajanga Province. As with many of these small *Monomorium*, the species has a predilection for rotten twigs and tree stumps, but also features prominently in sifted litter and pitfall-trapped samples. Tropical dry forest is a typical habitat, but several series have come from rainforest.

Monomorium madecassum **Forel**

Figs. 21, 59–60.

Monomorium minutum r. *madecassum* Forel, 1892c:255. Syntype ☿s (lectotype here designated), MADAGASCAR: Imerina (MHNG) [examined].

Monomorium madecassum Dalla Torre, 1893:67.

Monomorium minutum var. *leopoldinum* Forel, 1905:179 Syntype ☿s (lectotype here designated), DEMOCRATIC REPUBLIC OF CONGO: St. Gabriel, Stanleyville (MHNG) [examined]. Syn. nov.

Monomorium leopoldinum Bolton, 1987:397

Monomorium explorator Santschi, 1920:12, figs 1a–b. Holotype ☿, GABON: Samkita (NHMB) [examined]. Syn. under *M. leopoldinum* Bolton, 1987:397.

Monomorium aequum Santschi, 1928:195, fig.3b. Holotype ☿, DEMOCRATIC REPUBLIC OF CONGO: Stanleyville (NHMB) [examined]. Syn. under *M. leopoldinum* Bolton, 1987:397.

Monomorium (*Monomorium*) *estherae* Weber, 1943:361. Syntype ☿s (lectotype here designated), SUDAN, Imatong Mts. (MCZ) [examined]. Syn. under *M. leopoldinum* Bolton, 1987:397.

MATERIAL EXAMINED.— ***M. madecassum***: LECTOTYPE: ☿, Madagascar, Imerina, coll. [P.] Camboué (MHNG). This specimen is designated the lectotype to fix the name for the species. Malagasy workers are generally smaller and less hairy than workers collected in Africa. PARALECTOTYPES: (i) ☿, Madagascar, Imerina, coll. [F.] Sikora (MHNG). (ii) ♀, Madagascar, Imerina, coll. [P.] Sikora (MHNG). ***M. leopoldinum***: LECTOTYPE: ☿, DEMOCRATIC REPUBLIC OF CONGO: St. Gabriel, Stanleyville, P. Kohl (MHNG). A lectotype is designated to fix the name '*leopoldinum*' under which were placed certain African populations of what is here regarded as *M. madecassum*. PARALECTOTYPES: Two workers, same data as lectotype (MHNG). Repinned, with photocopies of the original labels. ***M. explorator***: HOLOTYPE: ☿, Gabon, Samkita, F. Faure (NHMB – Reg. no. 206). Santschi mentions only the one specimen was used for his description. ***M. aequum***: HOLOTYPE: ☿, Democratic Republic of Congo, Stanleyville, Reichensperger (NHMB – Reg. No. 216). This worker was designated a 'holotype' by Bolton (1987), and since the length is given as a single measurement, it seems clear no other specimens were examined. A holotype status fixed by monotypy (Code 73.1.2) is here assumed. ***M. estherae***: LECTOTYPE: ☿, Sudan, Imatong Mts., 24 July–5 Aug. 1943, N.A. Weber. 1423 (MCZ). The publication and the type label describe these two specimens as 'cotypes', but 'syntypes' is clearly intended. A lectotype is designated to fix the name '*estherae*' for this taxon, whose representatives are slightly less hairy than those of *M. leopoldinum*. PARALECTOTYPE: ☿, same data as lectotype (MCZ). Repinned, with photocopies of the original labels.

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** Forêt Anabohazo, 21.6 km 247 WSW Maromandia 11–16.iii.2001 Fisher *et al*. (4☿); R.S. Manongarivo, 10.8 km 229 SW Antanambao 8.xi.1998 B.L. Fisher (5☿). **Prov. Fianarantsoa:** 28 km SSW Ambositra, Ankazomivady, 9.i.1998 (1☿), 11.i.1998 (12☿, 1♀), 13.i.1998 B.L. Fisher (6☿); P.N. Andringitra, Forêt Ravaro, 12.5 km SW Antanitotsy 10–15.i.2000 S. Razafimanimby (6♀). **Prov. Mahajanga:** Mahavavy River, 6.2 km 145 SE Mitsinjo 1–5.xii.2002 Fisher *et al*. (3☿); P.N. Ankarafantsika, Tsimaloto, 18.3 km 46 NE Tsaramandroso 2–8.iv.2001 Rabeson *et al*. (4☿); P.N.

Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (1☿); P.N. Tsingy de Bemaraha, 2.5 km 62 ENE Bekopaka 11–15.xi.2001 Fisher *et al*. (1☿). **Prov. Toamasina:** Morarano-Chrome forêt, 25 km W, xi.1991 A. Pauly (1♀, 1♂ (*in cop*.)); S.F. Tampolo, 10 km NNE Fenoarivo Atn. 10.iv.1997 B.L. Fisher (2☿). **Prov. Toliara:** Cap Sainte Marie, 12.3 km 262 W Marovato 11–15.ii.2002 Fisher *et al.* (64☿, 1♀); Ehazoara Canyon, 26 km E Betioky 27.iv.1997 B.L. Fisher (2☿); Forêt Beroboka, 5.9 km 131 SE Ankidranoka 12–16.iii.2002 Fisher *et al*. (2☿); Forêt Mahavelo, Isantoria Riv., 5.2 km 44 NE Ifotaka 28.i–1.ii.2002 Fisher *et al*. (4☿); Forêt Mite, 20.7 km 29 WNW Tongobory 27.ii–3.iii.2002 Fisher *et al*. (1☿); Forêt Tsinjoriaka ['Tsinjoriaky'], 6.2 km 84 E Tsifota 6–10.iii.2002 Fisher *et al*. (73☿); southern Isoky-Vohimena Forest, 21.i.1996 B.L. Fisher (2☿); P.N. Andohahela, Manantalinjo, 7.6 km 99 E Hazofotsy 12–16.i.2002 Fisher *et al*. (2☿); P.N. Tsimanampetsotsa, 6.7 km 130 SE Efoetse, 18–22.iii.2002 Fisher *et al*. (1☿);. P.N. Tsimanampetsotsa, Bemanateza, 23.0 km 131 SE Beheloka 22–26.iii.2002 Fisher *et al*. (2☿); P.N. Tsimanampetsotsa, Mitoho, 6.4 km 77 ENE Efoetse 18–22.iii.2002 Fisher *et al*. (4☿); P.N. Zombitse, 19.8 km 84 E Sakaraha 5–9.ii. 2003 Fisher *et al*. (1☿); Ranobe, Frontier Project 17–21.ii.2003, MGFO61 (1☿); Rés. Berenty, Forêt Anjapolo, 21.4 km 325 NW Amboasary 7.ii.2002 Fisher *et al*. (15☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye large, eye width 1.5× greater than greatest width of antennal scape, to moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae always well-defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in small denticles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 1,2; Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, entire lower mesopleuron often distinctly striolate but sculpture may be vestigial; (viewed in profile) promesonotum broadly convex; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae well-spaced over entire promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with multiple hair like striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae usually consisting of one prominent pair anteriad, with other shorter setae very sparse or absent, more rarely consisting of two anterior pairs or three or four pairs ranged along either side of the propodeal dorsum; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered, or, cuneate, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; ventral petiolar lobe weakly present to absent; height ratio of petiole to postpetiole between 3:2 and 4:3; height-length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; post-

petiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color light brownish-yellow to brown, gaster darker. Worker caste monomorphic.

LECTOTYPE MEASUREMENTS (*M. madecassum*): HML 1.24 HL 0.49 HW 0.40 CeI 82 SL 0.35 SI 86 PW 0.26.

LECTOTYPE MEASUREMENTS (*M. leopoldinum*): HML 1.41 HL 0.53 HW 0.44 CeI 84 SL 0.39 SI 89 PW 0.29.

LECTOTYPE MEASUREMENTS (*M. explorator*): HML 1.34 HL 0.51 HW 0.42 CeI 82 SL 0.36 SI 86 PW 0.28.

LECTOTYPE MEASUREMENTS (*M. aequum*): HML 1.48 HL 0.52 HW 0.45 CeI 87 SL 0.37 SI 82 PW 0.30.

LECTOTYPE MEASUREMENT (*M. estherae*): HML 1.34 HL 0.51 HW 0.41 CeI 80 SL 0.35 SI 85 PW 0.27.

OTHER WORKER MEASUREMENTS (non-types): HML 1.14–1.27 HL 0.46–0.51 HW 0.37–0.41 CeI 78–83 SL 0.32–0.37 SI 83–93 PW 0.23–0.27 (n=20).

QUEEN DESCRIPTION.— HEAD: Head square; vertex weakly concave or planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length-width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron; propodeum shining and smooth, with multiple hair like striolae on metapleuron; propodeum always smoothly rounded; propodeal dorsum flat throughout most of its length; standing propodeal setae consisting of a few decumbent setae only; appressed propodeal setulae well-spaced and sparse; propodeal spiracle nearer metanotal groove than declivitous face of propodeum. Propodeal lobes present as bluntly angled flanges.

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu always absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node shining and weakly striolate posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process present as a thin flange tapering posteriad; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining and smooth; postpetiolar sternite not depressed, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 3.01–3.12 HL 0.76–0.77 HW 0.74–0.75 CeI 96–99 SL 0.56–0.58 SI 76–77 PW 0.88–0.92 (n=2).

MALE DESCRIPTION.— HEAD: Head width–mesosoma width ratio between 1:1 and 3:4 to less than 1:2; frons finely longitudinally striolate. Compound eyes protuberant and elliptical tending to elongate; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli turreted. Ratio of length of first funicular segment of antenna to second funicular segment about 1:3. Maximum number of mandibular teeth and denticles four.

MESOSOMA: Mesoscutum broadly convex; mesoscutum with a few vestigial striolae on its dorsum, otherwise both pronotum and mesonotum smooth and shining. Parapsidal furrows vestigial or absent; notauli vestigial. Axillae widely separated (i.e., by width of at least one axilla), axilla fused with scutellum.

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node. Petiolar node, (viewed in profile) conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1. Anteroventral petiolar process absent or vestigial. Height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 1:1; postpetiole shining, with vestigial sculpture.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color chocolate, tibia and tarsi pale brownish-yellow.

MALE MEASUREMENTS: HML 2.80–2.84 HL 0.70 HW 0.72–0.74 CeI 104–106 SL 0.21–0.22 SI 28–31 PW 0.90–0.94 (n=2).

REMARKS.— Workers of *Monomorium madecassum* are immediately recognizable by virtue of their large propodeal spiracle, clypeal denticles, and relatively large eyes. The petiolar node and postpetiole also tend to be high and narrow in most specimens. The taxon *Monomorium leopoldinum*, described from African material, is morphologically indistinguishable from *M. madecassum* and is here made a junior synonym of the earlier name. *Monomorium aequum* was collected in the same locality (Stanleyville, Democratic Republic of Congo) as *M. leopoldinum*, and apart from smaller eyes and a broad head the lectotype is virtually indistinguishable from that of *M. leopoldinum*. *Monomorium explorator* Santschi, from Gabon, has a smooth mesopleuron without any hint of sculpture. Otherwise, however, it conforms closely to *M. madecassum*. African populations of *M. madecassum* are on average larger than Malagasy populations of this species. Workers also tend to be more hirsute, with more than two pairs of erect propodeal setae, according to Bolton (1987). By way of contrast, Malagasy workers usually have one or two pairs of erect propodeal setae, but a series from Ankarafantsika, Mahajanga Province, is pilose like the African workers. (As mentioned under 'REMARKS' for *Monomorium exiguum*, degree of pilosity does not appear to be useful as a diagnostic character at a species level for many small *Monomorium*.) The type specimens of *Monomorium estherae* are altogether like *M. madecassum*. The queen and male of *M. madecassum* are both very large for members of the *M. monomorium* group, and each, like the worker, possesses a very large propodeal spiracle. The compound eye of the male is elongate-oval. The reproductive wing is a pale off-white, although its veins are fairly well-defined.

Monomorium madecassum is the only member of its complex found on Madagascar, where it can be found throughout the island. Most CAS material has been collected in Toliara. Although not as abundant in samples as several other small species, this ant has been taken from different vegetation assemblages, ranging from spiny forest to rainforest, and can exist in disturbed forest areas

and even in grassland. Various collection methods have been successful, and its inclusion in malaise trap samples indicates this species will forage arboreally. The ant appears to have catholic tastes in terms of nest sites, colonies having been sampled in a dead branch above ground and also under stones.

Monomorium micrommaton **Heterick, sp. nov.**
Figs. 22, 61–62.

ETYMOLOGY.— Greek '*mikrommatos*' ('small-eyed')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toamasina**, P.N. Mantadia 895 m, 18º47′5″S, 48º25′6″E, 28.xi–1.xii.1998 H.J. Ratsirarson 112/sifted litter (leaf mold, rotten wood) rainforest/112(32)–51 (CAS). PARATYPES: **Prov. Toamasina** (all specimens with same collection data as holotype): 32☿ + 1☿ (ANIC); 42☿ + 1☿ (BMNH); 32☿ + 1 (CAS); 42☿ + 1☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** 12.2 km WSW Befingotra, Res. Anjanaharibe-Sud, 19.x.1994 B.L. Fisher (19☿). **Prov. Fianarantsoa:** 45 km S Ambalavao 25.ix.1992 B.L. Fisher (24☿); 43 km S Ambalavao, Res. Andringitra 10.x.1993 B.L. Fisher (120☿); Parc Nat. de Ranomafana , 11.v.1991 L. Bartolozzi, S. Tiati & C. Raharimina (1☿); P.N. Ranomafana, Vatoharanana 4.1 km 231 SW Ranomafana 27–31.iii.2003 Fisher *et* al. (25☿); Ranomafana N.P. 1.i.1992 E. Rajeriarison (3☿) (MCZ); W.E. Steiner (1☿) (MCZ); Ranomafana N.P. 7 km (*sic*!) 8.x.1988 W.E. Steiner (1☿) (MCZ); 3 km W Ranomafana, nr. Ifanadiana 27.iv. 1989 P.S. Ward (4☿) (MCZ); 7 km W Ranomafana , 10.ix.1993 W. E. Steiner *et al.* (2☿) (MCZ); 7 km W Ranomafana , 23.ix.1993 M. Stebbins, W. E. Steiner *et al.* (2☿) (MCZ); 7 km W Ranomafana, 14.x.1993 W.E. Steiner *et al.* (1☿); (MCZ) R.S. Ivohibe, 7.5 km ENE Ivohibe, 7–12.xi.1997 B.L. Fisher (24☿); R. S. Ivohibe, 9.0 km NE Ivohibe, 12–17.xi.1997 B.L. Fisher (3☿). **Prov. Toamasina:** 6.9 km NE Ambanizana 2.xii.1993 B.L. Fisher (20☿); 6 km ESE Andasibe (- Périnet) 17. xi. 1990 P.S. Ward (4☿) (MCZ); F.C. Andriantantely 4–7.xii.1998 H.J. Ratsirarson (11☿); F.C. Didy, 16–23.xii.1998 H.J. Ratsirarson (10☿); P.N. Mantadia, 28.xi–1.xii.1998 H.J. Ratsirarson (2☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; Eye small, eye width less than 1× greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; eye more-or-less circular, or, elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae indistinct; anteromedian clypeal margin emarginate, clypeal carinae indistinct; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits equidistant from antennal fossae and mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae very sparse or absent;

propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole about 3:2; height–length ratio of postpetiole between 1:1 and 3:4; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color yellow. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.02 HL 0.39 HW 0.32 CeI 82 SL 0.27 SI 84 PW 0.22.

OTHER WORKER MEASUREMENTS: HML 0.92–1.11 HL 0.36–0.43 HW 0.30–0.35 CeI 78–84 SL 0.24–0.28 SI 78–87 PW 0.20–0.26 (n=20).

QUEEN DESCRIPTION.— HEAD: Head square; vertex always planar; frons shining and smooth except for piliferous pits; frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye elliptical, outer margin may be shallowly concave; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex; pronotum ,mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length-width ratio of mesoscutum and scutellum combined between 2:1 and 3:2. Axillae narrowly separated (i.e., less than width of one axilla). Standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining and smooth, metapleuron with a few distinct striolae; propodeum smoothly rounded or with indistinct angle; propodeal dorsum convex; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as vestigial flanges only, or absent.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered, to cuneate, vertex rounded; appearance of node shining, with vestigial sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1. Anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 2:1 and 4:3; postpetiole shining and smooth to shining, with vestigial sculpture; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color bright orange-yellow. Brachypterous, alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 2.87–2.98 HL 0.67–0.70 HW 0.68–0.71 CeI 99–104 SL 0.53–0.58 SI 76–82 PW 0.74–0.96 (n=5).

REMARKS.— *Monomorium micrommaton* workers are similar to the yellow, typical form of *M. termitobium*, but, unlike the latter, appear to be restricted to cryptic environments. The queens are

also clearly separable from those of the latter species. All collections have been made in rainforest on the east coast of Madagascar in the provinces of Antsiranana, Fianarantsoa and Toamasina, usually in sifted leaf litter, mould or rotten wood. The very reduced eyes and depigmented coloration suggest this species is strongly adapted to a cryptic lifeway.

Monomorium nigricans **Heterick, sp. nov.**
Figs. 20, 65–66.

ETYMOLOGY.— Latin '*nigricans*' ('blackish').

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toliara**, Rés. Cap Sainte Marie, 12.3 km 262º W Marovato 25º34′90″S, 45º10′10″E 200 m, 11–15.ii.2002 B. Fisher *et al*. BLF 5500/ sifted litter, spiny forest/thicket/ CASENT 0020200 5500(LO) (CAS). PARATYPES: **Prov. Toliara** (one worker collection code 5500, one worker collection code 5502, eleven males collection code 5504, otherwise data as for the holotype): 12♂ (ANIC); 13♂ + 1☿ (BMNH); 12♂ (CAS); 13♂ + 1♂ + 1☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Toliara:** 18 km NNW Betroka, 29.xi.–4.xii.1994 M.A. Ivie & D.A. Pollock (18☿) (MCZ); Res. Beza Mahafaly ['Mahafely'], 18.xi.1984 R.L. Brooks (14☿) (MCZ); Cap Sainte Marie, 14.9 km 261 W Marovato 13–19.ii.2002 Fisher *et al*. (14☿); Forêt Mahavelo, Isantoria Riv. 5.2 km 44 NE Ifotaka 28.i–1.ii.2002 B.L. Fisher (1♂); Forêt Mite, 20.7 km 29 WNW Tongobory 27.ii–3.iii.2002 Fisher *et al*. (1☿); Mahafaly Plateau, 6.2 km 74 ENE Itampolo 25.ii.2002 Fisher *at al*. (2); P.N. Isalo, Ambovo Springs, 29.3 km 4 N Ranohira 9–14.ii.2003 Fisher *et al*. (1♀); Réserve Berenty, 10.xii.1992 B.L. Fisher (2☿) Rés. Berenty, Forêt Malaza, 8.6 km 314 NW Amboasary 6.ii.2002 Fisher *et al*. (9♂).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye large, eye width 1.5× greater than greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set anteriad of midline of head capsule, or, set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 11; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex; promesonotal setae seven to twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on dorsum of promesonotum. Metanotal groove weakly impressed, with faint costulae or costulae lacking. Propodeum shining and smooth, with a few distinct striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petio-

lar node; node (viewed in profile) conical, vertex tapered to conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole between 4:3 and 1:1; height-length ratio of postpetiole about 4:3; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color dark reddish-brown to almost black. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.08 HL 0.42 HW 0.37 CeI 87 SL 0.30 SI 82 PW 0.25.

OTHER WORKER MEASUREMENTS: HML 1.00–1.12 HL 0.39–0.44 HW 0.34–0.38 CeI 84–90 SL 0.29–0.33 SI 82–89 PW 0.22–0.25 (n=19).

MALE DESCRIPTION.— HEAD: (In full-face view) head width–mesosoma width ratio between 4:3 and 1:1; frons finely micropunctate. Compound eyes protuberant and elliptical; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli not turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 2:3 and 1:2. Maximum number of mandibular teeth and denticles three.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining and microreticulate throughout; parapsidal furrows vestigial or absent; notauli absent; axillae widely separated (i.e., by width of at least one axilla), axilla fused with scutellum.

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node shining and microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole about 3:4; height–length ratio of postpetiole between 2:1 and 3:2; postpetiole shining and microreticulate.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color chocolate.

MALE MEASUREMENTS: HML 1.73–2.07 HL 0.45–0.55 HW 0.53–0.65 CeI 102–118 SL 0.12–0.18 SI 21–33 PW 0.53–0.73 (n=20).

REMARKS.— This smallish species, the only Malagasy *Monomorium* apart from *Monomorium exiguum* that has an 11-segmented antenna, appears to be confined to Toliara Province, where it is not uncommon in spiny forest. Several workers and males have also been collected in gallery and tropical dry forests. The profile of the worker mesosoma of *Monomorium nigricans* is not unlike that of the African *Monomorium bequaerti* Forel (Fig. 92 in Bolton 1987), but the postpetiole is more rounded and the color is much darker than in *bequaerti*. The relationship of this species to other small African and Malagasy *Monomorium* is uncertain, but the appearance of the worker and the male suggests it may belong to the *M. exiguum* complex. Workers have been collected in sifted litter or from beating low vegetation, or as ground foragers, and ground nests and nests in dead twigs have also produced worker specimens. Males have been taken in malaise traps.

Monomorium platynodis **Heterick, sp. nov.**

Figs. 22, 63–64.

ETYMOLOGY.— Greek '*platys*' (flat) + pl. of masc. '*nodus*'

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toamasina**, Mont Anjanaharibe, 18.0 km 21 NNE Ambinanitelo 470 m 15º11′3″S, 49º36′9″E, 8–12.iii.2003 Fisher *et al*. BLF 8002/sifted litter tropical dry forest/CASENT 0026538 8002(24) (CAS). PARATYPES: **Prov. Toamasina** (all specimens with same collection data as holotype): 13☿ (ANIC); 13☿ (BMNH); 13♂ + 13☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** Ampasindava, Ambilanivy, 3.9 km 181 S Ambaliha 4–9.iii.2001 Fisher *et al*. (1☿, 1♂). **Prov. Mahajanga:** P.N. Namoroka, 17.8 km 329 WNW Vilanandro, 8–12.xi.2002 Fisher *et al*. (2☿). **Prov. Toamasina:** F.C. Didy, 16–23.xii.1998 H.J. Ratsirarson (1☿). **Prov. Toliara:** 6 km SSW Eminiminy, Rés. Andohahela 4.ii.1993 (3☿, 3♂) (MCZ); 11 km NW Enakara, Rés. Andohahela 17.xi.1992 B.L. Fisher (3☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye large, eye width 1.5× greater than greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule to set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin, or, elongate, eye narrowed to point anteriad; Antennal segments 12; antennal club three-segmented. Clypeal carinae indistinct; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Mandibular with three evenly sized teeth; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t2 (three teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex; promesonotal setae seven to greater than twelve; standing promesonotal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum convex; propodeum always smoothly rounded; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct in some specimens. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle laterodorsal and situated slightly anteriad of petiolar node, or, lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole about 4:3; height-length ratio of postpetiole about 3:2; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color bright yellow-orange. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.15 HL 0.42 HW 0.34 CeI 81 SL 0.29 SI 85 PW 0.24.

OTHER WORKER MEASUREMENTS: HML 1.18–1.33 HL 0.44–0.50 HW 0.36–0.39 CeI 75–84 SL 0.31–0.35 SI 84–91 PW 0.25–0.27 (n=18).

MALE DESCRIPTION.— HEAD: Head width-mesosoma width ratio between 1:1 and 3:4; frons finely micropunctate. Compound eyes protuberant and elliptical; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli not turreted. Ratio of length of first funicular segment of antenna to second funicular segment about 1:1. Maximum number of mandibular teeth and denticles three.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining, with dorsum of mesoscutum faintly striolate. Parapsidal furrows vestigial or absent; notauli absent. Axillae separated by width of at least one axilla.

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node. Node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3. Anteroventral petiolar process absent or vestigial. Height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, semi-erect setae.

GENERAL CHARACTERS: Color brown.

MALE MEASUREMENTS: HML 1.31–1.44; HL 0.40–0.41; HW 0.35–0.38; CeI 88–93; SL 0.14–0.17; SI 39–46; PW 0.42–0.44 (n=3).

REMARKS.— *Monomorium platynodis* is a rather rare species, which, nonetheless, ranges throughout the entire island of Madagascar. Recorded material comes from Antsiranana, Mahajanga, Toamasina and Toliara provinces. The uniformly orange workers are immediately identifiable through their truncated clypeus, three-toothed mandibles and high nodes. The very small males (the queen is not known) resemble those of *M. exiguum*. The mandible of the male also has three strong teeth, and the entire anterior clypeal margin is straight and well-separated from the basal margin of the mandible. The male node seen in full-face view is bimodal. Specimens of *M. platynodis* have been collected from sifted litter and by hand from a rotten log in tropical dry forest and rainforest.

Monomorium sakalavum Santschi

Figs. 23, 1–11.

Monomorium sakalavum Santschi, 1928:196. Syntype ☿s (lectotype here designated), MADAGASCAR: Nosi be (NHMB) [examined].

