

## **HORTIPES, A HUGE GENUS OF TINY AFROTROPICAL SPIDERS (ARANEAE, LIOCRANIDAE)**

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Source: Bulletin of the American Museum of Natural History, 2000(256)  
: 4-108

Published By: American Museum of Natural History

URL: [https://doi.org/10.1206/0003-0090\(2000\)256<0004:HAHGOT>2.0.CO;2](https://doi.org/10.1206/0003-0090(2000)256<0004:HAHGOT>2.0.CO;2)

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*HORTIPES*, A HUGE GENUS  
OF TINY AFROTROPICAL SPIDERS  
(ARANEAE, LIOCRANIDAE)

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BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Number 256, 108 pp., 35 figures, 1 table, 5 maps

Issued October 19, 2000

Price: \$9.70 a copy

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ISSN 0003-0090

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## ABSTRACT

*Hortipes* Bosselaers and Ledoux (type species *Hortipes luytenae* Bosselaers and Ledoux from South Africa) is a genus of small (1.5–4 mm), pale, mainly soil-dwelling spiders from sub-Saharan Africa. The genus, which is tentatively placed in the Liocranidae, is characterized by the presence of a peculiar ellipsoidal array of setae on the dorsal side of metatarsi I and II and by the large anterior median eyes with a dark retina restricted to the median portion. Ledoux and Emerit (1998) described five more species from Ivory Coast and Gabon. Sixty-three additional *Hortipes* species are described here as new: *H. platnicki* (♀), *H. castor* (♂ ♀), *H. pollux* (♂ ♀), *H. fastigiensis* (♂ ♀), *H. ostiovolutus* (♂ ♀), *H. salticola* (♂ ♀), *H. exoptans* (♂ ♀), *H. scharffi* (♂ ♀), *H. cucurbita* (♂ ♀), *H. hesperoecius* (♀), *H. klumpkeae* (♀), *H. aurora* (♂ ♀), *H. echo* (♀), *H. stoltzei* (♂), *H. creber* (♂ ♀), *H. orchatocnemis* (♂ ♀), *H. contubernalis* (♂ ♀), *H. mesembrinus* (♀), *H. coccinatus* (♂ ♀), *H. wimmertensi* (♂ ♀), *H. irimus* (♀), *H. licnophorus* (♀), *H. schoemanae* (♂ ♀), *H. aelurisiepae* (♀), *H. hyakutake* (♂), *H. rothorum* (♂), *H. griswoldi* (♂), *H. oronesiotes* (♂ ♀), *H. penthesileia* (♀), *H. zombaensis* (♂ ♀), *H. atalante* (♀), *H. merwei* (♂ ♀), *H. leno* (♂ ♀), *H. mulciber* (♀), *H. libidinosus* (♂ ♀), *H. delphinus* (♂ ♀), *H. bjorni* (♂), *H. amphibolus* (♀), *H. hastatus* (♂ ♀), *H. horta* (♀), *H. angariopsis* (♀), *H. falcatus* (♂ ♀), *H. lejeunei* (♂ ♀), *H. narcissus* (♂ ♀), *H. auriga* (♂), *H. puylaerti* (♀), *H. chrysothemis* (♀), *H. machaeropolion* (♂ ♀), *H. centralis* (♀), *H. tarachodes* (♂ ♀), *H. terminator* (♂), *H. baerti* (♂), *H. robertus* (♂ ♀), *H. abucoletus* ♀, *H. alderweireldti* (♂), *H. architelones* (♂ ♀), *H. calliblepharus* (♂), *H. fortipes* (♂), *H. bosmansii* (♂ ♀), *H. sceptrum* (♂ ♀), *H. anansiodatus* ♀, *H. hormigricola* (♂ ♀), and *H. depravator* (♂). The genus has a vast Afrotropical distribution, occurring from as far south as East London in South Africa to Sierra Leone in western Africa. So far, no specimens are available from northeastern tropical Africa. Apart from *H. merwei*, which seems to prefer grassland, all species are found in leaf litter or the canopy of different kinds of forests and dense thickets. In captivity, *H. contubernalis* readily fed on Collembola. Specimens raised from cocoons obtained in the laboratory reached adulthood after three molts. A cladistic analysis of the 34 species for which both sexes are known, largely based on secondary genitalic characters, is proposed.

## INTRODUCTION

Among the many unstable areas in spider systematics is the former Clubionidae. According to Simon (1897) this was a huge family with many subfamilies, some of which Simon had already split off. Recently, two more subfamilies (Corinninae and Liocraninae) have been split off, now constituting Liocranidae, Corinnidae, and part of Miturgidae (Lehtinen, 1967). As a result, Clubionidae itself has become a small family with only five genera represented in Africa (Dippenaar-Schoeman and Jocqué, 1997). Although once the core of a large taxon, the family has now become a poorly defined leftover, as no apomorphies have been established for it.

As far as the family Liocranidae is concerned, apomorphies have been proposed, but none of them seems to apply to the all genera that are presently attributed to the family (Platnick and Baptista, 1995; Platnick, 1997). Flattened female posterior median spinnerets (Dippenaar-Schoeman and Jocqué,

1997) are not encountered in genera such as *Agroeca* Westring, *Liocranum* L. Koch, and *Mesiotelus* Simon. A male palpal MA (Lehtinen, 1967) is absent from Phrurolithinae (Ubick and Platnick, 1991) and is present in most entelegyne spiders. Modified, erectile ventral leg bristles, possibly synapomorphic for Liocraninae and Phrurolithinae (Ubick and Platnick, 1991), are certainly not encountered in all genera grouped as Liocranidae by Platnick (1997). The presence of cylindrical gland spigots on female posterior median and lateral spinnerets differentiates the family from typical Clubionidae, but the presence of this type of gland spigot is plesiomorphic for all entelegynes (Platnick et al., 1991b). The presence of numerous paired ventral spines on the anterior tibiae and metatarsi likewise is not restricted to Liocranidae alone.

Some of the genera currently placed in Liocranidae are definitely misplaced, for example *Cambalida* Simon and *Messapus* Simon, which clearly belong in Corinnidae,

Castianeirinae, and *Thysanina* Simon, which also belongs in Corinnidae, as will be formally discussed elsewhere (Bosselaers and Jocqué, 2000). *Titiotus* Simon and *Anachemnis* Chamberlin were transferred to Tengelidae by Platnick (1999). On the other hand some genera presently classified outside Liocranidae, for example *Neoanagraphis* Gertsch and Mulaik and *Sphingius* Thorell, should be included (Platnick and Di Franco, 1992; Vetter, 2000; Deeleman-Reinhold, personal commun.).

Three subfamilies are generally accepted (Platnick and Baptista, 1995) in the Liocranidae as presently delimited: Liocraninae, Phrurolithinae, and Cybaeodinae. The Cybaeodinae, which Simon (1893) placed as Cybaeodeae in his Drassidae, is composed of the Mediterranean genus *Cybaeodes* Simon, the Afrotropical myrmecophilous genus *Andromma* Simon, and the monotypic genus *Macedoniella* Drensky from the Balkan Peninsula (Drensky, 1935; Platnick and Di Franco, 1992), of which the unique type specimen has been lost (Deltshev, personal commun.). However, Cybaeodinae is an ill-defined, most probably artificial taxon. The genera presently grouped in it are entirely composed of rare species, seldom encountered in collections, and the relationships of those genera need further study.

The easily defined Afrotropical genus *Hortipes* Bosselaers and Ledoux seems related to *Andromma* (and to *Coryssiphus* Simon as well) based on somatic and genitalic characteristics, as will be discussed herein. In addition to the type species *Hortipes luytenae* Bosselaers and Ledoux from South Africa, five more *Hortipes* species are presently known (Ledoux and Emerit, 1998): *H. arboricola* Ledoux and Emerit, *H. limicola* Ledoux and Emerit, and *H. paludigena* Ledoux and Emerit from Gabon and *H. marginatus* Ledoux and Emerit and *H. silvarum* Ledoux and Emerit from Ivory Coast. These five species were described from females only. Although Ledoux and Emerit (1998) mentioned and illustrated two males (sp. 1 and sp. 2) in their paper, they did not formally name them, nor did they attribute them to any of the females described. Because Ledoux and Emerit's specimens have not been available to us yet, no additional description of their species

will be given here, except for *H. silvarum*, which was also present in our own material.

The present paper describes 65 *Hortipes* species, of which 63 are new to science, and brings the number of known *Hortipes* species from 6 to 69. All known *Hortipes* species turn out to have the same distinct somatic morphology (Bosselaers and Ledoux, 1998; Ledoux and Emerit, 1998), which is surprisingly constant throughout the genus (figs. 1, 2).

Our contribution triples the number of Liocranidae known from the Afrotropical region from 28 (Dippenaar-Schoeman and Jocqué, 1997) to 97 and makes *Hortipes* one of the largest Afrotropical spider genera and the largest genus in the family Liocranidae. Indeed, although *Phrurolithus* C. L. Koch is also a very large liocranid genus, it is generally accepted that the American species described as *Phrurolithus* (Gertsch, 1941) should be transferred to *Scotinella* Banks (Kaston, 1978, 1981; Gertsch, 1979; Dondale and Redner, 1982). Although many of these transfers have not been formally cited and some confusion remains (e.g., Richman and Cutler, 1997), both genera can be considered to count less than 60 known species at present.

#### ACKNOWLEDGMENTS

The authors are very much indebted to the curators mentioned below (see Methods for abbreviations) for the loan of material. We are also indebted to Anthony Russell-Smith for the loan of specimens. Special thanks go to Rop Bosmans, who made his important collection of *Hortipes* specimens from Cameroon available to the authors. The authors are also very grateful to Johan Billen (University of Leuven, Belgium) for encouragement and support during many stages of the work.

Jean-Claude Ledoux (Solignac-sur-Loire, France), John Murphy (London, United Kingdom) and Gabriele Uhl (University of Bonn, Germany) are thanked for fruitful discussions and interesting remarks on various aspects of *Hortipes* taxonomy and morphology. The authors are very grateful to Christa Deeelman (Ossendrecht, Netherlands) and Charles Griswold (CAS) who carefully read

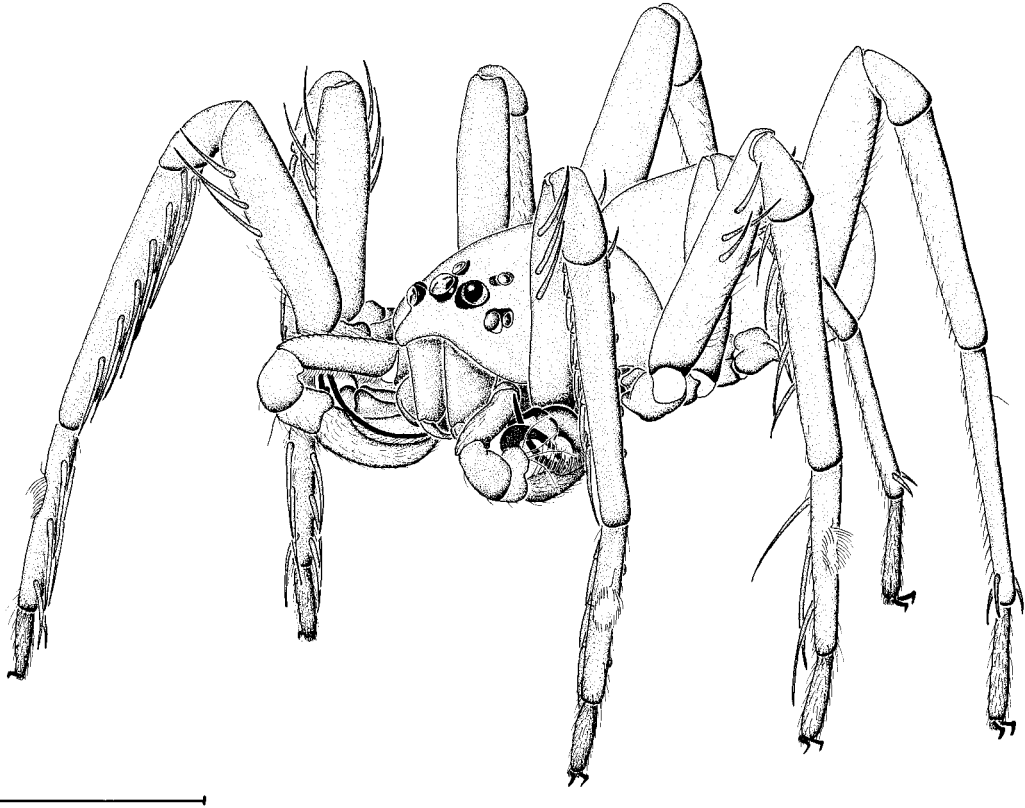


Fig. 1. *Hortipes falcatus*, new species. Habitus drawing, based on preserved specimen. In living animals, legs are stretched more sideways. Scale line: 1 mm.

an early version of the manuscript and commented on it, as well as to Nikolaj Scharff (ZMUC) and Eugene Gaffney (AMNH), who refereed the manuscript and made many valuable suggestions for improvement. Thanks are also due to Pablo Goloboff (Instituto Miguel Lillo, San Miguel de Tucumán, Argentina), Tiago Courrol Ramos (Sao Paulo, Brazil) Erik Smets and Jan De Laet (University of Leuven), Jonathan Coddington (Smithsonian Institution, Washington, D.C.), Nikolaj Scharff (ZMUC), and Jim Wilgenbusch (Smithsonian Institution) for advice on the use of specific computer pro-

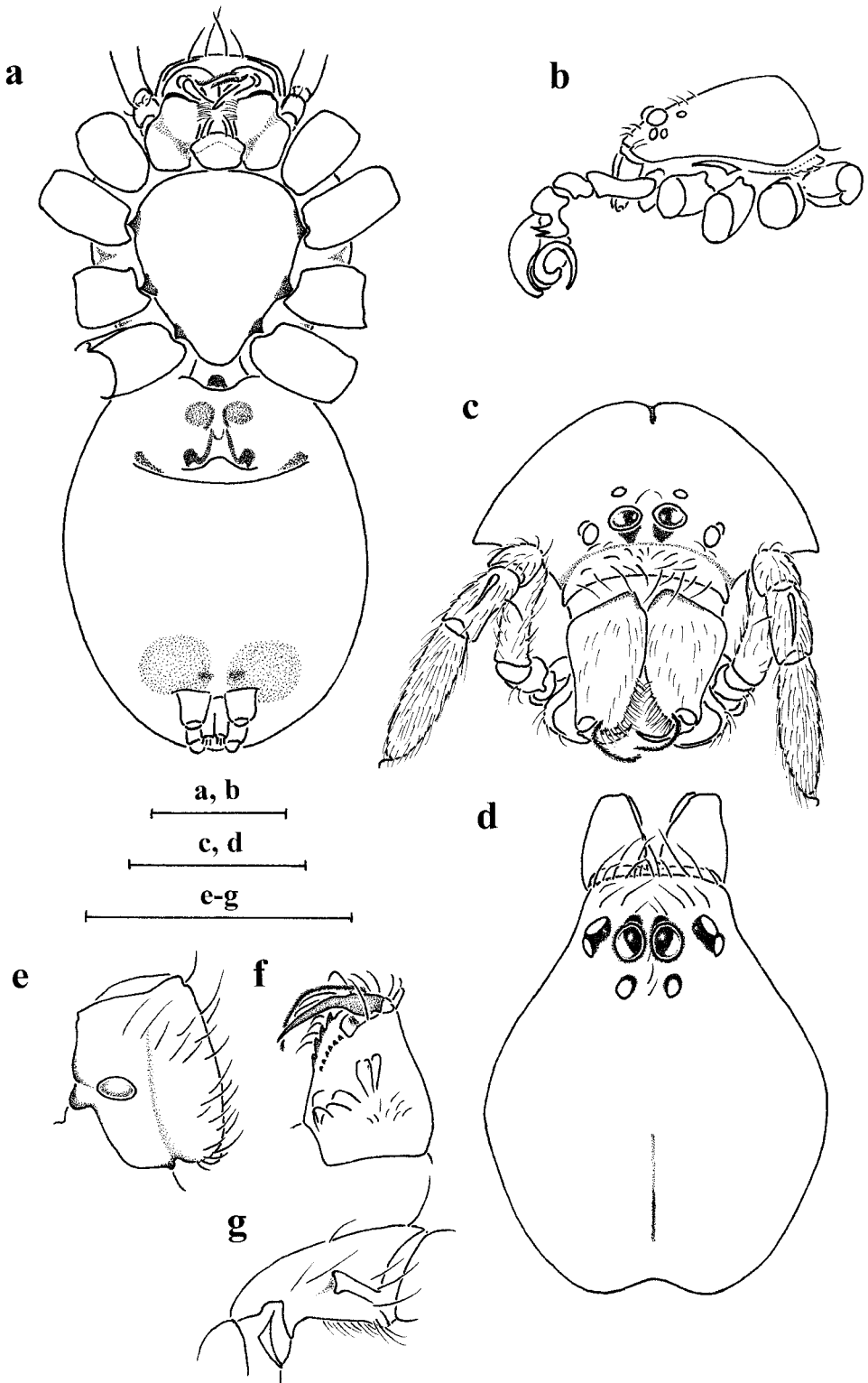
grams and on cladistics in general. Special thanks are due to Norman Platnick (AMNH), who was always available for discussion on every aspect of taxonomy, morphology, and cladistics we could explore. Furthermore, the authors are grateful to Antoon Bosselaers (University of Leuven) for writing a DOS program to calculate weighted tree lengths of PeeWee trees.

Alain Reygel (MRAC) is thanked for drawing the maps. The help of Lambert Leijssen and Rik Vermeer (Janssen Research Foundation, Beerse, Belgium), who skillfully made photographic plates compiling the

→

Fig. 2. *Hortipes luytenae* Bosselaers and Ledoux, somatic morphology. **a.** Female, ventral view. **b.** Male, lateral view of cephalothorax. **c.** Female, frontal view of cephalothorax. **d.** Female, dorsal view of cephalothorax. **e.** Female, posterior side of coxa I, showing retrocoxal window. **f.** Female, posterior side of chelicera. **g.** Female, posterior side of pa IV, showing patellar indentation.







drawings of JB, is gratefully acknowledged. Many thanks are due to Marie-Josée Vansant (Janssen Research Foundation) for help in obtaining some literature items and to Hans Henderickx (Janssen Research Foundation), who made the SEM photographs and took care of the necessary preparation techniques.

### NATURAL HISTORY

Most known *Hortipes* species inhabit the litter layer or, in some cases, the canopy (Ledoux and Emerit, 1998; Scharff, personal commun.) of Afrotropical mountain forests. However, 16 species, *H. castor*, *H. silvarum*, *H. mesembrinus*, *H. wimmertensi*, *H. rothorum*, *H. bjorni*, *H. puylaerti*, *H. chrysothemis*, *H. machaeropolion*, *H. tarachodes*, *H. terminator*, *H. centralis*, *H. baerti*, *H. abucoletus*, *H. alderweireldti*, and *H. fortipes* were collected only in lowland forests, and 5 species, *H. creber*, *H. merwei*, *H. robertus*, *H. architelines*, and *H. hormigricola*, occur over a wide altitude range. Not all species occur exclusively in the litter layer of forests: *H. calliblepharus* and *H. sceptrum* were also collected in savannah and *H. robertus*, *H. bosmansii*, and *H. hormigricola* were also found in grassland with isolated shrubs. *H. mesembrinus*, *H. atalante*, and *H. machaeropolion* are known only from bush vegetation. *H. merwei* is the only species that, besides having been collected from forest and a pine plantation, has consistently and repeatedly been captured in pitfall traps in grassland.

As far as the life history of *Hortipes* species is concerned, the only information presently available has been deduced from specimens of two South African species that were kept alive in captivity. Three females of *H. contubernalis* were collected live at Soutpansberg, Transvaal, South Africa in November 1996. The animals were kept in 5-cm-diameter petri dishes on moist filter paper covered with litter. They were found to feed on Collembola (*Orchesella* spp., *Isotoma* spp., and *Sminthurus* spp.) readily (fig. 3). One female died after a few weeks, but in December the other two females produced two egg cocoons each. The subglobular, off-white egg cocoons had a diameter of about 2 mm and were covered by a silken mat with



Fig. 3. *Hortipes contubernalis*, new species. Living animal devouring a collembolan.

a diameter of 4 mm, which attached the cocoon to the substrate. The females stayed close to the egg cocoons part of the time but did not guard them constantly. In mid-January 1997, five juveniles emerged from one of the egg cocoons through two holes that were diametrically opposed to each other at the edges of the silk mat. Upon examination, the hatched cocoon proved to contain the remnants of five eggshells.

Newly hatched *H. contubernalis* were 1 mm long, glossy, colorless, and nearly transparent, and had brown anterior median eyes. They lacked the peculiar oval array of setae on metatarsi I and II that is so typical of adult *Hortipes*. The young tended to stay close to the females at first and fed on small Collembola that they caught themselves. Juveniles as well as adult females spun a loosely woven mat of silk under which they often retreated. After three weeks the abdomen of the juveniles turned ochre. By the end of February, six weeks after emergence, the first molting occurred inside the animals' silken retreats. Second-instar juveniles had a length of 1.5 mm, a pale orange abdomen, and col-

orless carapace and legs. Contrary to the first-instar juveniles, they already possessed the peculiar oval array of setae, typical of the genus, on metatarsi I and II. Juveniles as well as adult females tended to be somewhat gregarious and did not show mutual aggression. No cannibalism was observed. The animals could move very swiftly, sometimes by small bounds. While running, the two pairs of front legs did not touch the substrate most of the time but were held outstretched in an antennalike fashion. By the end of March, 9 to 10 weeks after emergence, a second molting occurred. The resulting subadult specimens measured between 1.6 and 1.8 mm and were pale orange. Subadult males had thickened palps.

By the end of April, 14 weeks after hatching, a third molting produced a first adult male. Subadult females molted into adults by the third week of May, 17 weeks after hatching. The two females originally caught died in April and July, 1997, respectively. No copulation of the second-generation animals could be observed, no new egg cocoons were produced, and no third generation could be bred. The last animals died in August 1997.

New living male and female specimens of *H. contubernalis* and *H. coccinatus* were captured in August 1997, at Soutpansberg and Magoebaskloof, Transvaal, South Africa, respectively. Live captured males of both species did not survive longer than a few days and did not copulate. Females never produced egg cocoons, suggesting mating had not yet taken place in the field in August, when they were captured. Females of *H. coccinatus* did not survive longer than a few weeks in captivity, although they did feed on Collembola. One *H. contubernalis* female was kept alive until April 1998.

## METHODS

All measurements are given in millimeters, except when stated otherwise. Specimens were studied under a stereomicroscope equipped with an eyepiece grid by means of incident light. In order to make detailed drawings of the internal female genitalia, vulva preparations were dissected free, cleared in methyl salicylate, and photographed in several focal planes under a compound microscope

by means of transmitted light. Photographs of these optical sections were subsequently used for the execution of the drawings. In some instances, micrographs were electronically merged or enhanced with an "unsharp masking" technique by means of the computer programs Pictor 1.2 (Schollaerts and Houben, 1994) and Paint Shop Pro 5.0.

Specimens examined with the Philips XL-20 SEM were dehydrated in acetone, critical point dried in carbon dioxide, and sputter coated with gold prior to observation. Spinneret gland spigot terminology follows Koorvor (1987), Coddington (1989), and Platnick (1990).

Cladistic analyses were performed using the computer programs Pee-Wee 2.6 (Goloboff, 1997a), XPee-Wee (Goloboff, 1997b), NONA 1.6 (Goloboff, 1997c), Hennig86 1.5 (Farris, 1988), and PAUP 4.0 beta 2 (Swofford, 1999). Trees and distribution of character states in terminal taxa were visualized with the computer program Tree Gardener 2.2.1 (Ramos, 1997), which was also used as a Windows shell for Hennig86. Data files were converted from Hennig86 to NEXUS file format and vice-versa by means of Treeview 1.5 (Page, 1996, 1998). Component 2.0 (Page, 1993) was used for calculation of consensus trees, and for printing trees, in order to be able to compare individual trees in large sets of equally parsimonious trees. Optimization of character states and printing of the resulting trees was performed using Clados 1.9.1 (Nixon, 1998) and Winclada 0.9.99i beta (Nixon, 1999). Bremer support for equally weighted trees was calculated using Autodecay 4.0 (Eriksson, 1998) and PAUP 4.0 beta 2. All programs were run on a Compaq Prolinea 575 PC, a Compaq Deskpro XL 5100 PC, and an AT&T Globalyst 200S laptop PC, except for Autodecay 4.0, which was run on a Mac IICI. Data files that had to be transferred between Mac and PC platforms were converted using Transmac 3.1.

## ABBREVIATIONS

The following abbreviations are used throughout the text.

ALE	anterior lateral eyes
AME	anterior median eyes
ci	consistency index
FD	fertilization duct

fe	femur
ID	insemination duct
MA	median apophysis of the male palp
MDST	mean diameter of spermatheca
mt	metatarsus
pa	patella
PC	personal computer
PLE	posterior lateral eyes
plt	prolateral terminal
plv	prolateral ventral
PME	posterior median eyes
rc	rescaled consistency index
ri	retention index
rlt	retrolateral terminal
rlv	retrolateral ventral
RTA	retrolateral tibial apophysis of the male palp
rv	retroventral
SEM	scanning electron microscope
ST1	spermatheca 1 (closest to fertilization duct)
ST2	spermatheca 2
ta	tarsus
ti	tibia
vsp	ventral spine pairs
vt	ventral terminal

Institutional abbreviations and collection curators (in parentheses) follow.

AMNH	American Museum of Natural History, New York (N. Platnick)
CAS	California Academy of Sciences, San Francisco (C. Griswold)
MRAC	Musée Royal de l'Afrique Centrale, Tervuren (R. Jocqué)
NCA	National Collection of Arachnida, Pretoria (A. Dippenaar-Schoeman)
ZMUC	Zoological Museum University of Copenhagen (N. Scharff)

## PHYLOGENY

Because only one sex is known for 31 of the 65 *Hortipes* species described here, the complete data matrix for all species has a large number of missing entries, a situation known to cause problems when searching for most parsimonious trees (Platnick et al., 1991a; Wilkinson, 1995a). For example, when a preliminary tree search was performed using PeeWee 2.6 on a matrix for all 65 species under implied weighting, excessively long run times were needed and very large numbers of trees were generated, causing memory overflow even when the tree

buffer was set to contain 40000 trees. The resulting strict consensus showed little resolution. Tree searches under equal weighting in Hennig86 1.5 or NONA 1.6 experienced the same problems.

Therefore, it was decided to restrict phylogenetic analysis to the 34 *Hortipes* species known from males and females. The African liocranid genera *Andromma* and *Coryssiphus* were chosen as outgroups. Both genera share with *Hortipes* the presence of numerous vsp on ti and mt I and II; peculiar AME with their retina restricted to the median portion; relatively simple, weakly sclerotized epigynes; male palps with a simple, relatively thin and sharp embolus; and a mostly unsclerotized, more or less transparent tegulum showing at least part of the sperm duct. For *Andromma*, males of *A. aethiopicum* Simon (the type species of the genus), *A. raffrayi* Simon, and two undescribed species, as well as females of three undescribed species, have been studied for the present analysis. For *Coryssiphus*, the holotypes of *C. cinerascens* Simon, *C. praeusta* Simon (the type species of the genus), and *C. unicolor* Simon, as well as additional material from MRAC, were studied. All these specimens turned out to constitute only a single species, a matter that will be formally discussed elsewhere.

Because somatic characters show very little variation within the genus *Hortipes*, 59 of the 90 characters used in the present cladistic analysis are genitalic. Due to the large number of species in the genus and the extensive variation in shape and size of many parts of the genital organs, 26 characters are scored as multistate. The complex shape spectrum of the male RTA, crucial for distinguishing between some closely related species, had to be described by several characters (characters 53–59), each character referring to one RTA type.

Characters (e.g., characters 32 and 33) were scored with character states hierarchically related, as advocated by Hawkins et al. (1997), even though this necessitated coding missing entries due to character inapplicability in some instances (Maddison, 1993).

The characters used in the analysis are listed and discussed in the next section. Character state numbering does not imply plesiomorphy or apomorphy, because character

polarity is derived during cladogram search by outgroup comparison (Watrous and Wheeler, 1981; Maddison et al., 1984; Kitching et al., 1998).

#### CHARACTER DISCUSSION

##### LEGS

**Character 1. Dorsal side of mt I and II.** (0) Unmodified; (1) equipped with a peculiar set of setae arranged in a full circle (fig. 6a, b). Mt. I and II of all *Hortipes* species bear a peculiar ellipsoidal array of setae on their dorsal side, which is described in the genus description and in Ledoux and Emerit (1998). No other known spider genus has this feature.

**Character 2. Patellar indentation.** (0) Closed; (1) open. The patellar indentation (Ledoux and Canard, 1991: fig. 15; Ledoux and Emerit, 1998: 158) is a notch situated at the posterior side of the pa. It is thin and narrow, almost closed, in most liocranids including *Andromma*, whereas it is relatively short and wide in *Coryssiphus* and *Hortipes* (fig. 2g).

**Character 3. Basal dorsal spine on fe.** (0) Present; (1) absent.

**Character 4. Additional dorsal spines on fe.** (0) Present; (1) absent.

**Character 5. Plv spines on fe I.** (0) One; (1) two or more.

**Character 6. Flattened feathery hairs.** (0) Absent; (1) present. Flattened feathery hairs (Griswold, 1993: fig. 61; Townsend and Felgenhauer, 1998: fig. 8) are present on abdomen and legs of all *Hortipes* species but absent in *Andromma* and *Coryssiphus*.

**Character 7. Rlv spines on fe I of males.** (0) None; (1) two; (2) three.

**Character 8. Rlv spines on fe I of females.** (0) None; (1) two; (2) three or more.

**Character 9. Terminal spines on fe IV of males.** (0) None; (1) at least one.

**Character 10. Terminal spines on fe IV of females.** (0) None; (1) at least one.

**Character 11. Number of vsp on mt I and II.** (0) Two; (1) three.

**Character 12. Number of vsp on ti I and II of males.** (0) Six; (1) five; (2) four.

**Character 13. Number of vsp on ti I and II of females.** (0) Seven; (1) six; (2) four to five.

**Character 14. Plt spine on mt III of males.** (0) Absent; (1) present.

**Character 15. Plt spine on mt III of females.** (0) Absent; (1) present.

**Character 16. Vt spine on mt III of males.** (0) Absent; (1) present.

**Character 17. Vt spine on mt III of females.** (0) Absent; (1) present.

**Character 18. Rlt spine on mt III of males.** (0) Absent; (1) present.

**Character 19. Rlt spine on mt III of females.** (0) Absent; (1) present.

**Character 20. Plt and rlt spines on mt IV of males.** (0) One of each; (1) none.

**Character 21. Plt and rlt spines on mt IV of females.** (0) One of each; (1) none.

**Character 22. Vt spines on mt IV of males.** (0) One; (1) two; (2) none.

**Character 23. Vt spines on mt IV of females.** (0) One; (1) two; (2) none.

##### CEPHALOTHORAX

**Character 24. Dentation of inner cheliceral rim.** (0) Two isolated teeth; (1) a row of very small teeth. A large number liocranid genera have two small teeth on the inner cheliceral rim (Grimm and Vilbel, 1986), whereas *Hortipes* has a row of six to eight very small teeth (fig. 2f; Bosselaers and Ledoux, 1998: fig. 1D).

**Character 25. Very long shaggy hair in front of fang base.** (0) Absent; (1) present. The promarginal cheliceral rim of *Hortipes* and *Coryssiphus* bears a number of shaggy hairs, the outermost of these being as long as the cheliceral claw itself and bent at a right angle just beyond its origin (fig. 2c, f). Platnick (2000: 10) already mentioned this type of seta for Lamponidae.

**Character 26. Serrula.** (0) Present; (1) reduced. The serrula, a sharp, finely toothed frontal rim on the endites (fig. 2a), is plesiomorphic for spiders but is strongly reduced in all *Andromma* species seen in the present study.

**Character 27. Delimitation of cephalic region.** (0) Clear; (1) vague. Contrary to *Coryssiphus*, *Andromma*, and many other liocranids, *Hortipes* has no clear indentation of the carapace delimiting the cephalic region (fig. 2d; as opposed to Grimm and Vilbel, 1986: figs. 2, 4, 5).



**Character 28. AME size.** (0) Same size as ALE; (1) considerably larger than ALE (figs. 2c, d; 14k).

**Character 29. PME size.** (0) Same size as PLE; (1) smaller than PLE.

**Character 30. Highest point of carapace.** (0) Bulging part of carapace in front of fovea; (1) fovea. *Andromma* has a carapace with a high, bulging cephalic part, whereas *Hortipes* and *Coryssiphus*, like *Scotina* Menge and *Apostenus* Westring, have a carapace that is gradually slanting from its highest point at the fovea toward the eye region.

**Character 31. Clypeus.** (0) Vertical; (1) slanting forward. *Hortipes* is probably unique among liocranids in having a clypeus that is not vertical but slanting forward, almost as a continuation of the slope from fovea to eye region (fig. 2b; Bosselaers and Ledoux, 1998: fig. 1C)

#### MALE GENITALIA

**Character 32. Retrolateral femoral apophysis of male palp (fig. 32a).** (0) Absent; (1) present.

**Character 33. Retrolateral femoral apophysis of male palp.** (0) Knoblike: length less than half diameter of fe (fig. 32d, arrow); (1) distinct: longer than half diameter of the fe (fig. 32a).

**Character 34. Patellar apophysis of male palp (fig. 9c, g).** (0) Absent; (1) present.

**Character 35. Shape of patellar apophysis of male palp.** (0) Smoothly curved (fig. 9f); (1) with a sharp tip, which makes an angle with the basal part (fig. 9b).

**Character 36. Fringe of regularly spaced stiff hairs along retrolateral edge of cymbium.** (0) Absent or extending along only part of cymbial border; (1) extending from base to top along edge of cymbium (figs. 28e, 32e).

**Character 37. Sperm duct course.** (0) Starting with base of embolus (fig. 8c), sperm duct features an outward-bending stretch of varying length, followed by an inward bend, that, in turn, is followed by one outward bend directed apically and a second outward bend in basal part of tegulum, where the duct disappears behind base of embolus

(fig. 12h); (1) starting with base of embolus, sperm duct features a broad outward bend in basal part of tegulum, followed by an inward bend and a second outward bend in apical part of tegulum, whereafter the duct disappears behind base of embolus (fig. 9c). In ventral view of a left palp, the duct has to be followed in counterclockwise direction, starting from the embolus base, in order to follow the course described above. Although the tegulum of *Hortipes*, *Coryssiphus* and *Andromma* is relatively transparent, not all species allow the entire course of the duct to be observed without clearing.

**Character 38. Angle made by the two stretches of the first inward bend of sperm duct starting from base of embolus in counterclockwise direction (in ventral view of left palp).** (0) 20° (figs. 9c, 19e); (1) 60°–90° (figs. 10i, 12h); (2) 120°–180° (figs. 10g, 19i). The same remarks as made for character 37 apply here.

**Character 39. Segment of bulbous circumference encircled by embolus.** (0) At most 270°; (1) 270°–360°; (2) 360°–450°; (3) more than 450°.

**Character 40. Base of embolus.** (0) Appressed against tegulum (figs. 17n, 19e); (1) standing free of tegulum (figs. 12h, 19m, 24a).

**Character 41. Insertion of embolus base on periphery of tegulum (in ventral view of left palp).** (0) At 5–6 o'clock (fig. 12h); (1) at 3 o'clock (fig. 24a); (2) at 2 o'clock (fig. 27h); (3) at 9 o'clock (fig. 9c).

**Character 42. Basal tooth of embolus (fig. 27g).** (0) Absent; (1) present.

**Character 43. Row of teeth on embolus (fig. 28d).** (0) Absent; (1) present.

**Character 44. Conductor.** (0) Absent; (1) present. The homology of the various tegular apophyses of the male palp is still not elucidated for most spiders. In the present work, a hyaline appendage, immovably attached to the tegulum and facing the embolus tip, as in *Andromma* (de Lessert, 1936: figs. 13, 14), is considered to be a conductor, whereas a sclerotized appendage that is flexibly attached to the tegulum via a thin membrane is considered to be a MA (Sierwald, 1990; Griswold, 1993).