MATERIAL EXAMINED.— LECTOTYPE: ☿, Madagascar, Nosi be [= Nosy be], Decarpentries (NHMB – Reg. No. 210). The lectotype fixes the name of the taxon for the typical, reddish form of the species with scapes that exceed the vertex of the head. The carded lectotype is the ant on the top rectangle on a pin holding three ants, each occupying one card rectangle. PARALECTOTYPES: Two workers, data the same as for the lectotype (NHMB). The two workers occupy the second and third rectangles, respectively, on the pin mentioned above.

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** B.L. Fisher; Forêt Anabohazo, 21.6 km 247 WSW Maromandia 11–16.iii.2001 Fisher *et al*. (16☿, 1♀); Montagne Français, 7.2 km 142 SE Diego Suarez 22–28.ii.2001 Fisher *et al*. (17☿, 3♀); Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (1☿); Rés. Spéc. Ankarana, 13.6 km 192 SSW Anivorano Nord 16–21.ii.2001 Fisher *et al*. (10☿, 1♀); **Prov. Mahajanga:** Forêt de Tsimembo 11.0 km 346 NNW Soatana 21–25.xi.2001 Fisher *et* al. (27☿); P.N. Ankarafantsika, Ankoririka, 10.6 km 13 NE Tsaramandroso 9–14.iv.2001 Rabeson *et al*. (100☿, 1♀); P.N. Tsingy de Bemaraha, 2.5 km 62 ENE Bekopaka 11–15.xi.2001 Fisher *et al*. (4☿, 2♂); **Prov. Toliara:** Andohahela, 7.ii.1993 E. Hajeriarison (MCZ) (1☿, 1♂); Cap Sainte Marie, 12.3 km 262 W Marovato

11–15.ii.2002 Fisher *et al.* (1☿); Forêt Mahavelo, Isantoria Riv., 5.5 km 37 NE Ifotaka 31.i.2002 Fisher *et al.* (1☿); Kirindy, 15.5 km 64 ENE Marofandilia 28.xi–3.xii.2001 Fisher *et al.* (22☿); P.N. Andohahela, Manantalinjo, 7.6 km 99 E Hazofotsy 12–16.i.2002 Fisher *et al.* (17☿); P.N. Andohahela, 1.7 km 61 ENE Tsimelahy 16–20.i.2002 Fisher *et al.* (11☿, 1♀); Ranobe, Frontier Project 5–9.ii.2003, MGFO56 (1☿); southern Isoky-Vohimena Forest, 21.i.1996 B.L. Fisher (4☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; Antennal segments 12; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in small denticles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 1,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, entire lower mesopleuron usually distinctly striolate, striolae may be weak in smaller specimens; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae very sparse or absent. Metanotal groove weakly to strongly impressed, with distinct transverse costulae which are typically broad. Propodeum shining and smooth, with a few distinct striolae on metapleuron; propodeal dorsum flat throughout most of its length; propodeum always smoothly rounded; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct; propodeal lobes present as rounded flanges. Petiolar spiracle lateral and situated within anterior sector of petiolar node.

PETIOLE AND POSTPETIOLE: Node (viewed in profile) cuneate, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole about 4:3; postpetiole shining and smooth; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina, or without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color variable: head brown or reddish brown, mesosoma reddish-brown to orange, gaster chocolate, appendages yellowish-brown. Worker caste monomorphic.

LECTOTYPE WORKER MEASUREMENTS: HML 1.35 HL 0.51 HW 0.41 CeI 81 SL 0.47 SI 115 PW 0.26.

OTHER WORKER MEASUREMENTS: HML 1.38–1.50 HL 0.52–0.56 HW 0.42–0.46 CeI 81–86 SL 0.47–0.50 SI 106–114 PW 0.28–0.31 (n=20).

QUEEN DESCRIPTION.— HEAD: Head square; vertex always planar; frons shining and smooth except for piliferous pits and a few striolae around antennal sockets and frontal carinae; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, margin sometimes shallowly concave; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining, uniformly weakly striolate; propodeum always smoothly rounded; propodeal dorsum convex; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum. Propodeal lobes present as vestigial flanges only, or absent.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateroventral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node strongly rugose; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 3:2 and 4:3; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 7:3 and 2:1; postpetiole strongly rugose; postpetiolar sternite not depressed, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color blackish-red. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 2.17–2.46 HL 0.64–0.70 HW 0.63–0.66 CeI 93–102 SL 0.58–0.61 SI 90–96 PW 0.51–0.60 (n=6).

MALE DESCRIPTION.— HEAD: (In full-face view) head width-mesosoma width ratio between 1:1 and 3:4; frons finely micropunctate. Compound eyes protuberant and elliptical; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli not turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 2:3 and 1:2. Maximum number of mandibular teeth and denticles three.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; parapsidal furrows vestigial or absent; notauli absent; axillae separated by width of at least one axilla.

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered, bimodal in full-face view; appearance of node shining, with or without longitudinal striolae; ratio of greatest node breadth (viewed from

front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 1:1; postpetiole dorsal sector shining and smooth, basal sector microreticulate.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color chocolate, tibiae and tarsi pale brown to off-white.

MALE MEASUREMENTS: HML 1.75–2.02 HL 0.49–0.52 HW 0.51–0.54 CeI 104–106 SL 0.16–0.18 SI 30–33 PW 0.54–0.62 (n=3).

REMARKS.— *Monomorium sakalavum* is part of a complex of very common and taxonomically difficult Malagasy ants that are also well-represented in southern and east Africa (the *rhopalocerum* complex). Typically, this species can be distinguished from its relatives by its distinctive glassy, brick-red mesosoma that contrasts with the light chocolate head and brown gaster. The mesosoma in profile is straight, the mesopleuron has weak to strong sculpture, and the propodeum is vaguely angulate. The petiolar node is cuneate. However, smaller, paler specimens have a more rounded mesosoma and may be mistaken for *M. termitobium* ('*imerinense*') and *M. xuthosoma*. In such cases the reddish to orange color of the mesosoma will help differentiate *M. sakalavum* from the former and its relatively much longer antennal scape will separate it from the latter. *Monomorium sakalavum* has been collected by a variety of methods in drier forested areas, mainly in western parts of Madagascar. Nest series have been collected from rotted twigs, sticks and logs on the ground as well as above ground.

Monomorium termitobium Forel

Figs. 24, 93–99.

Monomorium termitobium Forel, 1892b:522. Syntype ☿ (lectotype here designated), MADAGASCAR: (?)Mangaroafa (MHNG) [examined].

Monomorium minutum r. *imerinense* Forel, 1892c:257. Syntype ♀s, ♂ (lectotype ♀ here designated), MADAGASCAR: Andrangoloaka (MHNG) [examined]. Syn. nov.

Monomorium minutum subsp. *imerinense* Wheeler, W.M. 1922:1027.

Monomorium imerinense Dalla Torre, 1893:67.

Monomorium exchao Santschi, 1926: 235 Syntype ☿s (lectotype here designated), SOUTH AFRICA: Paradise Kloof, Graham Town, Cape Colony (NHMB) [examined]. Syn. nov.

Monomorium binatu Bolton, 1987: 380, fig. 78 (☿). Holotype ☿, ZIMBABWE: Vumba Mts., nr. Umtali (NHMB) [examined]. Syn. nov.

MATERIAL EXAMINED.— ***M. termitobium***: LECTOTYPE: ☿, Madagascar, (?)Mangoroafa (MHNG). (Published locality Amparafaravantsiv.) The publication implies this species was collected by P. Sikora, though his name does not appear on any of the labels. The length is given as a range, indicating that more than one specimen was examined by Forel. This species is taxonomically confusing: the lectotype fixes the name for populations with yellow, biconvex workers with rather hairy mesosomas. Lectotype measurements have not been taken as the lectotype lacks a head. ***M. imerinense***: LECTOTYPE: ♀, Madagascar, Andrangoloaka, [P.] Sikora (MHNG). The lectotype fixes the taxon name for populations with uniformly brown queens (with *M. termitobium s. str.* the queens have lighter-colored mesosomas). PARALECTOTYPES: (i) Two queens, same data as above (MHNG). (The two queens occupied the same pin as the lectotype: they have been repinned, along with photocopies of the original labels). (ii) One male, Andrangoloaka, [P.] Sikora (MHNG). ***M. exchao***: LECTOTYPE: ☿, South Africa, Paradise Kloof, Graham Town, Cape Colony (NMHB Reg. No. 203). The lectotype (worker on LHS when seen from rear) fixes the name for populations with yellow workers whose gasters are often diffusely infuscated, particularly on the sides of the first gastral tergite. PARALECTOTYPE: One damaged worker mounted on same rectangle as lectotype (RHS), and with same data (NMHB). ***M. binatu***: HOLOTYPE: ☿, Zimbabwe ('Rhodesia') Vumba Mts, nr Umtali, 11.iii.[19]69 W.L. Brown, (MCZ). PARATYPES:

Six workers, with same data as the holotype (MCZ). (Relevant measurements of the holotype and paratypes are provided in Bolton 1987).

OTHER MATERIAL EXAMINED: **Prov. Antananarivo:** 3 km 41 NE Andranomay, 11.5 km 147 SSE Anjozorobe 5–13.xii.2000 Fisher *et al*. (44☿, 5♀, 24♂); Rés Ambohitantely, 20.9 km 72 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (38☿, 3♀); Rés Ambohitantely, 24.1 km 59 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (16☿). **Prov. Antsiranana:** Ampasindava, Ambilanivy, 3.9 km 181 S Ambaliha 4–9.iii.2001 Fisher *et al*. (31☿, 2♀, 17♂); 12.2 km WSW Befingotra, Res. Anjanaharibe-Sud, 25.xi.1994 (11☿), 26.xi.1994 (5☿, 2♀); B.L. Fisher; Forêt Anabohazo, 21.6 km 247 WSW Maromandia 11–16.iii.2001 Fisher *et al*. (25☿, 1♀); Forêt Orangea, 3.6 km 128 SE Remena 22–28.ii.2001 Fisher *et al*. (42☿, 6♀, 2♂); Montagne Français, 7.2 km 142 SE Diego Suarez 22–28.ii.2001 Fisher *et al*. (3☿); Nosy Be, Rés. Lokobe, 6.3 km 112 ESE Hellville 19–24.iii.2001 Fisher *et al*. (29☿, 1♀, 1♂); Nosy Be, P.N. Lokobe, 5 km 125 ESE Hellville 13–16.ii.2003 Fisher *et al*. (2☿); P.N. Montagne Ambre, 3.6 km 235 SW Joffreville 20–26.i.2001 Fisher *et al*. (11☿, 1♂); P.N. Montagne Ambre, 12.2 km 211 SSW Joffreville 2–7.ii.2001 Fisher *et al*. (76☿, 10♀, 1♂); Réserve Spéciale Ambre, 3.5 km 235 SW Sakaramy 26–31.i.2001 Fisher *et al*. (60☿, 5♀); Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (46☿, 4 ergatoids, 5♀); Rés. Spéc. Ankarana, 13.6 km 192 SSW Anivorano Nord 16–21.ii.2001 Fisher *et al*. (34☿, 8♀); R.S. Manongarivo, 14.5 km 220 SW Antanambao 20.x.1998 (2☿), 21.x.1998 (11☿) B.L. Fisher; R.S. Manongarivo, 17.3 km 218 SW Antanambao 27.x.1998 B.L. Fisher (1☿); R.S. Manongarivo, 10.8 km 229 SW Antanambao 8.xi.1998 B.L. Fisher (51☿, 1♀); 1 km W Sakalava Beach 23–27.i.2001 R. Harin Hala (1♂). **Prov. Fianarantsoa:** 38 km S Ambalavao, Res Andringitra 23.x.1993 B.L. Fisher (6☿, 1♀); 29 km SSW Ambositra, Ankazomivady, 7.i.1998 B.L. Fisher (6☿); 28 km SSW Ambositra, Ankazomivady, 8.i.1998 (2☿, 1♀), 14.i.1998 (1☿) B.L. Fisher; 29 km SSW Ambositra, Ankazomivady 14.i.1998 B.L. Fisher (1☿); 27.4 km SSW Ambositra, 15.i.1998 B.L. Fisher (6☿); Forêt Analalava, 29.6 km 280 W Ranohira 1–5.ii.2003 Fisher *et al*. (28☿, 11♀); Forêt Antsirakambiaty, 7.6 km 285 WNW Itremo 22–26.i.2003 Fisher *et al*. (19☿, 2♀); Ivohibe, 8.0 km E Ivohibe, 15–21.x.1997 B.L. Fisher (3☿); P.N. Andringitra, Forêt Ravaro, 12.5 km SW Antanitotsy 10–15.i.2000 S. Razafimanimby (30☿); P.N. Isalo, 9.1 km 354 N Ranohira 27–31.i.2003 Fisher *et al*. (3☿, 4♀); P.N. Isalo, 9.1 km 354 N Ranohira 27–31.i.2003 Fisher *et al*. (16☿, 1♀); P.N. Isalo, Sahanafa Riv., 29.2 km 351 N Ranohira R. S. 10–13.ii.2003 Fisher *et al*. (11☿, 1♀); P.N. Ranomafana, Vatoharanana 4.1 km 231 SW Ranomafana 27–31.iii.2003 Fisher *et* al. (1☿, 1♀); P.N. Ranomafana, Sahamalaotra, 6.6 km 310 31.iii.2003 Fisher *et al*. (6☿); 4.1 km 231 SW Ranomafana 27–31.iii.2003 Fisher *et* al. (1☿); Rés. Andringitra, Plateau d'Andohariana, base of Pic d'Ivangomena 3–9.ix.1995 Goodman (1☿, 1♀); Rés. Andringitra, Plateau d'Andohariana, cuvette du Pic Boby, 9–15.ix.1995 Goodman (1☿, 1♀); Rés. Andringitra, 8.5 km SE Antanitotsy 6.iii.1997 B.L. Fisher (12☿, 5♂); R.S. Ivohibe, 6.5 km ESE Ivohibe, 24–30.x.1997 B.L. Fisher (1☿). **Prov. Mahajanga:** Forêt de Tsimembo 11.0 km 346 NNW Soatana 21–25.xi.2001 Fisher *et* al. (17☿, 1♀); Forêt de Tsimembo 8.7 km 336 NNW Soatana 21–25.xi.2001 Fisher *et* al. (11☿); Mahavavy River, 6.2 km 145 SE Mitsinjo 1–5.xii.2002 Fisher *et al*. (2☿, 3♀); P.N. Ankarafantsika, Ampijoroa, 40 km 306 NW Andranofasika 26–31.iii.2001 Fisher *et al*. (4☿); P.N. Ankarafantsika, Ampijoroa, 5.4 km 331 NW Andranofasika 30.iii.2001 Rabeson *et al*. (80☿, 21♀); P.N. Ankarafantsika, Ankoririka, 9–14.iv.2001 10.6 km 13 NE Tsaramandroso Rabeson *et al*. (4☿); P.N. Ankarafantsika, Tsimaloto, 2–8.iv.2001 18.3 km 46 NE Tsaramandroso Rabeson *et al*. (21☿, 3♀); P.N. Baie de Baly, 12.4 km 337 NNW Soalala 26–30.xi.2002 Fisher *et* al. (7☿, 1♀); P.N. Namoroka, 9.8 km 300 WNW Vilanandro, 4–8.xi.2002 Fisher *et al*. (1☿, 1♀); P.N. Namoroka, 17.8 km 329 WNW Vilanandro, 8–12.xi.2002 Fisher *et al*. (6☿); P.N. Namoroka, 16.9 km 117 NW Vilanandro, 12–16.xi.2002 Fisher *et al*. (3☿); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (61☿, 7♀); P.N. Tsingy de Bemaraha, 2.5 km 62 ENE Bekopaka 11–15.xi.2001 Fisher *et al*. (39☿,1♀); P.N. Tsingy de Bemaraha, 10.6 km 123 ESE Antsalova 16–20.xi.2001 Fisher *et al*. (129☿, 1♀); Rés Ambohitantely, 20.9 km 72 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (1☿, 13♀); Res. Bemarivo, 23.8 km 223 SW Besalampy 19–21.xi.2002 (4☿), 19–23.xi.2002 (17☿); Fisher *et al*. **Prov. Toamasina:** 6.9 km NE Ambanizana 2.xii.1993 B.L. Fisher (6☿, 1♀); F. C. Andriantantely 4–7.xii.1998 (2☿) 7–10.xii.1998 (2☿) H.J. Ratsirarson; F. C. Didy, 16–23.xii.1998 H.J. Ratsirarson (4☿, 2♂); F. C. Sandranantitra 18–21.i.1999 H.J. Ratsirarson (6☿, 1♀); Mont Anjanaharibe, 18.0 km 21 NNE Ambinanitelo 8–12.iii.2003 Fisher *et* al. (3☿, 3♀); Mont Anjanaharibe, 19.5 km 27 NNE Ambinanitelo 12–16.iii.2003 Fisher *et al*. (2☿, 1♀); Mont. Akirindro, 7.6 km 341 NNW Ambinanitelo 17–21.iii.2003 Fisher *et* al. (2☿, 2♀); P.N. Mantadia,

28.xi–1.xii.1998 (4☿), 4–10.xii.1998 (1♂) H.J. Ratsirarson; P.N. Masoala, 39.4 km 150 SSE Maroantsetra 28.xi–3.xii.2001 Fisher *et al*. (1☿). **Prov. Toliara:** Cap Sainte Marie, 12.3 km 262 W Marovato 11–15.ii.2002 Fisher *et al.* (9☿); Cap Sainte Marie, 14.9 km 261 W Marovato 13–19.ii.2002 Fisher *et al*. (12☿, 3♀, 1♂); 11 km NW Enakara, Rés. Andohahela 17.xi.1992 B.L. Fisher (2☿); Forêt Analavelona, 33.2 km 344 NNW Mahaboboka 12–26.ii.2003 Fisher *et* al. (19☿, 4♀); Forêt Analavelona, 29.2 km 343 NNW Mahaboboka 18–22.ii.2003 Fisher *et* al. (11☿); Forêt Analavelona, 29.4 km 343 NNW Mahaboboka 21.ii.2003 Fisher *et* al. (8☿); Forêt Beroboka, 5.9 km 131 SE Ankidranoka 12–16.iii.2002 Fisher *et al*. (28☿, 12♀); Forêt Mahavelo, Isantoria Riv., 5.2 km 44 NE Ifotaka 28.i–1.ii.2002 Fisher *et al*. (6☿, 4♀); Forêt Mahavelo, Isantoria Riv., 5.5 km 37 NE Ifotaka 31.i.2002 Fisher *et al*. (68☿, 9♀); Forêt Mite, 20.7 km 29 WNW Tongobory 27.ii–3.iii.2002 Fisher *et al*. (37☿, 10♀); Forêt de Petriky, 12.5 km W 272 Tolagnaro 22.xi.1998 B.L. Fisher (67☿, 15♀); Forêt Tsinjoriaka ['Tsinjoriaky'], 6.2 km 84 E Tsifota 6–10.iii.2002 Fisher *et al*. 1(1☿, 8♀); southern Isoky-Vohimena Forest, 21.i.1996 B.L. Fisher (1☿); Kirindy, 15.5 km 64 ENE Marofandilia 28.xi–3.xii.2001 Fisher *et al*. (20☿); "MAD99/001" (Lakata Zafera) 30.vi.1999 H. Steiner (1☿); Mahafaly Plateau, 6.2 km 74 ENE Itampolo 25.ii.2002 Fisher *at al*. (2☿); 6.1 km 182 S Marovato 14.ii.2002 Fisher *et al*. (7☿); P.N. Andohahela, 3.8 km 113 ESE Mahamavo 21–25.i.2002 (23☿, 5♀, 3♂) 24.i.2002 (3☿) B.L. Fisher *et al*.; P.N. Andohahela, Manantalinjo, 7.6 km 99 E Hazofotsy 12–16.i.2002 Fisher *et al*. (6☿, 4♀); P.N. Andohahela, 1.7 km 61 ENE Tsimelahy 16–20.i.2002 Fisher *et al*. (51☿, 6♀, 3?); P.N. Kirindy Mite, 16.3 km 127 SE Belo sur Mer 6–10.xii.2001 Fisher *et al*. (8☿, 2♀); P.N. Tsimanampetsotsa, Bemanateza, 6.7 km 130 SE Efoetse 18–22.iii.2002 Fisher *et al*. (37☿, 11♀); P.N. Tsimanampetsotsa, Bemanateza, 23.0 km 131 SE Beheloka 22–26.iii.2002 Fisher *et al*. (2☿); P.N. Tsimanampetsotsa, Mitoho, 6.4 km 77 ENE Efoetse 18–22.iii.2002 Fisher *et al*. (28☿, 9♂); P.N. Zombitse, 19.8 km 84 E Sakaraha 5–9.ii. 2003. Fisher *et al*. (13☿, 3♀); P.N. Zombitse, 17.7 km 98 E Sakaraha 8.ii. 2003 Fisher *et al*. (3☿); Rés. Ambohijanahary, 35.2 km 312 NW Ambaravaranala 13–17.i.2003 Fisher *et al*. (7♀); Rés. Ambohijanahary, 34.6 km 314 NW Ambaravaranala 16.i.2003 Fisher *et al*. (4☿, 1♀); Rés. Berenty, Forêt Anjapolo, 21.4 km 325 NW Amboasary 7.ii.2002 Fisher *et al*. (1☿); Rés. Berenty, Forêt Bealoka, 14.6 km 329 NNW Amboasary 3–8.ii.2002 Fisher *et al*. (22☿, 2♀); Rés. Berenty, Forêt Bealoka, 8.6 km 314 NNW Amboasary 6.ii.2002 Fisher *et al*. (31☿, 10♀); S. F. Mandena, 8.4 km NNE 30 Tolagnaro 20.xi.1998 B.L. Fisher (17☿); 2.7 km WNW 302 Ste Luce, 9–11.xii.1998 B.L. Fisher (34☿, 1♀).

Worker description.— Head: Head square, or, rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate (rarely, small), eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eye set around midline of head capsule, or, set posteriad of midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae well-defined, weakly defined, or indistinct; anteromedian clypeal margin of variable appearance, ranging from broadly convex, or, narrowly convex between weakly ridged clypeal carinae, to straight, or, straight between strongly divergent clypeal carinae with clypeus descending almost vertically to horizontal arc of mandibles and sometimes transversely carinate below level of antennal insertions. Clypeus may also be emarginate, clypeal carinae indistinct or present and terminating in blunt angles. Paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four, with basal tooth only slightly smaller than preceding three teeth, or, three, plus minute, apical denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique, to strongly oblique; basal tooth approximately same size as t3 (four teeth present), or, a small to minute denticle or angle, much smaller than t3 (four teeth present).

Mesosoma: Promesonotum shining and either completely smooth, or, with faint punctation or

striolae on lower anterior mesopleuron; (viewed in profile) promesonotal outline ranging from broadly convex to anterior promesonotum smoothly rounded, thereafter more-or-less flattened, with promesonotum on same plane as propodeum; promesonotal setae very variable, from seven or eight to more than a dozen; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae very sparse or absent. Metanotal groove strongly impressed, with distinct transverse costulae or weakly impressed, with faint costulae or costulae lacking. Propodeum shining and smooth, metapleuron with a few weak to strongly defined, longitudinal, hair-like striolae; propodeal dorsum convex to flat throughout most of its length; smoothly rounded or with indistinct angle; standing propodeal setae either (i) consisting of one prominent pair anteriad, with other shorter setae very sparse or absent, or, (ii) consisting of one prominent pair anteriad, with a few to many erect to decumbent setae on/around dorsal and declivitous faces of propodeum, or, (iii) consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum, or, equidistant from metanotal groove and declivitous face of propodeum; vestibule of propodeal spiracle absent or not visible; propodeal lobes either present as rounded flanges, or, present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral or laterodorsal and situated within anterior sector of petiolar node. Node (viewed in profile) cuneate with vertex tapered or rounded, or, conical with vertex tapered or rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4. Anteroventral petiolar process either present as a thin flange tapering posteriad, or, absent or vestigial; ventral petiolar lobe present. Height ratio of petiole to postpetiole between 3:2 and 1:1; height–length ratio of postpetiole between 3:2 and 1:1; postpetiole shining and smooth; postpetiolar sternite not depressed at midpoint, its anterior end either an inconspicuous lip or small carina, or, this structure lacking or vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae, or, consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color of foreparts yellow to chocolate, gaster of same color or darker, appendages yellowish to brown or bicolored (but not darker than mesosoma). Worker caste monomorphic.

LECTOTYPE MEASUREMENTS (*M. termitobium*): Not taken, as the lectotype is headless.

LECTOTYPE MEASUREMENTS (*M. exchao*): HML 1.22 HL 0.48 HW 0.37 CeI 77 SL 0.34 SI 92 PW 0.24.

WORKER MEASUREMENTS (non-types): HML 0.86–1.54 HL 0.32–0.59 HW 0.25–0.50 CeI 74–90 SL 0.22–0.44 SI 76–109 PW 0.15–0.32 (n=200)

QUEEN DESCRIPTION.— HEAD: Head square to rectangular; vertex weakly concave or planar; frons either completely shining and smooth except for piliferous pits, or, shining and smooth with a few striolae around antennal sockets and frontal carinae; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye either more-or-less circular, or, elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint to below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule to set posteriad of midline of head capsule.

MESOSOMA: Pronotum and anterior mesoscutum smoothly rounded, thereafter more-or-less

flattened; mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 7:3 and 3:2. Axillae variable, separation of axillae can range from width of at least one axilla to axillae contiguous, or nearly so. Standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining and smooth, with multiple hair like striolae on metapleuron; propodeum smoothly rounded, with indistinct angle, or, angulate, propodeal angle blunt; propodeal dorsum either convex, or, flat throughout most of its length, or, slightly elevated anteriad and sloping away posteriad, propodeal angles not raised; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum, or, equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges, or, present as vestigial flanges only, or absent.

WING: Wing veins predominantly depigmented (wing membrane itself may have smoky tinge), with distal segments reduced to vestigial lines; vein m–cu always absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node, or, lateroventral and situated within anterior sector of petiolar node; node, in profile, very variable, ranging from cuneate, vertex tapered or rounded, or, cuneate, vertex rounded and node inclined posteriad, to conical, vertex tapered or rounded; appearance of node shining and smooth, or, shining, with vestigial sculpture, or, shining and weakly striolate posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 3:2 and 1:1. Anteroventral petiolar process present as a thin flange tapering posteriad, or, absent or vestigial; height ratio of petiole to postpetiole between 3:2 and1:1; height–length ratio of postpetiole between 3:2 and1:1; postpetiole shining and smooth, or, shining, with vestigial sculpture, or, shining and weakly striolate posteriad; postpetiolar sternite not depressed, its anterior end an inconspicuous lip or small carina or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae, or, consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color of head and mesosoma yellow to chocolate, gaster yellowish to chocolate, sometimes with variable lighter bands or pale patches or maculae near base of first gastral tergite. Brachypterous alates not seen. Ergatoid or worker-female intercastes seen.

LECTOTYPE MEASUREMENTS (*M. imerinense*): HML 2.36 HL 0.68 HW 0.67 CeI 99 SL 0.53 SI 79 PW 0.54.

OTHER QUEEN MEASUREMENTS: HML 1.61–2.53 HL 0.49–0.72 HW 0.42–0.65 CeI 83–98 SL 0.36–0.65 SI 77–94 PW 0.32–0.73 (n=62).

MALE DESCRIPTION.— HEAD: Head width–mesosoma width ratio between 1:1 and 3:4; frons smooth to finely striolate, or, vestigial, consisting of micropunctation and fine striolae, or, finely micropunctate. Compound eyes protuberant and elliptical; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 1:1 and 1:2. Maximum number of mandibular teeth and denticles four.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron, or, shining and faintly striolate throughout, striolae becoming more deeply impressed on posterior mesopleuron, or,

shining, with dorsum faintly striolate. Parapsidal furrows distinct to vestigial or absent; notauli denoted by a central groove, or, absent. Axillae separated by width of at least one axilla to narrowly separated (i.e., less than width of one axilla).

WING: Wing veins predominantly depigmented (though wing membrane itself may have a smoky tinge), with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node. Node (viewed in profile) highly variable, being either conical, with vertex tapered or rounded, or, evenly tumular to roundly conical, to tumular, inclined posteriad, with vertex also tapered posteriad; appearance of node also variable, from shining and smooth to completely shagreenate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 3:4. Anteroventral petiolar process absent or vestigial. Height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 7:3 and 1:1; postpetiole shining, with vestigial sculpture, or, shining and smooth anteriad, micropuncate posteriad.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, semi-erect setae, or, consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color yellowish-brown to chocolate, legs paler in some specimens.

MALE MEASUREMENTS: HML 1.50–2.36; HL 0.39–0.60; HW 0.38–0.72; CeI 88–120; SL 0.12–0.24; SI 28–44; PW 0.43–0.78 (n=63).

REMARKS.— *Monomorium termitobium*, as it is here understood, is not only the most abundant *Monomorium* species on Madagascar, often representing 80–90% of the *Monomorium* specimens in a given sample, but one that is almost intractable to taxonomic analysis based purely on morphology. What I recognize here is the best that I can currently make of the available material, which includes hundreds of queens and many males, as well as thousands of workers. While the amount of CAS material available for study has been daunting, most specimens, unfortunately, have been taken by bulk sampling methods (especially pitfall trapping and from sifted litter) rather than directly from colonies. Collection of nest series is vitally important for taxonomically difficult species (or species complexes) such as this one, to enable the researcher to associate workers with reproductives. In the case of taxa whose workers are without distinctive physical features (such as many small *Monomorium*), such reproductives may provide valuable additional characters as well as being significant in their own right for a good understanding of the taxonomy of a species. Undoubtedly, a more definitive diagnosis of *M. termitobium* will require molecular analysis.

However the species may finally be interpreted, *Monomorium termitobium* is unquestionably highly variable in appearance, and the provisional synonyms here include two African forms currently described as good species. Workers that can be associated together on the basis of shared morphological features often vary in their color, which ranges from bright yellow to deep chocolate. In many cases involving brown specimens, or specimens with a yellow mesosoma and a brown head, the antenna has a brown scape and a yellow funiculus. In workers with light colored foreparts the gaster can be completely yellow, infuscated to varying degrees, or completely black. The clypeal carinae can be strongly defined and parallel or subparallel, weakly defined or completely lacking, the anteromedian sector of the clypeus in the latter being somewhat bulging in appearance (as in *M. micrommaton*). The anteromedian clypeal margin is mostly emarginate in workers with strongly defined clypeal carinae and in a few bicolored workers with dark heads, but without strongly defined clypeal carinae, and straight or convex in the others. The promesonotum, viewed in profile, ranges from roundly convex to quite straight. The propodeum, also viewed in profile, may be rounded, roughly square or elongate. The petiolar node is most commonly broadly conical and tending to circular in cross-section, but may be narrowly cuneate or low, conical and tapered. Pilosity varies, the number of pairs of erect promesonotal setae ranging from three, e.g., brown and

yellow specimens of '*binatu*' from Toliara Province, to seven or more (the additional setae often being simply shorter and appressed rather than actually absent in the less 'shaggy' forms). Clinal patterns of color and morphology may exist but are difficult to anatomize, in view of the overwhelming number of specimens that have to be considered (around half-a-dozen packed drawers of pinned specimens, and much wet material besides).

This array of diverse forms has a few worker characters that separate them from similar but more easily recognized species. The mandible always has four teeth, and the basal tooth is usually about the same size as or slightly smaller than the preceding tooth, rarely being reduced to a minute denticle (unlike *M. flavimembra*). The diameter of the eye is between one and one-and-a-half times the greatest width of the antennal scape and has 10 or more ommatidia in all except a tiny handful of specimens with a brownish cast to their head capsules (distinguishing workers of this species from those of *M. micrommaton*). Commonly, there is a peripheral ring of ommatidia with a central row of two or three ommatidia, but two or more rows may be present. Workers with a light-colored head and mesosoma and dark gaster always have narrowly separated and well-defined clypeal carinae, setting them apart from *M. lepidum*.

The material I have examined clusters around about half-a-dozen forms, which I consider most likely to constitute good species if a future revision involving molecular analysis should indicate that *M. termitobium* is a complex. As far as I can see, however, the characters that distinguish clusters of these specimens are not fixed for the entire gene pool, and intermediate forms occur. The most salient morphotypes are:

Monomorium termitobium sensu stricto. Workers conforming closely to the lectotype are bright lemon yellow to a dusky brownish-yellow, often without any gastral infuscation whatever. In some populations the sides of the first gastral tergite have black markings, which may give the gaster a bimaculate appearance in dorsal view (*Monomorium termitobium* form '*exchao*'), or the entire gaster may be a pale, shiny brown, almost iridescent in some lights. Several long series from Antsiranana are light brown with very pale, depigmented tibiae and tarsi. The head of pale '*termitobium*' is often of darker hue than the mesosoma in dorsal view. The clypeal carinae are highly variable in form, being well-defined in some individuals and completely absent in others. The promesonotum, in profile, varies from broadly convex to rather flattened. Standing setae number at least four pairs, often more. The infrahumeral setae are usually well-developed and longer than half the length of the humeral setae, but can be shorter, tending to appressed. The petiolar node is conical and well-rounded, and the preceding peduncle is short and sculptured just before the node. Overall size is very variable, from about 1.3mm to at least 2 mm (i.e., HML 1.00–1.65mm). This form is dispersed throughout the island.

The queen is pale orange or yellow with a brownish gaster (rarely, variegated light brown and orange) and hairy in appearance, with many semi-erect and decumbent setae on the frons and promesonotum. The first gastral tergite may have two small, pale, oval areas near its base. The mesosoma is relatively small in relation to the head and seen to be laterally compressed when viewed dorsally. The male is usually of a light brown and conspicuously hairy. The wings are always brown, and densely covered with small setae. The wing veins are relatively well-developed and sector Rs of the radial vein and the cross-vein connecting it to the pterostigma may have a silvery sheen.

Monomorium termitobium form '*imerinense*'. Workers are more streamlined in appearance than the former morphotype, and typically light- to yellowish-brown with a darker head and gaster. They can, however, be yellow, though the head usually has a brownish tint. The clypeal carinae are usually distinct, but weak, and the head capsule in full-face view has decidedly convex sides. Also included under this head are very many series of mainly much smaller, brown to chocolate work-

ers with distinct clypeal carinae between which the median sector of the clypeus is shallowly excavate so as to form a groove. In these workers, the clypeal carinae tend not to be complete, with the result that the groove also does not reach the anterior clypeal margin, which is narrowly rounded. The head capsule usually has straight sides. Both groups are connected by a few specimens of intermediate size and morphology. In large workers the mesosoma is more flattened than in typical '*termitobium*', and the conical node, which is often broad and low, is more narrowly rounded dorsally. Small workers have a slightly convex to distinctly flattened mesosoma, and a node similar to '*termitobium*'. The pilosity is like that of *termitobium*. The appearance of large '*imerinense*' workers is very suggestive of *M. flavimembra*, but the basal tooth is well-developed in '*imerinense*', and the anteromedian clypeal margin is less depressed. The HML of larger specimens, i.e., the 'typical form', ranges from 1.29 mm to 1.54 mm, and the HML of small, compact specimens of similar appearance is 0.93 mm to 1.13 mm. A smaller number of nondescript brown workers are of intermediate size.

The queen associated with larger workers is brown and the male is glossy and deep reddish-brown, almost black. Both queen and male are distinctly less hairy than the corresponding reproductives of '*termitobium*'. The wings have well-defined veins whose outlines are often brown, but the wings are only lightly to moderately pilose. Queens associated with smaller workers are similar, but reduced in size. Nb. *Monomorium imerinense* was described from Andrangoloaka in Province Antananarivo from a queen and a male. These correspond well to queens and males recently collected from Antsiranana.

Monomorium termitobium form '*binatu*'. With a very elongate mesosoma, a straight propodeum, long antennal scape (SI mostly > 100) and frequent count of only three pairs of erect promesonotal setae, worker samples of this morphotype (here defined as a distinctive form of a taxon) from the south of Madagascar in Toliara Province appear at first glance sufficiently distinctive to warrant separate species status. The situation is complicated by the fact that slightly more northern populations from Fianarantsoa Province are less elongate, often have four or more pairs or erect promesonotal setae, and tend to merge in morphology with the smaller, yellow '*termitobium*'. The color of '*binatu*' is also variable throughout its range, concolored specimens being yellow or brown with other workers being yellow with an infuscated or even black gaster. A large series of brown workers from St Luce, Toliara Province, have the three erect pairs of setae, but in terms of shape of node, etc., seem to form an intermediate cluster between the yellow '*binatu*' (HML 1.05–1.30 mm) and larger '*imerinense*'.

Most collections of this morphotype have been taken from Toliara Province, and the further south they have been collected, in general, the more their appearance conforms to that of the Zimbabwean holotype of *M. binatu*. The queen is relatively large with orange foreparts and a dark brown to black gaster. The petiolar node is thin, tending to squamiform, and wide, contrasting with the thick, dorsally rounded node of '*imerinense*'. The node of '*termitobium*' is intermediate. The male of '*binatu*' has not been recognized among the CAS material.

Monomorium termitobium dark-headed form. Differences between this morphotype and the quite distinct species *Monomorium floricola* are noted above. Workers in which the chocolate head contrasts with a pale yellow mesosoma, nodes and gaster are among the most spectacular small *Monomorium* on Madagascar. If the color is ignored, however, it will be seen that the morphology of these workers is the same as that of brown or yellow workers of sympatric populations of '*termitobium*' or '*imerinense*', and varies as they vary. Also, if an array of workers of increasingly dark mesosoma color is placed together, they will be found to merge into '*imerinense*'. Distinct within this morphotype is a small number of workers and queens in which the anteromedian clypeal margin is emarginate, though the clypeal carinae are not developed. This character is variable, appears

to relate purely to the individual or to a particular nest, and to be without taxonomic significance. The intensification of color in the head capsule appears to be a variable feature throughout all populations of *M. termitobium*, and the strikingly bicolored form may represent a different allele or alleles, or the result of a different mix of the proteins that control this expression of color in the worker. The queen is brown with yellow bands on the gaster, and has pale wings and brownish wing veins, but otherwise is similar in appearance to '*termitobium*. No male has been associated with this form.

Monomorium termitobium small yellow form. The worker is pale yellow, minute (HML 0.75–0.94mm) with a very long antennal scape (SI 91–103). The appearance and morphology are those of a very small *binatu*, and, as with that morphotype, this form usually has appressed or very short erect infrahumeral setae. The clypeal carinae are sharply defined, the node is always low, conical and the queen is visibly smaller than, though morphologically similar to, the queen of other morphotypes of *M. termitobium*. The male is unknown. This form has some claims to being a separate, cryptic species, since it does not vary in its appearance in its wide range through the island. However, in Mahajanga Province, where it is most abundant, the appearance of the worker is convergent with that of the very small '*termitobium'* that occurs there. The small '*termitobium*' generally has more weakly defined clypeal carinae, four or more prominent pairs of erect promesonotal setae and a more robust petiolar node. However, workers of both morphotypes often have a fleck of brown pigment on the gena between eye and mandibular insertion. The pattern of infuscation on the sides of the gaster in the small yellow form, moreover, matches that found in most '*termitobium*'.

Known from a few series from Tsimanampetsotsa, Toliara Province, is a handsome morphotype in which the workers are bright orange with a very flat promesonotum. The gaster has distinct brown bands, and the petiolar peduncle is very short. The male, but not the queen, is known. That insect is light brown and smooth with minimal pilosity. The wings are of a milky, pale appearance, the veins being almost invisible against a pale background. This morphotype tends to merge with surrounding populations of '*binatu*'.

The impression I am left with, after many hours of examination of these specimens, is that a single founder species of African origin has given rise to branches in which speciation at this point of time is almost, but not quite complete. Although some worker and queen morphotypes include distinctive individuals or populations of individuals, this does not hold true for the members of all populations of that morphotype, and the distinctions therefore cannot be expressed in a taxonomic key. Differences between the known males, however, are greater and may be significant. With all of the preceding aspects in mind, I am provisionally synonymizing *Monomorium binatu* Bolton, *Monomorium exchao* Santschi and *Monomorium imerinense* Forel under the earliest name, *Monomorium termitobium* Forel. The affinities of *M. termitobium* in its various incarnations seem to lie with the *M. rhopalocerum* group, but I am ascribing to the latter a greater degree of morphological variability than expressed by Bolton (1987). The species is ubiquitous in all situations and has been collected by all the methods commonly used by myrmecologists and their teams.

***Monomorium versicolor* Heterick, sp. nov.**
Figs. 25, 67–68.

ETYMOLOGY.— Latin 'of various colors'.

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toliara**, Rés. Berenty, Forêt Malaza, 8.6 km 314 NW Amboasary 25º00'S, 46º18'E 40m, 6.ii.2002 Fisher *et al* BLF #/ex rotten log, gallery forest/CASENT 0042524 5434 (CAS). PARATYPES: **Prov. Toliara** (all specimens with same collection data as holotype): 2☿, 1♂ (ANIC); 12☿ + 2☿ + 12♂ (BMNH); 3☿, 1♂ (CAS); 22☿ + 1☿ + 13☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** Forêt Anabohazo, 21.6 km 247 WSW Maromandia 11–16.iii.2001 Fisher *et al*. (10☿); Montagne Français, 7.2 km 142 SE Diego Suarez 22–28.ii.2001 Fisher *et al*. (3☿); Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (3☿). **Prov. Fianarantsoa:** P.N. Isalo, Sahanafa Riv., 29.2 km 351 N Ranohira R. S. 10–13.ii.2003 Fisher *et al*. (5☿); Res. Andringitra 8.5 km SE Antanitotsy 6.iii.1997 B.L. Fisher (8☿, 1♀). **Prov. Mahajanga:** Forêt Analalava, 29.6 km 280 W Ranohira 1–5.ii.2003 Fisher *et al*. (19☿, 1♀) P.N. Ankarafantsika, Ankoririka, 10.6 km 13 NE Tsaramandroso 9–14.iv.2001 Rabeson *et al*. (1☿); N. Ankarafantsika, Tsimaloto, 18.3 km 46 NE Tsaramandroso 2–8.iv.2001 Rabeson *et al*. (66☿); P.N. Namoroka, 9.8 km 300 WNW Vilanandro 4–8.xi.2002 B.L. Fisher (3♀); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 B.L. Fisher (18☿); P.N. Tsingy de Bemaraha, 2.5 km 62 ENE Bekopaka 11–15.xi.2001 (1♀); Res. Bemarivo, 23.8 km 223 SW Besalampy, 19–23.xi.2002 Fisher *et al* (1☿). **Prov. Toliara:** P.N. Andohahela, Manantalinjo, 7.6 km 99 E Hazofotsy 12–16.i.2002 Fisher *et al*. (28☿); P.N. Andohahela, 1.7 km 61 ENE Tsimelahy 16–20.i.2002 Fisher *et al*. (12☿); Rés. Berenty, Forêt Malaza, 8.6 km 314 NW Amboasary 6.ii.2002 Fisher *et al*. (2☿); southern Isoky-Vohimena Forest, 21.i.1996 B.L. Fisher (2☿) Tsimanampetsotsa, Bemanateza, 23.0 km 131 SE Beheloka, 22–26.iii.2002 B.L. Fisher (1☿).

WORKER DESCRIPTION.— HEAD: Head oval; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule to set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae indistinct; anteromedian clypeal margin straight, or, emarginate, clypeal carinae indistinct; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandible with three evenly sized teeth; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t2 (three teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex; promesonotal setae greater than twelve; promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove weakly impressed, with faint costulae or costulae lacking. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 3:4; anteroventral petiolar process present as a thin flange tapering posteriad, or, absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining and smooth; postpetio-

lar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color variable: from concolorous dark reddish-brown to orange-and-brown, or orange, gaster chocolate, antenna always darker than head in lighter-colored specimens. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.50 HL 0.58 HW 0.51 CeI 89 SL 0.48 SI 93 PW 0.32.

OTHER WORKER MEASUREMENTS: HML 1.21–1.63 HL 0.49–0.62 HW 0.41–0.55 CeI 82–89 SL 0.38–0.52 SI 85–101 PW 0.25–0.36 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits; (viewed dorsally), occipital angles of head capsule conspicuous, lobate; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron; Propodeum shining and smooth, with a few weak striolae on metapleuron. Propodeum oblique, more-or-less straight; propodeal dorsum flat throughout most of its length; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Propodeal lobes present as well-developed, rounded flanges.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered. Appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 2:1 and 3:2; anteroventral petiolar process present as a thin flange tapering posteriad; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 7:3 and 2:1; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color dark chocolate, mandibles orange. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 1.81–1.94 HL 0.58–0.64 HW 0.49–0.53 CeI 80–84 SL 0.45–0.54 SI 90–102 PW 0.37–0.38 (n=5).

MALE DESCRIPTION.— HEAD: (In full-face view) head width–mesosoma width ratio between 4:3 and 1:1; frons finely micropunctate. Compound eyes protuberant and elliptical; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli not turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 2:3 and 1:2. Maximum number of mandibular teeth and denticles three.

MESOSOMA: Mesoscutum broadly convex; pronotum and mesoscutum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; parapsidal furrows distinct; notauli absent; axillae separated by width of at least one axilla.

WING: Wing veins predominantly depigmented, with distal segments reduced to vestigial lines; vein m–cu absent; vein cu–a absent.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 2:1 and 3:2; postpetiole shining, with vestigial sculpture.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color chocolate.

MALE MEASUREMENTS: HML 1.63–1.86 HL 0.49–0.54 HW 0.47–0.53 CeI 94–102 SL 0.15–0.18 SI 31–35 PW 0.45–0.65 (n=10).

REMARKS.— This fairly large (worker HML 1.21–1.63 mm), handsome species is readily recognized, principally through its three-toothed mandible and high, vertically attenuate petiolar node. The postpetiole is also high and somewhat compressed, resembling that of *M. platynodis*. The different color pattern and the shape of the clypeus distinguish it from that species. The body color of workers varies from a light brownish-orange with darker gaster to uniform blackish-red, and in many workers the propodeum in dorsal view is distinctly darker than the promesonotum. In lighter colored workers the brown antennal scapes are always slightly to distinctly darker than the head capsule. The anteromedian clypeal margin is broadly depressed, as in other members of the *M. flavimembra* complex. The queen and male are equally distinctive, with three strong teeth on each mandible. The occipital angles in queens and males are produced to form a small lobe or sharp angle, which is best seen in dorsal view. The wings of reproductives are pale and the veins are weak, becoming obsolete distally.

Monomorium versicolor is distributed throughout Madagascar, with most collections coming from southern and western regions. Like many other Malagasy *Monomorium* this species prefers a wood substrate for its nests, while individual workers have been collected by such means as beating of low vegetation and sifting of litter. *Monomorium versicolor* does not appear to be limited by habitat, being found in a diverse number of vegetation communities including spiny forest, dry tropical forest, montane rainforest and gallery forest.

Monomorium xuthosoma Heterick, sp. nov.

Figs. 25, 69.

ETYMOLOGY.— Greek '*xouthos*' (yellowish-brown) + '*soma*' (neut. 'body')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toliara**, Tsimanampetsotsa, 6.7 km 130 SE Efoetse, 24º06′S, 43º46′E 25 m, 18–22.iii.2002 B.L. Fisher *et al*. BLF 6160/sifted litter, spiny forest/thicket/CASENT 0020507 6160(17) (CAS). PARATYPES: **Prov. Toliara** (all specimens with same collection data as holotype)**:** 3☿ (ANIC); 2☿, 1♀ (BMNH); 2☿ (CAS); 2☿, 1♀ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Toliara:** Forêt Tsinjoriaka ['Tsinjoriaky'], 6.2 km 84 E Tsifota 6–10.iii.2002 Fisher *et al*. (19☿, 1♀); Ifaly, 17.ix.1993 W. E. Steiner & R. Andriamasimanana (2☿) (MCZ); Mahafaly ['Mahafely'] Plateau 6.2 km 74 ENE Itampolo, 21–25.ii.2002, Fisher *et al*. (18☿); Madarano ['Manderano'], 10.iv.2002, Frontier Project MG030 (1☿); Ranobe, Frontier Project 5–28.i.2003, MGFO54 (2☿); Ranobe, Frontier Project 25–28.iv.2003, MGFO64 (2☿); Res. Berenty, 10.ii.1993 P. S. Ward (1☿)

(MCZ); Tsimanampetsotsa, 6.7 km 130 SE Efoetse, 18–22.iii.2002 B.L. Fisher (15☿, 6♀); Tsimanampetsotsa, Bemanateza, 23.0 km 131 SE Beheloka, 22–26.iii.2002 B.L. Fisher (18☿, 2♀).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set below midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae always well-defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in blunt angles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth three, plus minute, basal denticle or angle; mandibles with sub-parallel inner and outer margins, smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) promesonotum broadly convex anteriad, convexity reduced posteriad; promesonotal setae seven to twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae very sparse or absent. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum convex; Propodeum always smoothly rounded; standing propodeal setae consisting of one prominent pair anteriad, with other shorter setae very sparse or absent; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; petiolar node, in profile, cuneate, vertex tapered; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color foreparts tawny-yellow to orange (postpetiole sometimes darker), antenna brown, gaster chocolate. Worker caste monomorphic: HML 1.14 HL 0.44 HE 0.35 CeI 80 SL 0.33 SI 94 PW 0.24

OTHER WORKER MEASUREMENTS: HML 1.13–1.32 HL 0.43–0.5 HW 0.35–0.42 CeI 79-84 SL 0.32–0.39 SI 90–93 PW 0.23–0.28 (n=20).

QUEEN DESCRIPTION.— HEAD: Head square; vertex always planar; frons shining and longitudinally striolate, with some smooth areas; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye ovoid, narrowed posteriad; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined about 2:1; axillae separated by width of at least one axilla to narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae consisting of well-spaced, incurved, erect and semi-erect setae only; appressed pronotal, mescoscutal and mesopleural setulae very sparse or absent. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeum always smoothly rounded; propodeal dorsum convex; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges.