**Character 45. MA.** (0) Present (fig. 8c, d); (1) absent (fig. 12e).

**Character 46. Insertion of MA on tegulum (in ventral view of left palp).** (0) At 12 o'clock on periphery of tegulum (fig. 12h, arrow); (1) at 2 o'clock on periphery of tegulum (fig. 21a, arrow); (2) centrally on tegulum (fig. 15e).

**Character 47. Curvature of MA.** (0) less than  $180^\circ$ ; (1)  $180^\circ$ – $270^\circ$ ; (2)  $270^\circ$ – $360^\circ$ ; (3)  $360^\circ$ – $450^\circ$ ; (4)  $540^\circ$ .

**Character 48. Shape of MA.** (0) Straight or smoothly curved under all angles; (1) with two almost orthogonal bends, as observed from the ventrolateral side (fig. 21j); (2) twisted in three dimensions in a complex way (figs. 28d, e; 32d, e).

**Character 49. Shape (cross section) of MA.** (0) More or less rounded in cross section, slender, sclerotized, gradually tapering into a thin apical point (fig. 10g); (1) more or less rounded in cross section, heavily sclerotized and massive throughout (fig. 24e); (2) laterally flattened (fig. 15e, f); (3) base of MA stout and more or less rounded in cross section, gradually narrowed into a long, firm, curved terminal portion (fig. 28e); (4) base of MA stout and more or less rounded in cross section, suddenly narrowed into a long, curved, thin apical portion (figs. 32b; 34b).

**Character 50. Appendages and tip of MA.** (0) Smooth, without appendages, tip pointed; (1) smooth, without appendages, tip blunt (fig. 15f); (2) with flattened, bell-shaped wing near apex (fig. 15b); (3) with flattened, bell-shaped wing halfway from base to tip (fig. 21j); (4) with flattened, shark-fin-shaped wing halfway from base to tip (fig. 24b); (5) with small triangular tooth (length  $1 \times$  diameter of MA), one-fourth from the tip (fig. 31a).

**Character 51. Insertion of RTA.** (0) Laterally (figs. 9d; 12i); (1) ventrolaterally (fig. 15b, o).

**Character 52. Length of RTA, as compared with length of palpal ti.** (0) RTA equally long or shorter (figs. 15b; 19j); (1) RTA definitely longer (figs. 12b, 32d).

**Character 53. Shape of RTA.** (0) Simple, gradually tapering (type 1, figs. 12h; 14c); (1) with a short, undivided, and stout basal part that is not wider at the base than it is halfway up; tip bifid or trifid with pointed ends (type 2, fig. 15b); (2) short, wider at the base than halfway up, partly or completely

divided in two (type 3, figs. 19f; 21b); (3) sickle shaped, dorsally curved, and provided with an internally directed spike, almost invisible from the outside (type 4, figs. 8c; 21i, j); (4) simple, stout,  $3 \times$  as long as wide, with two short, blunt tips (type 5, fig. 31a); (5) simple, with a stout base that is suddenly narrowed into a ventrally curved, sharp process (type 6, fig. 28e); (6) split into a ventral, apically oriented part with a recurved tip and a dorsal, basally or apically oriented winglike part (type 7, figs. 8d; 24h; 27g; 28b); (7) apparently consisting of two strips, fused by a transparent membranous portion into a gutter that can guide MA or embolus (type 8, fig. 32a, b, e); (8) consisting of two completely separated entities with a complex structure (type 9, de Lessert, 1936: figs. 13, 14).

**Character 54. Type 1 RTA.** (0) With simple, pointed tip, straight or recurved in ventral direction, less than  $4 \times$  as long as wide (fig. 14d); (1) straight, about  $3 \times$  as long as wide, with notch in tip (fig. 12i); (2) recurved in ventral direction,  $4$ – $7 \times$  as long as wide (fig. 9k); (3) recurved in ventral direction, more than  $8 \times$  as long as wide (fig. 12b); (4) recurved in basal direction (fig. 9c, g); (5) with curled tip, more than  $6 \times$  as long as wide, directed ventrolaterally and describing a hemicircular bend (fig. 12e, f); (6) wide and flattened, about  $2 \times$  as long as wide, suddenly narrowed into a ventrally curved, pointed tip (fig. 10b).

**Character 55. Type 2 RTA.** (0) With bifid or trifid end, the points subequal and oriented dorsally (figs. 14g; 17j); (1) with trifid end, one point oriented ventrally and the two others dorsally (figs. 15j; 17o); (2) with bifid end, the two points unequal, oriented dorsally (fig. 19a, b); (3) with a blunt, ventrally oriented bulge and two subequal, dorsally oriented points (fig. 15o).

**Character 56. Type 3 RTA.** (0) The two halves subequal (fig. 19j); (1) with bifid end, the two points unequal, one oriented ventrally, the other dorsally (fig. 19f); (2) with bifid end, shaped like a dolphin's tail (fig. 19m).

**Character 57. Type 4 RTA.** (0) With a sickle-shaped process  $2 \times$  as long as wide (fig. 24b); (1) with a sickle-shaped process  $3 \times$  as long as wide (fig. 24e); (2) with a sickle-shaped process more than  $5 \times$  as long as wide (fig. 21j).

**Character 58. Type 7 RTA.** (0) With an apically oriented dorsal process (fig. 24h); (1) with a basally oriented dorsal process (fig. 27g).

**Character 59. Type 8 RTA.** (0) Simple, boat shaped (figs. 32e; 34b); (1) complex, shaped like a violin knob (fig. 32b).

#### FEMALE GENITALIA

**Character 60. Position of entrances of IDs (in ventral view).** (0) In the strip between the extreme lateral limits of ST1 (figs. 11d; 22b, arrow); (1) in line with the lateral limits of ST1 or further outside (fig. 23a, b, arrow).

**Character 61. Position of entrances of IDs.** (0) In the same transversal plane as anterior edge of ST1 or in front of this plane (figs. 11c; 26f, arrow); (1) behind anterior edge of ST1 (figs. 13e, arrow; 20g).

**Character 62. Separation of ID entrances.** (0) By one-half or less of width of entire vulva (figs. 11b, arrows; 22b); (1) by more than one-half of width of entire vulva (figs. 11e, arrows; 26a, b).

**Character 63. Widened portion of ID associated with a glandular structure.** (0) Absent (figs. 20f, g; 22b); (1) present (figs. 25a, arrow; 29c, d, arrows). A number of related *Hortipes* species, mostly from western Africa and the Kivu region, have the first stretch of ID widened and associated with a globular, cauliflower-shaped glandular structure. *Andromma* also has such a gland associated with the ID.

**Character 64. Glandular structure in first stretch of ID, connected with the lumen through a series of pores.** (0) Absent (fig. 20f, g); (1) present (figs. 11b; 13a, d). In *H. pollux* and related species the first stretch of ID bears a glandular structure that is not associated with a widened portion but connected with the ID lumen through a series of pores.

**Character 65. First stretches of IDs.** (0) Separate (figs. 20f, g; 26a, f); (1) fused into one weakly sclerotized entrance chamber, which is situated between ST1 (figs. 16d; 18a; 20e). In South African *Hortipes* and a few related species from Malawi, the first part of both IDs is fused into a wide, thin-walled, weakly sclerotized entrance chamber.

**Character 66. Width of first stretch of ID.** (0) Not substantially widened (fig. 20f, g); (1) substantially widened, as compared with the diameter of the rest of the duct (figs. 23a; 29c; 35a).

**Character 67. Wall of first stretch of ID.** (0) First stretch of ID not very thick walled along part of its length (figs. 11b; 20f, g); (1) first stretch of ID substantially widened and very thick walled along part of its length (figs. 26a; 33c). In a number of related *Hortipes* species from western Africa and the Kivu region, the first ID portion is not only substantially widened but also very thick walled.

**Character 68. Structure of first stretch of ID.** (0) As heavily sclerotized as the rest of the ID (figs. 11b; 20f, g); (1) only weakly sclerotized (figs. 13d; 16e; 22c). In a few seemingly unrelated *Hortipes* species from widely different locations (*H. silvarum*, *H. creber* and *H. hastatus*, and in all South African species) the first ID stretches, fused or not, are very thin walled and rather hard to observe, even under a compound microscope.

**Character 69. Structure of first stretch of ID.** (0) Not consisting of two very different sections; (1) consisting of a narrow, weakly sclerotized section running in anterior direction, followed by an inflated, sclerotized section associated with a gland (figs. 16b; 22c). In *H. creber* and *H. hastatus* (and also in *H. horta*) the first part of the normally sclerotized remainder of the ID, following the thin-walled stretch, is inflated and associated with a gland.

**Character 70. Cavity, not associated with a gland, in first stretch of ID.** (0) Absent; (1) present (figs. 13e; 16a). In *H. aurora* (and also in *H. echo*) the first stretch of ID is partly inflated.

**Character 71. Course of first stretch of ID.** (0) Not passing along dorsal side of ST1; (1) passing along dorsal side of ST1 (figs. 26f; 29f).

**Character 72. Course of first stretch of ID.** (0) General direction anterior (figs. 20f, g; 26a); (1) general direction posterior (figs. 11b–f; 26f).

**Character 73. Course of first stretch of ID.** (0) General direction outward (figs. 20f,



g; 23a; 34c); (1) general direction inward (fig. 11b–f).

**Character 74. Course of last stretch of ID.** (0) Last stretch of ID not consisting of a diagonal stretch running inward, nor is it looped before entering ST1; (1) last stretch of ID positioned to the ventral side of ST1, consisting of a diagonal stretch running inward, looped before entering ST1 (figs. 29c; 33c).

**Character 75. General course of ID.** (0) ID lying in the same plane as ST1 and/or to its ventral side (fig. 20f, g); (1) one stretch of ID passing along the dorsal side of ST1 (fig. 26f); (2) two stretches of ID passing along the dorsal side of ST1 (fig. 33b); (3) three stretches of ID passing along the dorsal side of ST1 (fig. 29f); (4) four stretches of ID passing along the dorsal side of ST1 (fig. 33f).

**Character 76. General course of ID.** (0) Does not draw a complete circle in the frontal plane of the animal (fig. 11b, c); (1) draws one complete circle in the frontal plane of the animal (figs. 16e; 29c); (2) draws two complete circles in the frontal plane of the animal (fig. 25a); (3) draws three complete circles in the frontal plane of the animal (fig. 33c, d); (4) draws four complete circles in the frontal plane of the animal (fig. 33e, f); (5) draws five complete circles in the frontal plane of the animal (fig. 29e, g).

**Character 77. General course of ID.** (0) Does not draw a complete corkscrew loop in the transversal plane of the animal (fig. 20f, g); (1) draws one complete corkscrew loop in the transversal plane of the animal (fig. 20b); (2) draws three or more complete corkscrew loops in the transversal plane of the animal (fig. 20e).

**Character 78. Large, spherical, relatively thin-walled ST1 with short and simple ID.** (0) Absent; (1) present (fig. 11b, c, f).

**Character 79. Concave caudal extension of ST1.** (0) Absent; (1) present (figs. 11d; 13a, c; 35c).

**Character 80. Gourd-shaped ST1.** (0) Absent; (1) present (figs. 13a, c; 35c).

**Character 81. Surface area of ST1 (in ventral view).** (0) Between 15 and 80% of surface area of entire vulva; (1) less than 15% of surface area of entire vulva (ST1 very small) (fig. 18a, c); (2) more than 80%

of surface area of entire vulva (ST1 very large) (fig. 11d, f).

**Character 82. Internal spikes in ST1.** (0) Absent; (1) present (fig. 29d). *Andromma* as well as a number of *Hortipes* species have inward-pointing spikes in ST1. In order to avoid overburdening the illustrations of the intricate *Hortipes* vulvae, these internal spikes are not drawn in most figures.

**Character 83. Separation of ST1.** (0) Separated at most by  $2 \times$  their mean diameter (fig. 20f, g); (1) separated by more than  $2 \times$  their mean diameter (fig. 16c, e–g); (2) touching (fig. 13d).

**Character 84. ST2.** (0) Absent; (1) present (figs. 13d; 16c–g). *H. silvarum* as well as the South African *Hortipes* species and their relatives have an extra pair of large cavities attached to the ID. Light and transmission electron microscopy of sections of these structures from *H. contubernalis* showed them to be a hollow cavity without any trace of glandular tissue. As a result, we consider these additional cavities to be ST. The ST that are connected to the FD and that are present in *Andromma*, *Coryssiphus* and all *Hortipes* species are designated as ST1, whereas the additional ST are called ST2. Additional pairs of ST occur, among others, in many Liocranidae (Grimm and Vilbel, 1986), in Clubionidae (von Engelhardt, 1910), and in *Hahnia* C. L. Koch (Bosmans, 1981).

**Character 85. Mean diameter of ST2 (MDST2).** (0) Not more than  $1.25 \times$  as large as MDST1; (1) between  $1.25$  and  $2 \times$  MDST1 (fig. 18c, f); (2) between  $2$  and  $3 \times$  MDST1 (figs. 16f; 18a).

**Character 86. Shape of ST2.** (0) Subglobose; (1) elliptical or ovoid (long axis  $2 \times$  or more as long as short axis) (figs. 16f; 18a).

**Character 87. Entrance of ST2.** (0) Sideways or in the posterior half of the cavity (figs. 16c; 18f); (1) in the anterior half of the cavity (fig. 16f, g).

**Character 88. Attachment of ST2.** (0) Stalked, that is connected to a stretch of the ID that branches off from the section of the ID that runs from entrance to ST1 (fig. 18a, f); (1) sessile (fig. 16c, e).

**Character 89. Wall of ST2.** (0) As thick walled as the last stretch of the ID; (1) thin walled (fig. 20e).

**Character 90. Length of ID divided by**

**length of FD.** (0) Smaller than or equal to 10; (1) between 11 and 20; (2) between 21 and 30; (3) between 31 and 40; (4) between 41 and 50; (5) between 51 and 60; (6) larger than 60. This character can be considered to give an indication of the complexity of different *Hortipes* vulvae (Eberhard, 1996: 339–342).

#### CLADISTIC ANALYSIS

The matrix of character states can be found in table 1. The last four rows give the number of steps and, rounded to two significant digits, ci, ri, and Goloboff fit (Goloboff, 1993a) for each character. All characters were run unordered in every analysis performed. Unless otherwise stated, values of tree statistics that will be given will be those from PAUP 4.0b2, in order to avoid confusion resulting from different orders of magnitude (and even signs) of these statistics in different programs.

Contrary to the opinion of some authors (Kluge, 1997), it is our conviction that differential character weighting is necessary in phylogenetic reconstruction under the parsimony principle (Goloboff, 1993a). Because not all characters have the same informativeness and predictive value, equal weighting of characters can be considered a very improbable weighting scheme and an equally weighted analysis can certainly not be considered unweighted. Weighting (successive or implied) will give more weight to those characters that are more consistent with the initial heuristic cladograms and that are, as a result, the most useful ones for cladistic inference (Farris, 1969). Implied weighting was performed with PAUP 4.0b2 using **pset goloboff = yes hsearch addseq = random** (default number of 10 random addition sequence replications) and with PeeWee 2.6 and XPeeWee using **amb =** (considering ambiguous support) and **mult\*25** (using **max\*** was not necessary). The default value for the concavity constant ( $k = 2$ , **conc 3** in PeeWee) was used in all cases. In order to avoid confusion, it is perhaps worth pointing out here that PAUP 4.0b2 implements  $k$  as defined in the fit formula  $f_i = (k + 1)/(s_i + k + 1 - m_i)$  in Goloboff (1993a), whereas PeeWee uses a concavity constant equal to  $k + 1$ , since the

manual (Goloboff 1997a) specifies  $k/(k + \text{extra steps})$  as the fit formula. The same nine trees were found by the three programs under the implied weighting options specified above. Their strict consensus is identical to figure 4: it has a trichotomy involving *H. salticola* in clade 3 and another trichotomy involving *H. contubernalis* in clade 14. Six of the nine trees found have both strict consensus trichotomies (clade 3 and clade 14) resolved: *H. salticola* branching below *H. fastigiensis* or below *H. ostiovolutus*, each possibility combined with the three possible resolutions of clade 14. The three remaining trees have a clade 3 soft polytomy (Coddington and Scharff, 1996) as in figure 4. The nine trees, as well as their consensus, have fit  $-53.065$  in PAUP (530.4 in PeeWee, 5306.547363 in XPeeWee). By multiplying PeeWee character fits with steps, a weighted length of 143.63 can be calculated. When weights are reset to 1, the trees have a length of 256 steps.

Changing the value of the concavity constant  $k$  allows to increase (lower  $k$  value) or decrease (higher  $k$  value) the steepness of the hyperbolic weighting function (Goloboff, 1993a, 1995; Turner and Zandee, 1995). In this way it is possible to explore the results of the implied-weighting procedure when weighting against homoplastic characters is either stronger (lower  $k$ ), or less drastic (higher  $k$ ) than with the default concavity value. Increasing the value of  $k$  from 3 up to 100 in PAUP 4.0b2 using **pset gk** produced the same nine trees, but for  $k = 0$  or  $k = 1$  (**conc 1** and **conc 2** in PeeWee) a different set of 18 trees was found. However, with these low  $k$  values, implied weighting weights so strongly against homoplastic characters that excessive weight is given to a small set of mutually consistent characters. For that reason, this second set of 18 trees is rejected. Under  $k = 0$ , implied weighting weights against homoplastic characters more severely than ci-based successive weighting (see below); under  $k = 2$ , the opposite is the case (Goloboff, personal commun.).

Successive weighting based on the ri was executed in PAUP 4.0b2 using **hsearch reweight index = ri** until a stable solution was reached. The procedure resulted in nine trees with length = 256 (weighted length =

TABLE 1  
Character–Taxon Matrix

Polymorphic character states are placed in square brackets [ ]; inapplicable characters are represented by dashes and missing entries by question marks.

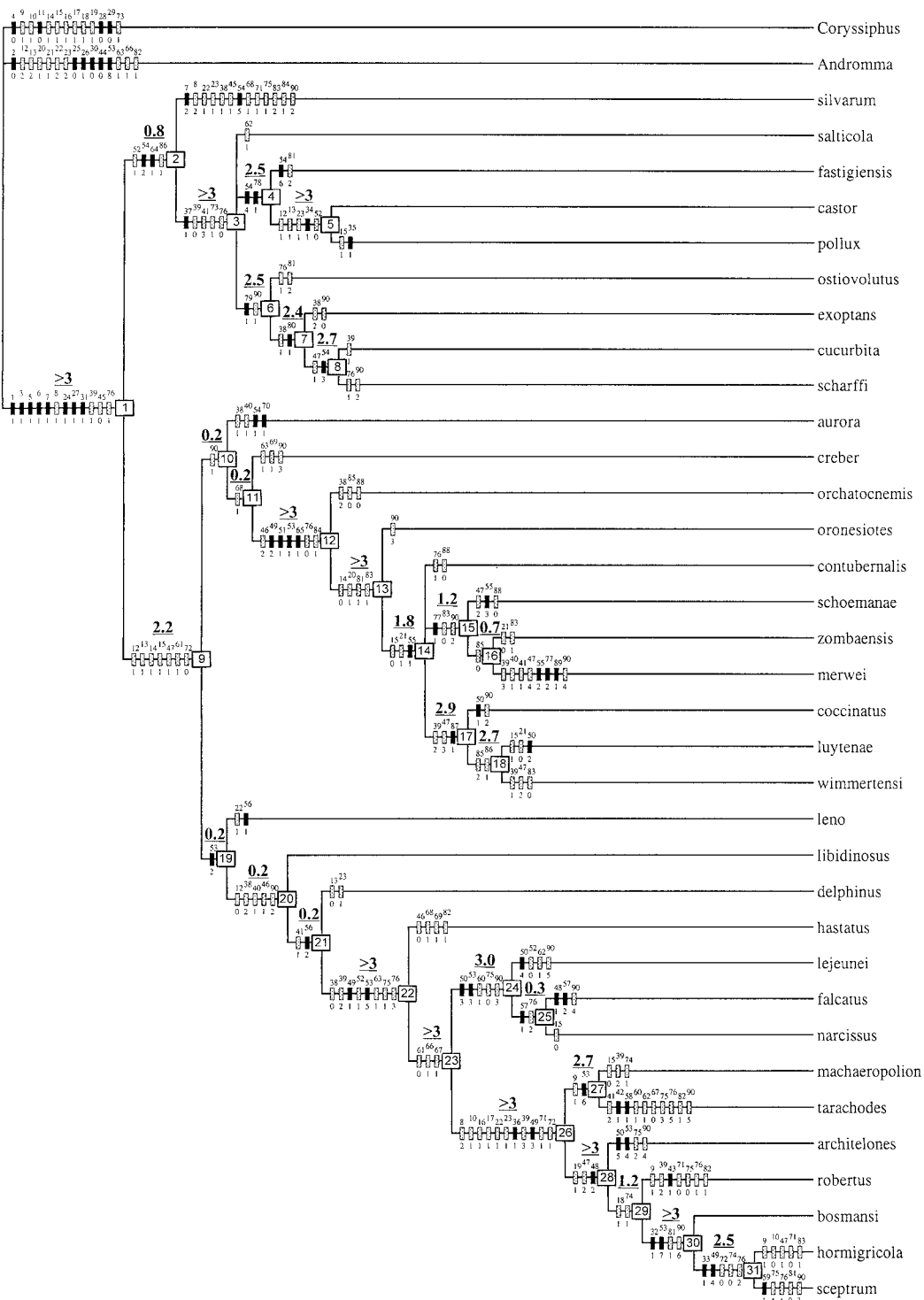
Taxa	Characters																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
<i>Coryssiphus</i>	0	1	0	0	0	0	0	0	1	1	0	0	[01]	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	1
<i>Andromma</i>	0	0	0	1	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	1	1	2	2	0	0	1	0	1	1	0
<i>architelones</i>	1	1	1	1	1	1	1	2	0	[01]	1	0	1	1	1	1	1	0	1	0	0	1	1	1	1	0	1	1	1	1
<i>aurora</i>	1	1	1	1	1	1	1	1	[01]	0	1	1	1	[01]	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>bosmansii</i>	1	1	1	1	1	1	1	2	0	1	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1
<i>castor</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	[01]	0	0	[01]	1	1	0	1	1	1
<i>coccinatus</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	0	1	1	1	1
<i>contubernalis</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	0	1	1	1	1
<i>creber</i>	1	1	1	1	1	1	1	1	0	0	1	[01]	1	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>cucurbita</i>	1	1	1	1	1	1	1	1	0	[01]	1	0	0	0	0	0	0	0	0	0	0	0	[01]	1	1	0	1	1	1	1
<i>delphinus</i>	1	1	1	1	1	1	1	1	0	0	1	0	0	1	1	0	0	[01]	[01]	0	0	[01]	1	1	1	0	1	1	1	1
<i>exoptans</i>	1	1	1	1	1	1	1	1	0	[01]	1	0	[01]	0	0	0	0	0	0	0	0	0	[01]	1	1	0	1	1	1	1
<i>falcatus</i>	1	1	1	1	1	1	1	[12]	0	0	1	0	1	[01]	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>fastigiensis</i>	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>hastatus</i>	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1
<i>hormigricola</i>	1	1	1	1	1	1	1	2	1	0	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1
<i>lejeunei</i>	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>leno</i>	1	1	1	1	1	1	1	[12]	0	0	1	1	[01]	1	1	0	0	0	0	0	0	1	0	1	1	0	1	1	1	1
<i>libidinosus</i>	1	1	1	1	1	1	1	1	0	0	1	0	[01]	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>luytenae</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	0	0	0	0	1	0	0	0	1	1	0	1	1	1	1
<i>machaeropolion</i>	1	1	1	1	1	1	1	2	1	1	1	0	1	1	0	1	1	0	0	0	0	1	1	1	1	0	1	1	1	1
<i>merwei</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	0	1	1	1	1
<i>narcissus</i>	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>orchatocnemis</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>oronesiotes</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	0	0	0	0	1	0	0	0	1	1	0	1	1	1	1
<i>ostiovolutus</i>	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	[01]	1	1	0	1	1	1	1
<i>pollux</i>	1	1	1	1	1	1	1	1	0	[01]	1	[01]	[01]	[01]	1	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1
<i>robertus</i>	1	1	1	1	1	1	1	2	1	1	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1
<i>salticola</i>	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>sceptrum</i>	1	1	1	1	1	1	1	2	0	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1
<i>scharffi</i>	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1
<i>schoemanae</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	0	1	1	1	1
<i>silvarum</i>	1	1	1	1	1	1	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1
<i>tarachodes</i>	1	1	1	1	1	1	[12]	1	1	1	1	0	1	1	1	1	1	0	0	0	0	1	1	1	1	0	1	1	1	1
<i>wimmertensi</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	0	1	1	1	1
<i>zombaensis</i>	1	1	1	1	1	1	1	1	0	0	1	1	1	0	?	0	?	0	?	1	0	0	0	1	1	0	1	1	1	1
Steps	1	1	1	1	1	1	2	3	4	3	1	4	4	3	7	2	2	2	2	2	4	4	5	1	1	1	1	1	1	1
ci	1	1	1	1	1	1	1	.67	.25	.33	1	.50	.50	.33	.14	.50	.50	.50	.50	.50	.25	.50	.40	1	1	1	1	1	1	1
ri	1	–	1	–	1	1	1	.86	.25	.60	–	.82	.67	.87	.60	.86	.75	.80	.88	.40	.75	.67	1	–	–	1	–	–	–	–
Goloboff fit	1	–	1	–	1	1	1	.75	.50	.60	–	.60	.60	.60	.33	.75	.75	.75	.75	.75	.50	.60	.50	1	–	–	1	–	–	–

TABLE I  
(Continued)

Taxa	Characters																													
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
<i>Coryssiphus</i>	0	0	-	0	-	0	-	-	0	0	0	0	0	1	1	-	-	-	-	-	0	0	0	0	-	-	-	-	-	0
<i>Andromma</i>	0	0	-	0	-	0	0	0	0	0	0	0	0	0	1	-	-	-	-	-	0	0	8	-	-	-	-	-	-	0
<i>architelones</i>	1	0	-	0	-	1	0	0	3	1	1	0	0	1	0	1	2	2	3	5	0	1	4	-	-	-	-	-	-	0
<i>aurora</i>	1	0	-	0	-	0	0	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	-	-	-	-	-	0
<i>bosmansii</i>	1	1	0	0	-	1	0	0	3	1	1	0	0	1	0	1	2	2	3	0	0	1	7	-	-	-	-	-	0	0
<i>castor</i>	1	0	-	1	0	0	1	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	4	-	-	-	-	-	0
<i>coccinatus</i>	1	0	-	0	-	0	0	0	2	0	0	0	0	1	0	2	3	0	2	1	1	0	1	-	1	-	-	-	-	0
<i>contubernalis</i>	1	0	-	0	-	0	0	0	1	0	0	0	0	1	0	2	1	0	2	0	1	0	1	-	1	-	-	-	-	0
<i>creber</i>	1	0	-	0	-	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	-	-	-	-	-	0
<i>cucurbita</i>	1	0	-	0	-	0	1	1	1	0	3	0	0	1	0	0	1	0	0	0	0	1	0	3	-	-	-	-	-	0
<i>delphinus</i>	1	0	-	0	-	0	0	2	1	1	1	0	0	1	0	1	1	0	0	0	0	0	2	-	-	2	-	-	-	0
<i>exoptans</i>	1	0	-	0	-	0	1	2	0	0	3	0	0	1	0	0	0	0	0	0	0	1	0	2	-	-	-	-	-	0
<i>falcatus</i>	1	0	-	0	-	0	0	0	2	1	1	0	0	1	0	1	1	1	1	3	0	1	3	-	-	-	2	-	-	1
<i>fastigiensis</i>	1	0	-	0	-	0	1	0	0	0	3	0	0	1	0	0	0	0	0	0	0	1	0	6	-	-	-	-	-	0
<i>hastatus</i>	1	0	-	0	-	0	0	0	2	1	1	0	0	1	0	0	1	0	1	0	0	1	5	-	-	-	-	-	-	0
<i>hormigricola</i>	1	1	1	0	-	1	0	0	3	1	1	0	0	1	0	1	1	2	4	0	0	1	7	-	-	-	-	-	0	0
<i>lejeunei</i>	1	0	-	0	-	0	0	0	2	1	1	0	0	1	0	1	1	0	1	4	0	0	3	-	-	0	-	-	-	1
<i>leno</i>	1	0	-	0	-	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	2	-	-	1	-	-	-	0
<i>libidinosus</i>	1	0	-	0	-	0	0	2	1	1	0	0	0	1	0	1	1	0	0	0	0	0	2	-	-	0	-	-	-	0
<i>luytenae</i>	1	0	-	0	-	0	0	0	2	0	0	0	0	1	0	2	3	0	2	2	1	0	1	-	1	-	-	-	-	0
<i>machaeropolion</i>	1	0	-	0	-	1	0	0	2	1	1	0	0	1	0	1	1	0	3	0	0	1	6	-	-	-	-	0	-	0
<i>merwei</i>	1	0	-	0	-	0	0	0	3	1	1	0	0	1	0	2	4	0	2	0	1	0	1	-	2	-	-	-	-	0
<i>narcissus</i>	1	0	-	0	-	0	0	0	2	1	1	0	0	1	0	1	1	0	1	3	0	1	3	-	-	-	1	-	-	1
<i>orchatocnemis</i>	1	0	-	0	-	0	0	2	1	0	0	0	0	1	0	2	1	0	2	0	1	0	1	-	0	-	-	-	-	0
<i>oronesiotes</i>	1	0	-	0	-	0	0	0	1	0	0	0	0	1	0	2	1	0	2	0	1	0	1	-	0	-	-	-	-	0
<i>ostiovolutus</i>	1	0	-	0	-	0	1	0	0	0	3	0	0	1	0	0	0	0	0	0	0	1	0	2	-	-	-	-	-	0
<i>pollux</i>	1	0	-	1	1	0	1	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	4	-	-	-	-	-	0
<i>robertus</i>	1	0	-	0	-	1	0	0	2	1	1	0	1	1	0	1	2	2	3	0	0	1	5	-	-	-	-	-	-	0
<i>salticola</i>	1	0	-	0	-	0	1	0	0	0	3	0	0	1	0	0	0	0	0	0	0	1	0	2	-	-	-	-	-	0
<i>sceptrum</i>	1	1	1	0	-	1	0	0	3	1	1	0	0	1	0	1	2	2	4	0	0	1	7	-	-	-	-	-	1	0
<i>scharffi</i>	1	0	-	0	-	0	1	1	0	0	3	0	0	1	0	0	1	0	0	0	0	1	0	3	-	-	-	-	-	0
<i>schoemanae</i>	1	0	-	0	-	0	0	0	1	0	0	0	0	1	0	2	2	0	2	0	1	0	1	-	3	-	-	-	-	0
<i>silvarum</i>	1	0	-	0	-	0	0	1	1	0	0	0	0	1	1	-	-	-	-	-	0	1	0	5	-	-	-	-	-	0
<i>tarachodes</i>	1	0	-	0	-	1	0	0	3	1	2	1	0	1	0	1	1	0	3	0	0	1	6	-	-	-	-	1	-	1
<i>wimmertensi</i>	1	0	-	0	-	0	0	0	1	0	0	0	0	1	0	2	2	0	2	0	1	0	1	-	1	-	-	-	-	0
<i>zombaensis</i>	1	0	-	0	-	0	0	0	1	0	0	0	0	1	0	2	1	0	2	0	1	0	1	-	1	-	-	-	-	0
Steps	1	1	1	1	1	1	1	7	10	3	4	1	1	1	2	3	8	2	4	5	1	4	8	6	3	2	2	1	1	2
ci	1	1	1	1	1	1	1	.29	.3	.33	.75	1	1	1	.5	.67	.5	1	1	1	1	.25	1	1	1	1	1	1	1	.5
ri	1	1	-	1	-	1	1	.17	.65	.86	.94	-	-	-	.5	.95	.64	1	1	1	1	.81	1	1	1	-	-	-	-	.67
Goloboff fit	1	1	-	1	-	1	1	.38	.3	.6	.75	-	-	-	.75	.75	.43	1	1	1	1	.5	1	1	1	-	-	-	-	.75

TABLE 1  
(Continued)

	Characters																													
Taxa	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Coryssiphus	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	0
Andromma	[01]	0	1	0	0	1	0	0	0	0	0	[01]	0	0	0	[02]	0	0	0	0	0	1	0	0	-	-	-	-	-	[01]
architelones	0	0	1	0	0	1	1	0	0	0	1	1	0	0	2	3	0	0	0	0	0	0	0	0	-	-	-	-	-	4
aurora	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	-	-	-	-	1
bosmansii	0	0	1	0	0	1	1	0	0	0	1	1	0	1	1	3	0	0	0	0	1	0	0	0	-	-	-	-	-	6
castor	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	-	-	-	-	-	0
coccinatus	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	0	0	0	0	1	0	1	1	1	0	1	0	0	2
contubernalis	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	1	0	0	0	0	1	0	1	1	1	0	0	1	0	1
creber	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	-	-	-	-	-	3
cucurbita	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	-	-	-	-	-	1
delphinus	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	-	-	-	-	-	2
exoptans	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	-	-	-	-	-	0
falcatus	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	-	-	-	-	-	4
fastigiensis	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	2	0	0	0	-	-	-	-	-	0
hastatus	1	0	1	0	0	0	0	1	1	0	0	0	0	0	1	3	0	0	0	0	0	1	0	0	-	-	-	-	-	2
hormigricola	0	0	1	0	0	1	1	0	0	0	0	0	0	0	1	2	0	0	0	0	1	0	1	0	-	-	-	-	-	6
lejeunei	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	-	-	-	-	-	5
leno	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	-	-	-	-	-	0
libidinosus	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	-	-	-	-	-	2
luytenae	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	0	0	0	0	1	0	1	1	2	1	1	0	0	1
machaeropolion	0	0	1	0	0	1	1	0	0	0	1	1	0	1	1	3	0	0	0	0	0	0	0	0	-	-	-	-	-	2
merwei	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	2	0	0	0	1	0	0	1	0	0	0	0	1	4
narcissus	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	-	-	-	-	-	3
orchatocnemis	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
oronesiotes	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	3
ostiovolutus	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	0	2	0	0	0	-	-	-	-	-	1
pollux	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	-	-	-	-	-	0
robertus	0	0	1	0	0	1	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	-	-	-	-	-	2
salticola	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	0
sceptrum	0	0	1	0	0	1	1	0	0	0	1	0	0	0	4	4	0	0	0	0	0	0	0	0	-	-	-	-	-	3
scharffi	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	1	0	0	0	0	-	-	-	-	-	2
schoemanae	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	1	0	0	0	1	0	0	1	1	0	0	1	0	2
silvarum	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0	0	0	0	2	1	1	1	0	0	0	2
tarachodes	0	1	1	0	0	1	0	0	0	0	1	1	0	0	3	5	0	0	0	0	0	1	0	0	-	-	-	-	-	5
wimmertensi	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	0	0	0	0	1	0	0	1	2	1	1	0	0	1
zombaensis	1	-	0	0	1	-	0	1	0	0	0	0	-	0	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	2
Steps	2	3	3	1	1	2	2	3	2	1	4	3	2	3	7	12	2	1	1	1	5	4	6	2	3	2	1	3	1	18
ci	.5	.33	.33	1	1	.5	.5	.33	.5	1	.25	.33	.5	.33	.57	.42	1	1	1	1	.4	.25	.33	.5	.67	.5	1	.33	1	.33
ri	.93	0	.83	1	1	.9	.88	.82	0	-	.4	.86	.88	0	.25	.53	1	1	1	1	.7	0	.2	.89	.67	.5	1	0	-	.4
Goloboff fit	.75	.6	.6	1	1	.75	.75	.6	.75	-	.5	.6	.75	.6	.5	.3	1	1	1	1	.5	.5	.43	.75	.75	.75	1	.6	-	.2



173.77),  $ci = 0.566$ , and  $ri = 0.771$ . The trees are very similar to the nine implied-weighting trees, differing by only the exchange of positions of *H. architelones* and *H. robertus* and the occurrence of a clade 14 soft polytomy involving *H. contubernalis* in three trees. Their strict consensus is identical to figure 4, except for the above-mentioned exchange of *H. architelones* and *H. robertus*.

Successive weighting based on the  $rc$  (Farris, 1989) executed in PAUP 4.0b2 using **hsearch reweight index = rc** until a stable solution was reached resulted in nine trees with length = 256 (weighted length = 114.84),  $ci = 0.566$  and  $ri = 0.771$ . Both  $ri$  and  $rc$  have a lowest bound of 0 (Farris, 1989; Goloboff, 1993a). However, it can be easily deduced from the equations for both indexes that weighting based on  $rc$  usually weights more strongly against homoplastic characters than does weighting based on  $ri$ . In this case,  $rc$  trees are identical to  $ri$  trees but for the placing of *H. robertus* and *H. architelones*, which corresponds to their positions in the implied weighting trees. As a result, the strict consensus of the  $rc$ -weighted trees is identical to figure 4. Moreover, six of the nine  $rc$ -weighted trees found are identical with the implied-weighting trees found under  $k > 1$  (**conc > 2** in PeeWee).  $RC$ -based successive weighting in Hennig86 using a matrix with polymorphic character states entered as missing entries and **xsteps w** and **h\*bb\*** or **tr bb\*** (**m\*bb\*** resulted in repeated computer crashes) produced six trees, a subset of the nine trees found by PAUP 4.0b2. Hennig86 finds less trees than PAUP because it truncates rather than rounds values and uses a baseweight of 10 (weights are scaled between 0 and 10) instead of PAUP's default of 1000. When the PAUP 4.0b2 options were set to emulate Hennig86 (**basewt = 10 truncate = yes**), the same six trees were found under  $rc$ -based successive weighting. The strict consensus of the six Hennig86 trees is again identical to figure 4.

Successive weighting based on the  $ci$  (Far-

ris, 1969; Carpenter, 1988) executed in PAUP 4.0b2 using **hsearch reweight index = ci** until a stable solution was reached resulted in nine trees with length = 256 (weighted length = 145.00),  $ci = 0.566$ , and  $ri = 0.771$ . Entering the command **run[ swt amb = mult\*25** in NONA 1.6, allowing for enough iterations to reach a stable solution, produced exactly the same result. The nine trees found under successive weighting based on the  $ci$  are identical to the nine trees found under implied weighting for  $k > 1$ . Although successive weighting based on  $ci$  generally weights less strongly against homoplastic characters than successive weighting based on  $rc$ , it is preferred to  $rc$ - and  $ri$ -based successive weighting on theoretical grounds:  $ci$  cannot reach a lower bound of 0, so no characters are entirely excluded, minimizing the chance of dismissing evidence (Goloboff, 1993a). Moreover, successive weighting using  $rc$  does not necessarily give higher weights to less homoplastic characters (Goloboff, 1991). Based on these considerations, and because of the agreement between the results from  $ci$ -based successive weighting and implied weighting with  $k > 1$ , the set of nine trees found by both methods is used as a basis for the selection of a preferred tree.

As stated above, six of these trees are fully resolved, three others have a soft polytomy (clade 3). The six fully resolved trees have ambiguous support for the nodes below *H. salticola* and below *H. contubernalis*. These trees differ by the optimization of four multistate characters (54, 76, 83 and 90) and one binary character (88). There are no zero-length branches (Coddington and Scharff, 1994; Wilkinson, 1995b): by careful manipulation of the optimization of characters 54, 76, 83, 88, and 90 in Clados 1.9.1 it is possible to obtain full support for all nodes on all six trees. However, there is no justification for preferring one optimization of the multistate characters over another. In addition to that, binary character 88 (ST2 stalked or sessile) certainly cannot be considered to con-

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←

steps on the tree are indicated in black, state changes of characters that require additional steps are shown in light grey. Nodes are numbered on the tree. Bold, underlined figures above branches are Bremer support values (in PeeWee fit values).



stitute the kind of complex change whose parallel gain should be minimized, allowing choice between equally parsimonious optimizations (Scharff and Coddington, 1997). As a result, no serious arguments can be put forward for preferring one of the six resolved trees over another. Consequently, it seems best to prefer the single, unambiguously supported tree found under **amb - mult\*25** in PeeWee, under **run[ swt amb - mult\*25** in NONA, and in PAUP under **pset collapse = minbrlen**, applying implied weighting or ci-based successive weighting. This tree can be considered strictly supported (Nixon and Carpenter, 1996) and is illustrated in figure 4. It is identical to the strict consensus of the nine trees found when considering ambiguous support and has the same length and Goloboff fit as these, confirming the fact that these trees differ only by branches with a minimum length of 0 (Nixon and Carpenter, 1996).

Character state changes on the preferred tree are indicated in figure 4. Fast (ACCT-RAN) optimization, favoring reversal over parallel gain, was chosen for all characters. The tree in figure 4 is proposed as our preferred hypothesis here, an estimate of the true phylogeny upon which future work will hopefully be able to improve further.

For the sake of comparison, an equally weighted analysis was performed in PAUP 4.0b2 with **hsearch addseq = simple** or **addseq = random** (default number of 10 random addition sequence replications) and tree bisection and reconnection (TBR) swapping, which resulted in 360 equally parsimonious trees with length = 255, ci = 0.569, and ri = 0.773.

Equal weighting in NONA 1.6 using **amb =** and **mult\*25** (using **max\*** was not necessary) produced the same 360 trees as PAUP 4.0b2. Equal weighting in Hennig86 1.5 using **h\* bb\*** or **tr bb\*** resulted in 356 trees, using **m\* bb\*** produced only 354 trees, all part of the set of 360 found by NONA and PAUP. It is unclear why Hennig86 missed a few trees. Hennig86 requires polymorphic character states to be entered as missing entries, and it is known that missing entries can introduce certain types of error (Nixon and Davis, 1991), but this would lead to more trees rather than to less. Under **pset**

**collapse = minbrlen** in PAUP or **amb-mult\*25** in NONA, 72 unambiguously supported trees were found.

Contrary to the opinion of some authors (Kluge, 1997; Turner and Zandee, 1995), that the equally weighted trees are one step shorter than the trees found under implied and successive weighting is not a convincing argument to prefer them. Indeed, the differentially weighted trees save steps for those characters that have less homoplasy and are therefore to be preferred (Platnick et al., 1991b; Goloboff, 1993a, 1993b, 1995).

The strict consensus of the set of equally weighted most parsimonious trees is illustrated in figure 5. This consensus tree shares with the preferred one discussed above three homogeneous clades (clade 3, 12, and 22 of fig. 4), although in less-resolved form. However, it differs in the placing of *H. silvarum*, *H. libidinosus*, *H. delphinus*, and *H. leno*. Moreover, as can be deduced from the trichotomies in the strict consensus (fig. 5), not all most parsimonious equally weighted trees share the insertion of *H. silvarum*, *H. libidinosus*, and *H. delphinus*. A number of trees place *H. silvarum* at the base of the clade 3 (species composition as defined in fig. 4), others insert it as the most basal branch of the large sister clade of clade 3. Similarly, some trees have the dichotomy grouping *H. libidinosus* and *H. delphinus* inserted on a branch below *H. aurora*, whereas others have it in a more basal position, inserted below the node joining the *H. aurora* branch and clade 22 (species composition as defined in fig. 4).

As can be seen by comparing figs. 4 and 5, clades 3, 12, and 22 are a constant element in both consensus trees, although their internal resolution may differ. On the other hand, the insertion of *H. aurora*, *H. creber*, *H. leno*, *H. libidinosus*, and *H. delphinus*, five species with relatively simple genitalia, and of *H. silvarum*, an enigmatic species that certainly holds a separate position within the genus, varies between individual trees in a set, with the search method employed, or both. In order to check which branches are best supported in the cladograms illustrated in figures 4 and 5, Bremer support (Bremer, 1988, 1994) was calculated for the trees obtained by equal weighting as well as for those re-

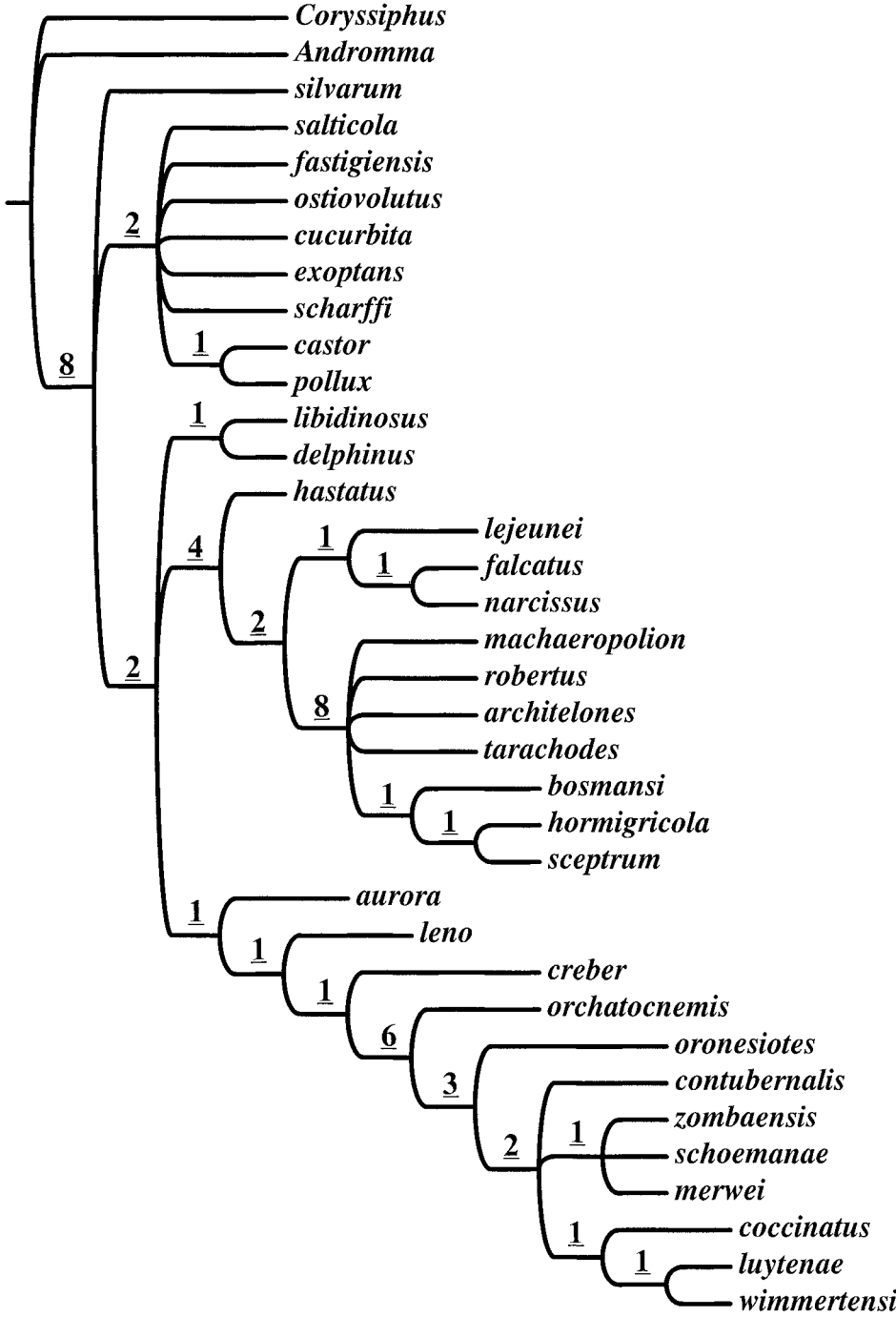


Fig. 5. Strict consensus tree of 360 most parsimonious trees found under equal weighting, considering ambiguous support, for 34 *Hortipes* species. Bold, underlined figures above branches are Bremer support values (in steps).

sulting from implied weighting with  $k = 2$ . The results can be found as underlined, bold values above branches in figures 4 and 5.

For the implied-weighting trees, Bremer support values up to 3 were obtained in PeeWee 2.6 (**conc 3**) using **bsupport**. In total, 333 trees of up to 1 less fit (PeeWee fit values) were obtained; 3291 trees of up to 2 less fit and more than 20000 trees of up to 3 less fit were generated, causing memory overflow. As a result, higher Bremer support values could not be calculated.

Bremer support values for the set of equally weighted trees were obtained in two stages. First, all trees with length = 255 or 256 were found in PAUP 4.0b2 using **hsearch keep = 256**. In total, 18174 trees were found, and the strict consensus of these was calculated. All branches missing in this tree, as compared with fig. 5, have Bremer support = 1. Higher Bremer support values were calculated by entering the above-mentioned consensus of 18174 trees in Autodecay 4.0 (Eriksson, 1998), a program that creates a PAUP command file containing constraint trees for all nodes in the tree entered. After executing this file in PAUP 4.0b2, under the reverse constraint option, Autodecay 4.0 extracts Bremer support values for all nodes from the resulting log file.

It is obvious from the Bremer support values in figures 4 and 5 that the placing of *H. aurora*, *H. creber*, *H. leno*, *H. libidinosus*, *H. delphinus*, and *H. silvarum* is uncertain. For that reason, we do not favor splitting the genus, as proposed by Ledoux and Emerit (1998). On the other hand, clades 3, 12, and 22 (as defined above) are reasonably well corroborated.

## SYSTEMATICS

### *Hortipes* Bosselaers and Ledoux

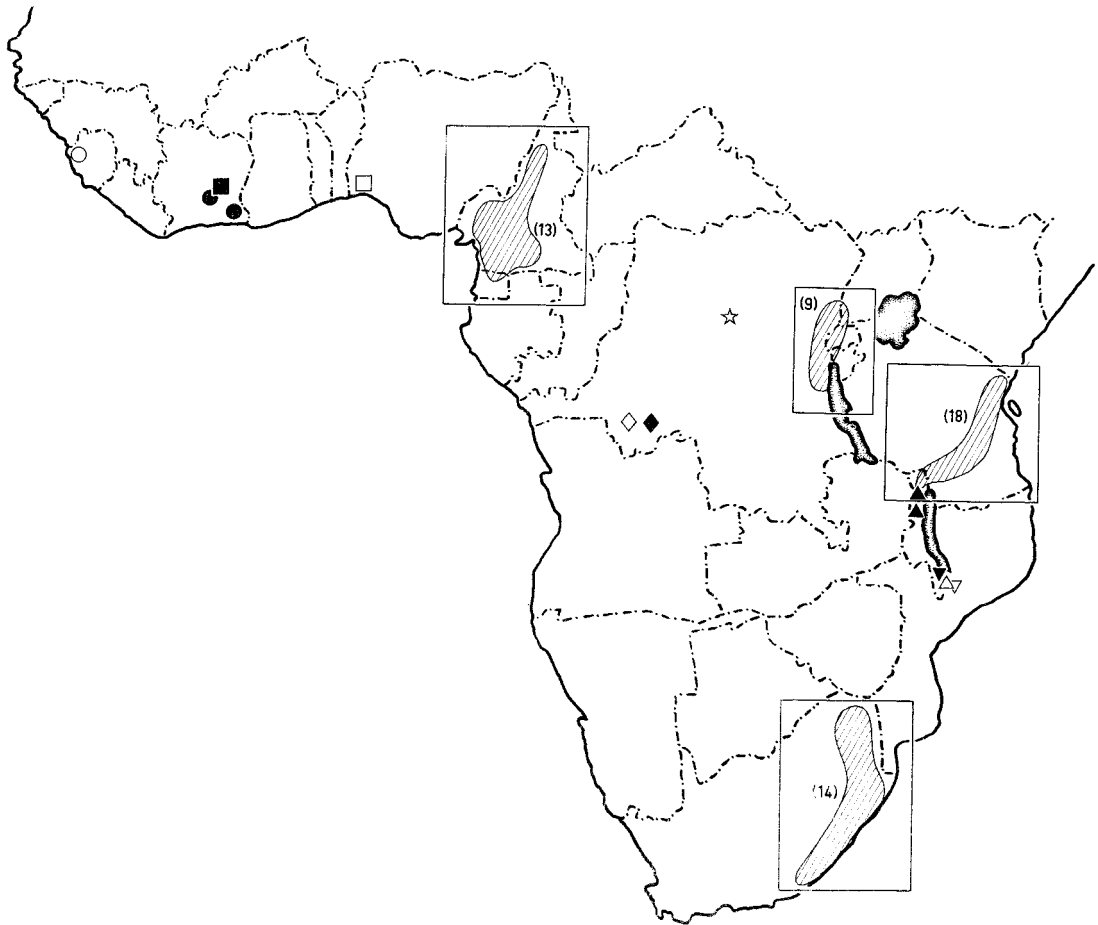
#### Map 1

*Hortipes* Bosselaers and Ledoux, 1998: 147, figs. 1A–E, 2A–E, 3A–D (type species by original designation *Hortipes luytenae* Bosselaers and Ledoux).

**DIAGNOSIS:** Spiders of the genus *Hortipes* can be recognized by the absence of dorsal setae on fe, the presence of two or more pro- and retrolateral spines on fe I and II, the large AME that have a dark tapetum restricted to

the median portion, the clypeus, which is slanting forward, and the peculiar ellipsoidal array of setae on the dorsal side of mt I and II.

**DESCRIPTION:** Araneomorph, ecribellate, entelegyne, dionychan spiders. Total length: males, 1.5–3.0; females, 2.0–4.0. **Cephalothorax.** Carapace regularly domed, highest at fovea (fig. 2b), yellow brown to brownish orange in alcohol-preserved specimens, vivid orange in living specimens of some (probably most) species. Carapace piriform in dorsal view, widest between coxae II and III, narrowed opposite palpal insertion; cephalic area trapezoidal with rounded corners and straight frontal edge bearing some forward-directed setae (figs. 2d; 14k). Thoracic groove a thin, brown, longitudinal line, occupying about one-sixth of carapace length, anterior end situated one-third from posterior end of carapace. From above, anterior eye row slightly procurved to straight, posterior eye row strongly procurved; from front, anterior eye row slightly procurved, posterior eye row strongly procurved; AME circular, dark retina restricted to the median half, lateral portion transparent (figs. 1; 2c, d; 14k), large, diameter  $1.5\text{--}2 \times$  as large as diameter of PME; PME circular, light; ALE oval, long axis two-thirds of diameter of AME, light; PLE oval to almost circular, same size as PME, light; all eyes ringed with black. Anterior median eyes separated by less than their diameter, by  $0.5\text{--}1 \times$  their diameter from ALE, by their diameter from PME; PME separated by  $1.5\text{--}2 \times$  their diameter from each other and from PLE; ALE and PLE touching. Median ocular quadrangle about as long as wide, slightly wider posteriorly. Clypeus as wide as or only slightly wider than AME diameter, slanting forward. Chelicerae twice as long as wide, tapering toward fang base, frontal side with short, erect setae on anterior face, and a dense row of long, curved, shaggy setae close to fang furrow, the outermost of these being as long as the cheliceral claw itself (fig. 2c, f); posterior side with a tuft of curved setae halfway between base and tip. Fang furrow with 3 or 4 small promarginal teeth toward fang tip, retromarginal cheliceral rim with a row of 6–8 subequal, very small teeth (fig. 2f). Sternum and mouth parts orange yellow. Ster-



Map 1. Distribution of *Hortipes* species described in this publication. *Hortipes baerti* ■, *H. centralis* ☆, *H. hesperoecius* ○, *H. machaeropolion* □, *H. orchatocnemis* ▲, *H. oronesiotes* △, *H. penthesileia* ▽, *H. silvarum* ●, *H. tarachodes* ◇, *H. terminator* ◆, and *H. zombaensis* ▼. Rectangles enclose regions (hatched) where high numbers of *Hortipes* species were found (number of species in parentheses). See detailed maps 2–5.

num shield shaped with straight frontal edge, not protruding between coxae, but with sclerotized extensions toward coxae I, II, and III. Labium bluntly trapezoidal with thickened, hemicircular frontal rim bearing two setae on each anterolateral corner. Endites rectangular with rounded corners and lateral notch on outside halfway from base to tip and with an oblique transversal groove running from lateral notch toward labium (fig. 2a). A serrula is present. **Abdomen.** Abdomen pink to yellowish white in alcohol-preserved specimens, scarlet in living specimens of some, probably most, species; no abdominal pattern, abdomen covered with thin, pointed,

light grey setae; abdomen widest midway, anteriorly truncate, posterior end bluntly triangular. **Legs.** Leg formula 4213; legs pale yellow in alcohol-preserved specimens, light orange in living specimens of some, probably most, species. Anterior and posterior legs quite dissimilar (fig. 1). Ta with two pectinate claws, thick claw tufts and several trichobothria in two rows. Claws of ta III and IV about  $2 \times$  as long as those of ta I and II. Mt. I and II, in males as well as in females, with 3 pairs of strong, mobile ventral spines. In addition to this, the dorsal side of mt I and II of males and females is equipped, halfway along its length, with an ellipsoidal array of

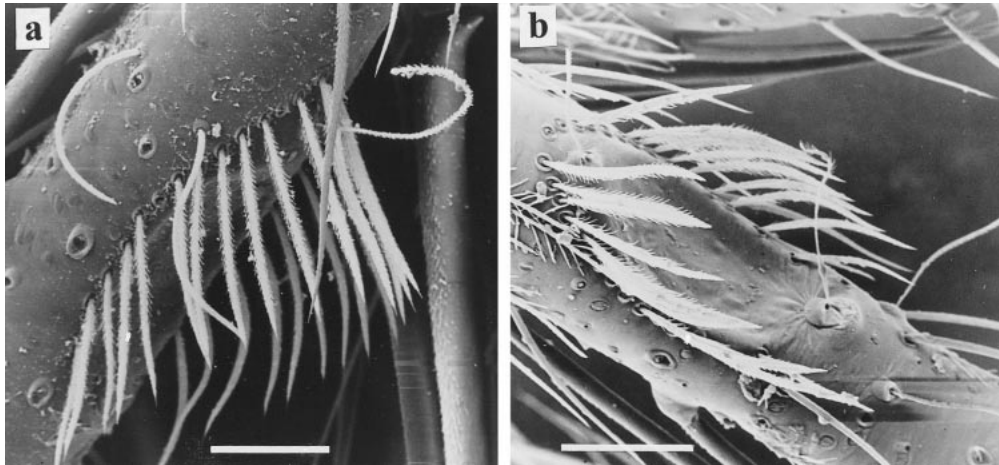


Fig. 6. **a.** *Hortipes orchatocnemis*, new species, oval array of setae on mt II of female. **b.** *Hortipes merwei*, new species, oval array of setae on mt II of male. Scale lines: 50  $\mu\text{m}$ .

about 30 ornate, presumably mechanosensory, hairs (Ledoux and Emerit, 1998), standing on the circumference of a shallow depression (fig. 6a,b). The long axis of the array, about 0.1 long (one-fifth of mt length), coincides with the symmetry axis of the article. A trichobothrium is situated at both ends of the long axis of the shallow depression, and a third trichobothrium lies on the same line, a bit more distal (fig. 6b). Ti I and II with 5 or 6 pairs of strong, mobile ventral spines in males, 6 or 7 pairs in females. Patellar indentation (Ledoux and Canard, 1991) rather short and wide (fig. 2g). No dorsal spines on leg articles. Fe I bear 2–4 prolateral ventral spines in males (3–4 in females) and 2–3 retrolateral ventral spines in both sexes; fe II bear 2–3 prolateral ventral spines in males (3–4 in females) and 2–4 retrolateral ventral spines in males (3–5 in females). Leg III spineless, except for the mt, where a prolateral, a ventral, and a retrolateral terminal spine are present singularly or in various combinations in some species. Leg IV, fe: a pro- and a retrolateral terminal spine are present in some species; ti: a pro or retrolateral spine or both may be present halfway along the length of the article; mt: 1 or 2 ventral spines and, in addition, a pro- or retrolateral spine or both may be present in basal, median, or terminal position or in various combinations. Retrocoxal window (Ra-

ven, 1998) present on the posterior side of coxa I (fig. 2e). Trochanters not notched.

**Spinnerets.** Anterior lateral spinnerets conical, contiguous, distal segment bearing one major ampullate gland spigot and a number of piriform gland spigots (about 10 in males, about 20 in females), not enlarged in either sex (fig. 7a, d); posterior median spinnerets short, conical, bluntly triangular when seen from above, bearing one minor ampullate gland spigot and a number of aciniform gland spigots in both sexes, complemented with three cylindrical gland spigots in females (fig. 7b, e); posterior lateral spinnerets long, tubular, distal segment bearing a few dozen aciniform gland spigots in both sexes, complemented with two cylindrical gland spigots in females (fig. 7c, f).

**Male palp** (fig. 8c, d). Fe unmodified, except for the presence of a retrolateral apophysis in a few species; pa small, unarmed except for the presence of a retrolateral apophysis in a few species; ti with a lateral or ventrolateral RTA ranging in shape from straight and simple to very complex and multilobed. Tegulum rounded and convex, with clearly visible sperm duct showing a few bends; embolus long and thin, MA present (except in *H. silvarum*), no conductor.

**Female genitalia.** Epigyne restricted to a hood-shaped vault, a central depression or sclerotized ID entrances in most species.



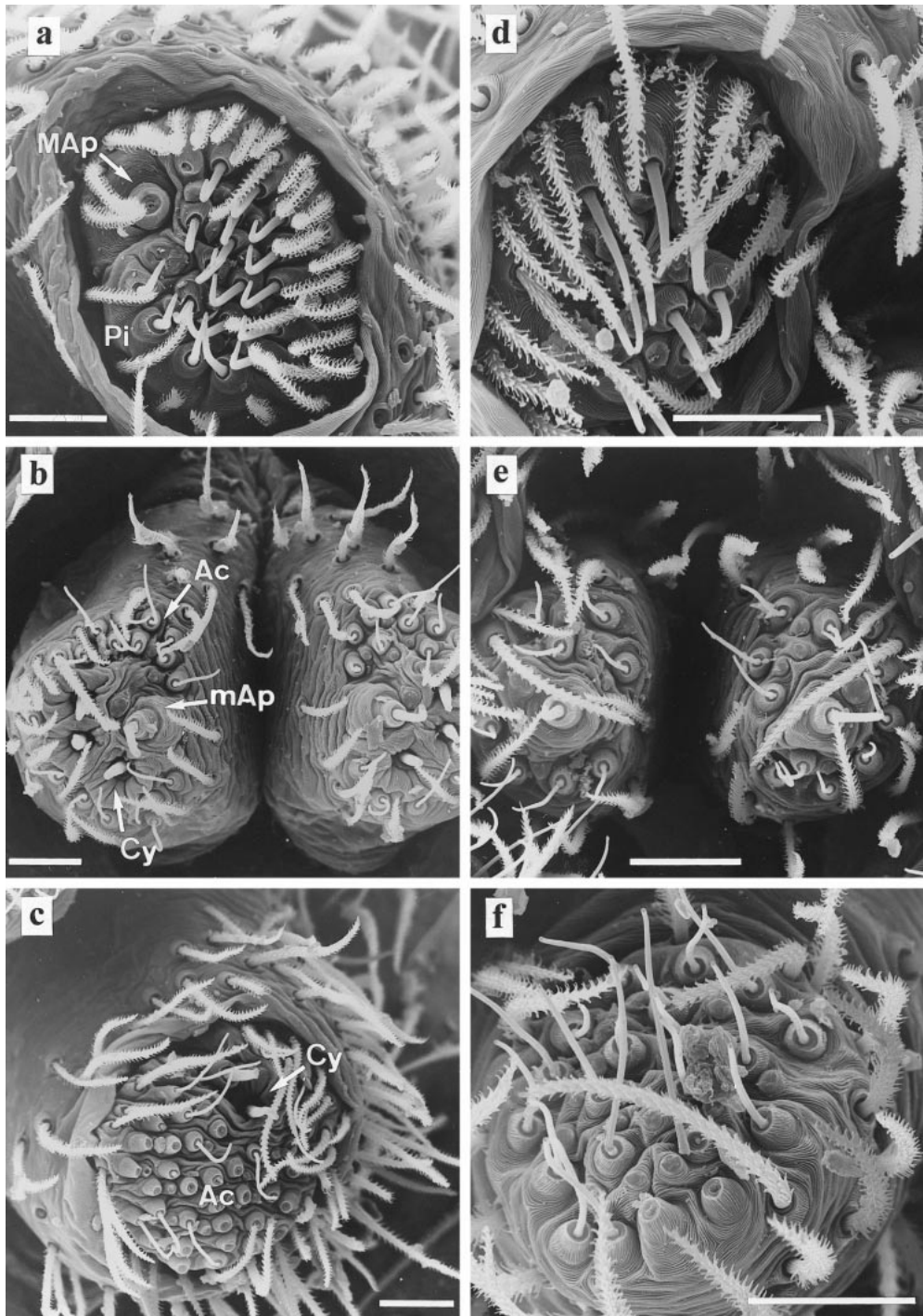


Fig. 7. *Hortipes luytenae* Bosselaers and Ledoux, spinnerets. a–c. Female. d–f. Male. **a, d.** Anterior lateral spinnerets. **b, e.** Posterior median spinnerets. **c, f.** Posterior lateral spinnerets. Scale lines: 20  $\mu$ m. Abbreviations are acini-form gland spigot (Ac), cylindrical gland spigot (Cy), major ampullate gland spigot (MAp), minor ampullate gland spigot (mAp), and piriform gland spigots (Pi).

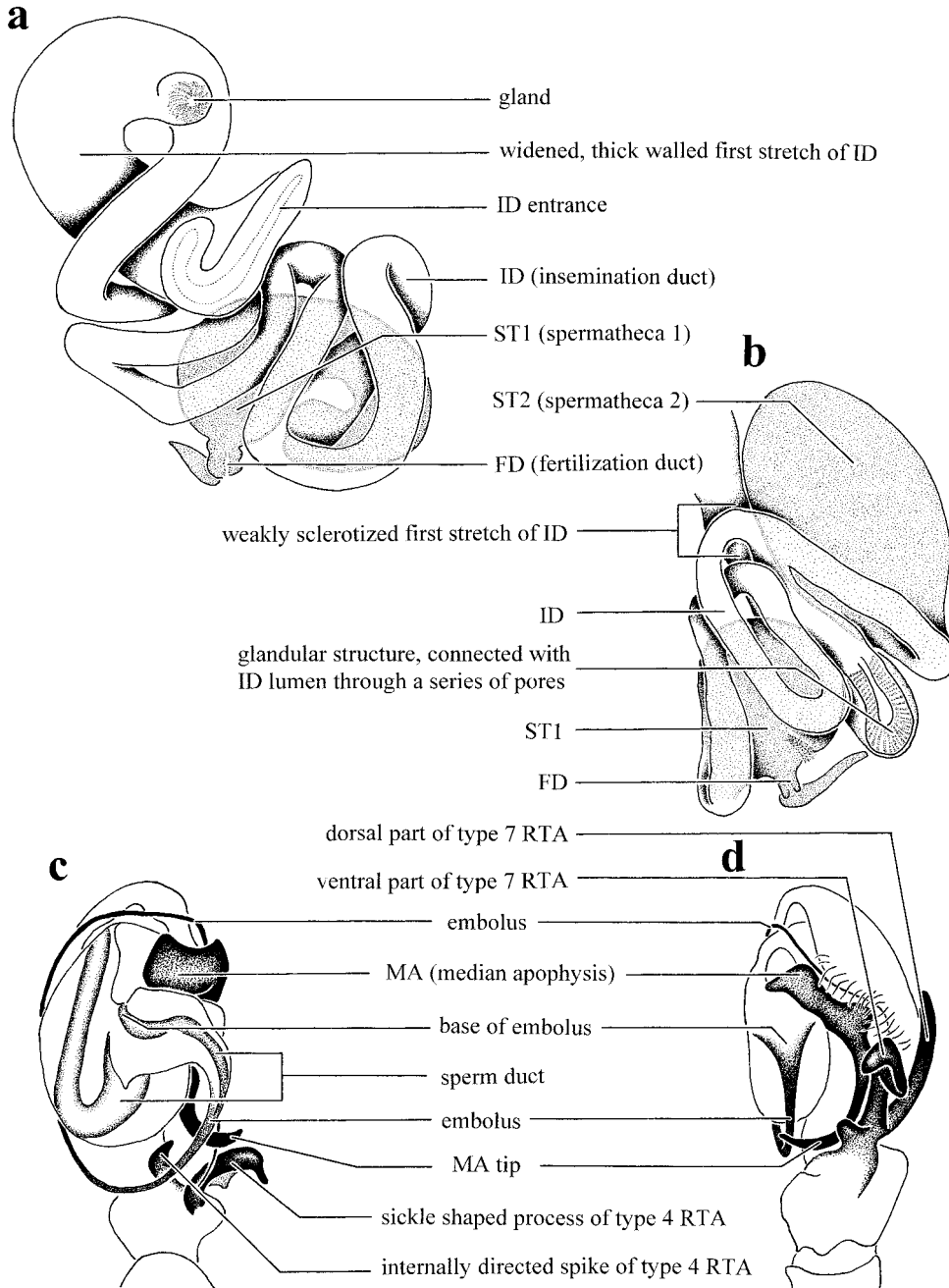


Fig. 8. *Hortipes* genitalia, labeled schematics. **a.** *H. falcatus*, new species, ventral view of vulva, left half. **b.** *H. silvarum* Ledoux and Emerit, ventral view of vulva, right half. **c.** *H. falcatus*, new species, male palp, ventral view. **d.** *H. machaeropolion*, new species, male palp, retrolateral view.



Vulva (fig. 8a, b): ST1 sclerotized, FD short and unsclerotized. ST2 present in a number of species. Insemination duct sclerotized over at least part of its length, often associated with a glandular structure and ranging from short and simple to very long, highly complex, and heavily coiled.

NOTE: The existence of this genus was first indicated by Platnick and Baptista (1995) in their revision of the South American corinnid genus *Attacobius*, where they mention “another group of spinose liocranids, apparently unnamed but nevertheless very common (and speciose) in African forests.” We propose the trivial name “garden legs” for the genus.

#### KEY TO *HORTIPES* SPECIES

1. Males<sup>1</sup> ..... 2
- Females<sup>2</sup> ..... 50
2. No plt spine on mt III ..... 3
- One plt spine on mt III ..... 25
3. MA absent (fig. 12e, f) ..... *silvarum*
- MA present ..... 4
4. Male palp strikingly globular; starting with base of embolus, sperm duct features a broad outward bend in basal part of tegulum, followed by an inward bend and a second outward bend in apical part of tegulum, where the duct disappears behind base of embolus; base of embolus implanted at 9 o'clock on periphery of tegulum in ventral view of left palp (fig. 9c) ..... 5
- Male palp not strikingly globular; starting with base of embolus, sperm duct features an outward bending stretch of varying length, followed by an inward bend, which in turn is followed by one outward bend directed apically and a second outward bend in basal part of tegulum, where the duct disappears behind base of embolus (fig. 12h) ..... 12
5. Patellar apophysis present (fig. 9c, g) ... 6
- Patellar apophysis absent ..... 7
6. Patellar apophysis smoothly curved (fig. 9f, h) ..... *castor*

<sup>1</sup> Males of *mulciber*, *klumpkeae*, *echo*, *amphibolus*, *horta*, *angariopsis*, *puylaerti*, *chrysothemis*, *centralis*, *abucoletus*, *anansiodatus*, *pentheseleia*, *mesembrinus*, *licnophorus*, *atalante*, *aelurisiepa*, *irimus*, *platnicki*, and *hesperoecius* are unknown.

<sup>2</sup> Females of *stoltzei*, *bjorni*, *auriga*, *terminator*, *baerti*, *alderweireldti*, *calliblepharus*, *fortipes*, *depravator*, *hyakutake*, *rothorum*, and *griswoldi* are unknown.