WING*:* Wing not seen (queen dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and weakly striolate posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 1:1; postpetiole shining and weakly striolate posteriad; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color foreparts dark yellowish-brown, gaster and antennal scape brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 2.27–2.43 HL 0.63–0.66 HW 0.58–0.61 CeI 91–95 SL 0.49–0.52 SI 83–86 PW 0.50–0.54 (n=9).

REMARKS.— *Monomorium xuthosoma* strongly resembles *M. termitobium* form '*binatu*' but can be distinguished from that form by its larger propodeal spiracle, the slightly different shape of the propodeum, its higher postpetiole and the pilosity of the promesonotum (at least four prominent pairs of erect setae present, including the infrahumeral pair). The queen is similar in form to that of '*binatu*', but the frons is markedly longitudinally striolate. The male is unknown. This unobtrusive member of the *M. rhopalocerum* complex is confined to Toliara province, where almost all specimens seen have come from the southwestern corner. One slightly aberrant worker (MCZ) was taken from Berenty Reserve, in the south-east. The species appears to be confined to spiny forest, where individuals have been taken from sifted litter and members of a colony were found in a rotten log.

THE *HANNELI*-GROUP

Monomorium hanneli **Forel**

Figs. 26, 70–71.

Monomorium hanneli Forel, 1907a:18. Holotype ☿, KENYA: Mto-ya-Kifaru (Katona) (MHNG) [examined].
Monomorium moestum Santschi, 1914a:74, fig. 7. Syntype ☿ (lectotype here designated), KENYA: Naivasha (NHMB) [examined].
M. (*Notomyrmex*) *moestum* Emery, 1922:170. Syn. under *M. hanneli* Bolton, 1987: 426.
Monomorium valtinum Bolton, 1987:428. Holotype ☿, KENYA: Kilifi District, (MHNG) [examined]. syn. nov.

MATERIAL EXAMINED.— ***M. hanneli***: HOLOTYPE: ☿, Kenya, Mto-ya-Kifaru (Katona) (MHNG). This worker was designated a 'holotype' by Bolton (1987), and since the length is given as a single measurement, it seems clear no other specimens were examined. Holotype status based on monotypy (Code 73.1.2) is here

assumed. ***M. moestum***: LECTOTYPE: ☿, Kenya ('British East Africa'), Naivasha, Dec. 1911, Alluaud and Jeannel, 1900 m st. no. 14 (NHMB – Reg. No. 205a). Although described as a 'holotype' by Bolton (1987), Santschi gives a range of lengths for *M. moestum*, indicating more than one specimen was examined. The lectotype fixes the name for populations of *M. hanneli* with very large, dark workers. ***M. valtinum***: HOLOTYPE: ☿, Kenya, Kilifi District, Mahnert, V. & Perret, J-L., 29.x.1977 (MHNG) (See Bolton 1987 for measurements).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** Ampasindava, Ambilanivy, 3.9 km 181 S Ambaliha 4–9.iii.2001 Fisher *et al*. (7☿, 1♀, 11♂); Forêt Anabohazo, 21.6 km 247 WSW Maromandia 11–16.iii.2001 Fisher *et al*. (1☿); Nosy Be, Rés. Lokobe, 6.3 km 112 ESE Hellville 19–24.iii.2001 Fisher *et al*. (6☿, 1♀); R.S. Manongarivo, 12.8 km 228 SW Antanambao 11.x.1998 B.L. Fisher (13☿). **Prov. Fianarantsoa:** R. S. Ivohibe, 6.5 km ESE Ivohibe, 24–30.x.1997 B.L. Fisher (1☿). **Prov. Mahajanga:** Forêt de Tsimembo 11.0 km 346 NNW Soatana 21–25.xi.2001 Fisher *et* al. (1☿); P.N. Ankarafantsika, Ankoririka, 10.6 km 13 NE Tsaramandroso 9–14.iv.2001 Rabeson *et al*. (2☿); P.N. Ankarafantsika, Tsimaloto, 2–8.iv.2001 18.3 km 46 NE Tsaramandroso Rabeson *et al*. (7☿); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (1♀, 4♂); P.N. Tsingy de Bemaraha, 2.5 km 62 ENE Bekopaka 11–15.xi.2001 Fisher *et al*. (1☿); Res. Bemarivo, 23.8 km 223 SW Besalampy Fisher *et al* 19–23.xi.2002 (1☿, 1♀). **Prov. Toamasina:** F. C. Andriantantely 4–7.xii.1998 (13☿, 1♀) 7–10.xii.1998 (27☿) H.J. Ratsirarson; F. C. Sandranantitra 18–21.i.1999 (15☿) 21–24.x.1999 (15☿) H.J. Ratsirarson; Mont. Akirindro, 7.6 km 341 NNW Ambinanitelo 17–21.iii.2003 Fisher *et* al. (1☿); Mont Anjanaharibe, 18.0 km 21 NNE Ambinanitelo 8–12.iii.2003 Fisher *et al*. (2☿). **Prov. Toliara:** Cap Sainte Marie, 14.9 km 261 W Marovato 13–19.ii.2002 Fisher *et al*. (7☿, 3♀); 10 km NW Enakara, Rés. Andohahela 24.xi.1992 B.L. Fisher (3☿); Rés. Berenty, Forêt Bealoka, 14.6 km 329 NNW Amboasary 3–8.ii.2002 Fisher *et al*. (1♀); Forêt de Petriky, 12.5 km W 272 Tolagnaro 22.xi.1998 B.L. Fisher (18☿, 2♀); P.N. Zombitse, 19.8 km 84 E Sakaraha 5–9.ii. 2003. Fisher *et al*. (10☿); P.N. Zombitse, 17.7 km 98 E Sakaraha 8.ii. 2003 Fisher *et al*. (12☿); Rés. Ambohijanahary, 35.2 km 312 NW Ambaravaranala 13–17.i.2003 Fisher *et al*. (1♀); R.S. Manongarivo, 10.8 km 229 SW Antanambao 8.xI.1998 B.L. Fisher (34☿, 11♀); S. F. Mandena, 8.4 km NNE 30 Tolagnaro 20.xi.1998 B.L. Fisher (26☿, 3♀); 2.7 km WNW 302 Ste Luce, 9–11.xii.1998 B.L. Fisher (2♀).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye small, eye width less than 1× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in blunt angles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions; Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining, dorsum and sides of propodeum mainly smooth, with weak to strong striolae on declivitous face and on metapleuron; propodeal dorsum slightly elevated anteriad and sloping away posteriad, propodeal angles not raised; propodeum distinctly angulate, propodeal angle sharp; length ratio of propodeal dorsum to its declivity about 3:2; standing propodeal setae consisting of one prominent pair anteri-

ad, with a few to many erect to decumbent setae on/around dorsal and declivitous faces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum. Vestibule of propodeal spiracle distinct in some specimens; propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1; anteroventral petiolar process present as a thin flange tapering posteriad; ventral petiolar lobe present; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:4 and 1:2; postpetiole shining and smooth; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90, or, not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color yellowish to tawny orange. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS (*M. hanneli*): HML 1.43 HL 0.51 HW 0.43 CeI 84 SL 0.35 SI 81 PW 0.31.

LECTOTYPE MEASUREMENTS (*M. moestum*): HML 1.60 HL 0.56 HW 0.49 CeI 88 SL 0.38 SI 78 PW 0.34.

OTHER WORKER MEASUREMENTS (non-types): HML 1.22–1.49 HL 0.45–0.54 HW 0.38–0.45 CeI 82–87 SL 0.31–0.38 SI 82–86 PW 0.28–0.33 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits and a few striolae around antennal sockets and frontal carinae; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 3:2 and 4:3; axillae contiguous, or nearly so; standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining and smooth, metapleuron with a few distinct striolae; propodeum angulate, propodeal angle blunt, or, distinctly angulate, propodeal angle sharp; propodeal dorsum flat throughout most of its length, or, sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae consisting of one pair of prominent setae anteriad, with a few smaller, erect to decumbent setae on and around dorsal and declivitous faces; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges.

WING: Wing veins tubular and strongly sclerotised; vein m–cu present in some individuals; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node, or, lateroventral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and smooth; ratio of greatest node breadth

(viewed from front) to greatest node width (viewed in profile) between 3:2 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining and smooth; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90º, or, not depressed, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color yellow-orange, gaster may have brownish tint. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 1.40–1.71 HL 0.47–0.57 HW 0.41–0.48 CeI 84–89 SL 0.34–0.41 SI 80–85 PW 0.31–0.44 (n=20).

MALE DESCRIPTION.— HEAD: (In full-face view) head width–mesosoma width ratio between 1:1 and 3:4; frons finely micropunctate. Compound eyes protuberant and elliptical; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli not turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 2:3 and 1:2. Maximum number of mandibular teeth and denticles two.

MESOSOMA: Mesoscutum broadly convex; a few vestigial striolae on dorsum of mesoscutum, otherwise smooth and shining; parapsidal furrows vestigial or absent; notauli absent; axillae separated by width of at least one axilla.

WING: Wing veins with vein M indistinct distally, otherwise tubular and sclerotised; vein m–cu absent; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) cuneate, vertex tapered, or, conical, vertex tapered; appearance of node shining and smooth; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 3:2 and 4:3, or, between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 3:2; postpetiole shining and smooth.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, semi-erect setae.

GENERAL CHARACTERS: Color brown, head darker, appendages light brown.

MALE MEASUREMENTS: HML 1.34–1.61 HL 0.44–0.48 HW 0.39–0.44 CeI 88–98 SL 0.11–0.13 SI 28–31 PW 0.44–0.52 (n=11).

REMARKS.— *Monomorium hanneli* is distinctive throughout its range, being the only member of its species group in Madagascar. The main variation is a pale worker morphotype that has been found in most of the major collection localities, usually in the same transects, as the normal, darker morphotype. Since it has occasionally been collected in the same pitfall trap or in a pitfall trap adjacent to one in which the darker morphotype has been captured, it may conceivably occur within the same nests. This, however, cannot be established with certainty, as only one CAS nest series of just eight workers of this small species is known. The normal worker is usually yellow-orange to tawny orange, with a distinct metanotal groove and angulate propodeum. Well-spaced, erect setae are the usual pilosity pattern on the gaster and the antennal scape, the latter also possessing decumbent setae. The pale yellow or orange form has a much more rounded mesosoma profile, almost crescentic, with a less angulate propodeum. The head in profile is rather fuller than the normal morphotype, which, together with the rounded mesosoma, gives the ant somewhat of a bloated appearance. The gastral setae are abundant and decumbent, the setae on the scape decumbent or appressed. The appearance is reminiscent of a larger *M. chnodes*. Whatever the reason for these differences, the pale workers are not simply tenerals, since their morphology differs from that of other workers. Queens of the pale morphotype also exist, and the same differences in pilosity noted above are the

major distinction between these and the normal, darker form. The queen is a bright orange. The distinction between the two forms, however, is not clear-cut and individuals with an intermediate appearance occasionally occur.

Bolton (1987) separated two ostensibly different Kenyan forms, the smaller *Monomorium valtinum* and the larger *M. hanneli*, principally on the basis of the smaller eye in *M. valtinum*. This researcher had relatively few specimens available to him and these excluded queens and males. In Madagascar, by contrast, what I take to be *M. hanneli* is very common and I have been able to examine hundreds of specimens, including over twenty queens and around a dozen males (my descriptions being based on 20 of the former and 11 of the latter). The size of the eye is clearly variable: the number of ommatidia in workers examined ranges from six, in paired rows of three, to at least sixteen with three transverse rows of four ommatidia. On one pin holding three workers of a nest series, the middle worker had 16 ommatidia visible under a stereomicroscope, the other two 11. The body size of Malagasy workers also overlaps the parameters of the morphometric measurements given by Bolton for the two taxa. For this reason, I consider *M. valtinum* and *M. hanneli* to be representatives of the same species, and *M. valtinum* becomes a junior synonym in this work. The queens and males generally have lightly-sclerotized wing veins, with vein M indistinct distally in the male. Vein m–cu has been absent from the wings of all males examined thus far, but is occasionally present in alate queens.

The types described from African worker material differ from Malagasy material in being slightly (*Monomorium hanneli*, *M. valtinum*) to considerably (*M. moestum*) darker with a more brownish or reddish tinge to the cuticle, and in having very small but sharp clypeal denticles. Malagasy populations of this ant range from yellow to tawny orange, and the anteromedian clypeal margin is either straight or weakly emarginate with blunt to sharp angles rather than denticles. I understand these to be non-significant differences, *M. hanneli* revealing considerable variation in color and morphology among both African and Malagasy populations.

Monomorium hanneli has been collected throughout the island of Madagascar, most frequently near the coast. The usual habitat is rainforest, though it also occurs in dry tropical forest and spiny forest. Sifted leaf litter has been the usual collection method, but the nest series was taken from under a stone.

THE *HILDEBRANDTI*-GROUP

***Monomorium adiastolon* Heterick, sp. nov.**
Figs. 27, 72.

ETYMOLOGY.— Greek '*adiastolos*' ('confused') [i.e., with two other very similar species]

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Antsiranana**, R.S. Manongarivo, 17.8 km 218 SW Antanambao, 1580 m 14º01′3″S, 48º25′1″E 27.x.1998 B.L. Fisher 1972/beating low vegetation, montane rainforest/1972(17)–3 (CAS). PARATYPES: **Prov. Antsiranana** (specimens with same collection data as holotype): One ergatoid (BMNH); 2☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** 11.0 km WSW Befingotra, Res. Anjanaharibe-Sud, 16.xi.1994 B. (2☿) 18.xi.1994 (4☿, 5♀) 20.xi.1994 (3☿, 2♀) L. Fisher; R.S. Manongarivo, 12.8 km 228 SW Antanambao 11.x.1998 B.L. Fisher (2☿); R.S. Manongarivo, 14.5 km 220 SW Antanambao 20.x.1998 B.L. Fisher (1☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer, erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; eye elliptical,

curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae weakly to strongly defined, anteromedian clypeal margin straight or emarginate, clypeal carinae terminating in blunt angles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, entire lower mesopleuron distinctly striolate; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove vestigial. Propodeum shining, dorsum and sides of propodeum mainly smooth, with weak to strong striolae on declivitous face and on metapleuron; propodeal dorsum slightly elevated anteriad and sloping away posteriad, propodeal angles not raised propodeum smoothly rounded or with indistinct angle; standing propodeal setae numerous, wholly or mainly erect or sub-erect, without conspicuous paired setae evident; appressed propodeal setulae abundant, particularly on dorsum of propodeum; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle distinct; Propodeal lobes present as blunt-angled flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) tumular, inclined posteriad, with vertex also tapered posteriad, or, subcuboidal, inclined posteriad; appearance of node faintly striolate, striolae becoming costulate on rear face of node; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining, with vestigial sculpture; postpetiolar sternite not, or, only slightly depressed at midpoint, anterior process prominent.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color yellowish to yellowish-brown, gaster darker brown. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 2.39 HL 0.82 HW O.64 CeI 78 SL 0.64 SI 100 PW 0.48.

OTHER WORKER MEASUREMENTS*:* HML 2.17–2.41 HL 0.75–0.84 HW 0.63–0.70 CeI 81–89 SL 0.58–0.68 SI 88–97 PW 0.45–0.52 (n=14).

QUEEN DESCRIPTION.— HEAD: Head square; vertex weakly concave or planar; frons shining and smooth except for piliferous pits, or, shining and smooth except for piliferous pits and a few striolae around antennal sockets and frontal carinae; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye semi-circular; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum length-width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae separated by width of at least one axilla; standing pronotal/mesoscutal setae consisting

of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining, dorsum and sides of propodeum mainly smooth, with weak to strong striolae on declivitous face and on metapleuron; propodeum distinctly angulate, propodeal angle sharp, or, distinctly angulate, propodeal angles produced as short denticles; propodeal dorsum flat throughout most of its length, or, sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae consisting of a few decumbent setae only; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges, or, present as vestigial flanges only, or absent.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle laterodorsal and situated slightly anteriad of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining, with vestigial sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color tawny-orange. Brachypterous alates not seen. Ergatoid or worker-female intercastes seen.

QUEEN MEASUREMENTS: HML 2.70–3.16 HL 0.85–0.96 HW 0.77–0.88 CeI 91–98 SL 0.62–0.74 SI 78–88 PW 0.68–0.85 (n=2).

REMARKS.— The taxonomic position of *M. adiastolon* is rather unsatisfactory, as it has more of the appearance of a hybrid between two other taxonomically difficult taxa (namely, *M. fisheri* and *M. hildebrandti*) than of a good species in its own right. I have tentatively identified two morphotypes or forms of this species. Workers from Manongarivo, in Antsiranana Province, have relatively large eyes (15 ommatidia >) for *M. hildebrandti* group workers, and a broad, asymmetrical petiolar node that is longitudinally striolate and similar in appearance to the node of a distinctive coastal population of *M. hildebrandti*. This form has been collected on the same transect as an apparently monomorphic, finely sculptured, small-eyed form of *M. fisheri.* The two ants are visibly distinct taxa. The other form has been collected at Befingotra, in a more eastern region of the Province, where it is adjacent to or sympatric with a population of a different morphotype of *M. fisheri*. In the latter form, the workers are extremely smooth and shiny and the promesonotum is flattened and protrudes laterally at the humeri. Nonetheless, the Befingotra *adiastolon* and *fisheri* workers are much more similar than their counterparts at Manongarivo. At Befingotra *M. adiastolon* also has a striolate node, but this structure is thinner and more like that of the local *M. fisheri*, and the brown coloration, though not the rounded promesonotum, is also similar. The eye, in this population of *M. adiastolon*, is smaller and nearer to that of typical *M. fisheri* belonging to the shiny morphotype. Several samples of the queen of *M. adiastolon* and one ergatoid are known. Queens from Befingotra are of a somewhat smaller average size than *M. fisheri* queens, but otherwise there is no physical difference between the two taxa. All known workers and queens of *M. adiastolon* have a maximum of four mandibular teeth and denticles, whereas at least some members of all the *M. fisheri* morphotypes have five or more, but as this character is variable and the amount of available *M. adiastolon* material is very limited, this fact signifies little.

For the moment, *M. adiastolon* can be separated from *M. hildebrandti* and *M. fisheri* by the

characters noted in the key. However, this is provisional, and a better knowledge of the *Monomorium* fauna in the Antsiranana Province, including information from more nest series, could well change the current situation. Both forms have been collected from rotten wood and sifted leaf litter in montane rainforest. The ergatoid and two workers from the Manongarivo population were collected by beating from low vegetation.

***Monomorium aureorugosum* Heterick, sp. nov.**
Figs. 28, 73–74.

ETYMOLOGY.— Latin '*aureus*' ('golden') + '*rugosus*' ('wrinkled')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toamasina**, 6.9 km NE Ambanizana, 15º34′S, 50º00′E 825m 2.xii.1993 B.L. Fisher #976(41)–19/sifted litter (leaf mold, rotten wood) rainforest (CAS). PARATYPES: **Prov. Toamasina** (specimens with same collection data as holotype): 1☿ (ANIC) 12☿ (BMNH); 1☿ (CAS) 23☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** RNI Marojejy, 20.xi.1993 Alpert *et* al. (4☿) (MCZ); RNI Marojejy, 10 km NW Manantenina 15–22.x.1996 (1☿). **Prov. Toamasina:** P.N. Masoala, 26.ii–2.iii.2003 D. Silva *et al*. (1☿); 1 km W Sahafary, along Onive River, Masoala Peninsula 25.iv.1996 Alpert *et al*. (16☿) (MCZ).

WORKER DESCRIPTION.— HEAD: Head oval; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set anteriad of midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club not clearly defined. Clypeal carinae indicated by multiple weak ridges; anteromedian clypeal margin broadly convex; paraclypeal setae short and thickened, not reaching basal margin of closed mandibles; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth five; mandibles triangular and smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t4 (five teeth present), or, smaller than t4 (five teeth present).

MESOSOMA: Promesonotum shining, with whorls of rugae on sides of promesonotum, these becoming longitudinal on dorsum; (viewed in profile) promesonotum broadly convex; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove absent. Propodeum shining, with strong, transverse rugae dorsally, laterally and on declivitous face; propodeal dorsum flat throughout most of its length; propodeum always smoothly rounded; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as blunt-angled flanges; Petiolar spiracle laterodorsal and situated slightly anteriad of petiolar node; node (viewed in profile) broad and thick, with short vertex anteriad, node sloping posteriad; appearance of node transversely rugose, shining between sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1.

PETIOLE AND POSTPETIOLE: Anteroventral petiolar process present as a thin flange tapering posteriad to absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 1:1; postpetiole strongly rugose; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color head, gaster and appendages yellow, mesosoma reddish-orange. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 3.61 HL 1.12 HW 1.02 CeI 91 SL 1.02 SI 100 PW 0.75.

OTHER WORKER MEASUREMENTS: HML 3.52–3.90 HL 1.10–1.20 HW 1.00–1.09 CeI 89–93 SL 1.02–1.07 SI 98–103 PW 0.74–0.82 (n=13).

REMARKS.— *Monomorium aureorugosum* is one of two very large members of the *M. hildebrandti* group with a restricted range in far north-eastern Madagascar. This ant, along with *M. infuscum*, is known only from a small number of workers. Because their ranges overlap, and they are clearly closely related, it is tempting to combine the two forms. However, they appear to represent distinct species, not only because there exist no examples of intermediate color, but because there are subtle but consistent differences in the morphometrics pertaining to the antennal scape (i.e., the SL for *M. aureorugosum* is 1.02–1.10mm, while that for *M. infuscum* is 0.86–1.00mm, and their respective SI's are 98–103 and 92–99).

Monomorium aureorugosum is known from Antsiranana and Toamasina provinces, where it appears to be confined to rainforest. A nest series has been collected from soil below tree roots by researchers from MCZ. Individual workers have been taken from sifted leaf litter, and in pitfall, Winkler and yellow pan traps.

Monomorium cryptobium Santschi

Figs. 29, 75–76.

Syllophopsis cryptobia Santschi, 1921b: 119, fig. 2 (☿). Holotype: ☿, DEMOCRATIC REPUBLIC OF CONGO (NHMB) [examined].

Monomorium cryptobium Bolton, 1987: 421.

MATERIAL EXAMINED.— HOLOTYPE: ☿, Congo, La Moult (NHMB – Reg. No. 202). In his publication Santschi indicates he examined just the one worker. The label does not mention that it is a type, but the details on the labels are consistent with type status, as is the fact that the specimen lacks a left antennal funiculus. The funiculus of the left antenna is mounted between two cover slips that are held on a separate pin. The identification label on this pin mentions that the funiculus comes from a type specimen.

OTHER MATERIAL EXAMINED: **Prov. Antsiranana:** Nosy Be, Rés. Lokobe, 6.3 km 112 ESE Hellville 19–24.iii.2001 Fisher *et al*. (5☿, 2♀); Résérve Spéciale Ambre, 3.6 km 235 SW Sakaramy 20–26.i.2001 Fisher *et al*. (3☿); Résérve Spéciale Ambre, 3.5 km 235 SW Sakaramy 26–31.i.2001 Fisher *et al*. (7☿); R.S. Manongarivo, 12.8 km 228 SW Antanambao 11.x.1998 B.L. Fisher (18☿, 10♀); R. S. Manongarivo, 14.5 km 220 SW Antanambao 20.x.1998 B.L. Fisher (14☿, 2♀); R. S. Manongarivo, 10.8 km 229 SW Antanambao 8.xi.1998 B.L. Fisher (12☿, 4♀). **Prov. Mahajanga:** P.N. Ankarafantsika, Ampijoroa, 5.4 km 331 NW Andranofasika 30.iii.2001 Rabeson *et al*. (61☿, 20♀); P.N. Tsingy de Bemaraha, 10.6 km 123 ENE Bekopaka 16–20.xi.2001 Fisher *et al*. (14☿). **Prov. Toliara:** Cap Sainte Marie, 14.9 km 261 W Marovato 13–19.ii.2002 Fisher *et al*. (8☿); Forêt Mahavelo, Isantoria Riv., 5.5 km 37 NE Ifotaka 31.i.2002 Fisher *et al*. (1☿, 1♀); Forêt de Petriky, 12.5 km W 272 Tolagnaro 22.xi.1998 B.L. Fisher (1♀).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye minute, eyes consisting of one or two ommatidia

only; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule. Antennal segments 12; Antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin not distinct in specimens seen. Anterior tentorial pits situated nearer mandibular insertions than antennal fossae. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present), or, a small to minute denticle or angle, much smaller than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, with a few weak striolae on metapleuron; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; propodeum distinctly angulate, propodeal angle sharp; length ratio of propodeal dorsum to its declivity about 1:1; standing propodeal setae consisting of one prominent pair anteriad, with a few to many erect to decumbent setae on/around dorsal and declivitous faces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex tapered, or, conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process absent or vestigial; ventral petiolar lobe present; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole about 4:3; postpetiole shining and smooth; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color pale yellow. Worker caste monomorphic.

HOLOTYPE WORKER MEASUREMENTS: HML 0.99 HL 0.38 HW 0.32 CeI 84 SL 0.30 SI 92 PW 0.21.

OTHER WORKER MEASUREMENTS: HML 0.91–1.04 HL 0.34–0.39 HW 0.27–0.30 CeI 76–85 SL 0.27–0.30 SI 92–100 PW 0.19–0.22 (n=20).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; Eye elliptical, margin sometimes shallowly concave; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Anterior mesoscutum smoothly rounded, thereafter more-or-less flattened; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum length–width ratio of mesoscutum and scutellum combined between 3:2 and 4:3; axillae narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum

and mesopleuron. Propodeum shining and smooth, with a few distinct striolae on metapleuron; propodeum distinctly angulate, propodeal angles produced as short denticles; propodeal dorsum slightly elevated anteriad and sloping away posteriad, propodeal angles not raised, or, sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae consisting of one pair of prominent setae anteriad, with a few smaller, erect to decumbent setae on and around dorsal and declivitous faces; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer declivitous face of propodeum than metanotal groove; propodeal lobes present as well-developed, rounded flanges.

WING: Wing veins tubular and strongly sclerotised; vein m–cu present as an entire vein enclosing first discoidal cell; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node shining, with vestigial sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining, with vestigial sculpture; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color head light brown, mesosoma and gaster brownish-yellow, legs pale. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 1.27–1.40 HL 0.36–0.40 HW 0.33–0.36 CeI 88–92 SL 0.30–0.33 SI 86–94 PW 0.29–0.33 (n=20).

REMARKS.— *Monomorium cryptobium* was first described as *Syllophopsis cryptobium* by Santschi (1921), but the genus *Syllophopsis* was reduced to a synonym of *Monomorium* by Bolton (1987). Along with *M. hildebrandti*, this species is the most abundant of the *M. hildebrandti* group *Monomorium* in Madagascar. *Monomorium cryptobium* is one of three Malagasy members of this group in which the compound eye of the worker is reduced to one or two ommatidia. Workers can be separated from those of *M. sechellense* by their unsculptured mesopleuron, and from *M. modestum* by the distinctly angulate nature of the propodeum when seen in profile and by their generally smaller size (HW 0.33–0.36mm compared with 0.36–0.41mm).

Monomorium cryptobium is one of the few west and central African species to be found in Madagascar, whose *Monomorium* fauna is much more representative of eastern and southern Africa. As well as the holotype, I have inspected samples of *M. cryptobium* from these tropical African regions and they are identical with the Malagasy material. Despite its abundance and the presence of many of the small *M. cryptobium* queens among the CAS material, the male is unknown, and does not appear to have been collected by CAS teams (nearly all of the unassigned males in the CAS Collection clearly belong to members of the *M. monomorium* group). In fact, males of all the *M. hildebrandti* group species are very rare in the CAS collection. Possibly this is because they are not only cryptic, but their release during nuptial flights (assuming these occur) is very infrequent and of short duration. *Monomorium cryptobium* is widespread throughout all the forest habitats sampled by the B. Fisher team. Most specimens have been taken from sifted litter.

***Monomorium ferodens* Heterick, sp. nov.**
Figs. 27, 77, 100.

ETYMOLOGY.— Latin '*ferox*' ('fierce') + '*dens*'

MATERIAL EXAMINED.— HOLOTYPE: ☿, 40 km S Ambalavao, Res. Andringitra, 22º13′S, 46º58′E 1275m 15.x.1993 B.L. Fisher #793(8)–13/sifted litter (leaf mold, rotten wood), montane rainforest (CAS). PARATYPES: **Prov. Fianarantsoa** (specimens with same collection data as holotype): 2☿ (ANIC) 12☿ (BMNH); 2☿ (CAS); 12☿ + 1☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Fianarantsoa:** 38 km S Ambalavao, Res. Andringitra, 23.x.1993 B.L. Fisher (3☿); R. S. Ivohibe, 6.5 km ESE Ivohibe, 24–30.x.1997 B.L. Fisher (3☿). **Prov. Toliara:** 13 km NW Enakara, Rés. Andohahela, 30.xi.192 B.L. Fisher (5☿); P.N. Andohahela, 3.8 km 113 ESE Mahamavo 21–25.i.2002 Fisher *et al*. (5☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye small, eye width less than 1× greatest width of antennal scape; eyes set above midpoint of head capsule; set posteriad of midline of head capsule; more-or-less circular to semi-circular. Antennal segments 12; club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin straight; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits equidistant from antennal fossae and mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 3,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth distinctly larger than t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to anterior of lower mesopleuron, or, shining and smooth on dorsum, entire lower mesopleuron distinctly striolate; in profile broadly convex; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining and smooth, metapleuron with multiple hair-like striolae; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; angulate, propodeal angle blunt; length ratio of propodeal dorsum to its declivity about 1:1; standing propodeal setae consisting of one prominent pair anteriad, with a few to many erect to decumbent setae on/around dorsal and declivitous faces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer declivitous face of propodeum than metanotal groove; vestibule of propodeal spiracle distinct; propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle laterodorsal and situated slightly anteriad of petiolar node. Petiolar node, in profile, subcuboidal, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and1:1. Anteroventral petiolar process absent or vestigial; ventral petiolar lobe present. Height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining and smooth; postpetiolar sternite not, or, only slightly depressed at midpoint, anterior process prominent.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color pale, depigmented yellow. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.43 HL 0.51 HW 0.44 CeI 86 SL 0.40 SI 91 PW 0.31.

OTHER WORKER MEASUREMENTS: HML 1.21–1.57 HL 0.45–0.57 HW 0.37–0.47 CeI 80–87 SL

0.35–0.44 SI 87–97 PW 0.26–0.32 (n=20).

Remarks.— The worker (queens and males are unknown) of this unobtrusive, but interesting species can easily be confused with a small, pale worker of *M. hildebrandti*. However, it can readily be distinguished by its PF of 3,2 and the enlarged, down-curved basal tooth. In profile, the clypeal protuberance tends to form a blunter angle than is the case with *M. hildebrandti*, its configuration more closely resembling that found in *M. sechellense*. The species is comparatively rare, being known from four sites in Fianarantsoa and Toliara Provinces. All have been taken in sifted litter (leaf mold and rotten wood) in rainforest.

***Monomorium fisheri* Heterick, sp. nov.**

Figs. 12, 30–31, 78–79.

Etymology.— In honour of Dr. Brian Fisher (California Academy of Sciences).

Material examined.— Holotype: ☿, **Prov. Toliara**, P.N. Andohahela, Manantalinjo, 3.8 km 113 ESE Mahamavo 900m, Sedro, 24º46′S 46º45′E 21–25.i.2002 Fisher *et al* BLF#/ex rotten log montane rainforest/CASENT0430841 5087 (CAS). Paratypes: **Prov. Toliara** (locality details as for holotype, but collected ex root mat, ground layer, montane rainforest/ collection code 5147): 12☿ (ANIC); 13☿ (BMNH); 1☿2☿ (CAS); 13☿ + 12☿ (MCZ).

Other material examined: **Prov. Antananarivo:** Rés Ambohitantely, 20.9 km 72 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (45☿); Rés Ambohitantely, 24.1 km 59 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (2☿); 3 km 41 NE Andranomay, 11.5 km 147 SSE Anjozorobe 5–13.xii.2000 Fisher *et al*. (57☿, 5☿). **Prov. Antsiranana:** R. S. Manongarivo, 20.4 km 219 SW Antanambao 3.xi.1998 B.L. Fisher (7☿). **Prov. Fianarantsoa:** Forêt Antsirakambiaty, 7.6 km 285 WNW Itremo 22–26.i.2003 Fisher *et al*. (30☿, 8☿, 12♂); P.N. Ranomafana, Vatoharanana 4.1 km 231 SW Ranomafana 27–31.iii.2003 Fisher *et* al. (13☿). **Prov. Toamasina:** F.C. Didy, 16–23.xii.1998 H.J. Ratsirarson (3☿); Mont Anjanaharibe, 19.5 km 27 NNE Ambinanitelo 12–16.iii.2003 Fisher *et al*. (6☿). **Prov. Toliara:** P.N. Andohahela, Manantalinjo, 3.8 km 113 ESE Mahamavo 21–25.i.2002 Fisher *et al*. (106☿).

Worker description.— Head: Head rectangular, oval, or, quadrate (i.e., heart-shaped); vertex planar to strongly concave; frons (i) shining and smooth except for piliferous pits, or, (ii) shining and smooth except for a few striolae around antennal sockets and front carinae and piliferous pits, or, (iii) shining and finely striolate and microreticulate; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye moderate, eye width 1–1.5× greatest width of antennal scape to small, eye width less than 1× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule to set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eyes more-or-less circular, or, elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin highly variable in appearance, being either: (i) narrowly convex between weakly ridged clypeal carinae, or, (ii) straight, or, (iii) straight between strongly divergent clypeal carinae, with clypeus descending almost vertically to horizontal arc of mandibles and sometimes transversely carinate below level of antennal insertions, or, (iv) emarginate, clypeal carinae indistinct, or, (v) emarginate, clypeal carinae terminating in blunt angles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae to approximately level with antennal fossae. Anterior tentorial pits equidistant from antennal fossae and mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 2,2. Mandibular teeth either five, or, four and one or two denticles, or, four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t4 (five teeth present), or, smaller than t4 (five teeth present), or, approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, with entire lower mesopleuron distinctly striolate, or, promesonotum shining and faintly striolate dorsally, with striolae becoming more distinct posteriad, and entire mesopleuron distinctly striolate; in profile promesonotum (i) broadly convex, or, (ii) with anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum, or, (iii) promesonotum gently convex or distinctly flattened, humeri with vestigial to strongly accentuated dorsolateral flange; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae very sparse or absent. Metanotal groove variable, from strongly impressed, with distinct transverse costulae to absent. Propodeum varying from shining, with dorsum and sides of propodeum mainly smooth with weak to strong striolae on declivitous face and on metapleuron, to uniformly finely striolate; propodeal dorsum either slightly elevated anteriad and sloping away posteriad, propodeal angles not raised, or, propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; propodeum either (i) smoothly rounded or (ii) with indistinct angle, or, (iii) angulate, propodeal angle blunt, or, (iv) distinctly angulate, propodeal angle sharp; if angulate, length ratio of propodeal dorsum to its declivity is between 3:2 and 4:3; standing propodeal setae consisting of one prominent pair anteriad, with a few to many erect to decumbent setae on/around dorsal and declivitous faces of propodeum, or, consisting of two or more prominent pairs of setae anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae well-spaced and sparse to very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum, or, nearer declivitous face of propodeum than metanotal groove; vestibule of propodeal spiracle distinct in some specimens; propodeal lobes present as blunt-angled flanges, or, present as rounded flanges.

PETIOLE AND POSTPETIOLE: Position of petiolar spiracle varying from lateral and situated well anteriad of petiolar node to lateral and situated within anterior sector of petiolar node. In profile, petiolar node shape ranging from subcuboidal, vertex rounded, to subcuboidal, inclined posteriad; appearance of node shining and smooth throughout, or, shining and faintly striolate and microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 3:4. Anteroventral petiolar process present as a thin flange tapering posteriad, or, absent or vestigial; ventral petiolar lobe absent. Height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:2; postpetiole shining and smooth; postpetiolar sternite either (i) depressed near its junction with gaster, and sloping anteriad at angle of 45–60 to form large conspicuous lip at its anterior end, or, (ii) not, or, only slightly depressed at midpoint, anterior process prominent, or, (iii) petiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color usually yellow to reddish-brown, some specimens with yellow head and gaster and reddish mesosoma, dark brown specimens with pale legs. Worker caste monomorphic, or, monophasically allometric, i.e., with variable size, but not morphology among workers from same nest, or, polymorphic.

HOLOTYPE MEASUREMENTS: HML 2.25 HL 0.76 HW 0.66 CeI 86 SL 0.64 SI 98 PW 0.46.

OTHER WORKER MEASUREMENTS: HML 1.78–3.58; HL 0.64–1.23; HW 0.50–1.26; CeI 76–103; SL 0.42–0.96; SI 75–107; PW 0.34–0.80 (n=60).

QUEEN DESCRIPTION.— HEAD: Head rectangular; vertex weakly concave or planar; either (i) frons shining and longitudinally striolate, with some smooth areas, or, (ii) frons longitudinally fine-

ly striolate; pilosity of frons with a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex, or, with a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex, or, broadly convex anteriad, with convexity reduced posteriad; mesoscutum and mesopleuron either shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum, or, faintly longitudinally striolate on sides of pronotum and mesoscutum, dorsum of mesoscutum mainly smooth; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2. Axillae separated by width of at least one axilla. Standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum either (i) longitudinally striolate, except for posterior sector of propodeum, which is smooth, or, (ii) shining and densely striolate over whole surface, or, (iii) shining, with strong, transverse rugae dorsally, laterally and on declivitous face; propodeum angulate, propodeal angle blunt, or, distinctly angulate, propodeal angle sharp, or, distinctly angulate, propodeal angles produced as short denticles; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle ranging from nearer metanotal groove than declivitous face of propodeum to equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as bluntly angled flanges.

WING: Wing veins tubular and strongly sclerotised; vein m–cu present as an entire vein enclosing first discoidal cell; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle either lateral and situated well anteriad of petiolar node, or, lateral and situated slightly anteriad of petiolar node, or, laterodorsal and situated slightly anteriad of petiolar node; node, in profile cuneate, vertex tapered; appearance of node shining and weakly striolate posteriad, or, shining, rugose posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1. Anteroventral petiolar process either present as a thin flange tapering posteriad, or, absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 1:1; postpetiole smooth anteriad, rugose posteriad to strongly rugose; postpetiolar sternite depressed near its junction with gaster, and sloping anteriad at angle of 45–60 to form large conspicuous lip at its anterior end.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color brownish-yellow, through orange to brown with lighter areas. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 3.13–4.92; HL 0.90–1.24; HW 0.83–1.34; CeI 87–111; SL 0.76–1.02; SI 76–95; PW 0.79–1.50 (n=29).

MALE DESCRIPTION.— HEAD: Head width-mesosoma width ratio between 4:3 and 3:4; frons finely micropunctate. Compound eyes protuberant and elliptical, or, protuberant and circular or subcircular; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli not turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 1:2 and 1:3. Maximum number of mandibular teeth and denticles four.

MESOSOMA: Mesoscutum broadly convex; either lower pronotum and mesoscutum finely stri-

olate, otherwise smooth and shining, or, shining and faintly striolate throughout, striolae becoming more deeply impressed on posterior mesopleuron. Parapsidal furrows distinct, vestigial or absent; notauli absent. Axillae separated by width of at least one axilla.

WING: Wing veins tubular and strongly sclerotised; vein m–cu present as an entire vein enclosing entire discoidal cell; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node. Node (viewed in profile) conical, vertex rounded, or, evenly tumular to roundly conical; appearance of node shining and smooth, or, shining, with vestigial sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1. Anteroventral petiolar process present as a thin flange tapering posteriad, or, absent or vestigial. Height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 3:4; postpetiole shining and smooth, or, shining, with vestigial sculpture.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color head chocolate, gaster, mesosoma brown, legs yellowish-brown.

MALE MEASUREMENTS: HML 2.37–2.99; HL 0.68–0.79; HW 0.66–0.80; CeI 99–102; SL 0.17–0.20; SI 23–29; PW 0.76–0.84 Male (n=7).

REMARKS.— *Monomorium fisheri* and its close ally, *Monomorium hildebrandti* pose the same problems within the *M. hildebrandti* group that *M. termitobium* does for the *M. monomorium* group. Workers within *M. fisheri* cluster around three morphotypes.

(a) Workers of this form exhibit only a slight variation in worker size. They are uniformly pale yellow to orange and, in the northernmost population, finely microstriolate over much of the head and mesosoma. The eye is very small, with about five or six ommatidia, its diameter much narrower than the thickest length of the antennal scape. The mandible most commonly has four teeth, rarely three teeth and two denticles or four teeth and a small denticle. All workers have smoothly rounded humeri. The node is regularly shaped and not particularly thick, and the postpetiole is evenly rounded. Most specimens come from a fairly large series from Ambohitantely Reserve, Antananarivo Province, with three additional workers having been collected from Manongarivo, Antsiranana Province. No queens or males have been identified for this morphotype, whose representatives have been taken from sifted litter and leaf mould.

(b) The second morphotype is very similar, and may well simply represent a southward continuation of form (a). The eye is similarly small and the color is the same. This form has a smoother exoskeleton, and the postpetiole in smaller specimens is attenuated anteriad. Many workers have a slight promesonotal shelf, but in others the humeri are rounded. Allometric variation is apparent between workers of the same nest, and in the southernmost populations the variation becomes a genuine polymorphism, with the largest workers rivaling *M. aureorugosum* and *M. infuscum* in size. These very large workers (HW = 1mm) have massive, quadrate head capsules and proportionately very small eyes. They also have a mandibular count of five or six mandibular teeth and denticles, contrasting with a usual count of four in the smaller workers. The mesonotal sector is sculptured in the large worker as is the mesopleuron, with strong lateral striae and striolae. The petiolar node is 'blocky' and subcuboidal. The queens are reasonably large ants, over half a centimeter in total length, with a massive, rounded mesosoma and small tubercles or denticles at the propodeal angles. Seen in full-face view, a number of these queens have paired setae straddling the mid point of the anterior clypeal margin, rather than one seta. Queens and males (which are as large as most workers of *M. fisheri*) have the full complement of wing veins. The CAS has several long series of this morphotype, collected from montane rainforest in Fianarantsoa and Toliara Provinces. These tend to be nest series, which is unsurprising as *M. fisheri* is larger and, hence, more conspicuous than

most *Monomorium* species. Most collections have come from sifted litter, root mats and rotten wood.

(c) Workers of the third morphotype are very smooth and shining, and the predominant base color of the head and mesosoma is a russet-brown with some smaller workers tending to ochraceous. All workers have pale legs. The promesonotum mostly has a distinctly flattened humeral shelf, which projects over the sides when the ant is seen in full-face view. The metanotal groove is weak to absent, but the postpetiole is attenuate, as with smaller workers of morphotype (b). Where present, sculpture is confined to a few dull striolae on the mesopleuron and metanotum. While workers of this form have relatively the longest scapes (SI to 107), scape length shows the same variability as that of the other morphotype. When plotted on a scattergram (Fig. 31), moreover, the relationship between HML and SL in all morphotypes shows the same slope (r^2 = 0.95). Morphotype (c) exhibits weak monophasic allometry. The queen is smaller and brown rather than dull orange-yellow, but its appearance otherwise agrees with that of morphotype (b), and there is no significant difference between the males. Collections have been made along Madagascar's eastern half, most samples being associated with rotten wood, though a few have come from sifted litter.

In my opinion, the variation seen in *M. fisheri* is infraspecific, as workers of all three morphotypes show convergence of form in at least some localities and all possess a basic underlying similarity. The tendency of populations of a *Monomorium* species living in very moist conditions to produce a worker morphotype that is smooth and glassy with minimal sculpture and a flattened promesonotum has been previously noted in the case of the Australian species, *Monomorium leae* Forel (Heterick 2001). This appears to have occurred with *M. fisheri*, whose distribution is confined to montane rainforest. Possibly, individual microhabitats experience greater precipitation or are otherwise damper than others, over long time periods imposing selection pressure on isolated populations of individual species to produce the sort of phenotypic variation noted above. The smooth, waxy cuticle may be an adaptation to prevent pathogenic fungi from growing on the ant, or, it may prevent waterlogging. The holotype selected is a medium-sized worker of morphotype (b), which is probably the form most commonly encountered.

Monomorium gongromos **Heterick, sp. nov.**
Figs. 27, 80.

ETYMOLOGY.— Greek '*gongros*' (masc. 'excrescence') + '*omos*' (masc. 'shoulder')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toamasina**, F. C. Sandranantitra 18º02′9″S, 49º05′5″E 450 m 18–21.i.1999 H.J. Ratsirarson 101(11)–51/sifted litter rainforest (CAS). PARATYPES: **Prov. Toamasina** (specimens with same collection data as holotype): 3☿ (ANIC) 12☿ + 3☿ (BMNH); 4☿ (CAS); 22☿ + 12♀ + 1☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Toamasina:** F. C. Andriantantely 4–7.xii.1998 H.J. Ratsirarson (1☿); F. C. Andriantantely 7–10.xii.1998 H.J. Ratsirarson (7☿); F.C. Sandranantitra 18–24.i.1999 (3☿) 21–24.i.1999 (1☿) H.J. Ratsirarson.

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; Eye small, eye width less than 1× greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club three-segmented. Clypeal carinae always well-defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in blunt angles, or, emarginate, clypeal carinae terminating in small denticles; para-

clypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, entire lower mesopleuron distinctly striolate; (viewed in profile) curve of anterior promesonotum abrupt, flattened or gently convex thereafter, promesonotal humeri with small tubercle or rugosity when seen in full-face view; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove absent. Propodeum shining, dorsum and sides of propodeum mainly smooth, with weak to strong striolae on declivitous face and on metapleuron; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; propodeum distinctly angulate, propodeal angle sharp; length ratio of propodeal dorsum to its declivity about 3:2; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer declivitous face of propodeum than metanotal groove. Vestibule of propodeal spiracle distinct in some specimens. Propodeal lobes present as blunt-angled flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node, or, lateral and situated within anterior sector of petiolar node; node (viewed in profile) subcuboidal, inclined posteriad; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process present as a thin flange tapering posteriad; ventral petiolar lobe present, but weakly developed to vestigial; height ratio of petiole to postpetiole about 4:3; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color of head, appendages and node yellow, mesosoma light orange to brick red, gaster yellowish-brown. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 1.55 HL 0.56 HW 0.47 CeI 84 SL 0.40 SI 85 PW 0.36.

OTHER WORKER MEASUREMENTS: HML 1.36–1.67 HL 0.51–0.58 HW 0.41–0.50 CeI 80–86 SL 0.36–0.42 SI 84–90 PW 0.30–0.39 (n=20).

QUEEN DESCRIPTION.— HEAD: Head square; vertex weakly concave or planar; frons longitudinally striolate medially, sides of head capsule shining and smooth; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye ovoid, narrowed posteriad; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae separated by width of at least one axilla; standing pronotal/mesoscutal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron.

Propodeum shining and densely striolate over whole surface; propodeum distinctly angulate, propodeal angle sharp; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae well-spaced and sparse; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as bluntly angled flanges.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and weakly striolate posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 3:2 and 4:3; anteroventral petiolar process present as a thin flange tapering posteriad, or, absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole about 4:3; postpetiole smooth anteriad, rugose posteriad; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color variegated brown and orange. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 2.26–2.29 HL 0.65 HW 0.62–0.63 CeI 95–97 SL 0.49–50 SI 78–79 PW 0.59–0.64 (n=2).

REMARKS.— The small red-and-yellow workers of *M. gongromos* closely resemble those of some populations of *M. hildebrandti*, but are distinguished by the presence of humeral angles (evident as small protuberances or rugosities in full-face view) and by numerous, fine, transverse striolae on the dorsum and upper sides of the propodeum. The dorsum of the mesosoma in dorsal view is subcarinate transversely between the humeri with a broken and vestigial lateral carina also arising from each humeral angle and proceeding to about the position normally occupied by the metanotal groove (here absent). The species has been collected at just two sites on the east coast of Madagascar in Toamasina Province. The queens of this species are similar to small queens of *M. hildebrandti*, but the propodeum is uniformly striolate and the mesoscutum is low and flat, so that the pronotum is clearly visible in dorsal view. All specimens have been collected from sifted litter or a rotten log in rainforest.

Monomorium hildebrandti Forel

Figs. 32–33, 101–105.

Monomorium minutum r. *hildebrandti* Forel, 1892c:256. Holotype ♀, MADAGASCAR: 'central Madagascar' (MHNG) [examined].
Monomorium minutum subsp. *hildebrandti* Wheeler, W.M. 1922:1027.
Monomorium hildebrandti Dalla Torre, 1893:67.

MATERIAL EXAMINED.— HOLOTYPE: (See comments under *M. shuckardi*, though, due to its damaged condition, this specimen could not be measured.) ♀, Madagascar, central Madagascar (MHNG). The published description of the queen mentions that a Mr. Hildebrand was the collector. The type specimen lacks head, postpetiole and gaster. A 'type' from Madagascar described by Santschi (1926) (NHMB) as the worker of *M. hildebrandti* is actually a specimen of *Monomorium madecassum* Forel.

OTHER MATERIAL EXAMINED: **Prov. Antananarivo:** 3 km 41 NE Andranomay, 11.5 km 147 SSE Anjozorobe 5–13.xii.2000 Fisher *et al*. (9☿, 2♀); Rés Ambohitantely, 20.9 km 72 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (15☿, 5♀); Rés Ambohitantely, 24.1 km 59 NE Ankazobe 17–22.iv.2001 Rabeson *et al*. (7☿).