- Patellar apophysis with a sharp tip, which makes an angle with basal part (fig. 9b, d) ..... *pollux*
- 7. RTA simple, gradually tapering (type 1), less than  $8 \times$  longer than wide (figs. 9k; 12i) ..... 8
- RTA simple, gradually tapering (type 1), more than  $8 \times$  longer than wide (fig. 12b) ..... 11
- 8. RTA less than  $4 \times$  longer than wide (fig. 10b) ..... *fastigiensis*
- RTA  $4$  to  $7 \times$  longer than wide (fig. 9k) .. 9
- 9. Angle made by the two stretches of the inward bend of sperm duct preceding base of embolus  $120$ – $180^\circ$  (fig. 10g) ..... *exoptans*
- Angle made by the two stretches of the inward bend of sperm duct preceding base of embolus less than  $120^\circ$  (figs. 9c; 10i) ..... 10
- 10. Median, apically oriented loop of sperm duct constricted at base, entire loop dumb-bell shaped (fig. 10d) ..... *ostiovolutus*
- Median, apically oriented loop of sperm duct not constricted at base, hairpin shaped ..... *salicicola*
- 11. Tegulum isodiametric in ventral view (fig. 10i), RTA sickle shaped in lateral view (fig. 10j) ..... *scharffi*
- Tegulum longer than wide in ventral view (fig. 12a), RTA, when observed laterally, composed of two straight sections making a blunt angle (fig. 12b) ..... *cucurbita*
- 12. Type 1 RTA straight, about  $3 \times$  longer than wide, with notch in tip (fig. 12h, i) .... *aurora*
- RTA different ..... 13
- 13. RTA sickle shaped, dorsally curved and provided with an internally directed spike, invisible from the outside (type 4, figs. 8c; 21i, j) ..... 14
- RTA different ..... 15
- 14. Sickle shaped process of RTA thin, more than  $5 \times$  longer than wide (figs. 8c; 21j) ..... *falcatus*
- Sickle shaped process of RTA broad,  $2 \times$  as long as wide, male palp very large (fig. 27a, b) ..... *auriga*
- 15. Base of embolus stands free of tegulum; base of embolus implanted at  $3$  o'clock on periphery of tegulum in ventral view of left palp; embolus encircles bulbus over more than  $450^\circ$  ( $1\frac{1}{4}$  turns); MA curved over  $540^\circ$  ( $1\frac{1}{2}$  turns) (fig. 19a, b) ..... *merwei*
- Base of embolus appressed against tegulum; base of embolus implanted at  $5$ – $6$  o'clock

- on periphery of tegulum in ventral view of left palp; embolus and MA shorter (fig. 15a, e) ..... 16
16. Animal very pale, two tips of RTA oriented ventrally (fig. 17d) ..... *rothorum*  
— Other combination of characters ..... 17
17. RTA with bifid end, two subequal, dorsally oriented points and a conspicuous, ventrally oriented bulge; MA ribbon shaped, making a wide, ventrally oriented loop (fig. 17b) ..... *hyakutake*  
— Other combination of characters ..... 18
18. MA with flattened, bell shaped wing near apex (fig. 15a) ..... *luytenae*  
— MA different ..... 19
19. MA with blunt tip (fig. 15f) .. *coccinatus*  
— MA different ..... 20
20. RTA with two tips (figs. 15o; 17f) .... 21  
— RTA with three tips (fig. 14m) ..... 22
21. Dorsally oriented tips of RTA long, one blunt, one pointed; MA curved over 360–450° (1–1¼ turns) (fig. 17f) .. *griswoldi*  
— Dorsally oriented tips of RTA short, triangular; MA shorter, curved over 270–360° (¾–1 turn) (fig. 15o) ..... *schoemanae*
22. Three tips of RTA oriented dorsally (fig. 17j) ..... *oronesiotes*  
— One of the RTA tips oriented ventrally (figs. 15j; 7o) ..... 23
23. RTA with short, straight tips (fig. 17o) ...  
— RTA with long, pointed, curved tips (fig. 14l) ..... *contubernalis*
24. MA semicircular (fig. 17o) ... *zombaensis*  
— MA obtusely triangular (fig. 15j) .....  
..... *wimmertensi*
25. RTA simple, gradually tapering (type 1, figs. 9c; 12h; 14c) ..... 26  
— RTA more complex ..... 29
26. Patellar apophysis present (fig. 9c) *pollux*  
— Patellar apophysis absent ..... 27
27. Base of embolus appressed against tegulum (fig. 14a) ..... 28  
— Base of embolus stands free of tegulum (fig. 12h) ..... *aurora*
28. Cymbium almost 2 × as long as wide; type 1 RTA with simple, pointed tip, recurved in ventral direction, less than 4 × longer than wide (fig. 14c) ..... *creber*  
— Cymbium shorter; type 1 RTA recurved toward tegulum (fig. 14a) ..... *stoltzei*
29. MA laterally flattened, implanted centrally on tegulum; RTA with a short, undivided and stout basal part that is not wider at the base than halfway up, tip bifid, with pointed ends (type 2) (fig. 14f, g) .....  
..... *orchatocnemis*  
— Other combination of characters ..... 30
30. RTA short, wider at the base than halfway up, partly or completely divided in two (type 3, figs. 19f; 21b) ..... 31  
— RTA different ..... 34
31. Base of embolus appressed against tegulum (fig. 19e) ..... *leno*  
— Base of embolus stands free of tegulum (fig. 19i) ..... 32
32. RTA with bifid end, shaped like a dolphin's tail in ventral view (fig. 19m) .....  
..... *delphinus*  
— RTA different ..... 33
33. RTA tips subequal (fig. 19j) .. *libidinosis*  
— RTA tips very unequal (fig. 21b) .. *bjorni*
34. RTA sickle shaped, dorsally curved and provided with an internally directed spike, invisible from the outside (type 4, figs. 8c; 21i, j) ..... 35  
— RTA different ..... 37
35. MA with flattened, shark-fin-shaped wing halfway from base to tip (fig. 24b) .....  
..... *lejeunei*  
— MA with flattened, bell shaped wing halfway from base to tip (fig. 24e) ..... 36
36. Sickle shaped RTA process more than 5 × longer than wide (fig. 21j) .... *falcatus*  
— Sickle shaped RTA process 3 × longer than wide (fig. 24e) ..... *narcissus*
37. Fringe of regularly spaced stiff hairs along retrolateral edge of cymbium, extending from base to top (fig. 27g); mt IV with 2 vt spines (uncertain for *alderweireldti*) ..  
..... 38  
— No fringe of regularly spaced stiff hairs along retrolateral edge of the cymbium; mt IV with 1 vt spine, RTA with harpoon shaped tip (fig. 21e) ..... *hastatus*
38. RTA split into a ventral, apically oriented part with a recurved tip and a dorsal, basally or apically oriented winglike part (type 7, figs. 4d; 24h; 27g; 28b) .... 39  
— RTA differently shaped ..... 41
39. Dorsal process of RTA apically oriented (fig. 24h) ..... *machaeropolion*  
— Dorsal process of RTA basally oriented (figs. 27g; 28b) ..... 40
40. Embolus with basal tooth (fig. 27f, g) ....  
..... *tarachodes*  
— Embolus without basal tooth (fig. 28a) ...  
..... *baerti*
41. RTA fan shaped in lateral view (fig. 27l) .....  
..... *terminator*  
— RTA different ..... 42
42. RTA simple, with a stout base that is suddenly narrowed into a ventrally curved sharp process (type 6, fig. 28e) ..... 43  
— RTA different ..... 44
43. RTA tip straight, making an angle with the

- inflated basal part; embolus smooth (fig. 30a, b) ..... *alderweireldti*
- RTA tip sickle shaped, ventrally recurved; embolus with row of teeth (fig. 28d, e) ..... *robertus*
44. RTA simple, stout, 3 × as long as wide, with two short, blunt tips (type 5, fig. 31a) ..  
..... 45
- RTA apparently consisting of two strips, fused by a transparent membranous portion into a gutter that can guide MA or embolus (type 8, fig. 32a, e); male palpal fe with apophysis ..... 47
45. MA smooth (fig. 30f) ..... *calliblepharus*
- MA with tooth (fig. 30d) ..... 46
46. MA with small triangular tooth, one-fourth from tip (fig. 31a) ..... *architelones*
- MA with strong curved tooth, one-third from tip (fig. 30d) ..... *fortipes*
47. Male palpal femoral apophysis short and blunt (fig. 32d) ..... *bosmansii*
- Male palpal femoral apophysis pronounced, longer than half diameter of fe (fig. 34a) ..... 48
48. RTA shaped like a violin knob (fig. 32b) ..  
..... *sceptrum*
- RTA boat shaped (fig. 34b) ..... 49
49. RTA less than 2 × as long as wide (fig. 34e) ..... *depravator*
- RTA more than 2 × as long as wide (fig. 34b) ..... *hormigricola*
50. First part of ID only weakly sclerotized (figs. 13d, 16d, 22c) ..... 51
- First part of ID at least as heavily sclerotized as rest of ID (figs. 11b; 20f, g) ..... 70
51. Only ST1 present (figs. 11b; 20f, g) .. 52
- ST1 and ST2 present (figs. 13d; 16c–g) ...  
..... 55
52. ST1 without internal spikes ..... 53
- ST1 with internal spikes (fig. 29d) .... 54
53. ID coiled once before entering ST1 (fig. 16b) ..... *creber*
- ID describing a circular and a figure-eight loop before entering ST1 (fig. 22a) .....  
..... *amphibolus*
54. Last stretch of ID entering ST1 anteriorly and from the outside (fig. 22d) .....  
..... *hastatus*
- Last stretch of ID entering ST1 posteriorly and from the inside (fig. 22f) .... *horta*
55. First stretches of ID separate, running in posterior direction (fig. 13d) .. *silvarum*
- First stretches of ID fused, running in anterior direction (figs. 16d; 18a; 22e) .. 56
56. ST2 thick walled, stalk of ST2, if present, not longer than long axis of ST2 ... 57
- ST2 thin walled, with a stalk several times longer than long axis of ST2 (fig. 20e) .....  
..... *merwei*
57. ST2 sessile (fig. 16c, e) ..... 58
- ST2 stalked (fig. 16d, g) ..... 61
58. No plt spine on mt III ..... 59
- One plt spine on mt III ... *orchatocnemis*
59. ST2 very large, MDST2 more than 3 × MDST1 (fig. 18e) ..... *aelurisiapae*
- ST2 not so large, MDST2 less than 2 × MDST1 ..... 60
60. ID describing a full corkscrew loop (fig. 18c) ..... *schoemanae*
- ID not describing a full corkscrew loop (fig. 16e) ..... *contubernalis*
61. Entrance of ST2 in the anterior half of the cavity (fig. 16f) ..... 62
- Entrance of ST2 in the posterior half of the cavity (fig. 16d) ..... 66
62. No plt spine on mt III ..... 63
- One plt spine on mt III ..... *luytenae*
63. ST2 isodiametric (figs. 16g; 20c) ..... 64
- ST2 elliptical or ovoid (long axis 2 × or more longer than short axis) (fig. 18a, b) .....  
..... 65
64. ST2 small (same size as ST1), globular, encircled by ID (fig. 20c) ..... *atalante*
- ST2 larger than ST1, egg shaped, not encircled by ID (fig. 16g) ..... *coccinatus*
65. ST2 touching (fig. 18a); no plt and rlt spines on mt IV ..... *wimmertensi*
- ST2 separated (fig. 18b); 1 plt and 1 rlt spine on mt IV ..... *irimus*
66. No plt spine on mt III, no plt and rlt spines on mt IV ..... 67
- One plt spine on mt III (uncertain for *zombaensis*), 1 plt and 1 rlt spine on mt IV .....  
..... 68
67. Fused first stretch of ID heart shaped (fig. 16d); ST2 touching; no corkscrew loop in ID ..... *mesembrinus*
- Fused first stretch of ID deeply bifurcated (fig. 18d), the anterior ends coiled inward a full turn; ST2 separated; two corkscrew loops in ID ..... *licnophorus*
68. ST2 not larger than ST1, ST2 stalk running inward (fig. 20b) ..... *zombaensis*
- ST2 larger than ST1, stalk running in anterior direction ..... 69
69. Fused first stretch of ID V shaped; ST1 elongate, ST2 isodiametric (fig. 18f) .....  
..... *oronesiotes*
- Fused first stretch of ID obtusely rectangular; ST1 globular, ST2 ovoid (fig. 20a) ..  
..... *penthesileia*
70. ST1 and ST2 present (fig. 13f) .....  
..... *hesperoeceus*
- Only ST1 present (figs. 11a–f; 27a–g) 71

71. General direction of first stretch of ID inward (fig. 11a-f) ..... 72
- General direction of first stretch of ID outward (figs. 20f, g; 23a; 33c) ..... 80
72. First stretch of ID substantially widened (fig. 11a) ..... *platnicki*
- First stretch of ID not substantially widened, associated with a glandular structure connected with the lumen through a series of pores (fig. 11b) ..... 73
73. ST1 globular, separated by some distance, ID simple, without coils, running in posterior direction between ST1 (fig. 11b, c) ..... 74
- Other combination of characters ..... 75
74. ID straight (fig. 11b) ..... *castor*
- ID with a U-loop in vertical direction (fig. 11c) ..... *pollux*
75. ST1 very large and globular, touching (fig. 11f) ..... *fastigiensis*
- Other combination of characters ..... 76
76. ST1 egg shaped or comma shaped (fig. 11d, e) ..... 77
- ST1 gourd shaped (figs. 13a, c; 35c) .. 78
77. ID without coils (fig. 11e) ..... *salicola*
- ID coiled (fig. 11d) ..... *ostiovolutus*
78. ID short and almost straight, without loops (fig. 35c) ..... *exoptans*
- ID with hairpin bends or loops ..... 79
79. ID relatively simple, with one hairpin loop (fig. 13c) ..... *cucurbita*
- ID first running outward in a semicircular bend, then turning inward with hairpin loop and running in posterior direction, making U-loop in ventral direction before connecting to ST1 (fig. 13a) ... *scharffi*
80. One vt spine on mt IV ..... 81
- Two vt spines on mt IV ..... 89
81. First stretch of ID comprises a cavity that is not associated with a gland (fig. 16a) ... 82
- Other combination of characters ..... 83
82. ID making a coil penetrating beyond the posterior end of ST1 (fig. 16a) ... *echo*
- ID not making a coil penetrating beyond the posterior end of ST1 (fig. 13e) *aurora*
83. Entrances of IDs positioned, in ventral view, in the strip between extreme lateral limits of ST1 (fig. 13b) ..... 84
- Entrances of IDs positioned in line with lateral limits of ST1 or further outside (fig. 23a) ..... 87
84. ID makes a hairpin loop in posterior direction, penetrating as far as or beyond the posterior end of ST1 (fig. 20d) ..... 85
- ID does not make a hairpin loop in posterior direction ..... 86
85. First stretches of ID make a hairpin loop in anterior direction, together shaped like an M (fig. 20d) ..... *mulciber*
- First stretches of ID make an anterior circular loop, followed by an outward hairpin loop (fig. 20g) ..... *libidinosus*
86. Last stretch of ID running in posterior direction, parallel to the long axis of the animal (fig. 20f) ..... *leno*
- Last stretch of ID running diagonally inward (fig. 13b) ..... *klumpkeae*
87. No plt spine on mt III ..... *narcissus*
- One plt spine on mt III ..... 88
88. Entrances of IDs separated by more than one-half of width of entire vulva (fig. 26a) ..... *lejeunei*
- Entrances of IDs separated by less than one-half of width of entire vulva (fig. 23a) .. *falcatus*
89. Seven ventral spine pairs on ti I and II ... *delphinus*
- Six ventral spine pairs on ti I and II ... 90
90. ID short, making one coil, shaped like a snail shell (fig. 26d) ..... *angariopsis*
- ID differently shaped ..... 90
91. General direction of first stretch of ID anterior (figs. 33e, f; 35a, b) ..... 92
- General direction of first stretch of ID posterior (figs. 26e, f; 29a-g) ..... 94
92. ST1 touching (fig. 35b) .... *anansiodatus*
- ST1 separated ..... 93
93. One stretch of ID passing along the dorsal side of ST1 (fig. 35a) .... *hormigricola*
- Four stretches of ID passing along the dorsal side of ST1 (fig. 33e, f) ..... *sceptrum*
94. Entrances of IDs positioned in line with lateral limits of ST1 or further outside (fig. 29d-g) ..... 95
- Entrances of IDs positioned, in ventral view, in the strip between extreme lateral limits of ST1 (fig. 33a) ..... 96
95. ID relatively simple, not describing a complete circular loop (fig. 29d) ..... *abucoletus*
- ID very complex, describing several circular loops and passing  $3 \times$  along the dorsal side of ST1 (fig. 29e-g) ... *tarachodes*
96. Last stretch of ID positioned to the ventral side of ST1, consisting of a diagonal stretch running inward, looped before entering ST1 (fig. 33c, d) ..... 97
- Last stretch of ID not consisting of a diagonal stretch running inward, nor is it looped before entering ST1 ..... 100
97. Entrances of IDs connected by a heavily sclerotized strip (fig. 33c) ... *bosmansii*
- Entrances of IDs separate ..... 98
98. ST1 with internal spikes ..... *robertus*
- ST1 without internal spikes ..... 99



99. Entrances of IDs conspicuous, not covered by an epigynal scape (fig. 24i) ..... *machaeropolion*  
 — Entrances of IDs not visible from the outside, covered by an epigynal scape (fig. 24j) ..... *puylaerti*
100. Course of ID relatively simple, consisting of one outward loop (fig. 26c) ..... *chrysothemis*  
 — Course of ID very complex ..... 101
101. Entrances of IDs close together, opening into a single epigynal orifice; ST1 without internal spikes (fig. 33a, b) ..... *architelones*  
 — Entrances of IDs separated, each with its own epigynal orifice; ST1 with internal spikes (fig. 29a, b) ..... *centralis*

***Hortipes platnicki*, new species**

Figures 9a, 11a; Map 2

**TYPES:** Female holotype: Chenzema, elev. 1700 m, Uluguru Mountains, Tanzania, S7°10', E37°40' (2–22 July, 1971; L. Berger, N. Leleup, and J. Debecker) (MRAC 141.099).

**ETYMOLOGY:** The species' epithet is a patronym in honor of Dr. Norman Platnick, who mentioned the existence of the present genus for the first time (Platnick and Baptista, 1995).

**DIAGNOSIS:** Females can be recognized by a piriform ST1 connected on its dorsal side to a short and wide ID, which is inflated and globular at the entrance.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.78; carapace 1.16 long, 0.95 wide; length of fe: I 1.03, II 1.16, III 0.89, IV 1.22. **Leg spination.** Fe: I rv 3–4; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow with darker yellow brown radial striae running between bases of legs and a brown longitudinal stripe at fovea. Chelicerae yellow, sternum yellowish white. Legs I and II brownish yellow, legs III and IV yellow. Abdomen peach, no pattern. **Genitalia.** Epigyne a hooded scape in front of a shallow depression showing the piriform ST and globular, widened ID entrance parts (fig. 9). Vulva: ID short, stout, and wide, inflated and globular at the site of the small, circular entrance hole; running in posterior direction and connected to dorsal side of piriform ST1 (fig. 11a).

**DISTRIBUTION:** Known only from the type locality.

***Hortipes castor*, new species**

Figures 9f–i, 11b; Map 2

**TYPES:** Male holotype: sieved from litter 1 km N of Matema, first canyon N with permanent water, Livingstone Mountains, Tanzania, S09°30', E34°03' (13 November, 1991; R. Jocqué) (MRAC 173.423). Paratypes: 1 ♀ (MRAC), 1 ♂, 1 ♀ (AMNH) together with holotype; 1 ♂ by Winkler extraction of sieved litter, same collection data (MRAC); 1 ♂ sieved from litter 3 km S of Matema, fourth canyon S with permanent water, Livingstone Mountains, Tanzania, S09°30', E34°03', (15 November, 1991; R. Jocqué) (MRAC); 1 ♂, 1 ♀ captured 7 km N of Matema, large canyon in Livingstone Mountains, Tanzania, S09°30', E34°03' (16 November, 1991; R. Jocqué) (MRAC).

**ETYMOLOGY:** Because this species is the smallest of two very similar species, it is named after the second-brightest first-magnitude star in the constellation Gemini.

**DIAGNOSIS:** Males of *H. castor* are recognized by the presence of an apophysis on palpal pa in combination with an evenly curved RTA and a MA that is visible over only a very short distance (both in ventral view); *H. pollux* males are very similar but differ by the sharply bent RTA and a much longer stretch of MA visible in ventral view. Females can be recognized by a very simple vulvar structure with straight ID running in posterior direction and globular ST1.

**MALE: Measurements.** Total length 1.94; carapace 0.81 long, 0.68 wide; length of fe: I 0.62, II 0.65, III 0.51, IV 0.73. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0–1 vt 1 rlt 1. **Coloration.** Carapace orange yellow, paler around fovea. Chelicerae orange yellow. Sternum pale yellow, bordered with orange yellow. Abdomen very pale whitish yellow, without any pattern. Legs yellow. **Palp.** Patella with short, almost straight, retrolateral apophysis whose distal end passes smoothly into basal part; ti with evenly recurved, sharp RTA; cymbium elongate without prolateral concavity nor series of curved hairs; sperm duct in tegulum fairly narrow and of same

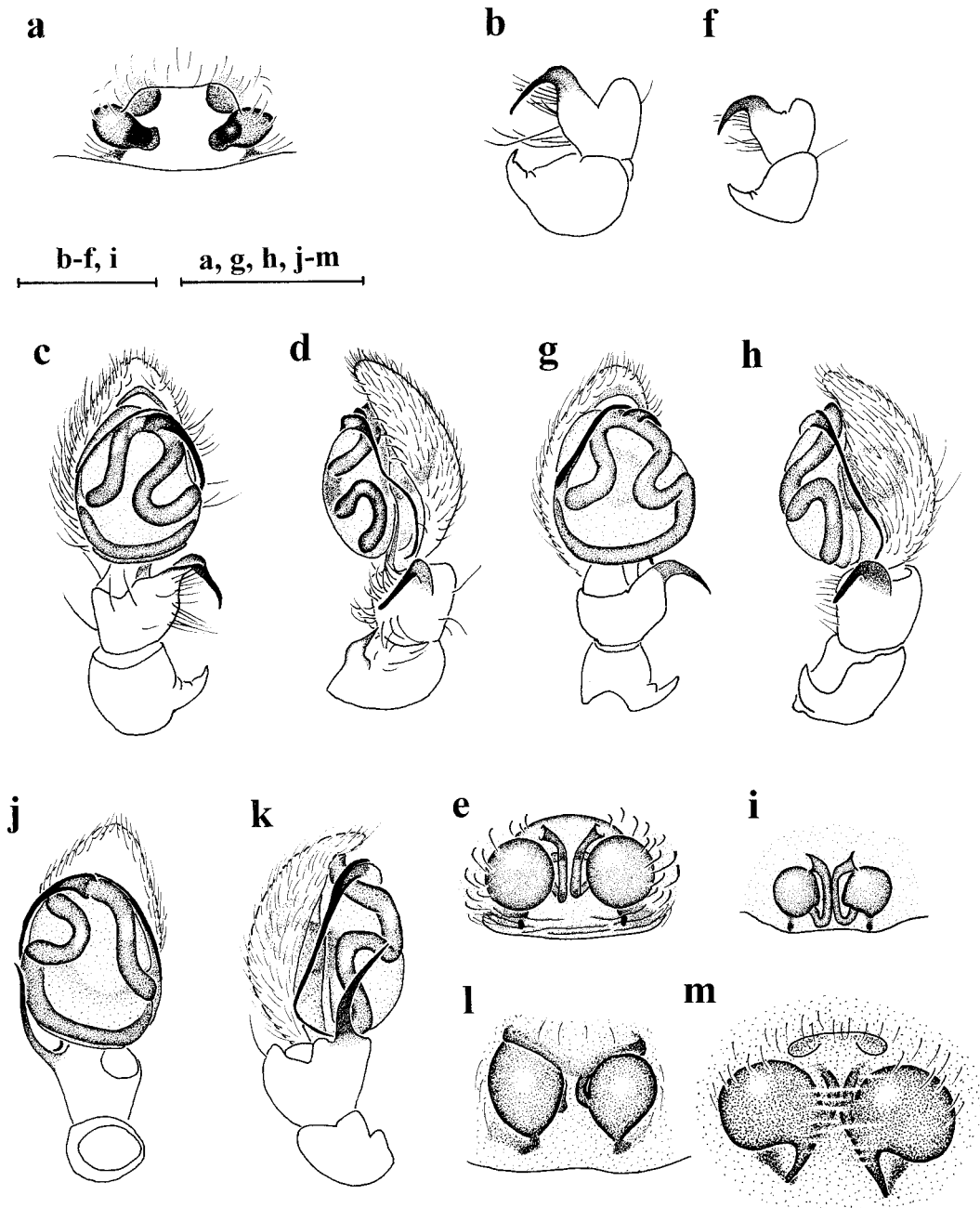
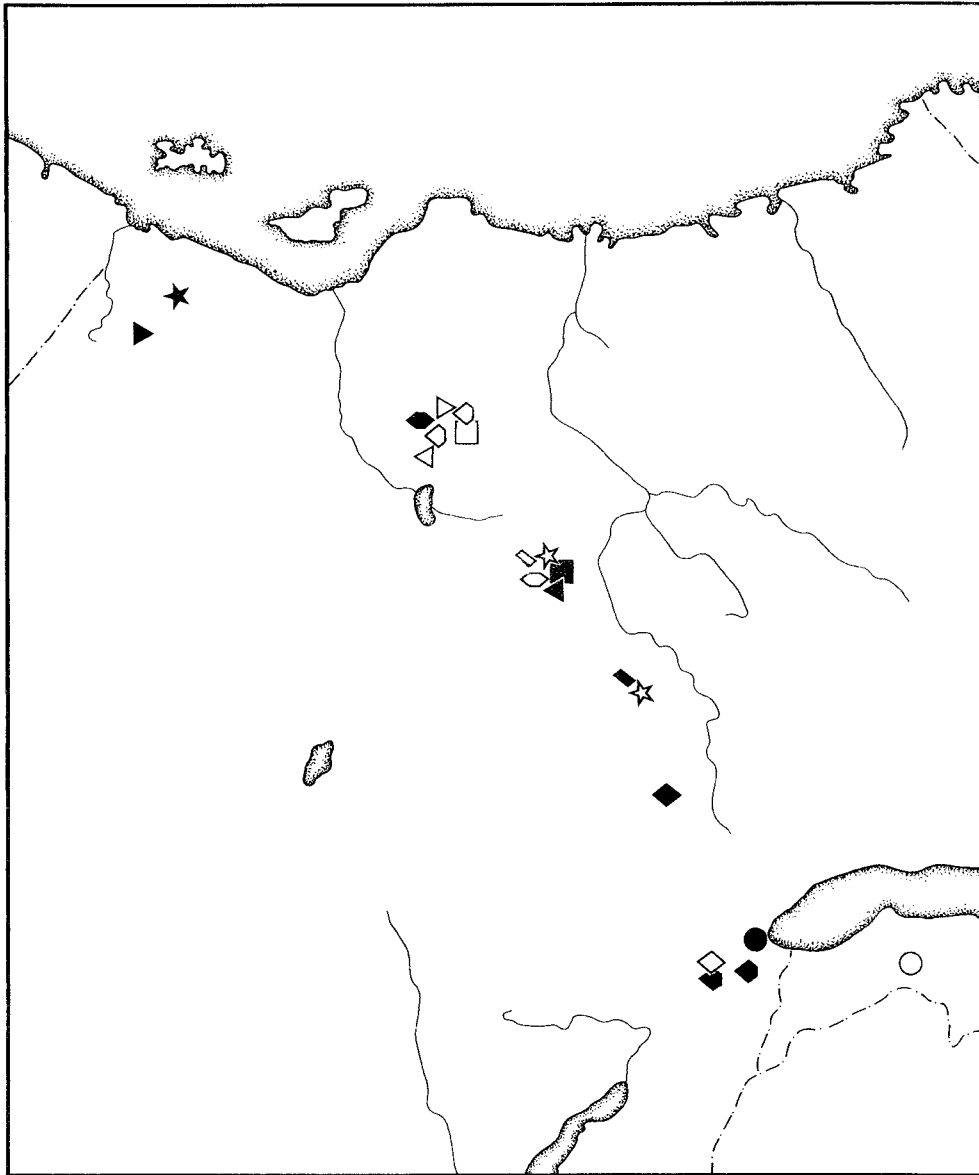


Fig. 9. **a.** *Hortipes platnicki*, new species, epigyne. **b-e.** *Hortipes pollux*, new species. **b.** Male palpal pa and ti, dorsal view. **c, d.** Male left palp, ventral and retrolateral views. **e.** Epigyne. **f-i.** *Hortipes castor*, new species. **f.** Male palpal pa and ti, dorsal view. **g, h.** Male left palp, ventral and retrolateral views. **i.** Epigyne. **j-l.** *Hortipes salticola*, new species. **j, k.** Male right palp, ventral and retrolateral views. **l.** Epigyne. **m.** *Hortipes exoptans*, new species, epigyne. Scale lines: 0.25 mm.



Map 2. Distribution of *Hortipes* species in Tanzania. *Hortipes angariopsis* ◻, *H. bjorni* ▽, *H. castor* ●, *H. creber* ☆, *H. cucurbita* ▲, *H. delphinus* ▼, *H. exoptans* ◆, *H. fastigiensis* ◇, *H. narcissus* △, *H. leno* ◊, *H. libidinosus* ★, *H. mulciber* ◆, *H. ostiovolutus* ■, *H. platnicki* □, *H. pollux* ○, *H. salticola* ◇, *H. scharffi* ◆, and *H. stoltzei* ●.

width over almost entire length; MA originating on distal extremity of tegulum, thin, and slightly tapered from base to tip, only base visible in ventral view, reaching RTA in retrolateral view; embolus originating on prolateral part of tegulum, without swollen

or enlarged base, fairly thin and short, distal part appressed against MA (fig. 9f–h).

**FEMALE: Measurements.** Total length 2.73; carapace 1.03 long, 0.86 wide; length of fe: I 0.86, II 0.89, III 0.73, IV 1.00. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II



vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1–2 rlt 1. **Coloration.** Carapace yellow, chelicerae pale yellow. Sternum pale yellow. Abdomen off-white, without pattern. Legs yellow. **Genitalia.** Vulva: entrance of ID anterior to globular ST1, IDs straight, running parallel to each other along symmetry axis in posterior direction, connected to ST1 with a semicircular bend. A short distance from entrance, ID is associated with glandular structure connected with the lumen through a series of pores (figs. 9i; 11b).

**VARIABILITY:** The number of mt IV plt spines in males (0 or 1) and mt IV vt spines in females (1 or 2), as well as the transparency of the vulva and the extent of the posterior bend of ID, are variable.

**DISTRIBUTION:** Livingstone Mountains, Tanzania.

*Hortipes pollux*, new species

Figures 9b–e, 11c; Map 2

**TYPES:** Male holotype: litter in Kasaramba forest, elev. 2350 m, Nyika Plateau, Malawi, S10°40', E33°50' (13 December, 1981; R. Jocqué) (MRAC 156.577). Paratypes: 3 ♀ together with holotype (MRAC), 1 ♀ (AMNH); 1 ♂, 1 ♀ from litter in Juniper Forest, elev. 2150 m, Nyika Plateau, Malawi S10°40', E33°50' (13 December, 1981; R. Jocqué) (MRAC); 1 ♂ from litter in Mwenembwe Forest, elev. 2300 m, Nyika Plateau, Malawi S10°40', E33°50' (17 December, 1981; R. Jocqué) (MRAC).

**ETYMOLOGY:** Because this species is the largest of two very similar species, it is named after the brightest of the two first-magnitude stars in the constellation Gemini.

**DIAGNOSIS:** Males of *H. pollux* are recognized by the presence of an apophysis on palpal pa in combination with the sharply bent RTA and a MA that is visible over a fairly large ratio of the MA's length. Males are distinguished from those of the closely related *H. castor* by the distal end of the palpal patellar apophysis being clearly distinguishable from basal part and making an angle with the latter. Females can be recognized by the relatively simple vulvar structure with large, spherical ST1 and ID running in posterior direction. Females can be distinguished from

those of the closely related *H. castor* by the ID making a ventrally oriented U-loop.

**MALE: Measurements.** Total length 2.27; carapace 1.13 long, 0.86 wide; length of fe: I 0.95, II 1.00, III 0.78, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5–6; mt: III plt 0–1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow, chelicerae and sternum pale yellow. Abdomen off-white, marbled with pale grey irregular spots. Legs yellow. **Palp.** Pa with short, slightly procurved, retrolateral apophysis whose distal end is clearly distinguishable from basal part and makes an angle with the latter; ti with evenly recurved, sharp RTA; cymbium elongate without prolateral concavity nor series of curved hairs; sperm duct in tegulum fairly narrow and of same width over almost entire length; MA originating on distal extremity of tegulum, thin, and slightly tapered from base to tip, visible over about one-half its length in ventral view, reaching RTA in retrolateral view; embolus originating on prolateral part of tegulum, without swollen or enlarged base, fairly thin and short, distal part appressed against MA (fig. 9b–d).

**FEMALE: Measurements.** Total length 3.73; carapace 1.51 long, 1.22 wide. Length of fe: I 1.35, II 1.40, III 1.16, IV 1.62. **Leg spination.** fe: I rv 2; IV plt 0–1 rlt 0–1; ti: I, II vsp 6–7; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace orange yellow, chelicerae yellow. Sternum pale yellow, bordered with orange yellow. Abdomen pale yellow, without pattern. Legs orange yellow. **Female genitalia.** Vulva: entrance of ID anterior to large, spherical ST1, IDs running parallel to each other along symmetry axis in posterior direction, making a U-loop in ventral direction before connecting to ST1. A short distance from entrance, at anterior end of U-loop, ID is associated with glandular structure connected with the lumen through a series of pores (figs. 9e, 11c).

**OTHER MATERIAL EXAMINED: Malawi:** 1 ♀ from litter in evergreen forest around Chisenga Falls, elev. 1800 m, Nyika Plateau, S10°40', E33°50' (9 December, 1981; R. Jocqué) (MRAC); 1 ♀ from litter alongside waterfall in Juniper Forest, elev. 2150 m, Nyika Plateau, S10°40', E33°50' (13 December, 1981; R. Jocqué) (MRAC).

**VARIABILITY:** The number of tibial vsp (5

or 6 in males, 6 or 7 in females), the presence of a plt spine on mt III in males, and the presence of terminal spines on fe IV of females, as well as the transparency of the vulva and the exact shape of the ID vertical U-loop are variable.

DISTRIBUTION: Nyika Plateau, Malawi.

***Hortipes salticola*, new species**

Figures 9j–l, 11e; Map 2

**TYPES:** Male holotype: in litter, elev. 1800 m, Mwanihana Forest Reserve, above Sanje, Uzungwa mountains, Tanzania (18 August, 1982; M. Stoltze and N. Scharff) (ZMUC). Paratypes: 1 ♀ in pitfall trap, same collection data (ZMUC); 1 ♂, 1 ♀ in pitfall trap in montane rain forest, elev. 1800–1850 m, same locality (25–29 September, 1984; N. Scharff) (ZMUC); 1 ♀: in pitfall trap in montane rain forest, elev. 1850 m, same locality (29 September, 1984; N. Scharff) (ZMUC).

**ETYMOLOGY:** The species' epithet refers to the biotope where the type specimens were found: *saltus* means montane forest.

**DIAGNOSIS:** Males of *H. salticola* are recognized by the thin, slender RTA, almost parallel with the proximal margin of the cymbium. Males are very similar to those of *H. ostiovolutus* (see under that species for difference). Females can be recognized by the epigyne consisting of two transversal slits, the simple ID curving inward, and the piriform ST1.

**MALE: Measurements.** Total length 1.89; carapace 0.95 long, 0.78 wide; length of fe: I 0.78, II 0.84, III 0.68, IV 0.95. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow, lighter around the fovea. Chelicerae, sternum, and legs pale yellow. Abdomen yellowish white, without pattern. **Palp.** RTA simple, fairly narrow at base and gradually tapered toward sharp tip, distal part almost parallel with axis of segment; cymbium fairly elongate, with shallow, narrow retrolateral concavity but without series of curved hairs; sperm duct fairly broad over entire course, restricted to anterior half of tegulum except for last loop, slightly narrowed just before entering embolus; MA originating in frontal part of tegulum, fairly broad at base, curved over tegulum, strongly

tapered in basal part, slender and sharply curved down in distal part, tip reaches base of RTA; embolus originating on posterior half of prolateral part of tegulum, whiplike, fairly short, distal part appressed against MA (fig. 9j, k).

**FEMALE: Measurements.** Total length 2.70; carapace 1.22 long, 1.05 wide; length of fe: I 1.00, II 1.08, III 0.86, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow ochre. Chelicerae and legs I and II yellow ochre, legs III and IV yellow. Sternum yellow. Abdomen pinkish yellow, without pattern. **Genitalia.** Epigyne two long, transversal slits situated at anterior end of ST1 (fig. 9l). Vulva: ID entrances widely separated; ID itself simple, curved inward over 90°, running in posterior direction; entrance associated with glandular structure connected with the lumen through a series of pores. Spermathecae 1 large, piriform (fig. 11e).