Prov. Antsiranana: 2.2 km WSW Befingotra, Res. Anjanaharibe–Sud, 9.xi.1994 B.L. Fisher (12☿, 1♀); Forêt Anabohazo, 21.6 km 247 WSW Maromandia 11–16.iii.2001 Fisher *et al*. (5☿); Forêt Orangea, 3.6 km 128 SE Remena 22–28.ii.2001 Fisher *et al*. (5☿); Montagne Français, 7.2 km 142 SE Diego Suarez 22–28.ii.2001 Fisher *et al*. (3☿); Nosy Be, Rés. Lokobe, 6 3 km 112 ESE Hellville 19–24.iii.2001 Fisher *et al*. (13☿, 1♀); P.N. Montagne Ambre, 12.2 km 211 SSW Joffreville 2–7.ii.2001 Fisher *et al*. (26☿, 1♀); Résérve Spéciale Ambre, 3.5 km 235 SW Sakaramy 26–31.i.2001 Fisher *et al*. (10☿); Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (3☿); Rés. Spéc. Ankarana, 22.9 km 224 SW Anivorano Nord 10–16.ii.2001 Fisher *et al*. (1☿); Rés. Spéc. Ankarana, 13.6 km 192 SSW Anivorano Nord 16–21.ii.2001 Fisher *et al*. (3☿); R.S. Manongarivo, 14.5 km 220 SW Antanambao 20.x.1998 B.L. Fisher (3☿, 2 ergatoids); R.S. Manongarivo, 17.3 km 218 SW Antanambao 27.x.1998 B.L. Fisher (6☿, 1♀); R. S. Manongarivo, 20.4 km 219 SW Antanambao 3.xi.1998 B.L. Fisher (3☿, 1♀); R. S. Manongarivo, 10.8 km 229 SW Antanambao 8.xi.1998 B.L. Fisher (3☿, 1♀). **Prov. Fianarantsoa:** 45 km S Ambalavao 25.ix.1992 B.L. Fisher (3☿, 32♂); 43km S Ambalavao, Res Andringitra, 5.x.1993 B.L. Fisher (3☿, 4♀, 2♂); 40 km S Ambalavao, Res Andringitra 15.x.1993 B.L. Fisher (4☿); 38 km S Ambalavao, Res Andringitra 23.x.1993 B.L. Fisher (12☿, 2♀); R.S. Ivohibe, 7.5 km ENE Ivohibe, 7–12.xi.1997 B.L. Fisher (6☿). **Prov. Mahajanga:** P.N. Ankarafantsika, Ampijoroa, 40 km 306 NW Andranofasika 26–31.iii.2001 Fisher *et al*. (3☿); P.N. Ankarafantsika, Ampijoroa, 5.4 km 331 NW Andranofasika 30.iii.2001 Rabeson *et al*. (128☿, 1 ergatoid, 5♀); P.N. Ankarafantsika, Ankoririka, 10.6 km 13 NE Tsaramandroso 9–14.iv.2001 Rabeson *et al*. (1☿); P.N. Baie de Baly, 12.4 km 337 NNW Soalala 26–30.xi.2002 Fisher *et* al. (3☿); P.N. Namoroka, 17.8 km 329 WNW Vilanandro, 8–12.xi.2002 Fisher *et al*. (23☿, 8 ergatoids); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (3♂); P.N. Tsingy de Bemaraha, 10.6 km 123 ESE Antsalova 16–20.xi.2001 Fisher *et al*. (5☿); Res. Bemarivo, 23.8 km 223 SW Besalampy, 19–23.xi.2002 Fisher *et al* (7☿). **Prov. Toamasina:** 5.3 km SSE Ambanizana, Andranobe, 21.xi.1993 B.L. Fisher (5☿, 1♀); 6.9 km NE Ambanizana, Andranobe, 2.xii.1993 (9☿, 1♀) 9.xii.1993 (3☿) B.L. Fisher; F.C. Andriantantely 4–7.xii.1998 H.J. Ratsirarson (4☿, 1♀); F. C. Sandranantitra 21–24.i.1999 H.J. Ratsirarson (5☿); P.N. Mantadia, 25–28.xi.1998 H.J. Ratsirarson (3☿); SF Tampolo, 10 km NNE Fenoarivo Atn. 10.iv.1997 B.L. Fisher (2☿). **Prov. Toliara:** Cap Sainte Marie, 12.3 km 262 W Marovato 11–15.ii.2002 Fisher *et al*. (4☿); Cap Sainte Marie, 14.9 km 261 W Marovato 13–19.ii.2002 Fisher *et al*. (12☿); 11 km NW Enakara, Rés. Andohahela 17.xi.1992 B.L. Fisher (2☿); 10 km NW Enakara, Rés. Andohahela 24.xi.1992 B.L. Fisher (3☿); Forêt Mahavelo, Isantoria Riv., 5.2 km 44 NE Ifotaka 28.i–1.ii. 2002 Fisher *et al*. (1☿); Forêt Mahavelo, Isantoria Riv., 5.5 km 37 NE Ifotaka 31.i.2002 Fisher *et al*. (3☿); Forêt Tsinjoriaka ['Tsinjoriaky'], 6.2 km 84 E Tsifota 6–10.iii.2002 Fisher *et al*. (1☿); Mahafaly Plateau, 6.2 km 74 ENE Itampolo 21–25.ii.2002 Fisher *at al*. (1♂); P.N. Andohahela, 7.6 km 99 E Hazofotsy 12–16.i.2002 Fisher *et al*. (19☿, 2 ergatoids); P.N. Andohahela, Manantalinjo, 3.8 km 113 ESE Mahamavo 21–25.i.2002 Fisher *et al*. (6☿); P.N. Kirindy Mite, 16.3 km 127 SE Belo sur Mer 6–10.xii.2001 Fisher *et al*. (2♂).

WORKER DESCRIPTION.— HEAD: Head oval; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye moderate, eye width 1–1.5× greatest width of antennal scape to small, eye width less than 1× greatest width of antennal scape; (in full-face view) eyes set at about midpoint of head capsule to set below midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; Antennal segments 12; antennal club three-segmented. Clypeal carinae always well-defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in blunt angles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits equidistant from antennal fossae and mandibular insertions. Frontal lobes straight, parallel. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron, or, shining and smooth on dorsum, entire lower mesopleuron dis-

tinctly striolate; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae few, mainly on dorsum of promesonotum. Metanotal groove absent. Propodeum shining, dorsum and sides of propodeum mainly smooth, with weak to strong striolae on declivitous face and on metapleuron; propodeal dorsum slightly elevated anteriad and sloping away posteriad, propodeal angles not raised, or, sloping posteriad, and depressed between raised propodeal angles; propodeum smoothly rounded or with indistinct angle, or, angulate, propodeal angle blunt; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum to nearer declivitous face of propodeum than metanotal groove. Vestibule of propodeal spiracle distinct. Propodeal lobes present as blunt-angled flanges, or, present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node, or, lateral and situated slightly anteriad of petiolar node; node (viewed in profile) cuneate, vertex rounded, or, conical, vertex rounded, or, tumular, inclined posteriad, with vertex also tapered posteriad, or, subcuboidal, vertex rounded; appearance of node shining and smooth throughout, or, shining and longitudinally striolate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process present as a thin flange tapering posteriad, or, absent or vestigial; ventral petiolar lobe present, or, present, but weakly developed to vestigial; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth, or, shining and weakly striolate posteriad; postpetiolar sternite depressed near its junction with gaster, and sloping anteriad at angle of 45–60 to form large conspicuous lip at its anterior end, or, depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90, or, not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color highly variable; from uniform pale yellow to light brown, often with yellow or yellowish-brown head and appendages and yellowish-brown to brown gaster, contrasting with reddish-orange mesosoma and nodes. Worker caste monomorphic within nests, but with large internidal and inter-population variation in size and sculpture.

OTHER WORKER CHARACTERS: HML 1.18–2.12 HL 0.44–0.73 HW 0.36–0.61 CeI 75–86 SL 0.30–0.54 SI 82–102 PW 0.25–0.47 (n=40).

QUEEN DESCRIPTION.— HEAD: Head square, or, rectangular; vertex weakly concave or planar; frons shining and smooth except for piliferous pits and a few striolae around antennal sockets and frontal carinae, or, shining and longitudinally striolate in left and right sectors and medially smooth; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter setae or setulae, which are decumbent or appressed, longer setae thickest on vertex. Eye ovoid, narrowed posteriad; (in full-face view) eyes set above midpoint of head capsule, or, set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex, or, broadly convex anteriad, convexity reduced posteriad; pronotum, mesoscutum and mesopleuron shining and mainly smooth, vestigial striolae, if present, confined to anterior katepisternum; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2 to between 3:2 and 4:3; axillae separated by width of at least one axilla, or, narrowly separated (i.e., less than width of one axilla); standing pronotal/mesoscutal setae con-

sisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae few, mainly on sides of pronotum and mesopleuron. Propodeum shining, dorsum and sides of propodeum mainly smooth, with weak to strong striolae on declivitous face and on metapleuron; propodeum distinctly angulate, propodeal angle sharp to distinctly angulate, propodeal angles produced as short denticles; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae variable, from absent to up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae well-spaced and sparse, or, very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges, or, present as bluntly angled flanges.

WING: Wing veins tubular and strongly sclerotised; vein m–cu present as an entire vein enclosing first discoidal cell; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node, or, lateral and situated slightly anteriad of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and weakly striolate posteriad; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 4:3 and 1:1; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 3:2 and 4:3; postpetiole shining, smooth anteriad, weakly to strongly striate posteriad; postpetiolar sternite depressed at about its centre, anterior carina usually inconspicuous.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color of smaller specimens usually yellowish or brown, larger specimens variegated yellowish-brown/brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes seen.

HOLOTYPE QUEEN MEASUREMENTS: Not taken, as the queen lacks crucial body parts, including the head.

QUEEN MEASUREMENTS (non-types): HML 3.21–4.13 HL 0.96–1.06 HW 0.92–1.06 CeI 92–101 SL 0.82–0.96 SI 84–99 PW 0.92–1.11 (n=19).

MALE DESCRIPTION.— HEAD: (In full-face view) head width–mesosoma width ratio between 1:1 and 3:4; frons finely micropunctate. Compound eyes protuberant and weakly ovoid; margin of compound eye clearly separated from posterior margin of clypeus. Ocelli not turreted. Ratio of length of first funicular segment of antenna to second funicular segment between 3:4 and 2:3. Maximum number of mandibular teeth and denticles four.

MESOSOMA: Mesoscutum broadly convex with a few vestigial striolae on its dorsum, otherwise pronotum and mesoscutum smooth and shining; parapsidal furrows distinct; notauli absent; axillae separated by width of at least one axilla.

WING: Wing veins tubular and strongly sclerotised; vein m–cu present as an entire vein enclosing entire discoidal cell; vein cu–a present.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node to laterodorsal and situated well anteriad of petiolar node; node (viewed in profile) conical, vertex tapered; appearance of node shining, with vestigial sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color reddish brown, head chocolate.

MALE MEASUREMENTS: HML 1.44–1.75 HL 0.43–0.54 HW 0.41–0.53 CeI 83–104 SL 0.07–0.13 SI 13–28 PW 0.37–0.56 (n=12).

REMARKS.— By far the most abundant member of the *M. hildebrandti* group on Madagascar, this species varies more than any other Malagasy *Monomorium*. Fortunately, the pattern of variation shows a clinal pattern, unlike that in *M. termitobium*, making its analysis somewhat easier. The species, as it is understood here, is closely related to the very similar *M. fisheri*, and may occasionally hybridize with that species (see 'REMARKS' under *M. adiastolon*). The petiolar node, although it varies greatly, is still the best means of separating workers of *M. hildebrandti* from those of *M. fisheri*, but in doubtful cases the other features mentioned in the key should be carefully examined. In the former the node has a posterior face that is rarely vertical, and its dorsum usually retains some degree of asymmetry. The latter species has a symmetrical node with a vertical posterior face. Thick, tapering nodes in some populations of *M. hildebrandti* tend to possess faint longitudinal striolae absent in *M. fisheri*. Workers of *M. hildebrandti* have a maximum of four mandibular teeth, and that will help to distinguish them from those *M. fisheri* workers that have a five-toothed mandible.

Several of the more conspicuous morphotypes of *M. hildebrandti* have a well-defined range. A form whose large, robust, reddish workers possess a longitudinally striolate petiolar node is perhaps the most distinctive. The eye can be relatively large in workers of this morphotype, with up to 30 or more ommatidia. Unlike the similarly large-eyed *M. adiastolon*, this morphotype has a narrow, high postpetiole. This ant is found along the entire western and southern coast of Madagascar, excluding only the extreme north-west. The queen has a distinctive postpetiole that is vertically strongly attenuate and produced laterally, and is otherwise more heavily sculptured than the typical *M. hildebrandti* queen. Some individual workers of this form show actual physical convergence with the smaller yellow worker of the common morphotype, the head and pronotal sector being that of the smaller morphotype, while the propodeum and nodes are those of the robust red morphotype! In the extreme north of Antsiranana Province and on Nosy Be Island, is another, yellow morphotype in which the anteroventral postpetiolar process is very large and terminates in a conspicuous carina. Further south in Antsiranana and parts of Toamasina is a similar form, whose workers are very smooth and have an elongate peduncle. The workers lack the large anteroventral petiolar process of the more northern populations. In some cases the petiolar node of individual workers from both groups is strongly asymmetrical and very low. Colonies with red-and-yellow workers, similar in appearance to *M. gongromos*, occur in Fianarantsoa Province among colonies with more unobtrusive yellow workers. The CAS has a number of queens and males for this morphotype, and the holotype queen, from "Central Madagascar", belongs to the same population. Ergatoids may be paler than fully developed queens. The large workers of yet another morphotype in Antananarivo and Antsiranana Provinces are very similar to workers of morphotype (b) of *M. fisheri* and have a similar node, which, however, usually has a slightly asymmetrical dorsum and a few weak striolae on the sides. The most commonly seen worker of *M. hildebrandti* is a small, depigmented yellow, through bright yellow to yellowish-brown ant with very small eyes (as few as five ommatidia) and a petiolar node that varies from rounded and smooth to more attenuate and sculptured. In brownish specimens the head may be darker than the mesosoma in dorsal view. Workers with this appearance are found in many parts of inland Madagascar.

Despite the variable morphology and color of *M. hildebrandti*, the pattern of distribution to be found among the various morphotypes and the high number of workers of intermediate morphology strongly suggests the divergence in appearance is due to different selection pressures operating on the one species. As with *M. fisheri*, the relationship between HML and SL is very similar for all

morphotypes ($r^2 = 0.97$) (Fig. 33). Molecular analysis (i.e., DNA sequencing) may be helpful in elucidating the relationship between this species, *M. fisheri* and *M. adiastolon*, which cannot be fully resolved by morphological examination. *Monomorium hildebrandti* is found in all native habitats. Sifting of litter appears to be the most effective sampling method. Nest series have been taken from rotted tree stumps and other wood substrates, and from under stones.

Monomorium infuscum **Heterick, sp. nov.**
Fig. 28.

ETYMOLOGY.— Latin '*infuscus*' ('dusky' 'dark brown' 'blackish')

MATERIAL EXAMINED.— HOLOTYPE: ☿, **Prov. Toamasina**, 5.3 km SSE Ambanizana, Andranobe, 15º40′S, 49º58′E 425 m 21.xi.1993 B.L. Fisher #926(43)–12/sifted litter (leaf mold, rotten wood) rainforest (CAS). PARATYPES: **Prov. Toamasina** (all specimens with same collection data as holotype): 1☿ (ANIC); 12☿ (BMNH); 12☿ (MCZ).

OTHER MATERIAL EXAMINED: **Prov. Toamasina:** 6.9 km NE Ambanizana, Andranobe, 2.xii.1993 (3☿) 8.xii.1993 (3☿) 9.xii.1993 (3☿) B.L. Fisher; Ambanisana, P.N. Masoala 2–6.iii.2003 Silva *et al.* (1☿).

WORKER DESCRIPTION.— HEAD: Head oval; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of well-spaced, distinctly longer erect and semi-erect setae interspersed with shorter decumbent setae or setulae. Eye moderate, eye width 1–1.5× greatest width of antennal scape; (in full-face view) eyes set above midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule; eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin. Antennal segments 12; antennal club not clearly defined. Clypeal carinae always well-defined; anteromedian clypeal margin emarginate, clypeal carinae terminating in blunt angles, or, emarginate, clypeal carinae terminating in small denticles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin approximately level with antennal fossae. Anterior tentorial pits situated nearer antennal fossae than mandibular insertions. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth five; mandibles triangular and smooth (except for piliferous pits); masticatory margin of mandibles approximately vertical or weakly oblique; basal tooth approximately same size as t4 (five teeth present).

MESOSOMA: Promesonotum shining, with whorls of rugae on sides of promesonotum, these becoming longitudinal on dorsum; (viewed in profile) promesonotum broadly convex; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove absent; propodeum shining, dorsum and sides of propodeum mainly smooth, with weak to strong striolae on declivitous face and on metapleuron; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle; standing propodeal setae consisting of two or more prominent pairs anteriad, often with another pair of prominent setae posteriad, and other smaller setae on/around dorsal and declivitous surfaces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as sharp, acute angled flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) broad and thick, with short vertex anteriad, node sloping posteriad; appearance of node transversely rugose, shining between sculpture; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) between 1:1 and 3:4; anteroventral petiolar process present as a thin flange tapering posteriad; ventral petiolar lobe absent; height ratio

of petiole to postpetiole about 4:3; height–length ratio of postpetiole between 1:1 and 3:4; postpetiole strongly rugose; postpetiolar sternite not depressed at midpoint, its anterior end an inconspicuous lip or small carina.

GASTER: Pilosity of first gastral tergite consisting of well-spaced, erect and semi-erect setae interspersed with a few appressed setulae.

GENERAL CHARACTERS: Color dark reddish- or yellowish-brown. Worker caste monomorphic.

HOLOTYPE MEASUREMENTS: HML 3.22 HL 1.04 HW 0.98 CeI 94 SL 0.94 SI 96 PW 0.72.

OTHER WORKER MEASUREMENTS: HML 2.87–3.63 HL 0.96–1.16 HW 0.86–1.07 CeI 89–96 SL 0.86–1 00 SI 92–99 PW 0.63–0.78 (n=15).

REMARKS.— *Monomorium infuscum* is known only from a few workers from three sites near Ambanizana, Toamasina Province. Samples have been collected from rotten wood, sifted leaf litter and pitfall trap, in rainforest. Differences between this species and the very similar *M. aureorugosum* are provided in '*Remarks*' under the latter species.

Monomorium modestum Santschi

Figs. 34, 81– 82.

Monomorium modestum Santschi, 1914b:17. Syntype ☿s South Africa: Natal, Stamford Hill (NHMB) [type material misplaced in NMHB].

Monomorium (*Syllophopsis*) *modestum* Santschi, 1915:259.

Monomorium modestum Bolton, 1987:423.

Monomorium (*Syllophopsis*) *modestum* var. *boerorum* Santschi 1915:260, fig. 9 (☿). [Junior primary homonym of *Monomorium minutum* var. *boerorum* Forel, 1910b:442.]. Syntype ☿, SOUTH AFRICA: Transvaal, Pretoria (NHMB) [examined].

Monomorium (*Syllophopsis*) *modestum* var. *transwaalensis* [*sic*] Emery, 1922:175 [Replacement name for *boerorum*.]. Syn. under *Monomorium modestum* Santschi: Bolton, 1987:423.

Monomorium modestum var. *smutsi* Wheeler, W.M. 1922: 867 [Unnecessary second replacement name for *boerorum*.]. Syn. under *Monomorium modestum* Santschi: Bolton, 1987:423.

MATERIAL EXAMINED.— *M. modestum transwaalense* (corrected ending): SYNTYPE: ☿, South Africa (Transvaal), Pretoria (NHMB – Reg. No. 207). The syntype examined is headless. Other, more complete syntypes may be in existence, hence this specimen has not been designated a lectotype.

OTHER MATERIAL EXAMINED: **Prov. Antananarivo:** 3 km 41 NE Andranomay, 11.5 km 147 SSE Anjozorobe 5–13.xii.2000 Fisher *et al*. (22☿). **Prov. Fianarantsoa:** 45 km S Ambalavao 25.ix.1992 B.L. Fisher (4☿); 43 km S Ambalavao Res., Andringitra 5.x.1993 B.L. Fisher (3☿); P.N. Ranomafana, Vatoharanana 4.1 km 231 SW Ranomafana 27–31.iii.2003 Fisher *et* al. (4☿). **Prov. Toamasina:** 6.9 km NE Ambanizana, 2.xii.1993 B.L. Fisher (4☿); F. C. Sandranantitra 18–21.i.1999 (14☿) 21–24.x.1999 (3☿) H.J. Ratsirarson. **Prov. Toliara:** P.N. Andohahela, 3.8 km 113 ESE Mahamavo 21–25.i.2002 Fisher *et al*. (2☿); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (1☿).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye minute, eyes consisting of one or two ommatidia only; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set around midline of head capsule, or, set posteriad of midline of head capsule; Antennal segments 12; antennal club three-segmented. Clypeal carinae weakly to strongly defined; anteromedian clypeal margin emarginate, clypeal carinae indistinct, or, emarginate, clypeal carinae terminating in blunt angles, or, emarginate, clypeal carinae terminating in small denticles; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer mandibular insertions than antennal fossae. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four;

mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and mainly smooth, vestigial striolae, if present, confined to lower anterior mesopleuron; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae, or vestigial. Propodeum shining and smooth, metapleuron with a few weak striolae; propodeal dorsum flat throughout most of its length; propodeum smoothly rounded or with indistinct angle; standing propodeal setae consisting of one prominent pair anteriad, with a few to many erect to decumbent setae on/around dorsal and declivitous faces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as rounded flanges.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated within anterior sector of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 1:1; anteroventral petiolar process present as a thin flange tapering posteriad; ventral petiolar lobe present; height ratio of petiole to postpetiole between 3:2 and 4:3; height–length ratio of postpetiole about 1:1; postpetiole shining and smooth; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color depigmented creamy yellow. Worker caste monomorphic.

SYNTYPE WORKER MEASUREMENTS: Measurements not taken as syntype is headless.

OTHER WORKER MEASUREMENTS: HML 1.21–1.44 HL 0.46–0.52 HW 0.36–0.41 CeI 77–80 SL 0.33–0.39 SI 90–97 PW 0.22–0.30 (n=20).

REMARKS.— At the time of writing, type material for *Monomorium modestum* is missing (per Dr. D. Burckhardt, NHMB, pers. commun.), and the syntype of *Monomorium modestum transwaalense* (i.e., previously *M. modestum boerorum*) available to me for examination is headless, hence the identification of the Malagasy material as *Monomorium modestum* is provisional. Bolton (1987) uses the morphology of the propodeum and the nature of the metanotal groove to distinguish *M. modestum* from other African ants in that species group. The *transwaalense* syntype, however, clearly has an angulate propodeum that approximates to what can be found in many *Monomorium cryptobium* specimens. In workers of these small ants propodeal denticles are not always present. Moreover, the *transwaalense* syntype has quite a distinct metanotal impression, not the 'simple indentation' that Bolton mentions. The Malagasy material, on the other hand, *does* have a much more rounded propodeum and the metanotal groove is indeed simply a weak impression. In fact, Malagasy workers have much more of the appearance of Fig. 95 in Bolton's monograph than the *transwaalense* syntype. Electronic images of worker material collected many years ago in Natal and identified (probably by Arnold: H. Robertson pers. commun.) as *M. modestum* have been sent to me by Dr. Hamish Robertson (South African Museum), and these appear to be identical with the Malagasy workers. This raises the possibility that *Monomorium modestum* and *Monomorium modestum transwaalense* may not be conspecific. The general appearance of the *transwaalense* syntype suggests *M. sechellense*, but in that species the propodeum is distinctly dentate and the mesopleuron is sculptured, whereas this is not the case with *transwaalense*.

On Madagascar *Monomorium modestum* has a known distribution that is exactly complemen-

tary to that of *M. sechellense*, the latter occupying the drier west coast of Madagascar and the former the more humid east coast. Populations of these two species converge in the south near the Isantoria River (Toliara Province). The workers of *M. modestum* are nearly identical in appearance to small, depigmented yellow workers of *M. hildebrandti,* from which they differ only in the form of the compound eye. The weakly angulate to rounded propodeum enables Malagasy workers of the species to be separated from those of *Monomorium cryptobium* and *M. sechellense*. Queens and males are not represented in the CAS collection. With the exception of one worker taken in a pitfall trap, the universal collection method for this species has been sifted litter. All specimens have been collected in rainforest.

Monomorium sechellense Emery

Figs. 34, 83–84.

Monomorium fossulatum subsp. *sechellense* Emery, 1894a: 69, fig. (☿). Syntype's (lectotype here designated). SEYCHELLES: Marianne (MCSN) [examined]. Syn. under *Monomorium fossulatum* Wilson and Taylor, 1967:64. Syn. under *Monomorium sechellense* Bolton, 1995: 267 [*sechellense* has priority over *fossulatum* as senior synonym].

MATERIAL EXAMINED.— LECTOTYPE: ☿, Seychelles, Marianne, C. Alluaud, 1892 (MCSN). The erection of the lectotype fixes the name of this widespread taxon, whose populations vary chiefly in the degree of cephalic punctation. PARALECTOTYPE: ☿, same data as above (MCSN). (Carded specimen removed from same pin as lectotype above and repinned, together with new labels.)