DISTRIBUTION: Known only from the type locality.

***Hortipes fastigiensis*, new species**

Figures 10a–c, 11f; Map 2

**TYPES:** Male holotype in pitfall trap on Mount Rungwe, SW slope, elev. 1900 m, Tanzania (20 August, 1980; M. Stoltze and N. Scharff) (ZMUC). Paratype: 1 ♀ together with holotype.

**ETYMOLOGY:** The species' epithet refers to the environment where the type specimens were found: *fastigium* means slope.

**DIAGNOSIS:** Males of *H. fastigiensis* are recognized by the beak-shaped RTA. Females can be recognized by the very large globular ST1, the simple and straight ID running in posterior direction and the epigyne being a rounded triangular depression.

**MALE: Measurements.** Total length 2.27; carapace 1.13 long, 0.86 wide; length of fe: I 0.95, II 1.00, III 0.78, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5–6; mt: III plt 0–1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace lemon yellow, lighter around the fovea. Chelicerae, sternum, and legs pale yellow. Abdomen pale yellow, without pattern. **Palp.** RTA simple, fairly broad at base, tip sharp, beak-shaped;

cymbium fairly elongate, without retrolateral concavity nor series of curved hairs; sperm duct fairly broad over entire course, restricted to anterior half of tegulum except for last loop, slightly narrowed just before entering embolus; MA originating in frontal part of tegulum, fairly broad at base, curved over tegulum, strongly tapered in basal part, slender and sinuous in distal part, tip reaches RTA; embolus originating on prolateral part of tegulum, whiplike, fairly short, distal part appressed against MA (fig. 10a, b).

**FEMALE: Measurements.** Total length 2.27; carapace 1.13 long, 0.86 wide; length of fe: I 0.95, II 1.00, III 0.78, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5–6; mt: III plt 0–1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow, cephalic region pale yellow. Chelicerae pale yellow, sternum, and legs yellow. Abdomen pale yellow, without pattern. **Genitalia.** Epigyne a triangular depression with rounded corners, situated between anterior ends of ST1 and flanked by ID entrances (fig. 10c). Vulva: IDs almost straight, running parallel to each other in posterior direction, entrance associated with glandular structure connected with the lumen through a series of pores. Spermathecae 1 globular, very large, touching each other on symmetry axis (fig. 11f).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes ostiovolutus*, new species

Figures 10d–f, 11d; Map 2

**TYPES:** Male holotype: intermediate montane rain forest, elev. 1000–1100 m, Mwanihana Forest Reserve, Uzungwa mountains, Tanzania (10–24 September, 1984; N. Scharff) (ZMUC). Paratypes: 1 ♀ from litter in montane rain forest, elev. 1250 m, same locality (25 July, 1982; M. Stoltze and N. Scharff) (ZMUC); 1 ♀ in pitfall trap, elev. 1000 m, same locality (1 August, 1982; M. Stoltze and N. Scharff) (ZMUC); 1 ♀: litter, elev. 1000 m, same locality (1 August, 1982; M. Stoltze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The species' epithet refers to the convoluted entrance of the IDs of the female vulva.

**DIAGNOSIS:** Males of *H. ostiovolutus* are recognized by the thin, slender, and fairly

short RTA, almost parallel with the proximal margin of the cymbium. Males are very similar to those of *H. salticola*, in which the MA reaches the last sharp bend of the sperm duct and the embolus originates farther backward on the tegulum. Females can be recognized by the coiled ID running in posterior direction and the large, comma-shaped ST1.

**MALE:** Holotype specimen damaged: carapace crushed, left palp and first left leg missing. **Measurements.** Total length 1.70; carapace 1.00 long, 0.78 wide; length of fe: I 0.84, II 0.89, III 0.68, IV 1.00. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow ochre; chelicerae, legs, and sternum yellow. Abdomen very pale yellow, no pattern. **Palp.** RTA simple, fairly narrow at base and gradually tapering toward sharp tip, distal part almost parallel with axis of segment; cymbium fairly elongate, with shallow, narrow retrolateral concavity but without series of curved hairs; sperm duct fairly broad over entire course, restricted to anterior half of tegulum except for last loop, slightly narrowed just before entering embolus; MA originating in frontal part of tegulum, fairly broad at base, curved over tegulum, strongly tapered in basal part, slender and sharply curved down in distal part, tip reaches beyond base of RTA; embolus originating on prolateral part of tegulum at about middle of tegular length, whiplike, fairly short, distal part appressed against MA (fig. 10d, e).

**FEMALE: Measurements.** Total length 2.65; carapace 1.19 long, 0.95 wide; length of fe: I 1.16, II 1.22, III 0.95, IV 1.32. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1–2 rlt 1. **Coloration.** Carapace, chelicerae, and legs yellow. Sternum whitish. Abdomen pale yellow, no pattern. **Genitalia.** Epigyne a bluntly triangular scape, situated between anterior ends of ST1 (fig. 10f). Vulva: IDs first coiled over 360°, then running parallel to each other in posterior direction, entrance associated with glandular structure connected with the lumen through a series of pores. Spermathecae comma shaped, very large (fig. 11d).

**VARIABILITY:** The number of mt IV vt spines in females (1 or 2) is variable.

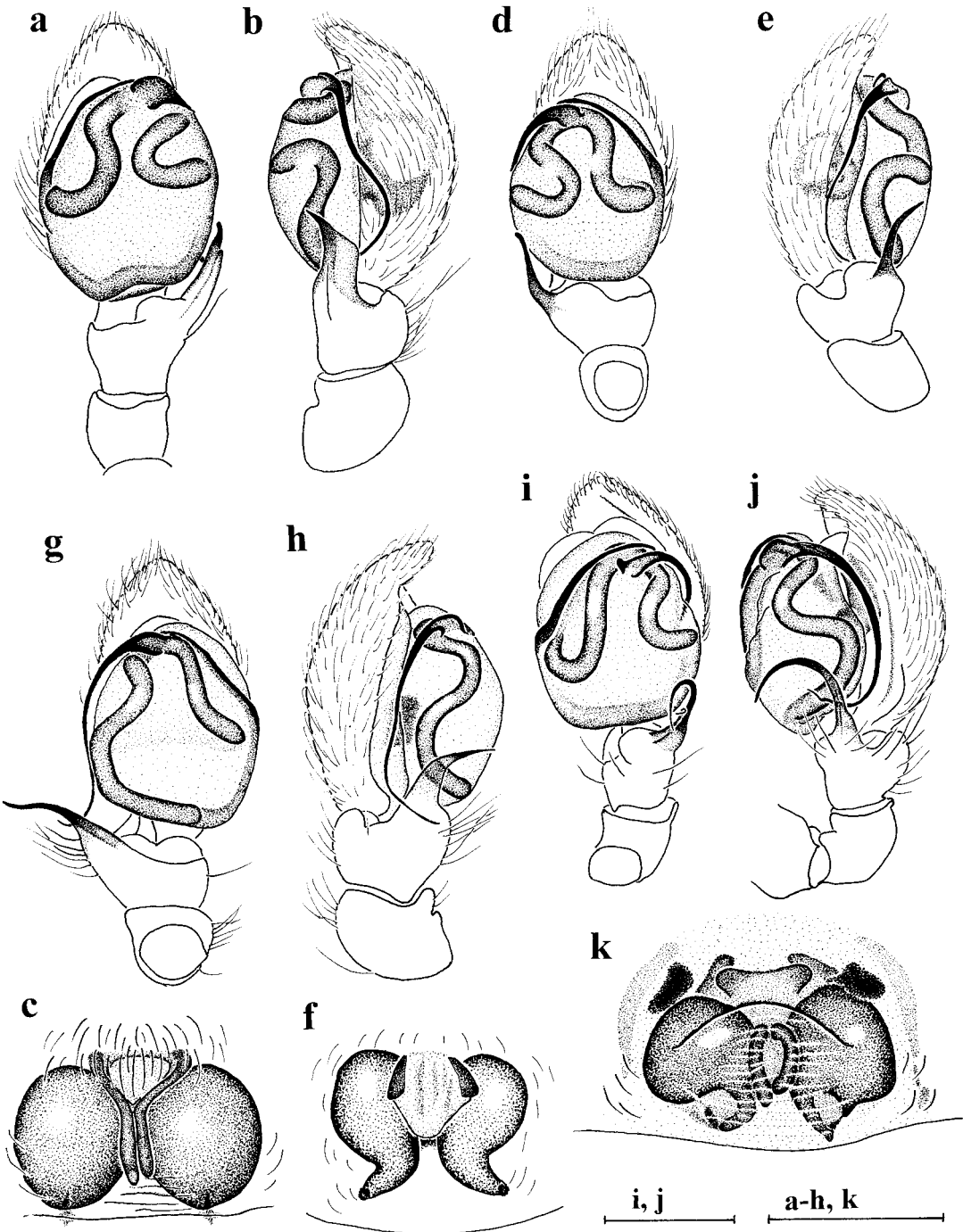


Fig. 10. a–c. *Hortipes fastigiensis*, new species. a, b. Male left palp, ventral and retrolateral views. c. Epigyne. d–f. *Hortipes ostiovolutus*, new species. d, e. Male right palp, ventral and retrolateral views. f. Epigyne. g, h. *Hortipes exoptans*, new species, male right palp, ventral and retrolateral views. i–k. *Hortipes scharffi*, new species. i, j. Male left palp, ventral and retrolateral views. k. Epigyne. Scale lines: 0.25 mm.



**DISTRIBUTION:** Mwanihana Forest Reserve, Uzungwa Mountains, Tanzania, in rain forest between elevations of 1000 and 1250 m.

***Hortipes exoptans*, new species**

Figures 9m, 10g, h, 35c; Map 2

**TYPES:** Male holotype in pitfall trap in montane rain forest, elev. 1600–1650 m, Uzungwa Scarp Forest Reserve, above Chita village, Iringa region, Uzungwa Mountains, Tanzania (8–13 November, 1984; N. Scharff) (ZMUC). Paratypes: 8♂, 10♀, three juveniles from litter and logs, elev. 1800 m, Uzungwa Scarp Forest Reserve, 11 km SE Masisiwe, Kihanga Stream, Uzungwa Mountains, Tanzania S8°22'5.7", E35°58'41.6" (17–27 May, 1997; N. Scharff) (ZMUC)

**ETYMOLOGY:** The species is called *exoptans*, longing for, because most males found had partly expanded palps.

**DIAGNOSIS:** Males of *H. exoptans* are recognized by the thin, slender RTA, clearly pointing outward, a feature that distinguishes them from the closely related *H. cucurbita* and *H. scharffi*. Females can be recognized by the gourd-shaped ST1 and the simple, almost straight ID. Females can be distinguished from those of the closely related *H. cucurbita* and *H. scharffi* by the absence of loops in ID.

**MALE: Measurements.** Total length 2.46; carapace 1.08 long, 0.92 wide; length of fe: I 0.95, II 1.00, III 0.81, IV 1.11. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace, sternum, and legs orange yellow, chelicerae pinkish yellow. Abdomen pale pink with a median longitudinal white stripe on the anterior half. **Palp.** RTA simple, fairly narrow at base and gradually tapered toward sharp tip, distal part at right angle with axis of segment; cymbium fairly elongate, with shallow, narrow retrolateral concavity but without series of curved hairs; sperm duct fairly broad over entire course, restricted to anterior half of tegulum except for last loop, slightly narrowed just before entering embolus; MA originating in frontal part of tegulum, fairly broad at base, curved along tegulum in expanded palp, strongly tapered in basal part, slender and sharply

curved down in distal part, tip reaches beyond base of RTA; embolus originating on prolateral part of tegulum, whiplike, fairly short, distal part appressed against MA (figs. 10g, h).

**FEMALE: Measurements.** Total length 3.92; carapace 1.08 long, 0.92 wide; length of fe: I 0.95, II 1.00, III 0.81, IV 1.11. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0–1; ti: I, II vsp 6–7; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1–2 rlt 1. **Coloration.** Carapace and legs yellow ochre; sternum and chelicerae yellow. Abdomen greyish yellow with a median longitudinal lighter stripe on the anterior half. **Genitalia.** Epigyne a transversal slit with an elongated hole, coinciding with ID entrances, at each end (fig. 9m). Vulva: ID short and almost straight, running in posterior direction; entrance associated with glandular structure connected with the lumen through a series of pores. Spermathecae gourd shaped, very large (fig. 35c).

**VARIABILITY:** The number of fe IV terminal spines, mt IV vt spines (1 or 2) and tibial vsp (6 or 7) in females are variable.

**DISTRIBUTION:** Uzungwa Scarp Forest Reserve, Uzungwa Mountains, Tanzania, elev. 1600–1800 m.

***Hortipes scharffi*, new species**

Figures 10i–k, 13a; Map 2

**TYPES:** Male holotype in pitfall trap in montane rain forest, elev. 1900 m, Kigogo Forest Reserve, Mufindi, Iringa region, Uzungwa Mountains, Tanzania (7–15 October, 1984; N. Scharff) (ZMUC). Paratype: 1♀ together with holotype.

**ETYMOLOGY:** The species name is a patronym in honor of Dr. N. Scharff, who collected the type specimens.

**DIAGNOSIS:** Males of *H. scharffi* are recognized by the very long and slender RTA, strongly curved backward. Males are similar to those of *H. cucurbita*, but in that species the RTA is not recurved but simply curved down. Females can be recognized by the gourd-shaped ST1 and the ID having a hairpin loop associated with a glandular structure and making a U-loop in a ventral direction before connecting to ST1.

**MALE: Measurements.** Total length 2.65; carapace 1.16 long, 1.00 wide; length of fe:



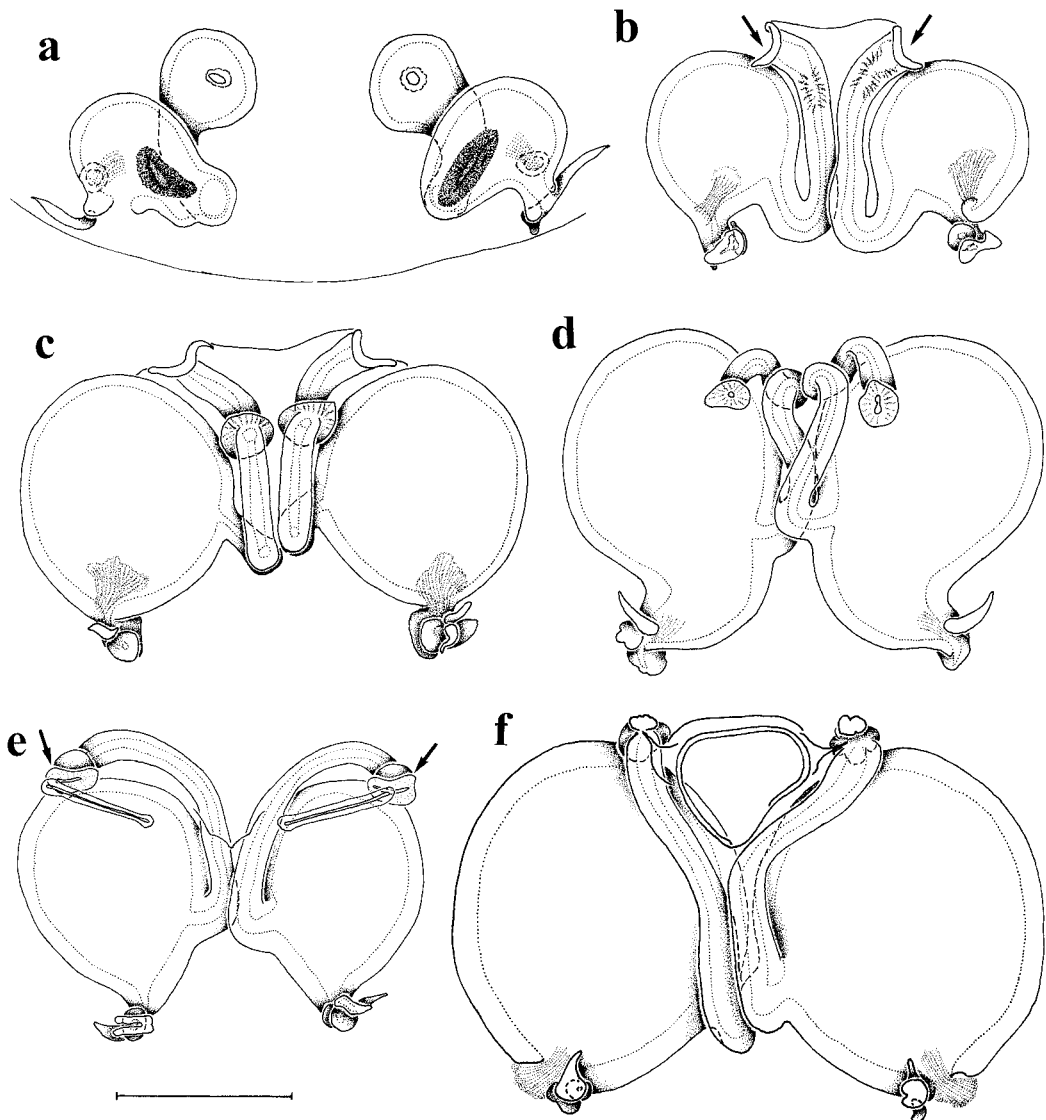


Fig. 11. **a.** *Hortipes platnicki*, new species, vulva, ventral view. **b.** *Hortipes castor*, new species, vulva, ventral view. Arrows indicate ID entrances. **c.** *Hortipes pollux*, new species, vulva, ventral view. **d.** *Hortipes ostiovolutus*, new species, vulva, ventral view. **e.** *Hortipes salticola*, new species, vulva, ventral view. Arrows indicate ID entrances. **f.** *Hortipes fastigiensis*, new species, vulva, ventral view. Scale line: 0.1 mm.

I 1.03, II 1.08, III 0.84, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange brown, chelicerae orange. Legs I and II orange brown, legs III and IV orange yellow. Sternum orange, abdomen yellowish white, without pattern. **Eyes.** PME small. **Palp.** RTA simple, narrow

at base and suddenly tapered beyond base, thence gradually tapered toward tip; cymbium fairly elongate, with shallow, narrow retrolateral concavity but without series of curved hairs; sperm duct fairly broad over entire course, slightly narrowed just before entering embolus; MA originating in frontal part of tegulum, fairly broad at base, curved

over tegulum, strongly tapered in basal part, slender and sharply curved down in distal part, tip almost reaches base of RTA; embolus originating on prolateral part of tegulum, whiplike, fairly short, distal part appressed against MA (fig. 10i, j).

**FEMALE: Measurements.** Total length 3.65; carapace 1.57 long, 1.32 wide. Length of fe: I 1.38, II 1.43, III 1.13, IV 1.59. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange brown, chelicerae orange. Legs I and II orange brown, legs III and IV orange yellow. Sternum orange, abdomen yellowish white, without pattern. **Eyes.** Eyes all ringed with black, rather small, especially the PME. **Genitalia.** Epigyne a shallow bilobed depression enclosing ID entrances (fig. 10k). Vulva: ID first running outward in a hemicircular bend, then turning inward with hairpin loop and running in posterior direction, making U-loop in ventral direction before connecting to ST1. Hairpin loop of ID associated with glandular structure connected with the lumen through a series of pores. Spermathecae gourd shaped, very large (fig. 13a).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes cucurbita*, new species

Figures 12a–c, 13c; Map 2

**TYPES:** Male holotype: litter in montane rain forest, elev. 1800–1850 m, Mwanihana Forest Reserve, Uzungwa mountains, Tanzania (28–29 September, 1984; N. Scharff) (ZMUC). Paratypes: 1 ♀ from litter in montane rain forest, elev. 1000 m, same locality (1 August, 1982; M. Stoltze and N. Scharff) (ZMUC); 1 ♂ from forest, elev. 1700 m, same locality (15 August, 1982; M. Stoltze and N. Scharff) (ZMUC); 2 ♂ from pitfall trap, elev. 1650 m, same locality (18 August, 1982; M. Stoltze and N. Scharff) (ZMUC); 1 ♂, 1 ♀ from litter, elev. 1650 m, same locality (18 August, 1982; M. Stoltze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The species' epithet refers to the gourd-like shape of the female ST.

**DIAGNOSIS:** Males of *H. cucurbita* are recognized by the very long and slender RTA, strongly curved inward at extremity. Males

are similar to those of *H. salticola*, but in that species the RTA is slightly curved outward. Females can be recognized by the epigyne consisting of two circular holes, the very large gourd-shaped ST1 and the ID first running outward and then turning inward with a hairpin loop, which distinguishes the ID from that of the closely related *H. exoptans*.

**MALE: Measurements.** Total length 2.30; carapace 1.03 long, 0.84 wide; length of fe: I 0.92, II 0.97, III 0.76, IV 1.05. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace ochre-yellow, lighter around the fovea. Chelicerae yellow, legs pale yellow. Sternum lemon yellow. Abdomen pale pinkish yellow, no pattern. **Palp.** RTA simple, narrow at base and gradually tapered toward the middle from where it is parallel sided toward the sharp tip, which is strongly curved inward; cymbium fairly elongate, with shallow, narrow retrolateral concavity but without series of curved hairs; sperm duct fairly broad over entire course, slightly narrowed just before entering embolus; MA originating in frontal part of tegulum, fairly broad at base, curved over tegulum, strongly tapered in basal part, slender and sharply curved down in distal part, tip reaches base of RTA; embolus originating on prolateral part of tegulum, whiplike, fairly short, distal part appressed against MA (fig. 12a, b).

**FEMALE: Measurements.** Total length 4.00; carapace 1.62 long, 1.35 wide; length of fe: I 1.43, II 1.49, III 1.19, IV 1.70. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1–2 rlt 1. **Coloration.** Carapace orange brown. Chelicerae light ochre, legs I and II orange brown, legs III and IV yellow. Sternum pale yellow with a brown margin. Abdomen peach, no pattern. **Genitalia.** Epigyne two circular holes coinciding with ID entrances and situated at anterior ends of ST1 (fig. 12c). Vulva: ID first running outward, then turning inward with hairpin loop and running in posterior direction; entrance associated with glandular structure connected with the lumen through a series of pores. Spermathecae gourd shaped, very large (fig. 13c).

**VARIABILITY:** The males studied are fairly homogeneous. The female found at elev.

1650 m slightly differs from the female found at elev. 1000 m in having an epigyne with IDs that are not so clearly visible externally, in the lack of rlt spines on fe IV, and in having 1 vt spine instead of 2 on mtIV.

**DISTRIBUTION:** Mwanihana Forest Reserve, Uzungwa Mountains, Tanzania, in litter of montane rain forest between elev. 1000 and 1850 m.

*Hortipes hesperoecius*, new species

Figures 12d, 13f; Map 1

**TYPES:** Female holotype: Mt. Aureol, Free-town, Sierra Leone N08°30' W13°15' (September 1976; D. Olu-Pitt) (MRAC 148.476).

**ETYMOLOGY:** The species' epithet is a latinization of the ancient Greek words εσπεριος, Western, and οικεος, indigenous. It means "living in the west" and highlights the fact that this species occurs more to the west than any other *Hortipes* species known.

**DIAGNOSIS:** Females can be recognized by the large, spherical ST2 and by the piriform ST1 gradually merging into the wide ID and containing a peculiar treelike structure.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 3.00; carapace 1.24 long, 1.03 wide; length of fe: I 0.97, II 1.00, III 0.81, IV 1.16. **Leg spination.** Fe: I rv 3; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace and legs orange brown, sternum and chelicerae yellow brown. Abdomen peach, no pattern, sparsely covered with thin, pointed grey setae. **Genitalia.** Vulva: ID entrances widely separated, first stretch of ID narrow and rather thick-walled, running inward, its entrance associated with glandular structure connected with the lumen through a series of pores and its end attached to the spherical ST2 and to second part of ID, which is wide and sclerotized and gradually merges into the piriform ST1. Spermathecae 1 has a peculiar, tree-like internal structure, probably a gland (figs. 12d; 13f).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes silvarum* Ledoux and Emerit

Figures 12e–g, 13d; Map 1

*Hortipes silvarum* Ledoux and Emerit, 1998:166, figs. 6F, G; 7A, B (female holotype from Ivory Coast, Cavally forest, not examined).

**DIAGNOSIS:** Males of *H. silvarum* are easily recognized by the long thin RTA which is curved down, in combination with the absence of a MA and the presence of three rv spines on fe I. Females can be recognized by the weakly sclerotized first stretch of ID, the looped sclerotized second part of ID, the spherical ST1, and the large, ellipsoidal, stalked ST2.

**MALE:** The male of *H. silvarum* is found to be identical with the specimen described as "*Hortipes* sp. 1" in Ledoux and Emerit (1998). **Measurements.** Total length 1.94; carapace 0.89 long, 0.73 wide; length of fe: I 0.78, II 0.84, III 0.68, IV 0.95. **Leg spination.** Fe: I rv 3; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace and legs yellow, chelicerae and sternum pale yellow. Abdomen pale yellow, no pattern. **Palp.** Tibia with long, thin, strongly sclerotized RTA attached to lateral side of ti; cymbium unmodified; sperm duct with wide basal part gradually tapered toward embolus but not with thin distal part; MA absent; embolus originating on posterior part of tegulum with swelling or broadened base; long, whiplike, looped over almost 360° (fig. 12e, f).

**FEMALE: Measurements.** Total length 3.02; carapace 1.24 long, 1.11 wide; length of fe: I 1.08, II 1.11, III 0.84, IV 1.22. **Leg spination.** Fe: I rv 3; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace, chelicerae, sternum, and legs yellow ochre. Abdomen pale yellow, no pattern, sparsely covered with thin, pointed grey setae. **Genitalia.** Vulva: entrance situated between anterior ends of ST2. First stretch of ID weakly sclerotized, hidden along most of its length at dorsal side of second, sclerotized stretch, running outward and in posterior direction; second stretch of ID sclerotized, its origin associated with glandular structure connected with the lumen through a series of pores, first running in anterior direction, then making a complete circular loop before running in posterior direction and connecting to the spherical ST1. Just prior to loop is attached the stalked, ellipsoidal ST2 (figs. 12g, 13d).

**MATERIAL EXAMINED: Ivory Coast:** 1♂ from secondary forest, Kossou, N06°57' W04°58' (4 February 1975; R. Jocqué)

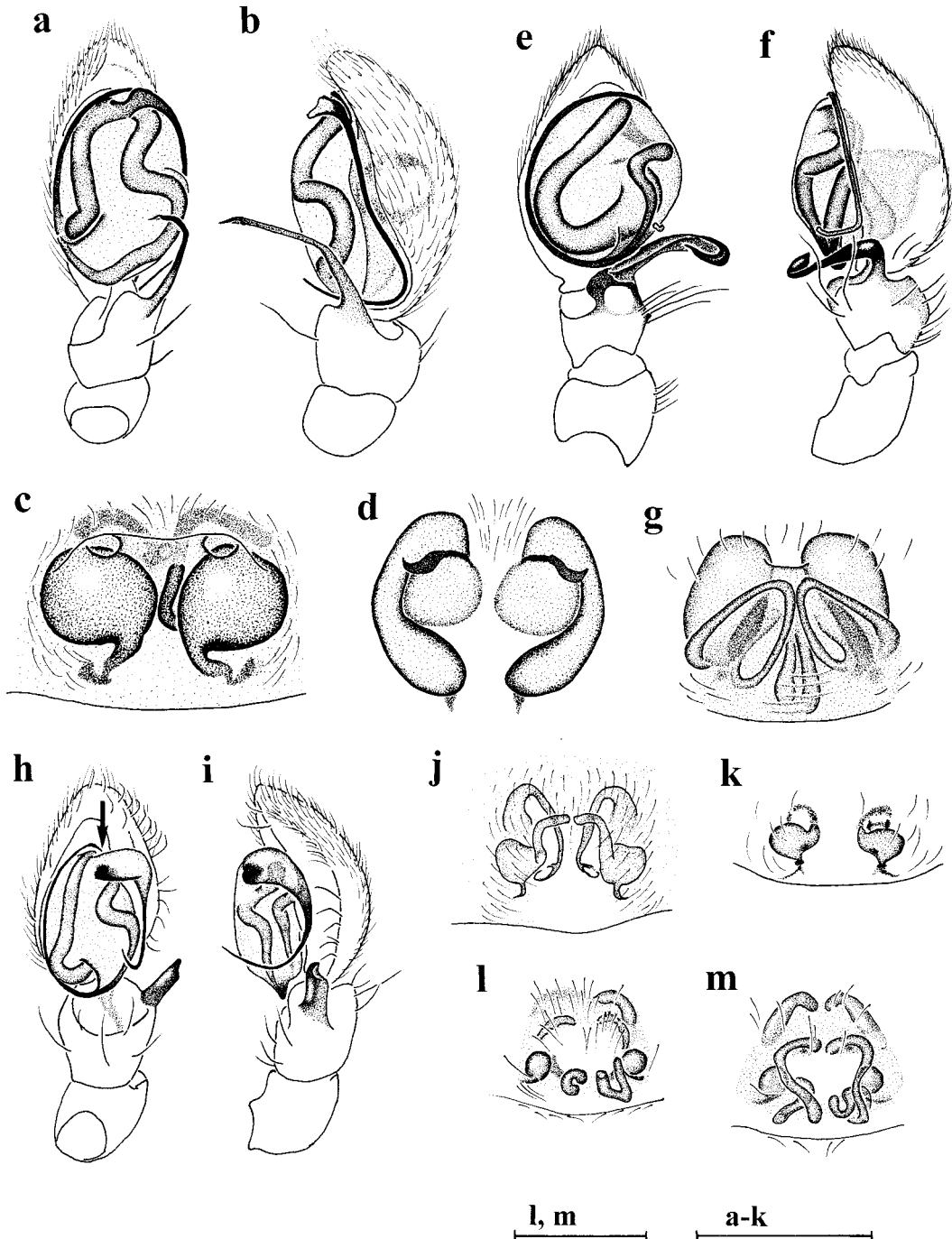


Fig. 12. a–c. *Hortipes cucurbita*, new species. a, b. Male left palp, ventral and retrolateral views. c. Epigyne. d. *Hortipes hesperoecius*, new species, epigyne. e–g. *Hortipes silvarum*. e, f. Male left palp, ventral and retrolateral views. g. Epigyne. h–j. *Hortipes aurora*, new species. h, i. Male left palp, ventral and retrolateral views. Arrow indicates insertion of MA on tegulum. j. Epigyne. k. *Hortipes klumpkeae*, new species, epigyne. l, m. *Hortipes echo*, new species, epigynes. Scale lines: 0.25 mm.

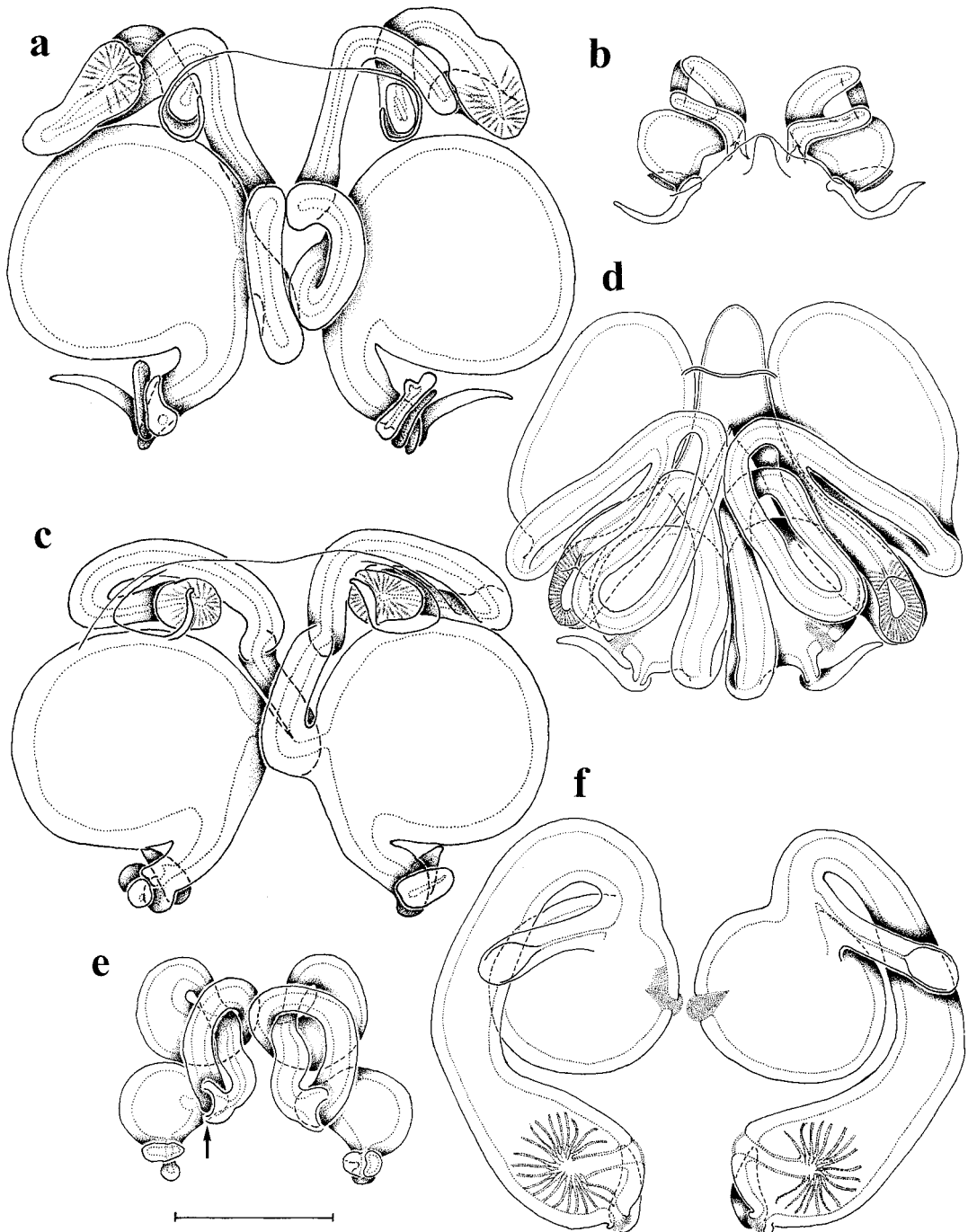


Fig. 13. **a.** *Hortipes scharffi*, new species, vulva, ventral view. **b.** *Hortipes klumpkeae*, new species, vulva, ventral view. **c.** *Hortipes cucurbita*, new species, vulva, ventral view. **d.** *Hortipes silvarum*, vulva, ventral view. **e.** *Hortipes aurora*, new species, vulva, ventral view. Arrow indicates ID entrance. **f.** *Hortipes hesperoecius*, new species, vulva, ventral view. Scale line: 0.1 mm.



(MRAC); 1 ♂ sieved from litter in dense forest, Mabi Classified Forest, Bettié, N06°05' W03°30' (25 November 1993; R. Jocqué) (MRAC); 1 ♂ sieved from litter in rain forest, Bossematié Classified Forest, Appouesso (15 February 1997; R. Jocqué and L. Baert) (MRAC); 1 ♀ in pitfall trap in forest, same locality (19 November 1995; R. Jocqué and Tanoh) (MRAC); 1 ♀ in pitfall trap in rain forest, same locality (29 November 1993; R. Jocqué and N. Seabé) (MRAC); 2 ♀ in pitfall trap in forest, same locality (15 January 1995; R. Jocqué and Tanoh) (MRAC); 1 ♂, 1 ♀ in pitfall trap in forest, same locality (29 January 1995; R. Jocqué and Tanoh) (MRAC, now in AMNH).

**VARIABILITY:** There is a variability in size (1.5–2.8 in males, 2.5–4 mm) as well as in the exact course of the female ID loops.

**DISTRIBUTION:** Southern half of Ivory Coast.

*Hortipes klumpkeae*, new species

Figures 12k, 13b; Map 2

**TYPES:** Female holotype and 1 ♀ paratype: in pitfall trap at elev. 1900 m, Lupanga West, Uluguru Mountains, Tanzania (1 July 1981; M. Stoltze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The species' name is a patronym in honor of Dorothea Klumpke (1861–1942), astronomer known for her work on Saturn's rings and for her contributions to the Carte du Ciel program.

**DIAGNOSIS:** Females are closest to those of *H. leno* but can be distinguished from them by the inward-running stretch of the ID, which is angular instead of continuously curved.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.11; carapace 1.00 long, 0.81 wide; length of fe: I 0.89, II 0.95, III 0.70, IV 1.00. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange yellow, lighter at the fovea. Chelicerae pale yellow, sternum, and legs yellow. Abdomen peach, no pattern. Vulva very simple, ID making sharp outward bend, followed by inward-running stretch making an angle before connecting to ST1 (figs. 12k, 13b).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes aurora*, new species

Figures 12h–j, 13e; Map 3

**TYPES:** Male holotype: in elephant dung, Ruindi plains, elev. 1000 m, Kivu, Congo S00°48', E29°18' (9 July, 1972; M. Lejeune) (MRAC 144.393). Paratypes: 1 ♀ together with holotype (MRAC; now in AMNH); 1 ♀: Butembo, Musosa valley, elev. 1745 m, Kivu, Congo N00°09', E29°17' (April 1968; M. Lejeune) (MRAC); 1 ♂ in superficial litter in forest, elev. 2200 m, Musyenene region, Kyondo, Congo N00°00', E29°24' (April 1976; M. Lejeune) (MRAC).

**ETYMOLOGY:** The specific name is a noun in apposition meaning dawn. It refers to the fact that this was the very first species described in the course of the present work.

**DIAGNOSIS:** Males of *H. aurora* are easily recognized by the simple palp: the RTA is an almost cylindrical prong with slightly indented tip, the MA is evenly curved and gradually tapered from base to end. Females are close to those of *H. echo* but can be distinguished from the latter species through the smaller reniform cavities and a simpler structure of the vulva, with ID turning 540° before entering ST1.

**MALE: Measurements.** Total length 1.73; carapace 0.95 long, 0.73 wide; length of fe: I 0.70, II 0.76, III 0.62, IV 0.89. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0–1; ti: I, II vsp 5; mt: III plt 0–1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace and chelicerae ochraceous yellow. Sternum yellow, with yellow brown border. Abdomen pale yellow. Legs yellow. **Palp.** Tibia with simple, roughly cylindrical, RTA with tip slightly indented dorsally; cymbium elongate, with shallow lateral concavity with a few long hairs along its rim; sperm duct with wide basal part, hardly narrowed in distal part, with S-shaped turn just before embolus; MA simple, evenly curved and gradually tapered from base to tip; embolus originating on posterior part of tegulum, with fairly broad, triangular base, fairly short, whiplike, looped over 270–360° (fig. 12h, i).

**FEMALE: Measurements.** Total length 2.65; carapace 1.16 long, 0.95 wide; length

of fe: I 0.86, II 0.92, III 0.73, IV 1.08. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace ochraceous yellow. Chelicerae yellow. Sternum pale yellow, with yellow brown border. Abdomen pale yellow. Legs I and II ochraceous yellow, III and IV yellow. **Genitalia.** Vulva: ID coiled over 540° and widened halfway into reniform cavity about as large as ST1 (figs. 12j; 13e).

**OTHER MATERIAL EXAMINED:** **Congo:** 1♂, Lubero mountain range, N slope of Mt. Lubwe, Kivu, elev. 2200 m, N00°02', E29°18' (2 August 1963; M. Celis) (MRAC); 1♀ from humus in montane forest with *Hagenia*, fen at the Kahalolo spring, Itombwe, Uvira region, Kivu, elev. 2800 m, S03°15', E28°50' (January 1960; N. Leleup) (MRAC); 1♀ in moss on humus layer, Lubero-Butembo road, Lukanga region, Vukengete Forest, elev. 2180 m (December 1974–January 1975; M. Lejeune) (MRAC); 1♀ in litter under grasses, Lubero-Butembo road, Lukanga region, Vukengete Forest, elev. 2200 m (December 1974–January 1975; M. Lejeune) (MRAC).

**VARIABILITY:** The number of mt III plt spines (0 or 1) and fe IV rlt spines (0 or 1) in males as well as the transparency of the vulva in females are variable.

**DISTRIBUTION:** Mountain region, from Bujumbura in the south to Butembo in the north, Kivu, Congo.

### *Hortipes echo*, new species

Figures 12l, m, 16a; Map 3

**TYPES:** Female holotype and female paratype collected in humus layer forest, elev. 1700 m, Mt. Kabobo, Haut Kiyambi, Katanga, Congo S05°07', E29°03' (October 1958; N. Leleup) (MRAC 112.826).

**ETYMOLOGY:** The present species, of which only females are known, was collected together with *H. narcissus*. For that reason it is named after the nymph Echo, who fell in love with Narcissus but was rejected.

**DIAGNOSIS:** Females are close to those of *H. aurora* but can be distinguished from the latter species through the larger reniform cavities and a more complex vulva, with the ID turning 540° followed by a twisted loop situated posterior to ST1.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.86; carapace 1.22 long, 1.00 wide; length of fe: I 0.97, II 1.03, III 0.81, IV 1.16. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow brown, chelicerae and sternum yellow. Legs yellow brown. Abdomen pinkish yellow, no pattern. **Genitalia.** Vulva: ID coiled over 540°, followed by an almost straight stretch running in posterior direction and a twisted loop situated posterior to ST1. First coil widened into reniform cavity about 2 × as large as ST1 (figs. 12l,m; 16a).

**VARIABILITY:** The transparency of the vulva as well as the exact shape of the posterior ID loops (fig. 12l, m) are variable.

**DISTRIBUTION:** Known only from the type locality.

### *Hortipes stoltzei*, new species

Figure 14a, b; Map 2

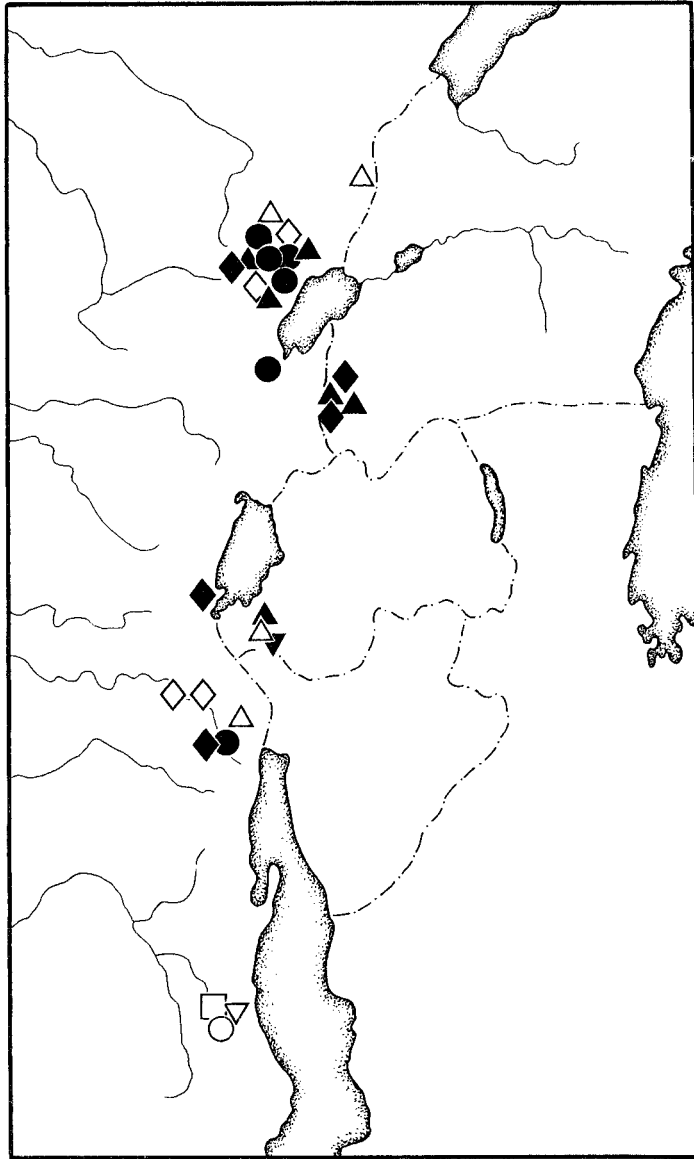
**TYPES:** Male holotype caught in litter at elev. 1600 m, Lupanga East, Uluguru Mountains, Tanzania (July 10, 1981; M. Stoltze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The species' name is a patronym in honor of M. Stoltze, one of the collectors of the type specimen.

**DIAGNOSIS:** Males of *H. stoltzei* are easily recognized by the simple palp: the RTA is a simple forward-directed prong tapered from base to tip which is curved down and inward.

**MALE: Measurements.** Total length 1.70; carapace 0.81 long, 0.68 wide; length of fe: I 0.62, II 0.68, III 0.49, IV 0.73. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace pale yellow, whitish around the fovea. Chelicerae yellow, sternum yellowish white. Legs yellow. Abdomen pale yellow, no pattern. **Palp.** Tibia with simple, tapered, RTA with tip slightly curved down and inward; cymbium elongate, with shallow lateral concavity; sperm duct with wide basal part, hardly narrowed in distal part, and S-shaped turn just before embolus; MA simple, evenly curved and gradually tapered from base to tip; embolus originating on posterior part of tegulum, fairly short, whiplike, looped over 270–360° (fig. 14a, b).

**FEMALE:** Unknown.



Map 3. Distribution of *Hortipes* species in the Kivu region. *Hortipes amphibolus* □, *H. auriga* ▼, *H. aurora* ●, *H. echo* ○, *H. falcatus* ▲, *H. hastatus* ◆, *H. horta* ◇, *H. lejeunei* △, and *H. narcissus* ▽.

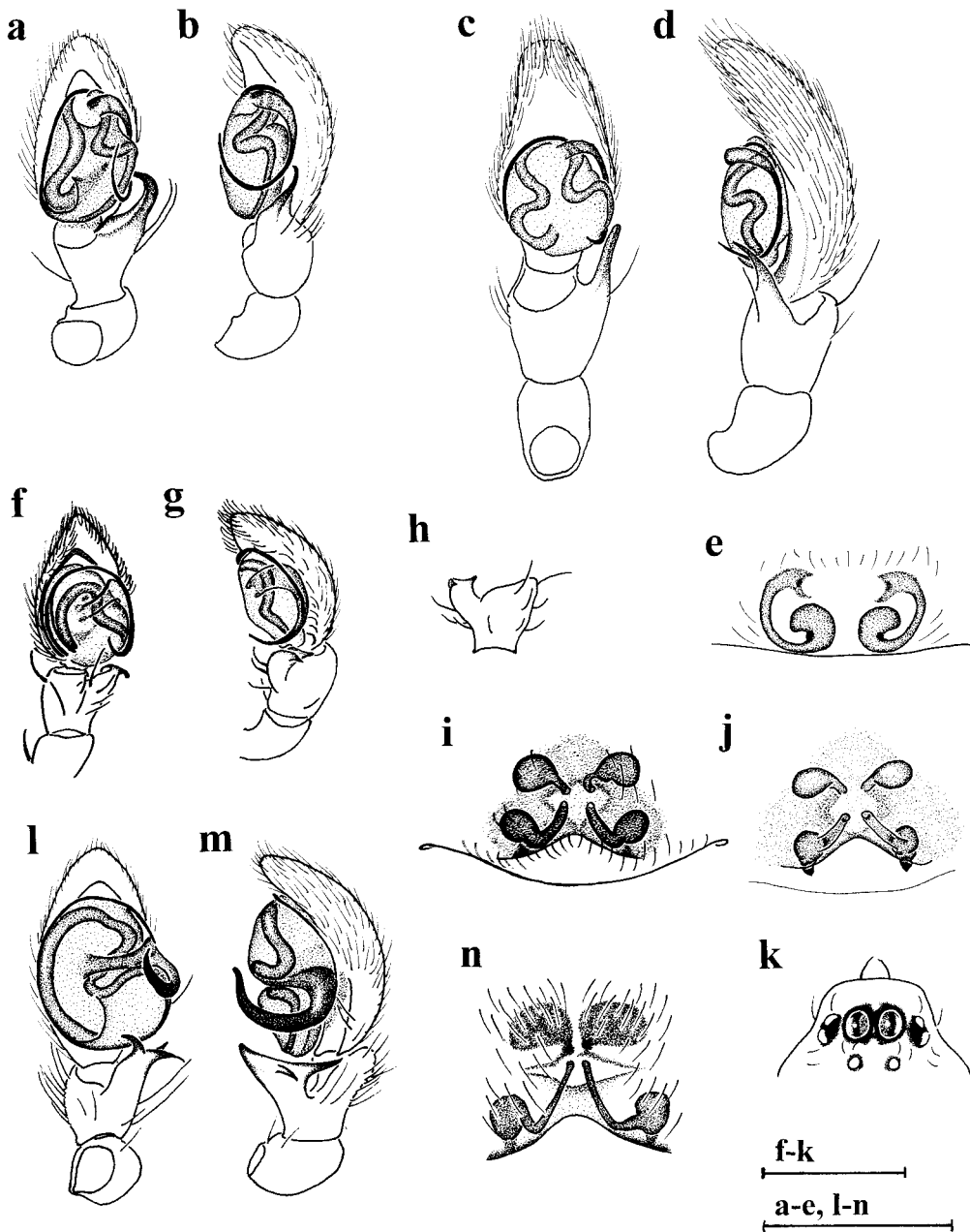
DISTRIBUTION: Known only from the type locality.

***Hortipes creber*, new species**

Figures 14c–e, 16b; Map 2

TYPES: Male holotype: in litter, elev. 1650 m, Mwanihana Forest Reserve above Sanje, Uzungwa Mountains, Tanzania (18 August 1982; M. Stoltze and N. Scharff) (ZMUC).

Paratypes: 1♂ and two subadult females together with holotype; 2♂ in pitfall trap, elev. 1650 m, same locality (August 18, 1982; M. Stoltze and N. Scharff) (ZMUC); 1♂, 2♀ in pitfall trap, elev. 1850 m, same locality (18 August 1982; M. Stoltze and N. Scharff) (ZMUC); 3♀ in pitfall trap, elev. 1000 m, same locality (1 August 1982; M. Stoltze and N. Scharff) (ZMUC); 1♂ and 3♀ in litter,



Figs. 14. **a, b.** *Hortipes stoltzei*, new species, male left palp, ventral and retrolateral views. **c–e.** *Hortipes creber*, new species. **c, d.** Male left palp, ventral and retrolateral views. **e.** Epigyne. **f–k.** *Hortipes orchatocnemis*, new species. **f, g.** Male left palp, ventral and retrolateral views. **h.** Male palpal ti, dorsal view. **i, j.** Epigynes. **k.** Eye arrangement, dorsal view. **l–n.** *Hortipes contubernalis*, new species. **l, m.** Male left palp, ventral and retrolateral views. **n.** Epigyne. Scale lines: 0.25 mm.

elev. 1000 m, same locality (1 August 1982; M. Stoltze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The species is named *creber*, frequent, because it appears to be common in Mwanihana Forest Reserve.

**DIAGNOSIS:** Males of *H. creber* are recognized by the thin, slender RTA, which is slightly curved down and inserted at an angle of about 30° with axis of the segment; the males are somewhat similar to those of *H. salticola* but differ by the much shorter RTA, the narrower cymbium, and the evenly curved MA, which only reaches the tip of the RTA. In *H. salticola* the MA is sharply bent and reaches the base of the RTA. Females can be distinguished by the rather simple vulva, the ID of which consists of a first, straight, weakly sclerotized stretch running in frontal direction followed by a wider, more heavily sclerotized part associated with a gland, followed by a 360° loop.

**MALE: Measurements.** Total length 2.30; carapace 1.08 long, 0.81 wide; length of fe: I 0.97, II 1.05, III 0.78, IV 1.16. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5–6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow, lighter at the fovea. Chelicerae pale yellow, sternum yellowish white. Legs pale yellow. Abdomen pale yellow, no pattern. **Palp.** RTA simple, fairly narrow at base and gradually tapered toward sharp tip; cymbium narrow, with very narrow, shallow retrolateral concavity but without series of curved hairs; retrolateral part of tegulum swollen; sperm duct fairly narrow over entire course, slightly more narrowed just before entering embolus; MA originating in frontal part of tegulum, fairly narrow at base, curved over tegulum, strongly tapered in basal part, slender and gradually curved down in distal part, tip reaches extremity of RTA; embolus originating on pro-lateral part of tegulum, whiplike, fairly short, distal part appressed against MA (fig. 14c, d).

**FEMALE: Measurements.** Total length 2.32; carapace 0.97 long, 0.81 wide; length of fe: I 0.76, II 0.84, III 0.70, IV 0.92. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow, lighter at the fovea. Chelicerae pale yellow, sternum lemon yellow. Legs yellow. Abdomen pale

yellow, no pattern. **Genitalia.** Vulva: ID consisting of first, straight, weakly sclerotized stretch running in frontal direction, followed by wider, more heavily sclerotized part associated with gland and connected to ST1 by stretch looped over 360° (figs. 14e; 16b).

**OTHER MATERIAL EXAMINED: Tanzania:** 1♂ in litter, Mwanihana Forest Reserve above Sanje, Uzungwa mountains, elev. 1250 m (1 August 1981; M. Stoltze and N. Scharff) (ZMUC); 2♂ in litter, same locality, elev. 1250 m (25 July 1982; M. Stoltze and N. Scharff) (ZMUC); 1♀ in pitfall trap, same locality, same data (M. Stoltze and N. Scharff) (ZMUC); 1♀ in pitfall trap, same locality, elev. 900 m (1 August 1982; M. Stoltze and N. Scharff) (ZMUC); 4♂ in litter, same locality, elev. 600 m (3 August 1982; M. Stoltze and N. Scharff) (ZMUC); 2 sub-adult females in litter, same locality, elev. 1800 m (18 August 1982; M. Stoltze and N. Scharff) (ZMUC); 1♀ in pitfall trap, same locality, same data (M. Stoltze and N. Scharff) (ZMUC); 1♂, 1♀ in litter in montane rain forest, Mwanihana Forest Reserve, elev. 1800–1850 m, (28–29 September 1984; N. Scharff) (ZMUC); 1♀ in pitfall trap in lowland rain forest, same locality, elev. 700 m (8–16 September 1984; N. Scharff) (ZMUC); 2 females in a pitfall trap in intermediate rain forest Iringa region, Uzungwa Scarp Forest Reserve above Chita village, elev. 1050 m (26–29 October 1984; N. Scharff) (ZMUC).

**VARIABILITY:** The number of tibial vsp in males (5 or 6) and the transparency of the vulva are variable.

**DISTRIBUTION:** Mwanihana Forest Reserve and Uzungwa Scarp Forest Reserve, Uzungwa Mountains, Tanzania, between elev.s of 600 and 1850 m.

### *Hortipes orchatocnemis*, new species

Figures 14f–k, 16c; Map 1

**TYPES:** Male holotype: in forest litter, Mwenembwe Forest, elev. 2300 m, Nyika Plateau, Malawi S10°40', E33°50' (17 December 1981; R. Jocqué) (MRAC 155.928). Paratypes: 1♂, 1♀ together with holotype; 1♀ in forest litter, mainly *Hagenia*, same locality, elev. 2350 m (17 December 1981; R. Jocqué) (MRAC); 1♂ in pitfall trap on



stream bank, elev. 2150 m, : Nyika Plateau, Chowo Forest, Malawi S10°40', E33°50' (4–18 December 1981; R. Jocqué) (MRAC); 1♂, 1♀ from litter in Juniper Forest, elev. 2150 m, Nyika Plateau, Malawi, S10°40', E33°50' (13 December 13 1981; R. Jocqué) (MRAC); 2♂, 3♀ from evergreen forest, forest area 51, elev. 2200 m, Nyika Plateau, Malawi, S10°40', E33°50' (10 December 10, 1981; R. Jocqué) (MRAC; 1♂, 1♀ in AMNH); 1♂ in pitfall near stream, Kasyaula Forest, elev. 2050m, Nyika Plateau, Malawi S10°37', E32°40' (18 January–4 February, 1982; R. Dowsett and F. Lemaire) (MRAC); 3♀ from evergreen forest, Chamambo Forest, Chikangawa, Viphya Mountains, Malawi S11°50', E33°48' (5 February 1978; R. Jocqué) (MRAC).

**ETYMOLOGY:** The species' epithet is derived from the classical Greek *κνημῖς*, shin-plate, and *ορχατος*, fenced garden. Like the genus name, this species' epithet refers to the peculiar circular arrangement of setae on the dorsal side of the mt I and II, which resembles a small fenced garden according to the authors.

**DIAGNOSIS:** Males of *H. orchatocnemis* are recognized by the strongly bent RTA with two sharp, diverging prongs, one pointing up, the other one outward. Females can be recognized by the short, stout ID and the sessile, piriform ST2.

**MALE: Measurements.** Total length 1.84; carapace 0.86 long, 0.68 wide; length of fe: I 0.73, II 0.76, III 0.57, IV 0.84. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow with eight darker radial striae, lighter at the fovea. Chelicerae yellow. Sternum pale yellow, legs yellow. Abdomen pale yellow, no pattern. **Palp.** RTA a ventrolateral swelling that is strongly curved, its retrolateral side provided with two sharp, subequal, diverging prongs, one pointing up, one pointing outward; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with shallow turn before entering ill-defined swelling at base of embolus; MA originating in center of tegulum, with fairly long and narrow, oblique base, sharply curved back-

ward, ending in evenly curved, gradually tapered part pointing down; embolus originating on posterior part of tegulum, whiplike, looped over slightly less than 360° (fig. 14f–h).

**FEMALE: Measurements.** Total length 2.62; carapace 1.11 long, 0.95 wide; length of fe: I 0.97, II 1.03, III 0.78, IV 1.11. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange brown with eight darker radial striae. Chelicerae and sternum yellow brown. Legs orange yellow. Abdomen peach, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized entrance chamber with entrance toward posterior side, second stretch of ID with sclerotized wall, short and stout, running in posterior direction and entering the globular ST1 after having described one-half of a corkscrew loop. A piriform, sessile ST2 attached to ID at transition between thin walled and sclerotized parts (figs. 14i, j; 16c).

**OTHER MATERIAL EXAMINED: Malawi:** 1♂, 1♀ from: Chamambo Evergreen Forest, Chikangawa, Viphya Mountains S11°50', E33°48' (1 November 1977; R. Jocqué) (MRAC); 1♀ from Chelinda, Nyika Plateau S10°19', E33°48' (12 December 1977; R. Jocqué) (MRAC); one from under bark, Chowo Evergreen Forest, Nyika Plateau, elev. 2150 m, S10°40', E33°50' (4 December 1981; R. Jocqué) (MRAC); 1♂ in pitfalls at streambank, same locality, elev. 2150 m (4–18 December 1981; R. Jocqué) (MRAC); 2♂, 1♀ in pitfalls, same locality, elev. 2150 m (4–18 December 1981; R. Jocqué) (MRAC); 1♂ in pitfalls near stream, elev. 2050 m, Kasyaula Forest, Nyika Plateau, S10°37', E32°40' (18 January–4 February 1982; R. Dowsett and F. Lemaire) (MRAC); 2♂ from Dambo, along circular drive, 500 m south from the side road to Dembo Bridge, Nyika Plateau, elev. 2350 m, S10°40', E33°50' (12 December 1981; R. Jocqué) (MRAC); 1♀ isolated wood west of Dembo Bridge, from road to N'Ganda hill, Nyika Plateau, elev. 2450 m, S10°40', E33°50' (12 December 1981; R. Jocqué) (MRAC); 1♂, 1♀ from isolated wood, same locality (12 December 1981; R. Jocqué) (MRAC); 1♀ in litter in Juniper Forest, Nyika Plateau, elev.

2150 m, S10°40', E33°50' (13 December 1981; R. Jocqué) (MRAC); in litter next to falls, Juniper Forest, Nyika Plateau, elev. 2150 m, S10°40', E33°50' (13 December 1981; R. Jocqué) (MRAC); 1♂ in pitfalls near stream, Manyenjere, Nyika Plateau, elev. 2025 m, S10°35', E33°39' (3–20 February 1982; R. Dowsett and F. Lemaire) (MRAC).

**VARIABILITY:** The transparency of the vulva and the exact orientation of ID connection to ST1 are variable.

**DISTRIBUTION:** Viphya Mountains and Nyika Plateau, Malawi.

*Hortipes contubernalis*, new species

Figures 14l–n, 16e; Map 4

**TYPES:** Male holotype: sieved from litter in montane forest, elev. 1400 m, Soutpansberg, Entabeni, Louis Trichardt, South Africa S22°59', E30°17' (30 November 1996; R. Jocqué) (MRAC). Paratypes: 1♂, 1♀ sieved from litter in montane forest, elev. 1500 m, Soutpansberg, Hanglip, Louis Trichardt, South Africa (30 November 1996; R. Jocqué) (MRAC); 3♂ sieved from litter in montane forest, elev. 1350 m, Soutpansberg, Entabeni, Louis Trichardt, South Africa S22°59', E30°17' (November 1996; C. Griswold) (MRAC; one in AMNH; one in CAS); 1♂, same data, elev. 1360 m (1–2 December 1996; C. Griswold) (CAS); 1♂, same data, elev. 1400 m (30 November 1996; R. Jocqué) (MRAC).

**ETYMOLOGY:** The species' epithet *contubernalis*, housemate, is used as a noun in apposition. The species is named that way because specimens of it were bred for over a year in the first author's house.

**DIAGNOSIS:** Males of *H. contubernalis* are recognized by the RTA with two sharp, opposed prongs, one pointing up, the other one pointing outward. Females can be recognized by the large, globular, sessile ST2 and by the relatively simple second part of the ID, which consists of an outward loop followed by a straight section running in posterior direction.

**MALE: Measurements.** Total length 1.67; carapace 0.84 long, 0.70 wide; length of fe: I 0.68, II 0.76, III 0.59, IV 0.84. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp

5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0.

**Coloration.** Carapace orange yellow. Chelicerae and legs yellow. Sternum pale yellow. Abdomen golden yellow, no pattern, sparsely covered with long, pointed grey setae. The living animals are vivid orange, with a pelargonium red abdomen. **Palp.** RTA a ventrolateral swelling, its retrolateral side provided with two sharp, opposed prongs, one pointing up, the external one pointing outward; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with sharp turn before entering subcircular swelling at base of embolus; MA originating in center of tegulum, with fairly narrow, short, transverse base, sharply curved downward, then backward, ending in evenly curved, flattened part pointing forward; embolus originating on subcircular swelling on posterior part of tegulum, whiplike, looped over slightly less than 360° (fig. 14l, m).

**FEMALE: Measurements.** Total length 2.46; carapace 0.95 long, 0.78 wide; length of fe: I 0.76, II 0.78, III 0.62, IV 0.92. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace and legs orange brown. Chelicerae and sternum pale orange. Abdomen pale yellow, no pattern. The living animals are vivid orange, with a pelargonium red abdomen. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized entrance chamber with entrance toward posterior side. Anterior end of this weakly sclerotized part split in two more heavily sclerotized, forward-pointing tips attached to the sessile, globular ST2. From this point on, second, normally sclerotized part of ID first makes outward U-loop and then runs in posterior direction before entering the small, ellipsoidal ST1 (figs. 14n; 16e).

**OTHER MATERIAL EXAMINED: South Africa:** Following material was bred in captivity from egg case laid by a single female sieved from litter in montane forest, elev. 1400 m, Louis Trichardt, Entabeni, Soutpansberg, S22°59', E30°17' (30 November 1996; R. Jocqué, specimen fixed for microscopy) (MRAC); 1 male, died 16 June 1997; 1 female, died 2 June 1997, 1 juvenile, died July 1997; 1♂, one juvenile sieved from leaf litter

in forest, elev. 1300 m, Lajuma farm, Soutpansberg, S23°02', E29°26' (9 August 1997; R. Jocqué) (MRAC); 1 ♀ from forest near waterfall, same data (R. Jocqué) (MRAC); 1 ♀ sieved from leaf litter in forest, same locality and elevation (10 August 1997; R. Jocqué) (MRAC).

**VARIABILITY:** The transparency of the vulva and details in the shape of the thin-walled entrance chamber and the ID course are variable.

**DISTRIBUTION:** Louis Trichardt, Soutpansberg, South Africa, elev. 1300–1500 m.

*Hortipes mesembrinus*, new species

Figures 15h, 16d; Map 4

**TYPES:** Female holotype in pitfall trap in natural bush, elev. 300 m, Pineapple Research Station, East London, South Africa S33°01', E27°58' (December 1981; G. Petty) (NCA 92/121).

**ETYMOLOGY:** The species' epithet is a latinization of the classical Greek word μεσημβρινος meaning southern. *Hortipes mesembrinus* is the southernmost species known in the genus.

**DIAGNOSIS:** Females can be recognized by the heart-shaped entrance chamber of the vulva and by the second part of the ID making a rounded, almost orthogonal bend before entering ST1.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.11. Carapace 0.95 long, 0.76 wide; length of fe: I 0.78, II 0.81, III 0.59, IV 0.92. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace yellow, lighter at the fovea. Legs yellow, chelicerae and sternum pale yellow. Abdomen yellowish white, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized heart-shaped entrance chamber with entrance toward posterior side. Anterior ends of this weakly sclerotized stretch merge into two more heavily sclerotized, inward-pointing tips, attached to the stalked, subglobular ST2. From this point on second, normally sclerotized stretch of the ID first makes outward circular loop and then runs in posterior direction, making a rounded, almost orthogo-

nal bend before entering the small, piriform ST1 (figs. 15h; 16d).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes luytenae* Bosselaers and Ledoux

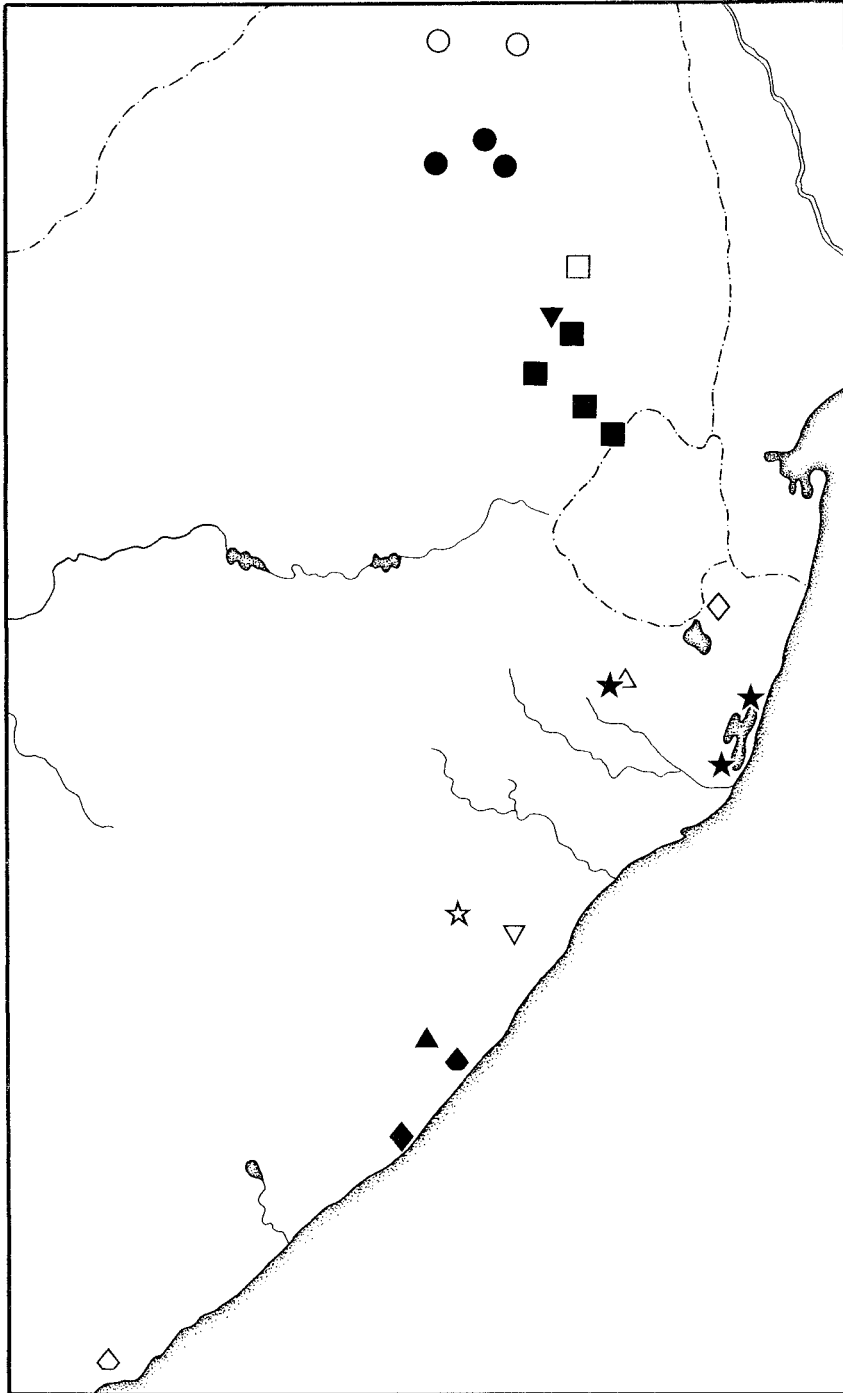
Figures 15a-c, 16f; Map 4

*Hortipes luytenae* Bosselaers and Ledoux, 1998: 151, figs. 3A–D (male holotype from Ngome forest, Natal, South Africa, examined).

**DIAGNOSIS:** Males of *H. luytenae* are recognized by the RTA with two sharp, subequal, parallel prongs pointing up in combination with the strongly curved MA of which the distal part points forward. Females can be recognized by the large, ellipsoidal ST2 with stalk attached to the anterior side, in combination with the simple, almost straight second stretch of the ID and the presence of a plt spine on mt III and plt and rlt spines on mt IV.

**MALE: Measurements.** Total length 2.08; carapace 0.86 long, 0.73 wide; length of fe: I 0.68, II 0.73, III 0.59, IV 0.86. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace, legs, chelicerae and sternum orange brown. Abdomen pale apricot, no pattern. **Palp.** RTA a ventrolateral swelling, its retrolateral side provided with two sharp, subequal, parallel prongs pointing up; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with sharp turn before entering triangular swelling at base of embolus; MA originating in center of tegulum, with fairly narrow, short, transverse base, sharply curved forward, then backward, ending in evenly curved part pointing forward; embolus originating on triangular extension on posterior part of tegulum, whiplike, looped over slightly less than 360° (fig. 15a, b).

**FEMALE: Measurements.** Total length 2.57; carapace 1.13 long, 0.92 wide; length of fe: I 1.00, II 1.05, III 0.86, IV 1.19. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace, legs, chelicerae and sternum orange brown. Abdomen pale apricot, no pattern. **Genitalia.** Vulva: first



Map 4. Distribution of *Hortipes* species in South Africa. *Hortipes aelurisiepae* ◇, *H. atalante* ☆, *H. coccinatus* ●, *H. contubernalis* ○, *H. griswoldi* ▼, *H. hyakutake* ◆, *H. irimus* ◆, *H. licnophorus* □, *H. luytenae* △, *H. merwei* ★, *H. mesembrinus* ◇, *H. rothorum* ▽, *H. schoemanae* ■, and *H. wimmertensi* ▲.