OTHER MATERIAL EXAMINED: **Prov. Mahajanga:** P.N. Ankarafantsika, Ampijoroa, 5.4 km 331 NW Andranofasika 30.iii.2001 Rabeson *et al*. (1☿); P.N. Namoroka, 9.8 km 300 WNW Vilanandro, 4–8.xi.2002 Fisher *et al*. (18☿, 6♀); P.N. Namoroka, 17.8 km 329 WNW Vilanandro, 8–12.xi.2002 Fisher *et al*. (11☿, 3♀); P.N. Tsingy de Bemaraha, 3.4 km 93 E Bekopaka 6–10.xi.2001 Fisher *et al*. (8☿). **Prov. Toliara:** Cap Sainte Marie, 14.9 km 261 W Marovato 13–19.ii.2002 Fisher *et al*. (6☿); Fiherenana, Frontier Project 21–24.x.2002 MGF040 (7☿); Forêt Mahavelo, Isantoria Riv., 5.5 km 37 NE Ifotaka 31.i.2002 Fisher *et al*. (1☿); 28 km NNW Ranohira, Isalo N. P., 16.xii.1993 G. D. Alpert (6☿) (MCZ).

WORKER DESCRIPTION.— HEAD: Head rectangular; vertex planar or weakly concave; frons shining and smooth except for piliferous pits; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye minute, eyes consisting of one or two ommatidia only; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule. Antennal segments 12; antennal club three-segmented. Clypeal carinae always weakly defined; anteromedian clypeal margin straight between strongly divergent clypeal carinae, clypeus descending almost vertically to horizontal arc of mandibles and sometimes transversely carinate below level of antennal insertions; paraclypeal setae moderately long and fine, curved; posteromedian clypeal margin extending slightly beyond level of posterior margin of antennal fossae. Anterior tentorial pits situated nearer mandibular insertions than antennal fossae. Frontal lobes sinuate, divergent posteriad. Psammophore absent. Palp formula 2,2. Mandibular teeth four; mandibles linear-triangular and smooth (except for piliferous pits); masticatory margin of mandibles strongly oblique; basal tooth approximately same size as t3 (four teeth present).

MESOSOMA: Promesonotum shining and smooth on dorsum, lower mesopleuron strongly punctate; (viewed in profile) anterior promesonotum smoothly rounded, thereafter more-or-less flattened, promesonotum on same plane as propodeum; promesonotal setae greater than twelve; standing promesonotal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally and often paired, interspersed with much shorter, incurved, decumbent setae; appressed promesonotal setulae few, mainly on sides of promesonotum. Metanotal groove strongly impressed, with distinct transverse costulae. Propodeum shining, dorsum and sides of propodeum

mainly smooth, with weak to strong striolae on declivitous face, metapleuron also with weak to strong striolae; propodeal dorsum flat throughout most of its length; propodeum distinctly angulate, propodeal angles produced as short denticles; length ratio of propodeal dorsum to its declivity about 1:1; standing propodeal setae consisting of one prominent pair anteriad, with a few to many erect to decumbent setae on/around dorsal and declivitous faces of propodeum; appressed propodeal setulae very sparse or absent; propodeal spiracle equidistant from metanotal groove and declivitous face of propodeum. Vestibule of propodeal spiracle absent or not visible. Propodeal lobes present as vestigial flanges or small strips of cuticle only.

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated slightly anteriad of petiolar node; node (viewed in profile) conical, vertex rounded; appearance of node shining and smooth throughout; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; ventral petiolar lobe absent; height ratio of petiole to postpetiole between 4:3 and 1:1; height–length ratio of postpetiole between 4:3 and 1:1; postpetiole shining and smooth; postpetiolar sternite without anterior lip or carina, or this structure vestigial.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, semi-erect setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color pale, depigmented yellow. Worker caste monomorphic.

LECTOTYPE MEASUREMENTS: HML 1.12 HL 0.41 HW 0.34 CeI 83 SL 0.31 SI 91 PW 0.23.

OTHER WORKER MEASUREMENTS (non-types): HML 1.07–1.24 HL 0.40–0.45 HW 0.33–0.36 CeI 78–84 SL 0.31–0.35 SI 94–100 PW 0.22–0.25 (n=20).

QUEEN DESCRIPTION.— HEAD: Head square; vertex weakly concave or planar; frons shining and finely longitudinally striolate and microreticulate; pilosity of frons a mixture of incurved, semi-erect setae and slightly shorter decumbent setae. Eye elliptical, curvature of inner eye margin may be more pronounced than that of its outer margin; (in full-face view) eyes set at about midpoint of head capsule; (viewed in profile) eyes set posteriad of midline of head capsule.

MESOSOMA: Mesoscutum broadly convex anteriad, convexity reduced posteriad; pronotum, especially, also mesoscutum and mesopleuron shining with scattered punctation, otherwise smooth; length–width ratio of mesoscutum and scutellum combined between 2:1 and 3:2; axillae separated by width of at least one axilla; standing pronotal/mesoscutal setae a mixture of well-spaced, distinctly longer, erect and semi-erect setae which are curved distally, interspersed with much shorter, incurved, decumbent setae; appressed pronotal, mescoscutal and mesopleural setulae very sparse or absent; propodeum shining, uniformly weakly striolate; propodeum distinctly angulate, propodeal angle sharp; propodeal dorsum sloping posteriad, and depressed between raised propodeal angles; standing propodeal setae consisting of up to a dozen or more longer erect and shorter sub-erect setae; appressed propodeal setulae very sparse or absent; propodeal spiracle nearer metanotal groove than declivitous face of propodeum; propodeal lobes present as well-developed, rounded flanges.

WING: Wing not seen (queens dealated).

PETIOLE AND POSTPETIOLE: Petiolar spiracle lateral and situated well anteriad of petiolar node; node (viewed in profile) cuneate, vertex tapered; appearance of node shining and microreticulate; ratio of greatest node breadth (viewed from front) to greatest node width (viewed in profile) about 4:3; anteroventral petiolar process absent or vestigial; height ratio of petiole to postpetiole about 1:1; height–length ratio of postpetiole about 4:3; postpetiole shining and microreticulate; postpetiolar sternite depressed at about its center, with anterior process developed as a short, conspicuous spur angled at 45–90.

GASTER: Pilosity of first gastral tergite consisting of a mixture of incurved, erect and semi-erect

setae and slightly shorter decumbent setae.

GENERAL CHARACTERS: Color brown. Brachypterous alates not seen. Ergatoid or worker-female intercastes not seen.

QUEEN MEASUREMENTS: HML 1.68–1.78 HL 0.48–0.51 HW 0.45–0.46 CeI 90–96 SL 0.42–0.43 SI 91–93 PW 0.41–0.43 (n=9).

REMARKS.— Its sculptured mesopleuron immediately enables the *Monomorium sechellense* worker to be distinguished from the worker of *M. cryptobium* and *M. modestum*. Queens are larger, darker and more heavily sculptured than those of *M. cryptobium*. As has been the case with *M. modestum*, sifted litter has been the most effective collection method for individual workers of *M. sechellense*, though one small nest series was taken from a rotten log. The species is found in dry tropical forest and gallery forest habitats in Antsiranana, Mahajanga and Toliara Provinces. Outside of Madagascar, this species has a wide distribution in the Indo-Pacific region (e.g., Bolton 1987; Wetterer 2002) and probably also occurs in Australia (Heterick 2001).

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Illustrations

Figures 14–30, 32, 34: Distribution maps;
Figures 31 and 33: Scatter diagrams;
Figures 35–105: Automontage images
of specimens examined

FIGURE 14. Distribution of *M. clarinodis*(△), *M. notorthotenes* (□), *M. robertsoni* (▲), and *M. shuckardi* (■) specimens examined during this study

FIGURE 15. Distribution of *M. destructor* (■) and *M. robustior* (□) specimens examined during this study.

FIGURE 16. Distribution of *M. pharaonis* (△), *M. subopacum* (□), *M. willowmorense* (▲), and *M. latinode* (■) specimens examined during this study.

FIGURE 17. Distribution of *M. bifidoclypeatum* (■), *M. chnodes* (□), and *M. denticulus* (▲) specimens examined during this study.

FIGURE 18. Distribution of *M. exiguum* (■) specimens examined during this study.

FIGURE 19. Distribution of *M. flavimembra* (■) and *M. floricola* (□) specimens examined during this study.

FIGURE 20. Distribution of *M.nigricans* (■) and *M. lepidum* (□) specimens examined during this study.

FIGURE 21. Distribution of *M. madecassum* (■) specimens examined during this study.

FIGURE 22. Distribution of *M. micrommaton* (□) and *M. platynodis* (■) specimens examined during this study.

FIGURE 23. Distribution of *M. sakalavum* (■) specimens examined during this study.

FIGURE 24. Distribution of *M. termitobium* (■) specimens examined during this study.

FIGURE 25. Distribution of *M. versicolor* (□) and *M. xuthosoma* (■) specimens examined during this study.

FIGURE 26. Distribution of *M. hanneli* (■) specimens examined during this study.

FIGURE 27. Distribution of *M. adiastolon* (□), *M. ferodens* (●), and *M. gongromos* (▲) specimens examined during this study.

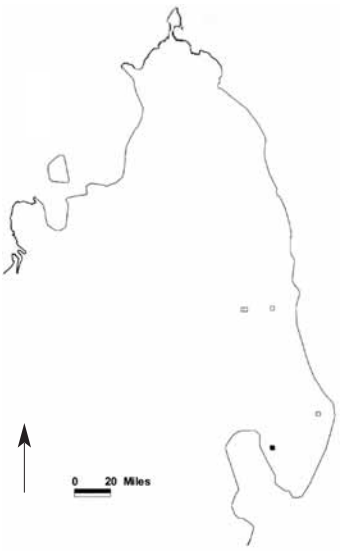


FIGURE 28. Distribution of *M. aureorugosum* (□) and *M. infuscum* (■) specimens examined during this study.

FIGURE 29. Distribution of *M. cryptobium* (■) specimens ex-amined during this study.

FIGURE 30. Distribution of *M. fisheri* (■) specimens examined during this study.

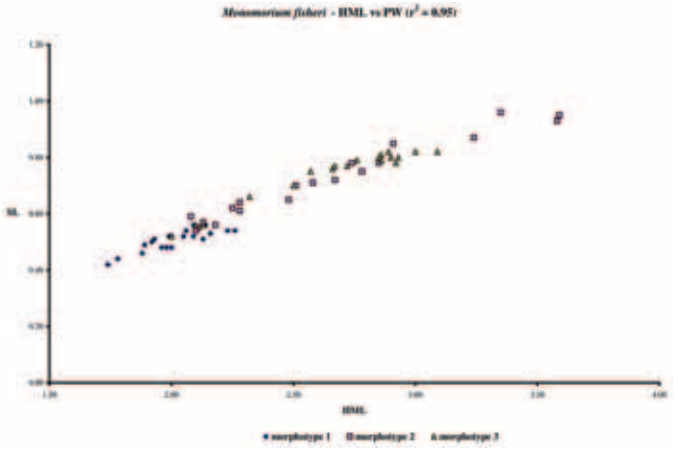


FIGURE 31. Scattegram showing relationship between head-mesosoma length (HML) and scape length (SL) for different morphotypes of *M. fisheri* sp. nov.

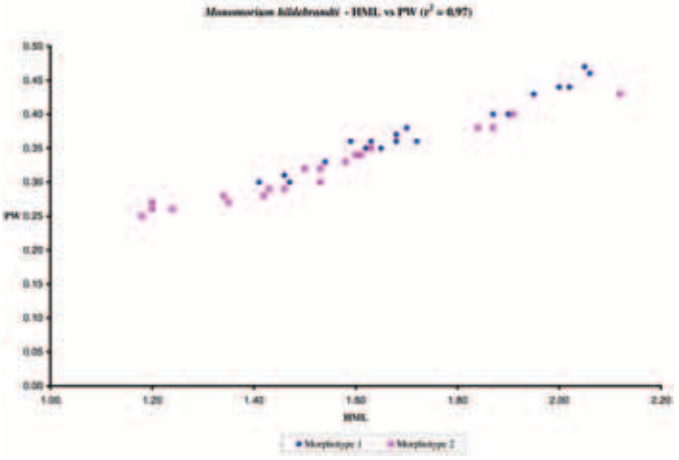
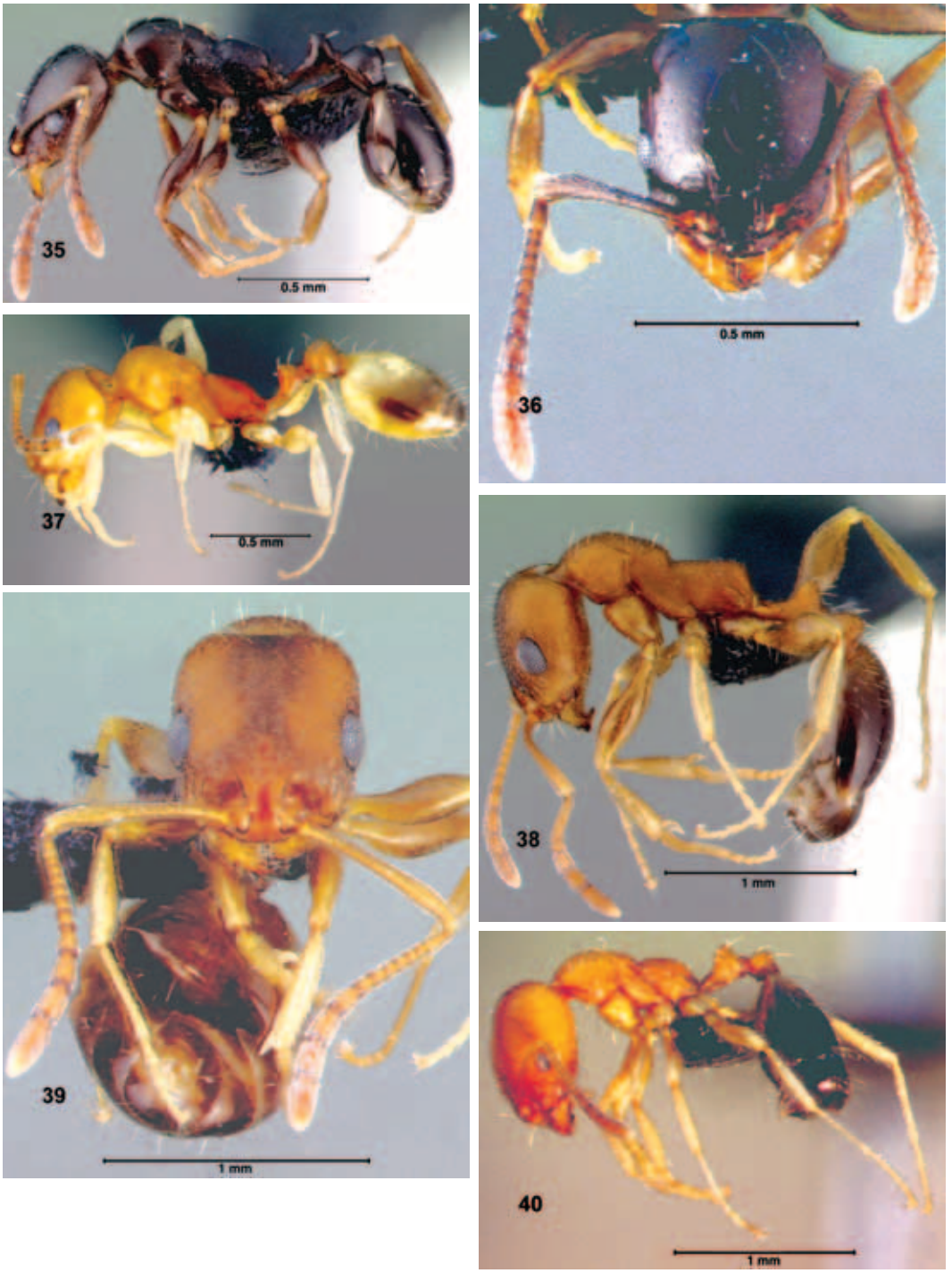


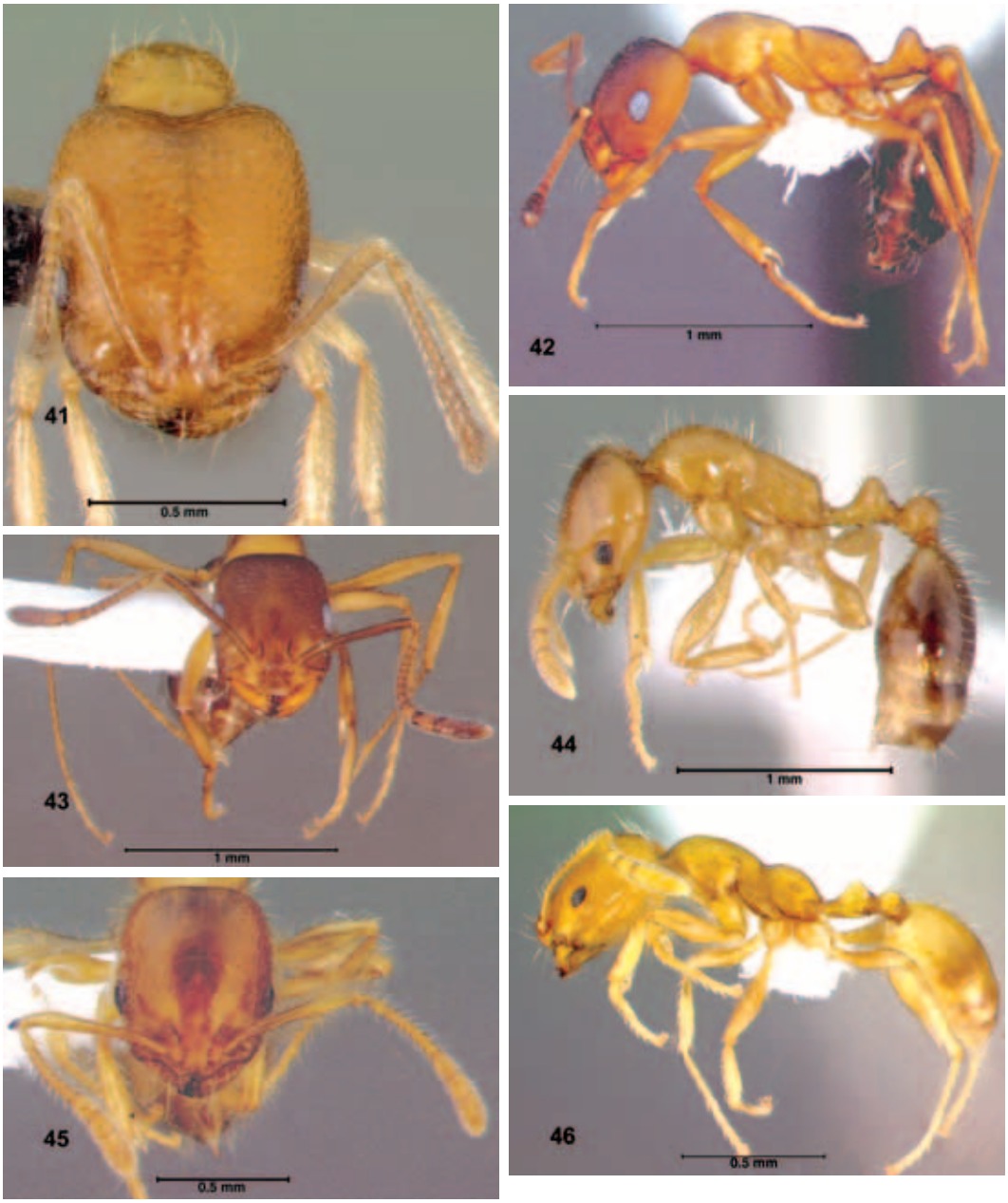
FIGURE 33. Scattegram showing relationship between head-mesosoma length (HML) and scape length (SL) for different morphotypes of *M. hildebrandti* sp. nov.

FIGURE 32. Distribution of *M. hildebrandti* (■) specimens examined during this study.

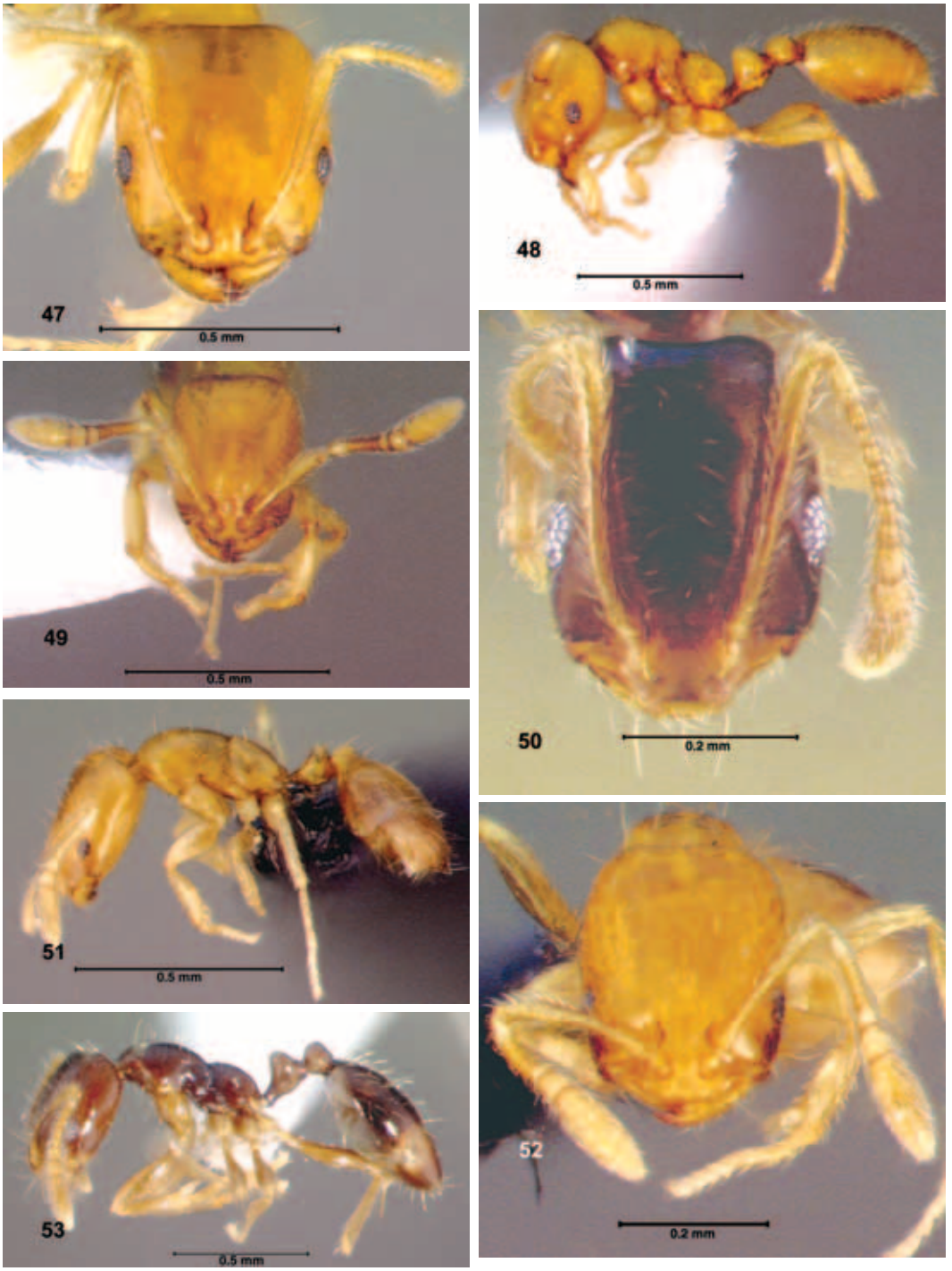
FIGURE 34. Distribution of *M. sechellense* (□) and *M. modestum* (■) specimens examined during this study.