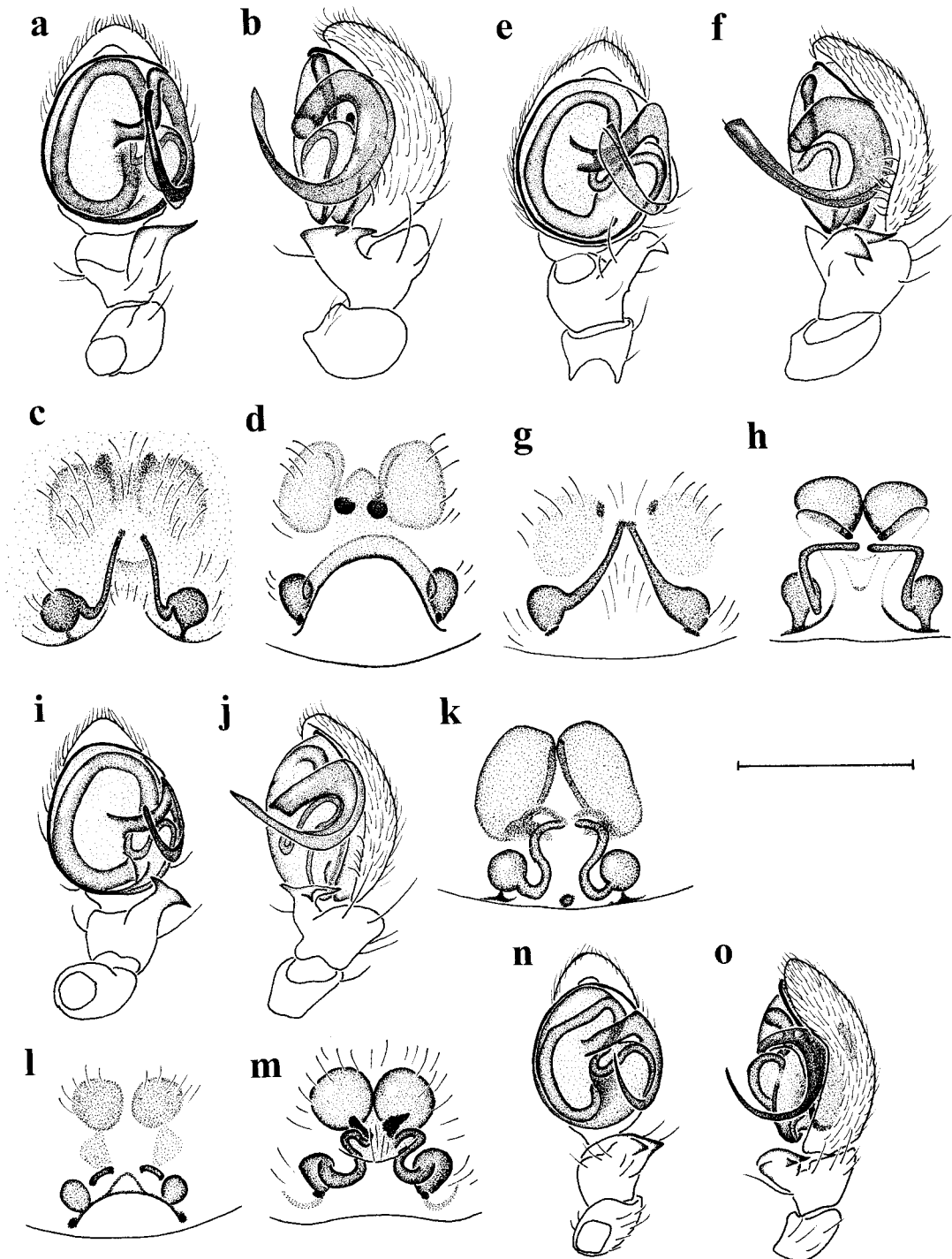
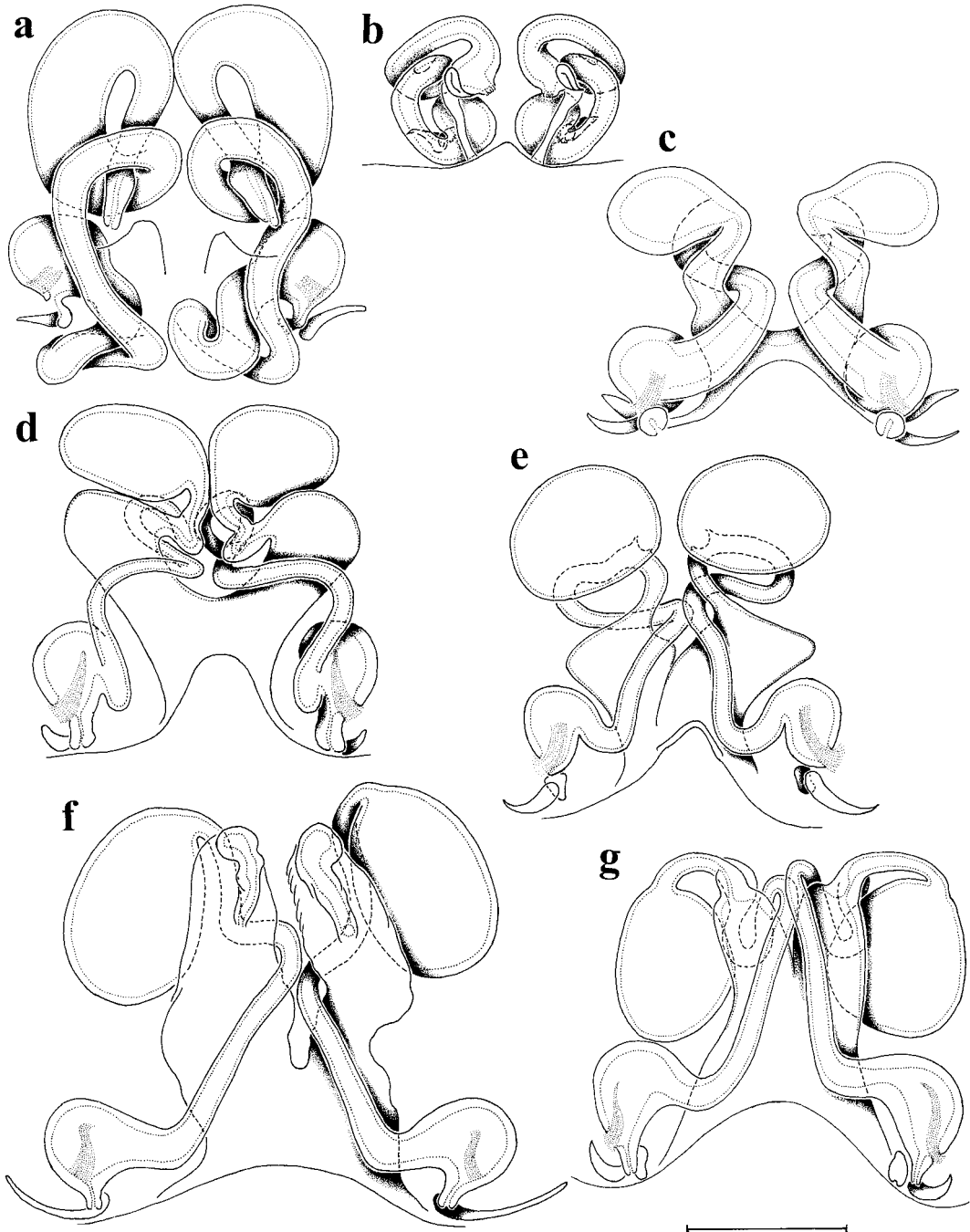


Fig. 15. a–c. *Hortipes luytenae*. a, b. Male left palp, ventral and retrolateral views. c. Epigyne. d. *Hortipes irimus*, new species, epigyne. e–g. *Hortipes coccinatus*, new species. e, f. Male left palp, ventral and retrolateral views. g. Epigyne. h. *Hortipes mesembrinus*, new species, epigyne. i–k. *Hortipes wimertensi*, new species. i, j. Male left palp, ventral and retrolateral views. k. Epigyne. l. *Hortipes lichophorus*, new species, epigyne. m–o. *Hortipes schoemanae*, new species. m. Epigyne. n, o. Male left palp, ventral and retrolateral views. Scale line: 0.25 mm.





Figs. 16. **a.** *Hortipes echo*, new species, vulva, ventral view. **b.** *Hortipes creber*, new species, vulva, ventral view. **c.** *Hortipes orchatocnemis*, new species, vulva, ventral view. **d.** *Hortipes mesembrinus*, new species, vulva, ventral view. **e.** *Hortipes contubernalis*, new species, vulva, ventral view. **f.** *Hortipes luytenae*, vulva, ventral view. **g.** *Hortipes coccinatus*, new species, vulva, ventral view. Scale line: 0.1 mm.

stretches of IDs fused into one weakly sclerotized, deeply bifurcated entrance chamber with entrance toward posterior side. Anterior ends of this weakly sclerotized chamber merge into two more heavily sclerotized tips recurved in caudal direction, and attached to the large, stalked, ellipsoidal ST2. Stalk attached to anterior end of ST2. End of recurved sclerotized tip of entrance chamber also connected to second, normally sclerotized, almost straight part of ID, running in posterior direction and connected to the small, subglobular ST1 (figs. 15c, 16f).

**MATERIAL EXAMINED:** Male holotype from **Ngome Forest, Natal, South Africa**, S27°52', E31°24' (January 1954; C.L. Davies) (MRAC 133.056); 5♀ in humus, S27°52', E31°24' (October 1960; N. Leleup) (MRAC); 3♂, 3♀ in pitfall trap in dense forest, S27°49', E31°26' (April 1992; M. v. d. Merwe) (NCA); 1♂, 1♀ in AMNH); 1♂ in pitfall trap in open forest (August 1992; M. v. d. Merwe) (NCA); 1♀ in pitfall trap in dense forest (June 1992; M. v. d. Merwe) (NCA); 4♂, 1♀ in pitfall trap in dense forest (March 1992; M. v. d. Merwe) (NCA); 1♂; in pitfall trap in open forest (November 1992; M. v. d. Merwe) (NCA); 1♂ in pitfall trap in open forest (November 1992; M. v. d. Merwe) (NCA); 3♀ in pitfall trap in dense forest (June 1992; M. v. d. Merwe) (NCA); 7♂, 2♀ in pitfall trap in pine plantation (October 1992; M. v. d. Merwe) (NCA); 1♀ in pitfall trap in ecotone pine forest (August 1992; M. v. d. Merwe) (NCA); 1♂ in pitfall trap in ecotone pine forest (September 1992; M. v. d. Merwe) (NCA); 1♂ in pitfall trap in ecotone pine forest (June 1992; M. v. d. Merwe) (NCA); 3♂, 3♀ in pitfall trap in ecotone pine forest (March 1992; M. v. d. Merwe) (NCA); 2♂ in pitfall trap in open forest (September 1992; M. v. d. Merwe, NCA); 7♂, 3♀ in pitfall trap in ecotone pine forest (May 1992; M. v. d. Merwe) (NCA); 2♂ in pitfall trap in dense forest (May 1992; M. v. d. Merwe) (NCA); 2♂ in pitfall trap in open forest (September 1992; M. v. d. Merwe) (NCA); 2♀ in pitfall trap in dense forest (March 1992; M. v. d. Merwe) (NCA); 1♂, 2♀ in pitfall trap in dense forest (May 1992; M. v. d. Merwe) (NCA); 3♂ in pitfall trap in pine plantation (April 1992; M. v. d. Merwe) (NCA); 5♂, 9♀ in pitfall trap in

pine plantation (April 1992; M. v. d. Merwe) (NCA); 1♀; in pitfall trap in open forest (May 1992; M. v. d. Merwe) (NCA); 1♂ in pitfall trap in ecotone pine forest (June 1992; M. v. d. Merwe) (NCA); 1♀ in pitfall trap in pine plantation (May 1992; M. v. d. Merwe) (NCA); 13♂ in pitfall trap in open forest (October 1992; M. v. d. Merwe) (NCA); 2♂, 1♀ in pitfall trap in ecotone pine forest (October 1992; M. v. d. Merwe) (NCA); 1♂, 2♀ in pitfall trap in ecotone pine forest (June 1992; M. v. d. Merwe) (NCA); 5♂, 1♀ in pitfall trap in ecotone pine forest (November 1992; M. v. d. Merwe) (NCA); 1♂ in pitfall trap in open forest (August 1992; M. v. d. Merwe) (NCA); 2♂ in pitfall trap in open forest (June 1992; M. v. d. Merwe) (NCA); 5♂, 2♀ in pitfall trap in pine plantation (October 1992; M. v. d. Merwe) (NCA); 2♂, 2♀ in pitfall trap in ecotone pine forest (April 1992; M. v. d. Merwe) (NCA); 5♂, 3♀ in pitfall trap in open forest (June 1992; M. v. d. Merwe) (NCA); 1♀ in pitfall trap in ecotone pine forest (February 1992; M. v. d. Merwe) (NCA); 2♀ in pitfall trap in dense forest (April 1992; M. v. d. Merwe) (NCA); 2♂, 3♀ in pitfall trap in ecotone pine forest (January 1993; M. v. d. Merwe) (NCA); 2♂, 1♀ in pitfall trap in ecotone pine forest (May 1992; M. v. d. Merwe) (NCA); 4♂, 4♀ in pitfall trap in ecotone pine forest (November 1992; M. v. d. Merwe) (NCA); 4♂, 3♀ in pitfall trap in open forest (March 1992; M. v. d. Merwe) (NCA); 1♂ in pitfall trap in dense forest (December 1992; M. v. d. Merwe) (NCA); 1♂ in pitfall trap in dense forest (October 1992; M. v. d. Merwe) (NCA); 1♀ in pitfall trap in pine plantation (July 1992; M. v. d. Merwe) (NCA); 3♂, 1♀ in pitfall trap in dense forest (January 1993; M. v. d. Merwe) (NCA); 1♂, 3♀ in pitfall trap in ecotone pine forest (May 1992; M. v. d. Merwe) (NCA); 1♂, 1♀ in pitfall trap in open forest (January 1993; M. v. d. Merwe) (NCA); 4♂, 5♀ in pitfall trap in open forest (April 1992; M. v. d. Merwe) (NCA); 2♂ in pitfall trap in dense forest (January 1993; M. v. d. Merwe) (NCA).

**VARIABILITY:** The transparency of the vulva and details in the shape of the thin-walled entrance chamber, the ID course, and the orientation of ST2 are variable.

DISTRIBUTION: Ngome State Forest, Kwa-zulu-Natal, South Africa.

*Hortipes coccinatus*, new species

Figures 15e–g, 16g; Map 4

**TYPES:** Male holotype: humus in Wood-bush Forest, Pietersburg district, Transvaal, South Africa S23°54', E29°27' (September 1960; N. Leleup) (MRAC 131.947). Paratypes: 2♀ together with holotype (MRAC); 1♂, 1♀ from humus at Helpmekaar spring, Pietersburg District, Transvaal, South Africa S23°54', E29°27' (September 1960; N. Leleup) (MRAC); 3♂, 4♀, and three juveniles: sieving litter in forest, elev. 2000 m, Forest Hideaway Farm, Magoebaskloof, Transvaal, South Africa S23°37', E29°37' (11 August 1997; R. Jocqué) (MRAC; 1♂, 1♀ in AMNH); 1♀, ten juveniles from sieving litter in forest, elev. 2150 m, 6 km E of farm B11, Wolkberg, 30 km from Haenertsburg, Transvaal, South Africa S23°52', E29°52' (12 August 1997; R. Jocqué) (MRAC).

**ETYMOLOGY:** The species' epithet refers to the scarlet color of living specimens.

**DIAGNOSIS:** Males of *H. coccinatus* are recognized by the RTA with two tips pointing upward in combination with the flattened MA which is broadened and twisted toward the tip. Males differ from those of *H. schoemanae* by the latter character. Females can be recognized by the elongate entrance chamber of the vulva in combination with the elongate ST1 and the recurved ST2 that is the stalk is attached to the anterior end of ST2.

**MALE: Measurements.** Total length 2.05; carapace 0.89 long, 0.73 wide; length of fe: I 0.65, II 0.73, III 0.57, IV 0.81. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace and legs brownish yellow. Chelicerae and sternum yellow. Abdomen pale yellow, no pattern. When alive, the whole animal is a bright pelargonium red. **Palp.** RTA extended downward with three sharp prongs, one extended down, second pointing up; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct with wide basal part and hardly narrower distal part with deep, S-shaped turn in front of embolus; MA

simple with fairly narrow base, thicker main part, tapered into flat, strongly curved and twisted distal part; embolus originating on posterior part of tegulum, base not widened, long, whiplike, looped over slightly less than 360° (fig. 15e, f).

**FEMALE: Measurements.** Total length 2.65; carapace 1.03 long, 0.84 wide; length of fe: I 0.76, II 0.81, III 0.62, IV 0.95. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace, chelicerae, and legs orange yellow, sternum yellow. Abdomen pale apricot, no pattern. When alive, the whole animal is a bright pelargonium red. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized elongate entrance chamber with entrance toward posterior side. Anterior ends of this weakly sclerotized stretch merge into two more heavily sclerotized, outward-pointing tips, attached to the stalked, recurved, subglobular ST2. From this point on, second, normally sclerotized stretch of the ID first makes U-loop in posterior direction, followed by straight stretch also running in posterior direction, in turn connected to the small, elongate ST1 (figs. 15g; 16g).

**DISTRIBUTION:** Pietersburg area, from Pietersburg to Tzaneen, Northern Transvaal, South Africa.

*Hortipes wimmertensi*, new species

Figures 15i–k, 18a; Map 4

**TYPES:** Male holotype: humus at Oribi Gorge, Alfred district, Natal, South Africa S30°35', E30°00' (November 1961; N. Leleup) (MRAC 132.051). Paratypes: 1♂, 1♀ together with holotype (MRAC 132.051).

**ETYMOLOGY:** The species is named in honor of the Flemish composer Wim Mertens, protagonist of the European romantic minimalist school.

**DIAGNOSIS:** Males of *H. wimmertensi* are recognized by the RTA with trifid extremity, each prong pointing in a different direction. Females can be easily recognized by the large, ellipsoidal ST2 with stalk attached to the anterior end and by the S-shaped second part of the ID.

**MALE: Measurements.** Total length 1.65; carapace 0.81 long, 0.65 wide; length of fe:

I 0.62, II 0.65, III 0.54, IV 0.78. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace orange yellow, lighter at the fovea. Chelicerae, sternum, and legs yellow. Abdomen pale yellow, no pattern. **Palp.** RTA a ventrolateral swelling, its retrolateral side provided with three, short, sharp prongs: one pointing up, the external one pointing outward, the inferior one pointing down; cymbium fairly elongate, without retrolateral concavity nor series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with sharp turn before entering triangular swelling at base of embolus; MA originating in center of tegulum, with fairly long narrow, transverse base, sharply curved downward, then backward, ending in slightly curved, flattened part pointing down; embolus originating on triangular swelling on posterior part of tegulum, whiplike, looped over 360° (fig. 15i, j).

**FEMALE: Measurements.** Total length 2.19; carapace 0.97 long, 0.78 wide; length of fe: I 0.78, II 0.84, III 0.65, IV 0.95. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace orange, lighter at the fovea. Chelicerae and legs orange yellow, sternum yellow. Abdomen apricot, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized elongate, anteriorly bifurcated entrance chamber with entrance toward posterior side. Anterior ends of this weakly sclerotized part merge into two more heavily sclerotized, inward-pointing tips, attached to the very large, stalked, ellipsoidal ST2. Stalk attached to anterior end of ST2. End of inward-pointing sclerotized tip of entrance chamber connected to second, normally sclerotized stretch of ID, which first makes small outward U-loop, followed by S-shaped stretch running in posterior direction, connected to the small, globular ST1 (figs. 15k; 18a).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes irimus*, new species

Figures 15d, 18b; Map 4

**TYPES:** Female holotype: captured in humus, close to the town, Port Shepstone Dis-

trict, Natal, South Africa (December 1961; N. Leleup) (MRAC 131.834).

**ETYMOLOGY:** The species' epithet is a latinization of Irimu, the were-leopard from the Chaga legends. Like *Hortipes* species, Irimu is covered by thorn bushes.

**DIAGNOSIS:** Females can be recognized by the deeply bifurcated entrance chamber with inward-curving tips in combination with the elongate, anteriorly stalked ST2, the second part of the ID making a loop in anterior direction, and the presence of pro- and retrolateral spines on mt IV.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.59; carapace 1.05 long, 0.84 wide; length of fe: I 0.89, II 0.92, III 0.76, IV 1.08. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow ochre, lighter at the fovea. Legs I and II yellow ochre, legs III and IV yellow. Sternum and chelicerae yellow. Abdomen a pale golden yellow, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized, deeply bifurcated entrance chamber with entrance toward posterior side. Anterior ends of this weakly sclerotized chamber are curved inward and connected to the large, stalked, elongate ST2. Stalk attached to anterior end of ST2. End of inward-curved tip of entrance chamber also connected to second, normally sclerotized part of ID, which first makes 360° loop in anterior direction and then takes straight course in posterior direction, connecting to the small, globular ST1 (figs. 15d; 18b).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes lincnophorus*, new species

Figures 15l, 18d; Map 4

**TYPES:** Female holotype: humus in Mariepskop Forest, Pilgrim's Rest District, South Africa S24°32', E30°52' (August 1960; N. Leleup) (MRAC 131.896). Paratypes: 1 ♀ together with holotype; 1 ♀ from sifting leaf litter in indigenous forest, elev. 1365 m, Mariepskop about 15 km W Klaserie, Pilgrim's Rest District, South Africa S24°33', E30°53' (5 December 1996; C. Griswold) (CAS).

**ETYMOLOGY:** The species' epithet is a lat-



inization of the classical Greek *λυκνο-φορος*, meaning carrying the holy basket. The peculiar circular arrays of setae on mt I and II of *Hortipes* species were compared with baskets by some arachnologists.

**DIAGNOSIS:** Females can be recognized by the bifurcate weakly sclerotized entrance chamber of the vulva having anterior ends coiled inward over 360° and by the second part of the ID making two complete corkscrew turns before connecting to the small, top-shaped ST1.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.40; carapace 0.97 long, 0.81 wide; length of fe: I 0.78, II 0.84, III 0.65, IV 1.00. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace orange yellow, lighter at the fovea. Chelicerae and sternum pale yellow, legs yellow brown. Abdomen pale apricot, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized, anteriorly bifurcated entrance chamber with entrance toward posterior side. Anterior ends of this weakly sclerotized part very long and coiled inward over 360°, after which they merge into two more heavily sclerotized, inward-pointing tips attached to the stalked, egg-shaped ST2. End of inward-pointing sclerotized tip of entrance chamber connected to second, normally sclerotized part of ID running in posterior direction, which makes two complete corkscrew turns before connecting to the small, top-shaped ST1 (figs. 15l; 18d).

**DISTRIBUTION:** Known only from Mariepskop Forest, Pilgrim's Rest District, South Africa.

*Hortipes schoemanae*, new species

Figures 15m–o, 18c; Map 4

**TYPES:** Male holotype in pitfall trap in pine plantation, elev. 1300 m, Bergvliet Forest Station, Sabie, Mpumalanga region, South Africa S25°10', E30°48' (20 December 1984; M. v. d. Berg) (NCA 88/754). Paratypes: 1 ♂, 2 ♀ together with holotype; 1 ♂ and 8 ♀ in pitfall trap, same locality, same elevation (20 September 1984; A. v. d. Berg) (NCA); 2 ♀ on pine trees in pine plantation, same locality, same elevation (27 September 1984; M.

v. d. Berg) (NCA); 3 ♂, 11 ♀ in pitfall trap, same locality, same elevation (December 20, 1984; M. v. d. Berg) (NCA); 3 ♀ in pitfall trap, same locality, same elevation (23 January 1985; M. v. d. Berg) (NCA); 1 ♂, 3 ♀, same locality, same elevation (19 June 1984; M. v. d. Berg) (NCA); 2 ♂, 5 ♀ in pitfall trap in pine plantation, same locality, same elevation (23 October 1984; M. v. d. Berg) (NCA); 1 ♂, 1 ♀ in AMNH; 1 ♂, 1 ♀ in pitfall trap, same locality, same elevation (24 August 1984; M. v. d. Berg) (NCA); 2 ♀ in humus in forest in Piggs Peak region close to Transvaal, Swaziland, South Africa S25°58', E31°15' (October 1961; N. Leleup) (MRAC); 2 ♀ in humus, 8 km S of Piggs Peak, Mbabane road, Swaziland, South Africa S25°58', E31°15' (October 1961; N. Leleup) (MRAC); 1 ♀ in humus, Schoenmansklouf, Belfast District, Transvaal, South Africa (October 1961; N. Leleup) (MRAC); 1 ♀ in humus close to the Transvaal border, Piggs Peak region, Swaziland, South Africa S25°58', E31°15' (October 1961; N. Leleup) (MRAC); 1 ♀ on bank of Suid Kaap River, Barberton District, Transvaal, South Africa S25°47', E31°03' (October 1961; N. Leleup) (MRAC).

**ETYMOLOGY:** The species is named in honor of Dr. Ansie Dippenaar-Schoeman.

**DIAGNOSIS:** Males of *H. schoemanae* are recognized by the RTA with two tips pointing upward. Males are similar to those of *H. coccinatus* from which they differ by the simple MA. Females can be recognized by the inward-curling anterior ends of the deeply bifurcated entrance chamber of the vulva in combination with the rather large, globular ST2 touching each other on the symmetry axis.

**MALE: Measurements.** Total length 1.57; carapace 0.73 long, 0.59 wide; length of fe: I 0.59, II 0.62, III 0.51, IV 0.78. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace, legs, chelicerae, and sternum orange yellow. Abdomen pale pink, no pattern, sparsely covered with thin, pointed grey setae. **Palp.** RTA extended downward; extremity with ventral boss and two dorsal tips pointing upward; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct with



wide basal part and hardly narrower distal part with deep turn in front of embolus; MA attached in center of tegulum, simple, with fairly narrow base, gradually tapered from to sharp tip; embolus originating on posterior part of tegulum, with fairly broad base, long, whiplike, looped over slightly less than 360° (fig. 15n, o).

**FEMALE: Measurements.** Total length 2.24; carapace 0.86 long, 0.73 wide; length of fe: I 0.73, II 0.76, III 0.59, IV 0.89. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace, legs, chelicerae and sternum orange yellow. Abdomen pale pink, no pattern, sparsely covered with thin, pointed grey setae. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized, deeply bifurcated entrance chamber with entrance toward posterior side. Long anterior ends of this weakly sclerotized part graciously curved inward and merging into two more heavily sclerotized, inward-pointing tips attached to the sessile, subglobular ST2. End of inward-pointing sclerotized tip of entrance chamber connected to second, normally sclerotized part of ID running in posterior direction, which makes outward U-loop and a complete corkscrew turn before connecting to the small, globular ST1 (figs. 15m; 18c).

**DISTRIBUTION:** From Sabie to Piggs Peak, East Transvaal, South Africa.

*Hortipes aelurisiepae*, new species

Figures 17g, 18e; Map 4

**TYPES:** Female holotype: humus in Gualiveni Forest, Inguavuma District, Natal, South Africa (October 1961; N. Leleup) (MRAC 131.854).

**ETYMOLOGY:** The species' epithet is given in remembrance of the first author's much loved cat Siep, which was run over by a truck when this species was being described. Αἰλουρος means cat in classical Greek.

**DIAGNOSIS:** Females can easily be recognized by the very large, isodiametric ST2 and by the bifurcate entrance chamber of the vulva equipped with long, blind-ending lateral pockets.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length

2.48; carapace 1.05 long, 0.97 wide; length of fe: I 0.89, II 0.95, III 0.76, IV 1.13. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace golden yellow, lighter at the fovea. Chelicerae, legs and sternum yellow. Abdomen pale yellow, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized, deeply bifurcated entrance chamber with entrance toward posterior side. Entrance chamber with two long, blind-ending lateral pockets. At its anterior end, entrance chamber merges into two sclerotized, inward-pointing tips attached to second, normally sclerotized part of ID that first makes small circular loop in frontal direction, followed by 540° corkscrew turn in caudal direction, connected to the small, globular ST1. The very large, sessile, isodiametric ST2 attached with its posterior end to sclerotized tip of entrance chamber (figs. 17g; 18e).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes hyakutake*, new species

Figure 17a, b; Map 4

**TYPES:** Male holotype: humus in Ingogo Forest Reserve, Port St. John's District, South Africa S31°17', E29°54' (December 1961; N. Leleup) (MRAC 202.492).

**ETYMOLOGY:** This species is named after the great comet of 1996, which graced the skies while the first author was in the initial stage of his work on the genus *Hortipes*. Moreover, the elegantly curved MA of the male palp resembles a comet's tail.

**DIAGNOSIS:** Males of *H. hyakutake* are recognized by the RTA with two sharp, diverging prongs pointing obliquely up in combination with the strongly curved MA, the extremity of which points up.

**MALE: Measurements.** Total length 1.89; carapace 0.86 long, 0.76 wide; length of fe: I 0.73, II 0.76, III 0.62, IV 0.95. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace dark yellow, lighter at the fovea. Legs and chelicerae yellow, sternum pale yellow. Abdomen pale yellow, no pattern. **Palp.** RTA a ventrolateral swelling, its retrolateral side provided with two sharp,

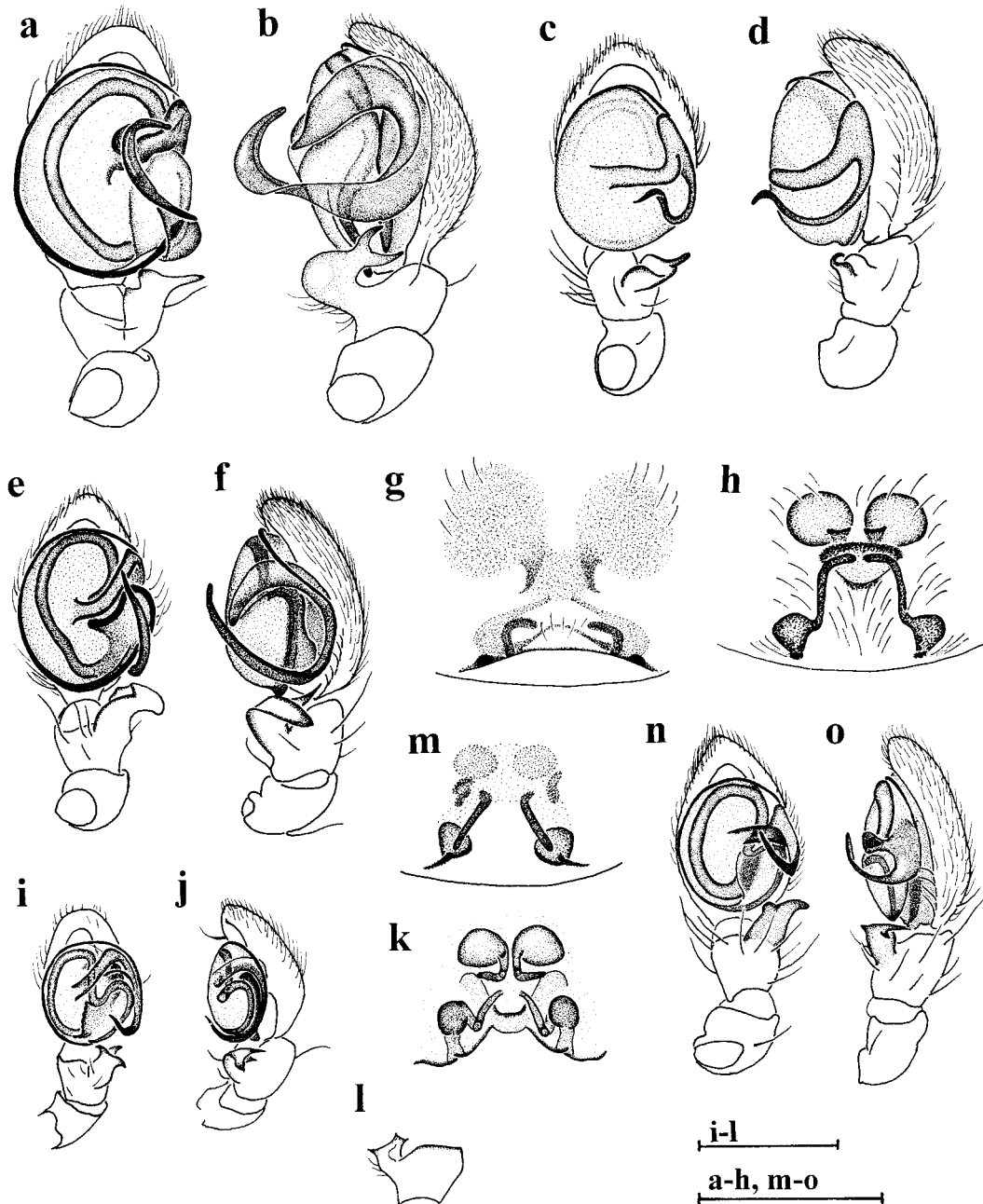


Fig. 17. **a, b.** *Hortipes hyakutake*, new species, male left palp, ventral and retrolateral views. **c, d.** *Hortipes rothorum*, new species, male left palp, ventral and retrolateral views. **e, f.** *Hortipes griswoldi*, new species, male left palp, ventral and retrolateral views. **g.** *Hortipes aelurisiepae*, new species, epigyne. **h.** *Hortipes penthesileia*, new species, epigyne. **i-l.** *Hortipes oronesiotes*, new species. **i, j.** Male left palp, ventral and retrolateral views. **k.** Epigyne. **l.** Male palpal ti, dorsal view. **m-o.** *Hortipes zombaensis*, new species. **m.** Epigyne. **n, o.** Male left palp, ventral and retrolateral views. Scale lines: 0.25 mm.

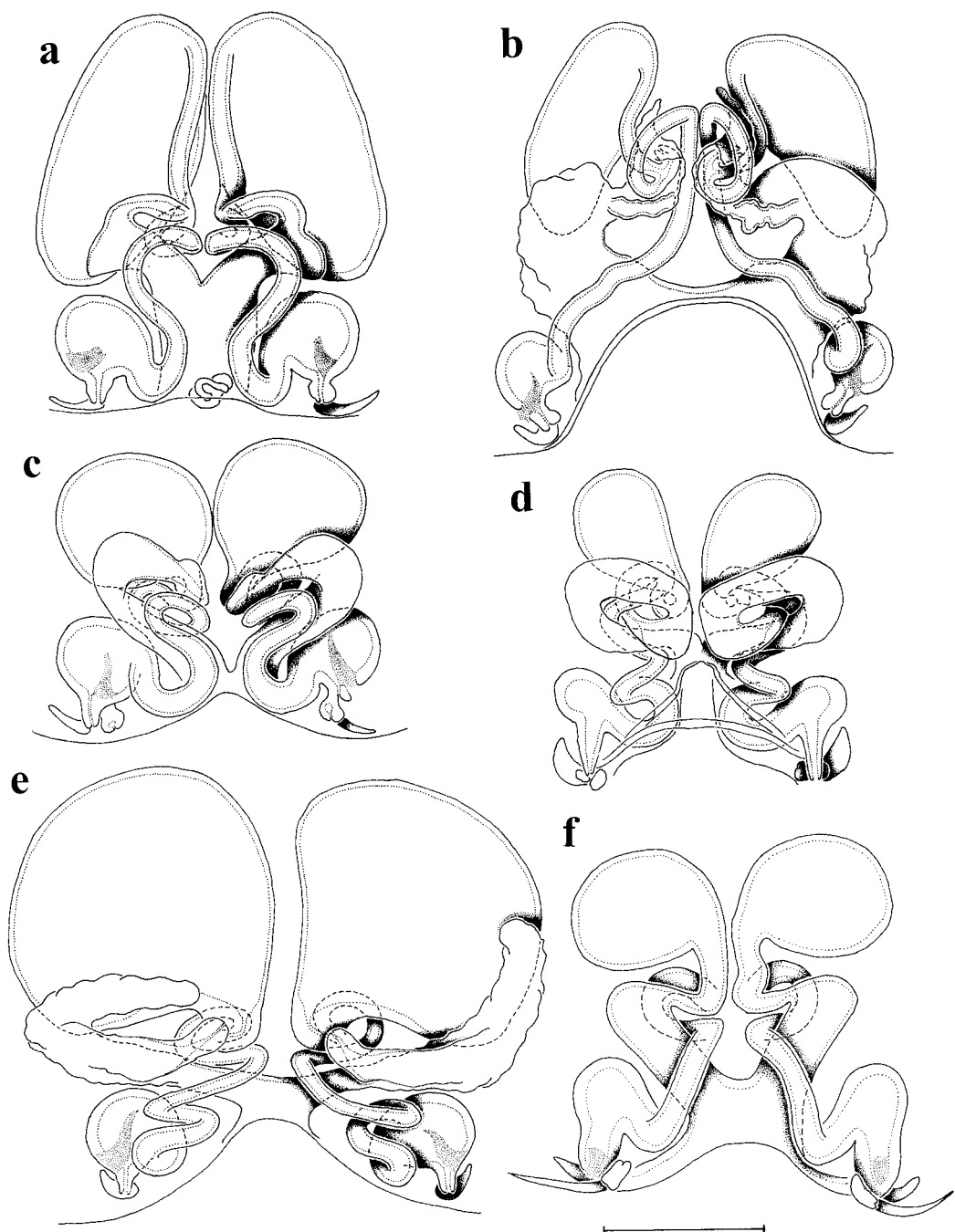


Fig. 18. **a.** *Hortipes wimmertensi*, new species, vulva, ventral view. **b.** *Hortipes irimus*, new species, vulva, ventral view. **c.** *Hortipes schoemanae*, new species, vulva, ventral view. **d.** *Hortipes licnophorus*, new species, vulva, ventral view. **e.** *Hortipes aelurisiopae*, new species, vulva, ventral view. **f.** *Hortipes oronesiotes*, new species, vulva, ventral view. Scale line: 0.1 mm.

diverging prongs pointing obliquely up, the external one pointing outward, thicker than internal one pointing inward; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with sharp turn before entering triangular tegular part at base of embolus; MA originating in center of tegulum, with base fairly narrow, short, slightly curved forward; proximal part flattened, sharply curved forward, then backward, sharply twisted before entering in equally flattened, strongly curved distal part with tip pointing up; embolus originating on triangular extension on posterior part of tegulum, whiplike, looped over slightly less than  $360^\circ$  (fig. 17a, b).