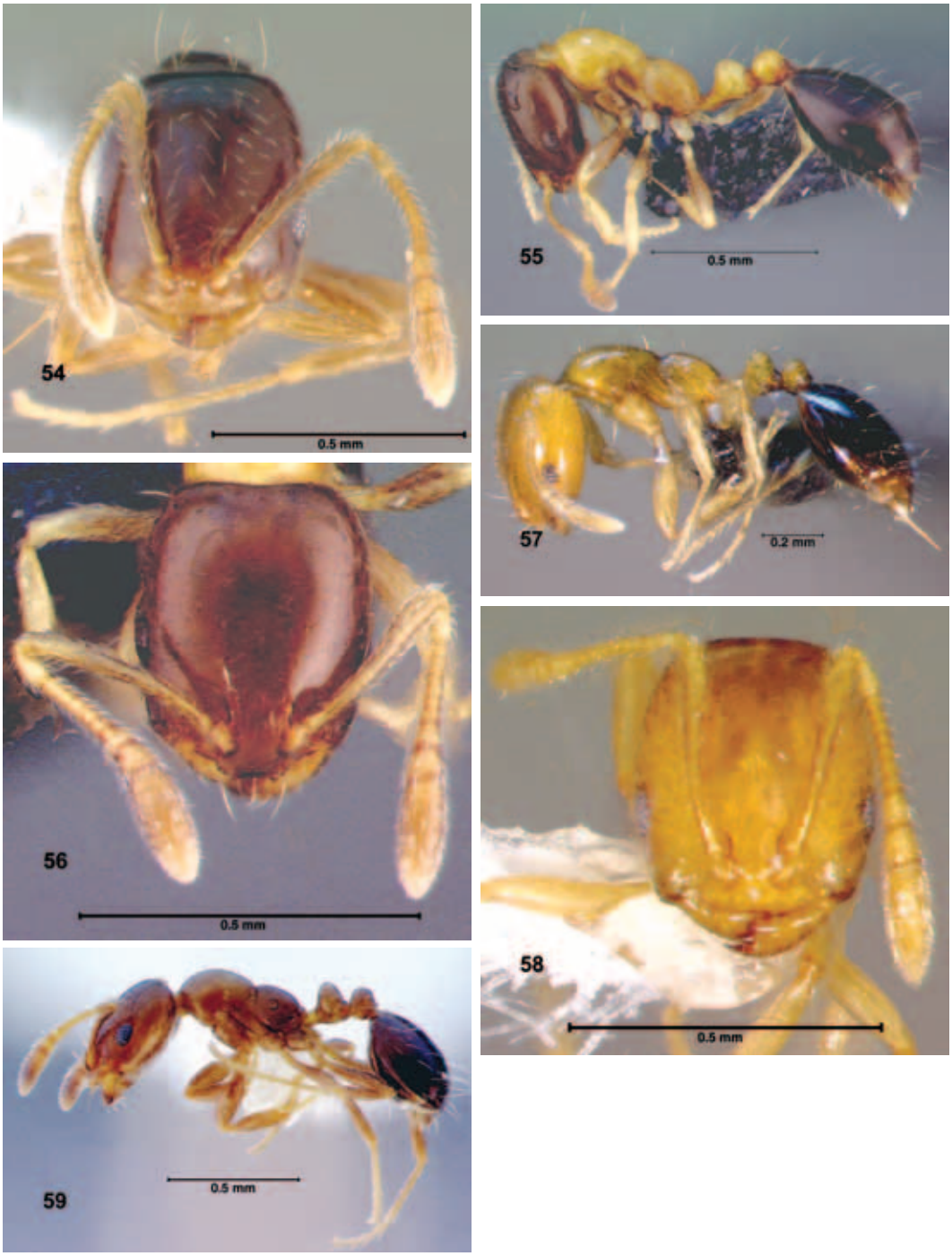
FIGURES 35–40. *Monomorium* workers: 35, profile of *M. clarinodis*; 36, full-face view of *M. clarinodis*; 37, profile of *M. robertsoni*; 38, profile of *M. shuckardi*; 39, full-face view of *M. shuckardi*; 40, profile of *M. destructor* ('*vexator*' lectotype).



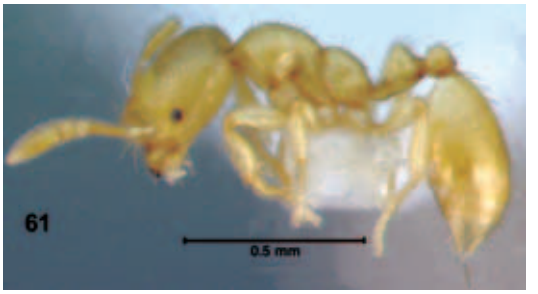
FIGURES 41–46. *Monomorium* workers: 41, full-face view of *M. destructor* ('*vexator*' lectotype); 42, profile of *M. subopacum*; 43, full-face view of *M. subopacum*; 44, profile of *M. latinode*; 45, full-face view of *M. latinode*; 46, profile of *M. bifidoclypeatum*.



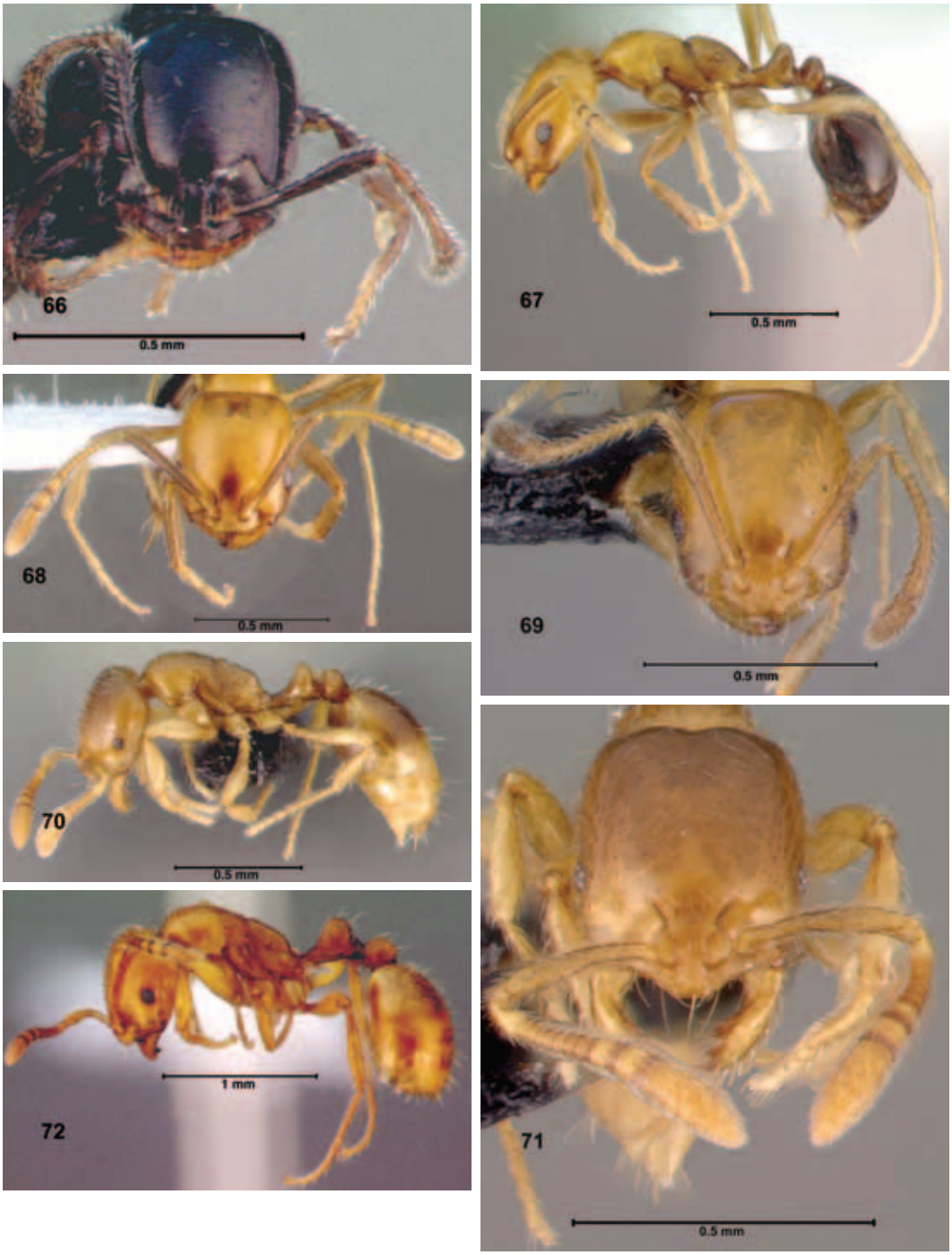
FIGURES 47–53. *Monomorium* workers: 47, full-face view of *M. bifidoclypeatum*; 48, profile of *M. chnodes*; 49. full-face view of *M. chnodes;* 50, full-face view of *M. denticulus*; 51, profile of *M. exiguum* (lectotype) 52, full-face view of *M. exiguum* (lectotype) 53, profile of *M. flavimembra*.



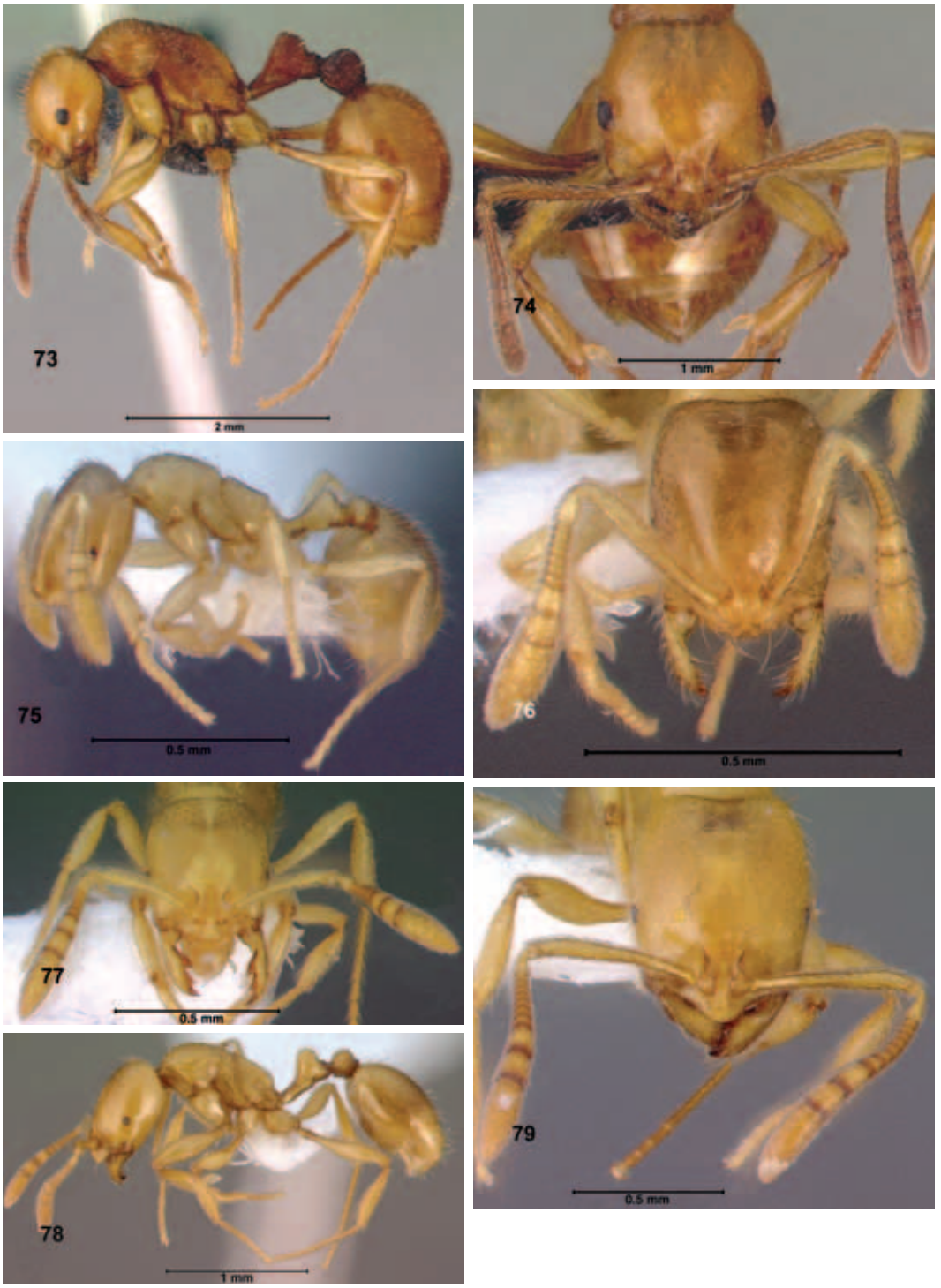
FIGURES 54–59. *Monomorium* workers: 54, full-face view of *M. flavimembra*; 55, profile of *M. floricola*; 56, full-face view of *M. floricola;* 57, profile of *M. lepidum*; 58, full-face view of *M. lepidum*; 59, profile of *M. madecassum*.



FIGURES 60–65. *Monomorium* workers: 60, full-face view of *M. madecassum*; 61, profile of *M. micrommaton*; 62, full-face view of *M. micrommaton*; 63, profile of *M. platynodis*; 64, full-face view of *M. platynodis*; 65, profile of *M. nigricans*.

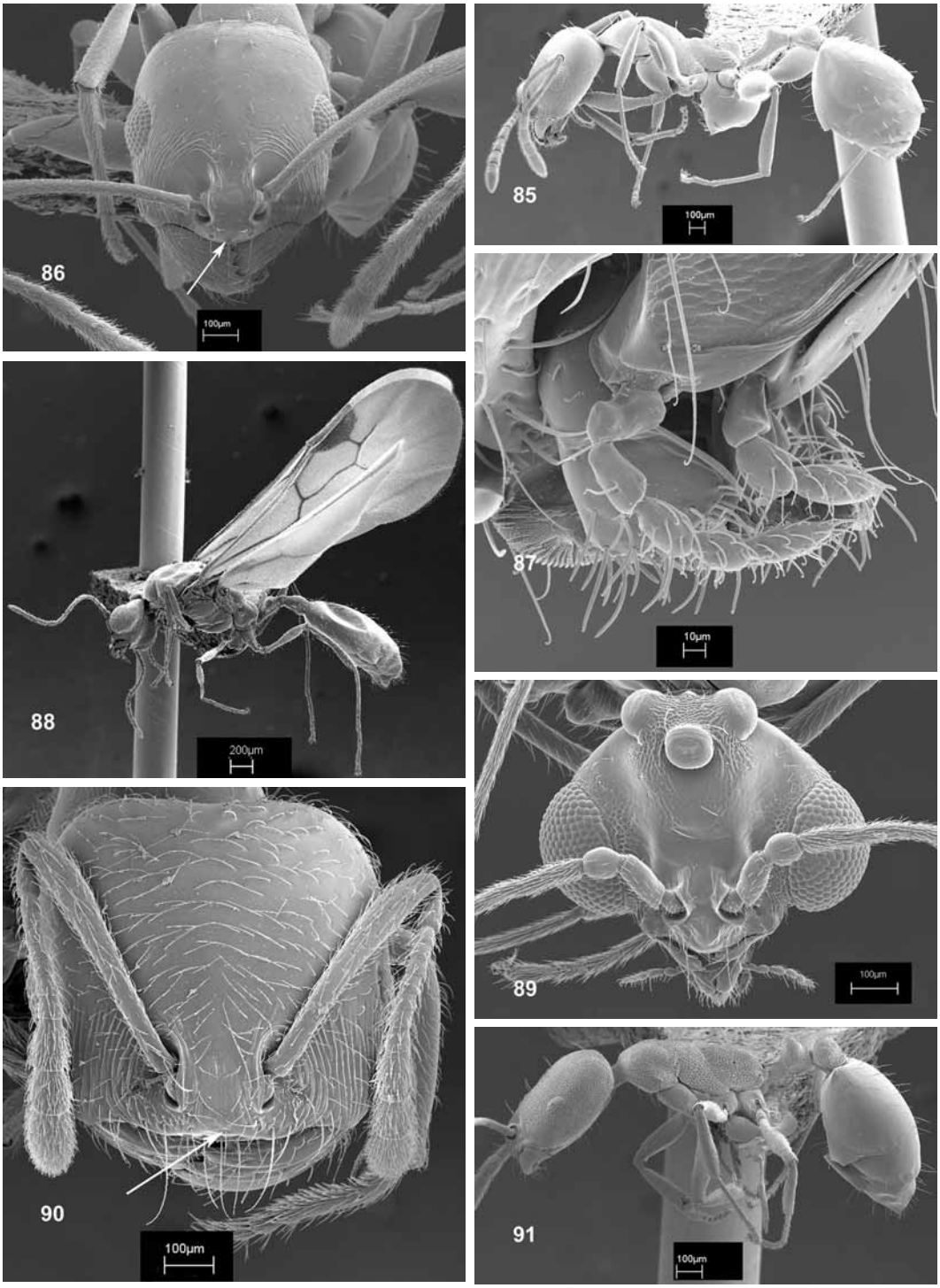


FIGURES 66–72. *Monomorium* workers: 66, full-face view of *M. nigricans*; 67, profile of *M. versicolor*; 68, full-face view of *M. versicolor*; 69, full-face view of *M. xuthosoma*; 70, profile of *M. hanneli* (‘*valtinum*’ holotype); 71, full-face view of *M. hanneli* (‘*valtinum*’ holotype); 72, profile of *M. adiastolon*.

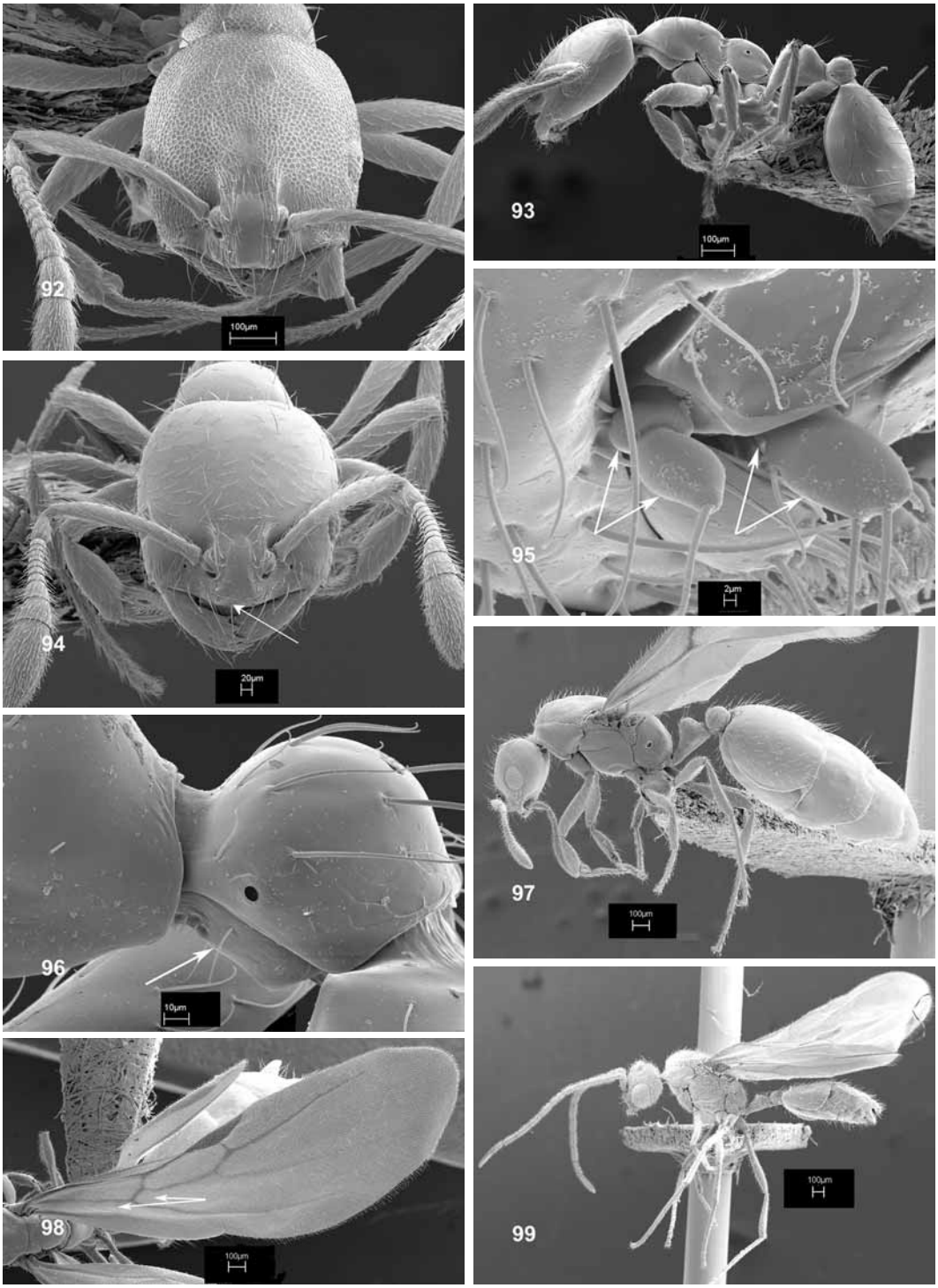


FIGURES 73–79. *Monomorium* workers: 73, profile of *M. aureorugosum*; 74, full-face view of *M. aureorugosum*; 75, profile of *M. cryptobium*; 76, full-face view of *M. cryptobium;* 77, full-face view of *M. ferodens*; 78, profile of *M. fisheri*; 79, full-face view of *M. fisheri*.

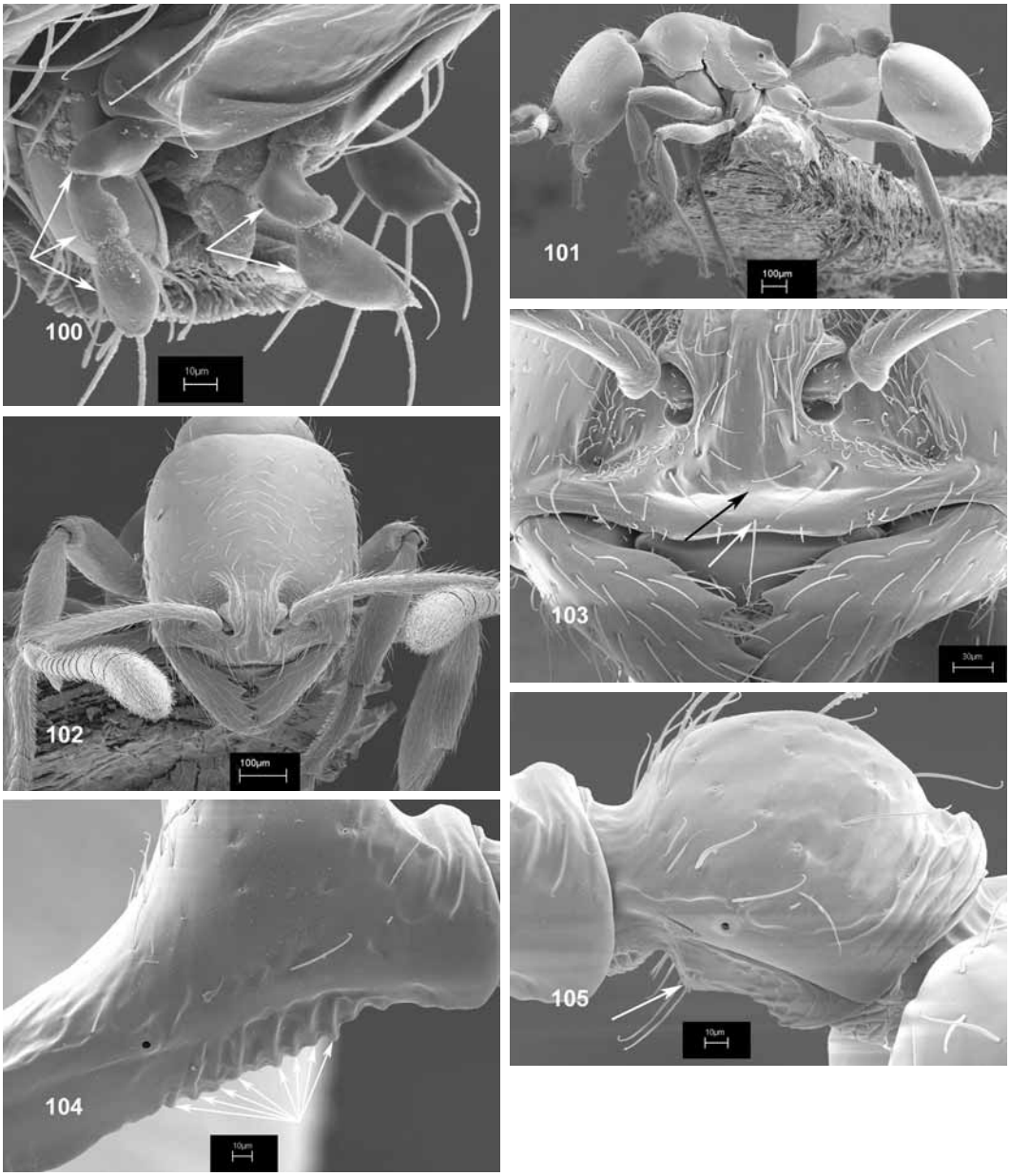
FIGURES 80–84. *Monomorium* workers: 80, full-face view of *M. gongromos* showing humeral excrescences; 81, profile of *M. modestum*; 82, full-face view of *M. modestum*; 83, profile of *M. sechellense*; 84, full-face view of *M. sechellese.*



FIGURES 85–91. *Monomorium* (SEM): 85, profile of *M. notorthotenes* worker; 86, full-face view of *M. notorthotenes* worker; 87, *M. notorthotenes* worker palps; 88, profile of *M. notorthotenes* male; 89, full-face view of *M. notorthotenes* male; 90, full-face view of *M. robustior* worker; 91, profile of *M. pharaonis* worker.



FIGURES 92–99 (left). *Monomorium* (SEM): 92, full-face view of *M. pharaonis* worker; 93, profile of *M. termitobium* worker; 94, full-face view of *M. termitobium* worker; 95, *M. termitobium* worker palps; 96, postpetiolar sternite of M. *termitobium* worker (anteroventral process is absent here); 97, profile of *M. termitobium* queen; 98, forewing of *M. termitobium* queen showing absence of cross-veins m-cu and cu-a; 99, *M. termitobium* male.



FIGURES 100–105 (above). *Monomorium* (SEM): 100, *M. ferodens* worker palps; 101, profile of *M. hildebrandti* worker; 102, full-face view of *M. hildebrandti* worker; 103, anterior margin of clypeus of *M. hildebrandti* worker showing placement of median seta (black arrow denotes clypeal protuberance); 104, underside of node of *M. hildebrandti* showing transverse rugulae; 105, postpetiolar sternite of M. *hildebrandti* worker showing anteroventral process.