FEMALE: Unknown.

DISTRIBUTION: Known only from the type locality.

*Hortipes rothorum*, new species

Figure 17c, d; Map 4

**TYPES:** Male holotype: dense indigenous forest, elev. 500 m, Mhlathuzana River, Jackson's Fall, KwaZulu-Natal, South Africa S29°48', E30°45' (18 December 1990; V. and B. Roth) (CAS).

**ETYMOLOGY:** This species is named in honor of Vince and Barbara Roth, who collected the type specimen.

**DIAGNOSIS:** Males of *H. rothorum* are recognized by the long RTA pointing downward with procurved tip in combination with the peculiarly curved MA.

**MALE: Measurements.** Total length 1.40; carapace 0.73 long, 0.62 wide; length of fe: I 0.62, II 0.68, III 0.57, IV 0.86. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace pale brown, legs and chelicerae brownish white, sternum off-white. Abdomen very pale apricot, no pattern, covered with thin, pointed grey setae. **Palp.** Tibia with fairly long RTA extended downward, with procurved tip and small, pointed, frontal prong; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, with sharp turn in front of embolus; MA originating in center

of tegulum, with fairly narrow, transverse base, sharply curved forward, then backward, ending in S-shaped turn; embolus originating on posterior part of tegulum, whiplike, looped over slightly less than  $360^\circ$  (fig. 17c, d).

FEMALE: Unknown.

DISTRIBUTION: Known only from the type locality.

*Hortipes griswoldi*, new species

Figure 17 e, f; Map 4

**TYPES:** Male holotype: sifting leaf litter in indigenous forest, elev. 1100 m, Ceylon Forest W of Sabie, Mpumalanga region, East Transvaal, South Africa S25°05', E30°42' (4 December 1996; C. Griswold) (CAS).

**ETYMOLOGY:** The species is named in honor of Dr. Charles Griswold, who collected the type specimen.

**DIAGNOSIS:** Males of *H. griswoldi* are recognized by the RTA with two sharp, diverging prongs pointing up, the external one being much wider than the internal one.

**MALE: Measurements.** Total length 1.76; carapace 0.84 long, 0.68 wide; length of fe: I 0.62, II 0.65, III 0.54, IV 0.78. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace orange, chelicerae and sternum orange yellow. Legs orange. Abdomen apricot, no pattern. **Palp.** RTA ventral swelling, its retrolateral side provided with two sharp, diverging prongs pointing up, the external one with broad side exposed, internal one transverse, broad side facing forward; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with sharp turn before entering subcircular swelling at base of embolus; MA originating in center of tegulum, with fairly narrow, short, slightly curved base, sharply curved forward, then backward, ending in evenly curved part pointing forward; embolus originating on triangular extension on posterior part of tegulum, whiplike, looped over slightly less than  $360^\circ$  (fig. 17e, f).

FEMALE: Unknown.

DISTRIBUTION: Known only from the type locality.

*Hortipes oronesiotes*, new species

Figures 17i–l, 18f; Map 1

**TYPES:** Male holotype: Mt. Mulanje, Thuchila hut, Nambiti stream, elev. 2000 m, Malawi S16°00', E35°30' (11 November 1981; R. Jocqué) (MRAC 156.329). Paratypes: 2♀ together with holotype; 1♂, 2♀ under *Phippia* and *Setaria*, 1 km E from the hut on the crossing of the Madzeka path with a small stream, Thuchila, Mt. Mulanje, Malawi S16°00', E35°30' (11 November 1981; R. Jocqué) (MRAC; 1♀ in AMNH); 2♀ from sweeping in *Widdringtonia* evergreen forest, elev. 2000 m, Lichenya Plateau, Malawi S16°00', E35°30' (7 November 1981; R. Jocqué) (MRAC); 1♀ sifted from litter in bamboo forest, Lichenya Plateau, elev. 1750 m, Malawi S16°00', E35°30' (6 November 1981; R. Jocqué) (MRAC).

**ETYMOLOGY:** The species' epithet is derived from the classical Greek *opos*, mountain and *νησιωτης*, islander, referring to the type locality Mt. Mulanje, a typical Malawian inselberg (Porembski, 1996).

**DIAGNOSIS:** Males of *H. oronesiotes* are recognized by the RTA with three sharp, subequal prongs all pointing up in combination with the MA of which the base is obliquely pointing forward. Females can be recognized by the small, elongate ST1, the subglobular stalked ST2 lying close together, and the outward U-loop of the ID.

**MALE: Measurements.** Total length 1.62; carapace 0.78 long, 0.59 wide; length of fe: I 0.62, II 0.68, III 0.51, IV 0.76. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace orange yellow, lighter at the fovea. Chelicerae and legs yellow, sternum pale yellow. Abdomen pale yellow, no pattern. **Palp.** RTA a ventrolateral swelling, its retrolateral side provided with three sharp, subequal, slightly diverging prongs pointing up; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with sharp turn before entering triangular swelling at base of embolus; MA originating in center of tegulum, with fairly long and narrow, oblique base, sharply curved backward, ending in evenly curved, gradu-

ally tapered part pointing down; embolus originating on flat triangular extension on posterior part of tegulum, whiplike, looped over slightly less than 360° (fig. 17i, j, l).

**FEMALE: Measurements.** Total length 2.19; carapace 0.97 long, 0.76 wide; length of fe: I 0.81, II 0.84, III 0.65, IV 0.95. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange brown, with darker radial striae. Chelicerae yellow brown, sternum yellow. Legs I and II orange brown, legs III and IV yellow brown. Abdomen brownish yellow, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized entrance chamber with entrance toward posterior side, second part of ID with sclerotized wall, first making outward U-loop and then running in posterior direction and entering the elongate ST1. A subglobular, stalked ST2 attached to ID at transition between thin-walled and sclerotized part (figs. 17k, 18f).

**OTHER MATERIAL EXAMINED: Malawi:** 1♀: Church of Central Africa Presbyterian (CCAP) hut, elev. 2000 m, Lichenya Plateau, Mt. Mulanje S16°00', E35°30' (25 November 1981; R. Jocqué) (MRAC); 1♀ from evergreen forest near forestry hut, elev. 1800 m, Lichenya Plateau, Mt. Mulanje S16°00', E35°30' (14 November 1981; R. Jocqué) (MRAC).

**VARIABILITY:** The transparency of the vulva is variable.

**DISTRIBUTION:** Mt. Mulanje, Malawi, between elev. 1750 m and 2000 m.

*Hortipes penthesileia*, new species

Figures 17h, 20a; Map 1

**TYPES:** Female holotype: in litter, elev. 1860 m, Mulanje path, Lichenya Plateau, Mt. Mulanje, Malawi S16°00', E35°30' (16 November 1981; R. Jocqué) (MRAC 156.605). Paratype: 1♀, 1 km E from hut on crossing of Madzeka path with small stream, Thuchila, Mt. Mulanje, Malawi S16°00', E35°30' (11 November 1981; R. Jocqué) (MRAC).

**ETYMOLOGY:** The species' epithet *penthesileia* is a noun in apposition referring to the legendary queen of the Amazons. The name is given because only females of the present species are known.



**DIAGNOSIS:** Females can be recognized by the small, globular ST1, the subglobular stalked ST2 separated by almost half their diameter, and the outward, rectangular U-loop of the ID.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.57; carapace 1.11 long, 0.86 wide; length of fe: I 0.89, II 0.95, III 0.78, IV 1.05. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 1; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange yellow, chelicerae, sternum, and legs yellow brown. Abdomen pale peach, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized entrance chamber with entrance toward posterior side, second part of ID with sclerotized wall, first making rectangular outward U-loop and then running in posterior direction and entering the small, globular ST1. A subglobular, stalked ST2 attached to ID at transition between thin-walled and sclerotized part (figs. 17h; 20a).

**DISTRIBUTION:** Mt. Mulanje, Malawi.

*Hortipes zombaensis*, new species

Figures 17m–o, 20b; Map 1

**TYPES:** Male holotype: sieved from litter in montane forest, elev. 1700 m, Zomba Plateau, Malawi S15°20', E35°18' (27 December 1977; R. Jocqué) (MRAC 153.687). Paratypes: 1 ♀ sieved from litter in montane forest, elev. 1500 m, Zomba Plateau, Malawi S15°20', E35°18' (13 November 1977; R. Jocqué) (MRAC).

**ETYMOLOGY:** The species is named after the type locality.

**DIAGNOSIS:** Males of *H. zombaensis* are recognized by the forward-directed RTA with two sharp, opposed prongs, one pointing up, the other one down. Females can be recognized by the second part of the ID making a ventrally oriented U-loop and describing a complete corkscrew turn before entering ST1.

**MALE: Measurements.** Total length 1.86; carapace 0.84 long, 0.65 wide; length of fe: I 0.68, II 0.70, III 0.57, IV 0.81. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace orange with eight brown radial striae, lighter at the fovea. Che-

licerae and legs yellow, sternum light yellow. Abdomen peach, no pattern. **Palp.** RTA a ventrolateral swelling, directed obliquely forward, extremity with two prongs, the external one pointing up, inferior one much shorter, pointing down; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course, slightly more narrowed toward embolus, with deep turn before entering oval swelling at base of embolus; MA originating in center of tegulum, with fairly narrow, transverse base, sharply curved backward and broadened, ending in evenly curved, gradually tapered distal part, pointing forward; embolus originating on posterior part of tegulum, whiplike, looped over slightly less than 360° (fig. 17n, o).

**FEMALE: Measurements.** Total length 2.30; carapace 0.95 long, 0.73 wide; length of fe: I 0.73, II 0.78, III ?, IV 0.86. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt ? vt ? rlt ?; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange with eight brown radial striae, lighter at the fovea. Chelicerae, sternum, and legs yellow. Abdomen peach, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized entrance chamber with entrance toward posterior side. Anterior end of this weakly sclerotized part split in two more heavily sclerotized, outward-pointing tips connected to second part of ID, which has sclerotized wall. The second part of ID first makes ventrally oriented U-loop and then runs in posterior direction, describing a complete corkscrew turn before entering the small, elongate ST1; a subglobular, stalked ST2 attached to ID at transition between thin-walled and sclerotized part (figs. 17m; 20b).

**DISTRIBUTION:** Zomba Plateau, Malawi, elev. 1500–1700 m.

*Hortipes atalante*, new species

Figures 19d, 20c; Map 4

**TYPES:** Female holotype: humus under bushes, left bank of the Umgeni River, Lions River District, Natal, South Africa S29°25', E30°10' (October 1961; N. Leleup) (MRAC 131.811).

**ETYMOLOGY:** This species, of which only

a single female has been found, is named after the nymph Atalante, who lived alone in the woods and practiced hunting.

**DIAGNOSIS:** Females can easily be recognized by their small, globular, anteriorly stalked ST2 attached to a circular loop in the second part of the ID.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.57; carapace 1.00 long, 0.81 wide; length of fe: I 0.76, II 0.78, III 0.65, IV 0.97. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 0. **Coloration.** Carapace golden yellow, lighter at the fovea. Chelicerae and legs yellow, sternum pale yellow. Abdomen pale yellow, no pattern. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized, deeply bifurcated entrance chamber with entrance toward posterior side. Anterior ends of this weakly sclerotized part curved outward and merging into two heavily sclerotized, inward-pointing tips attached to second, normally sclerotized part of ID, which first makes complete circular loop in frontal direction, and is followed by a complete corkscrew turn in caudal direction that is connected to the small, globular ST1. The small, globular, anteriorly stalked ST2 attached to anterior circular loop in second part of ID (figs. 19d, 20c).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes merwei*, new species

Figures 19a–c, 20c; Map 4

**TYPES:** Male holotype in pitfall trap in grass, Ngome State Forest, Kwazulu-Natal, South Africa S27°49', E31°26' (August 1992; M. v. d. Merwe) (NCA 93/867). Paratypes: 3♀ together with holotype; 1♀ in pitfall trap in grass, same locality (February 1992; M. v. d. Merwe) (NCA); 1♀ in pitfall trap in pine plantation, same locality (October 1992; M. v. d. Merwe) (NCA); 2♂, 2♀ in pitfall trap in pine plantation, same locality (April 1992; M. v. d. Merwe) (NCA); 1♂, 1♀ in AMNH; 3♀ in pitfall trap in pine plantation, same locality (April 1992; M. v. d. Merwe) (NCA); 1♂, 3♀ in pitfall trap in grass, same locality (May 1992; M. v. d. Merwe) (NCA); 1♂, 3♀ in pitfall trap in

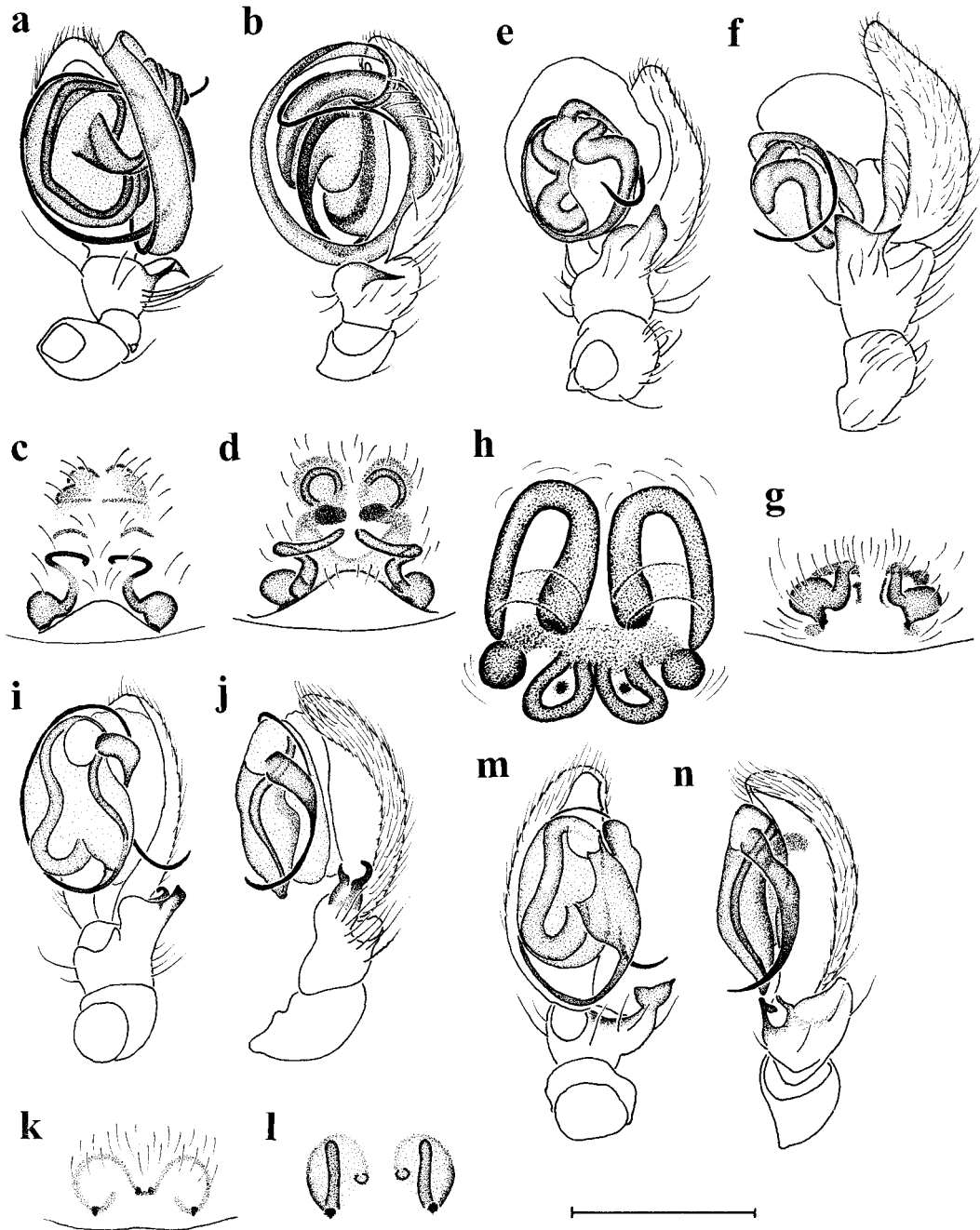
pine plantation, same locality (January 1993; M. v. d. Merwe) (NCA); 2♂, 4♀ in pitfall trap in grass, same locality (March 1992; M. v. d. Merwe) (NCA); 4♀ in pitfall trap in grass, same locality (June 1992; M. v. d. Merwe) (NCA); 1♂, 3♀ in pitfall trap, same locality (1992; M. v. d. Merwe) (NCA); 1♂, 1♀ in pitfall trap in pine plantation, same locality (March 1992; M. v. d. Merwe) (NCA); 2♀ in pitfall trap in pine plantation, same locality (March 1992; M. v. d. Merwe) (NCA); 1♂, 6♀ in pitfall trap in grass, same locality (July 1992; M. v. d. Merwe) (NCA).

**ETYMOLOGY:** The species is named in honor of Marius van de Merwe, who collected almost all of the specimens available.

**DIAGNOSIS:** *Hortipes merwei* is easily distinguished from all other *Hortipes* species by the long, coiled palpal embolus and MA in the male and by the solenoidally coiled ID of the vulva in the female.

**MALE: Measurements.** Total length 1.62; carapace 0.76 long, 0.62 wide; length of fe: I 0.54, II 0.57, III 0.41, IV 0.68. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace reddish brown, lighter at the fovea. Chelicerae, legs, and sternum yellow brown. Abdomen yellowish white, no pattern, sparsely covered with thin, pointed grey setae. **Palp.** Tibia with simple RTA with long sharp tip pointing up; cymbium fairly elongate, without retrolateral concavity or series of long curved setae; sperm duct fairly narrow over entire course with sharp turn in front of embolus; MA originating in center of tegulum, large, broad, coiled twice; embolus originating on anterior part of tegulum, with base fairly narrow, long, whiplike, looped in figure 8 turn (fig. 19a, b).

**FEMALE: Measurements.** Total length 1.89; carapace 0.86 long, 0.73 wide; length of fe: I 0.65, II 0.68, III 0.54, IV 0.81. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0 vt 1 rlt 0. **Coloration.** Carapace yellow ochre, chelicerae, legs, and sternum yellow brown. Abdomen pale peach, no pattern, sparsely covered with thin, pointed grey setae. **Genitalia.** Vulva: first stretches of IDs fused into one weakly sclerotized, deeply bifurcated entrance chamber with entrance toward posterior side. Long, forward-pointing ends of bi-



Figs. 19. a-c. *Hortipes merwei*, new species. a, b. Male left palp, ventral and retrolateral views. c. Epigyne. d. *Hortipes atalante*, new species, epigyne. e-g. *Hortipes leno*, new species. e, f. Male left palp, partly expanded, ventral and retrolateral views. g. Epigyne. h. *Hortipes mulciber*, new species, epigyne. i-k. *Hortipes libidinosus*, new species. i, j. Male left palp, ventral and retrolateral views. k. Epigyne. l-n. *Hortipes delphinus*, new species. l. Epigyne. m, n. Male left palp, ventral and retrolateral views. Scale line: 0.25 mm.

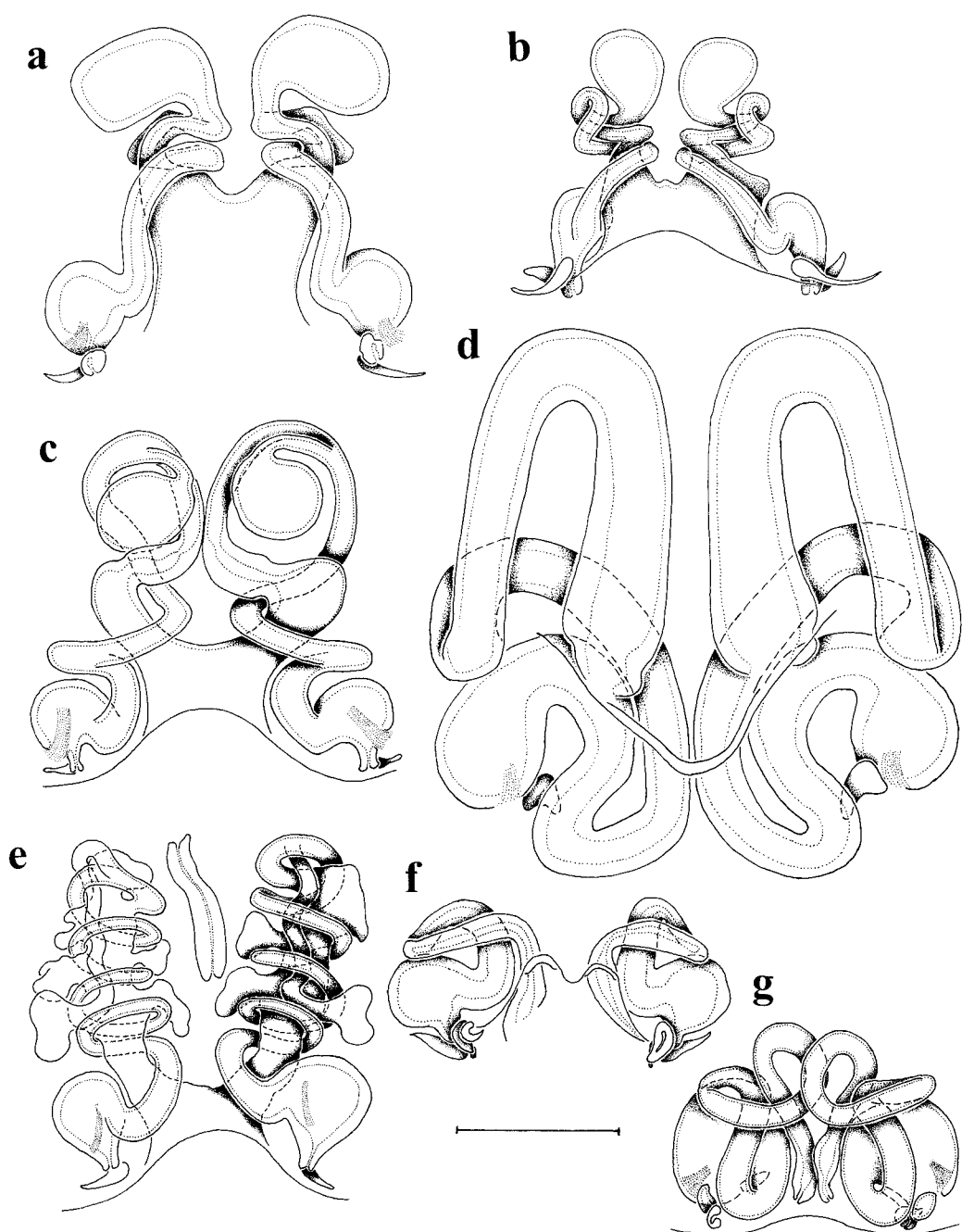


Fig. 20. **a.** *Hortipes penthesileia*, new species, vulva, ventral view. **b.** *Hortipes zombaensis*, new species, vulva, ventral view. **c.** *Hortipes atalante*, new species, vulva, ventral view. **d.** *Hortipes mulciber*, new species, vulva, ventral view. **e.** *Hortipes merwei*, new species, vulva, ventral view. **f.** *Hortipes leno*, new species, vulva, ventral view. **g.** *Hortipes libidinosus*, new species, vulva, ventral view. Scale line: 0.1 mm.

furcated entrance chamber completely encircled by second, normally sclerotized part of ID, which first makes three corkscrew turns in caudal direction before entering the small, tear-shaped ST1. The small, elongate ST2 protrudes laterally from the solenoidally coiled second part of ID, halfway along its length, and is attached to anterior end of weakly sclerotized entrance chamber by a long, thin, weakly coiled stalk running in posterior direction (figs. 19c; 20e).

**OTHER MATERIAL EXAMINED:** **South Africa:** 1 ♂ hand-captured in litter, Lake St Lucia, elev. 100 m, Natal S27°45', E32°30' (14 September 1978; G.L. Loots) (NCA); 1 female caught with a sweepnet in low forest undergrowth, Dukuduku Forest, elev. 100 m, Lake St Lucia, Natal S28°23', E32°20' (7 November 1990; M. Filmer) (NCA).

**VARIABILITY:** The exact position of the curled MA of the male palp, the transparency of the vulva and the details in the shape of the thin-walled entrance chamber as well as the course of the ID loops are variable.

**DISTRIBUTION:** from Ngome State Forest to the coastal region around Lake St. Lucia, Kwazulu-Natal South Africa.

### *Hortipes leno*, new species

Figures 19e–g, 20f; Map 2

**TYPES:** Male holotype: Lukwangule Plateau, elev. 2400–2600 m, Uluguru Mountains, Tanzania S7°10', E37°40' (2–22 July 1971; L. Berger, N. Leleup, J. Debecker) (MRAC 141.109). Paratypes: 1 ♀ together with holotype; 1 ♂ in litter, elev. 1600 m, Lupanga East, Tanzania (10 July 1981; M. Stolze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The name *leno*, Latin for seducer, is a noun in apposition and refers to the fact that both male specimens known have expanded palps.

**DIAGNOSIS:** Males of *H. leno* are recognized by the large lateral RTA ending in a divergent bifid tip. Females are closest to those of *H. klumpkeae* but can be distinguished from them by the inward-running stretch of the ID, which is continuously curved instead of angular.

**MALE: Measurements.** Total length 2.16; carapace 1.03 long, 0.81 wide; length of fe: I 0.84, II 0.92, III 0.70, IV 0.97. **Leg spi-**

**nation.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 5; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 2 rlt 1.

**Coloration.** Carapace yellow brown, lighter around the fovea. Chelicerae yellow brown, legs yellow. Sternum yellow, bordered with a thin orange brown line. Abdomen pale yellow, no pattern. **Eyes.** Anterior median eyes with a bluish hue. **Palp.** RTA a lateral extension with bifid extremity, superior tip sharp and slender, inferior one blunt; cymbium fairly elongate, with shallow retrolateral concavity in proximal half; sperm duct fairly broad over entire course, slightly narrowed toward embolus, with sharp turn before entering triangular tegular swelling at base of embolus; MA originating in frontal part of tegulum, curved over tegulum, gradually tapered toward tip, which reaches RTA; embolus originating from triangular extension on posterior part of tegulum, whiplike, fairly short, distal part appressed against MA (fig. 19e, f).

**FEMALE: Measurements.** Total length 2.67; carapace 1.08 long, 0.89 wide; length of fe: I 0.89, II 0.95, III 0.76, IV 1.00. **Leg spination.** Fe: I rv 2–3; IV plt 0 rlt 0; ti: I, II vsp 6–7; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange brown, chelicerae orange yellow, and legs orange brown. Sternum lemon yellow, bordered with orange brown. Abdomen yellowish white, no pattern. **Female genitalia.** Vulva very simple, ID making sharp outward bend, followed by continuously curved inward-running stretch connected to ST1 (figs. 19g; 20f).

**DISTRIBUTION:** Tanzania, Uluguru Mountains, between elev. 1600 m and 2600 m.

### *Hortipes mulciber*, new species

Figures 19h, 20d; Map 2

**TYPES:** Female holotype: litter in woodland at Masoko Crater Lake, road Itete-Tukuyu, Tanzania S09°25', E33°40' (30 November 1991; R. Jocqué) (MRAC 173.360). Paratypes: 2 ♀ from Mt. Rungwe, SW, elev. 1900 m, Tanzania (August 20, 1980; M. Stolze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The name *mulciber*, a noun in apposition, is the nickname of the Roman god Vulcanus and refers to the fact that all the specimens of this species have been col-



lected in the neighborhood of volcanic craters.

**DIAGNOSIS:** Females can be distinguished by the first stretch of the ID, which is rather wide and horseshoe shaped.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 3.16; carapace 1.22 long, 1.05 wide; length of fe: I 1.08, II 1.13, III 0.92, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 0–1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow ochre, paler at the fovea. Chelicerae yellow. Sternum pale yellow, legs yellow. Abdomen pale yellow, no pattern. **Genitalia.** Epigyne with a blunt triangular scape, flanked by the entrances of the IDs (figs. 19h; 20d). Vulva: ID consists of a first, wide, horseshoe-shaped stretch running in frontal direction, followed by C-shaped second part. Spermathecae 1 small, subglobular (fig. 20d).

**DISTRIBUTION:** Mt. Rungwe and surrounding area, Tanzania.

*Hortipes libidinosus*, new species

Figures 19i–k, 20g; Map 2

**TYPES:** Male holotype: elev. 1000 m, Amani, E Usambara Mountains, Tanzania S05°05'04", E38°37'40" (15 July 1980; M. Stoltze and N. Scharff) (ZMUC). Paratypes: 1♀ together with holotype; 1♂: same data (20 July 1980; M. Stoltze and N. Scharff) (ZMUC); 1♂, 5♀, same data (11 February 1997; P. d. P. Björn and L. Sørensen) (ZMUC).

**ETYMOLOGY:** The species is named *libidinosus*, dissolute, because all male specimens known have expanded palps.

**DIAGNOSIS:** Males of *H. libidinosus* are recognized by the peculiar RTA with two prongs, both hook-shaped but curved in opposite direction. Females are recognized by the ID describing a full circle followed by a hairpin loop pointing outward.

**MALE: Measurements.** Total length 1.62; carapace 0.81 long, 0.62 wide; length of fe: I 0.70, II 0.78, III 0.57, IV 0.84. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow, lighter at the fovea. Chelicerae yellow, sternum yellowish white. Legs pale yellow. Abdomen pale yellow, no pattern. **Palp.** Tibia with well-devel-

oped RTA provided with two prongs: dorsal one fairly long, slender, ending in hook that is curved down, ventral one short, thick, ending in upturned hook; cymbium with large, retrolateral concavity with series short setae; sperm duct with wide basal part and narrow distal part with S-shaped turn just in front of embolus; MA fairly small, with broad curved proximal part and strongly curved, slender distal part; embolus with broad, roughly triangular base, long, whiplike, looped over 360° (fig. 19i, j).

**FEMALE: Measurements.** Total length 2.57; carapace 1.08 long, 0.92 wide; length of fe: I 0.92, II 0.97, III 0.78, IV 1.08. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6–7; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace pale yellow, even paler at the fovea. Chelicerae and sternum pale yellow. Legs pale yellow. Abdomen pale peach, no pattern. **Genitalia.** Vulva: ID first running in frontal direction, then describing full circle and connected to ST1 by loop directed sideways and final stretch running in posterior direction (figs. 19k; 20g).

**VARIABILITY:** The number of tibial vsp in females (6 or 7) and the details in the size of ID loops are variable.

**DISTRIBUTION:** Known only from the type locality.

*Hortipes delphinus*, new species

Figures 19l–n, 22b; Map 2

**TYPES:** Male holotype: elev. 1600 m, Mazumbai, West Usambara mountains, Tanzania (1 August 1980; M. Stoltze and N. Scharff) (ZMUC). Paratypes: 2♂ together with holotype; 1♀, elev. 1900 m, same data (ZMUC).

**ETYMOLOGY:** The species is named *delphinus*, dolphin, because the RTA of the male palp resembles a dolphin's tail.

**DIAGNOSIS:** Males of *H. delphinus* are recognized by the peculiar shape of the RTA, which reminds that of a dolphin tail, in combination with the large, roughly oval tegular swelling at the base of the embolus. Females are recognized by the ID describing a full circle followed by a hairpin loop pointing backward.

**MALE: Measurements.** Total length 1.73; carapace 0.89 long, 0.70 wide; length of fe:

I 0.78, II 0.86, III 0.68, IV 0.92. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0–1; IV plt 1 vt 1–2 rlt 1. **Coloration.** Carapace yellow, lighter at the fovea. Chelicerae yellow, sternum lemon yellow. Legs yellow. Abdomen pale yellow, no pattern. **Palp.** RTA a lateral extension, widened and twisted at its extremity, shaped as a dolphin's tail; cymbium fairly elongate, with long and fairly deep retrolateral concavity without series of curved hairs; sperm duct fairly broad in proximal part of its course, gradually narrowing into roughly oval tegular swelling at base of embolus; MA originating on frontal part of tegulum, fairly broad and with a small constriction at base, curved around tegulum, then tapered and slightly curved in distal part, tip reaches extremity of RTA; embolus originating from retrolateral part of tegulum, whiplike, fairly long, looped over almost 360° (fig. 19m, n).

**FEMALE: Measurements.** Total length 2.48; carapace 1.08 long, 0.81 wide; length of fe: I 0.95, II 1.00, III 0.78, IV 1.08. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 7; mt: III plt 1 vt 0 rlt 0–1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow, lighter at the fovea. Chelicerae yellow, sternum lemon yellow. Legs yellow. Abdomen yellowish white, no pattern. **Genitalia.** Vulva: IDs running parallel to each other in frontal direction, then describing full circle and connected to elongate ST1 by hairpin loop pointing backward (figs. 19l; 22b).

**DISTRIBUTION:** Known only from the type locality, between elev. 1600 m and 1900 m.

*Hortipes bjorni*, new species

Figure 21a, b; Map 2

**TYPES:** Male holotype: Kimboza forest, elev. 250 m, Uluguru Mountains, Tanzania (18 July 1981; M. Stoltze and N. Scharff) (ZMUC).

**ETYMOLOGY:** The species name is a patronym in honor of Per de Place Bjørn, student of African spiders.

**DIAGNOSIS:** Males of *H. bjorni* are recognized by the peculiar RTA with two prongs, a dorsal slender one with a hook-shaped tip and a short, sharp ventrolateral one.

**MALE: Measurements.** Total length 2.03; carapace 0.92 long, 0.68 wide; length of fe:

I 0.84, II 0.89, III 0.68, IV 0.95. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace, chelicerae, sternum, and legs pale yellow. Abdomen yellowish white, no pattern. **Palp.** Tibia with well-developed RTA provided with two prongs: one long, slender, dorsal with twisted, hook-shaped tip, second retrolateral, short, with wide base and thin sharp tip; cymbium with large, retrolateral concavity with series of widely spaced long setae; sperm duct with wide basal part and narrow distal part with S-shaped turn just in front of embolus; MA fairly small, with broad curved proximal part and strongly curved, slender distal part; embolus with broad, roughly triangular base, long, whiplike, looped over almost 360° (fig. 21a, b).

**FEMALE:** Unknown.

**DISTRIBUTION:** Known only from the type locality.

*Hortipes amphibolus*, new species

Figures 21c, 22a; Map 3

**TYPES:** Female holotype: between roots of low plants in forested swamp, elev. 1000 m, Katanga, Albertville region, Bendersa, Congo S05°03', E28°54' (October 1958; N. Leleup) (MRAC 112.902).

**ETYMOLOGY:** The species is named *amphibolus*, a latinization of the Greek ἀμφίβολος, ambiguous, because the vulva, with its posteriorly located entrances connected by a straight duct to a thickened, coiled part of the ID, seems to combine features of *Hortipes* species from Kivu with features of the South African species.

**DIAGNOSIS:** Females of *H. amphibolus* are recognized by the vulva, which has a thickened and coiled stretch of ID, connected to posterior entrances through a straight duct.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.59; carapace 1.00 long, 0.81 wide; length of fe: I 0.76, II 0.81, III 0.68, IV 0.92. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace, chelicerae and legs yellow, sternum pale yellow. Abdomen yellowish white, no pattern. **Genitalia.** Vulva

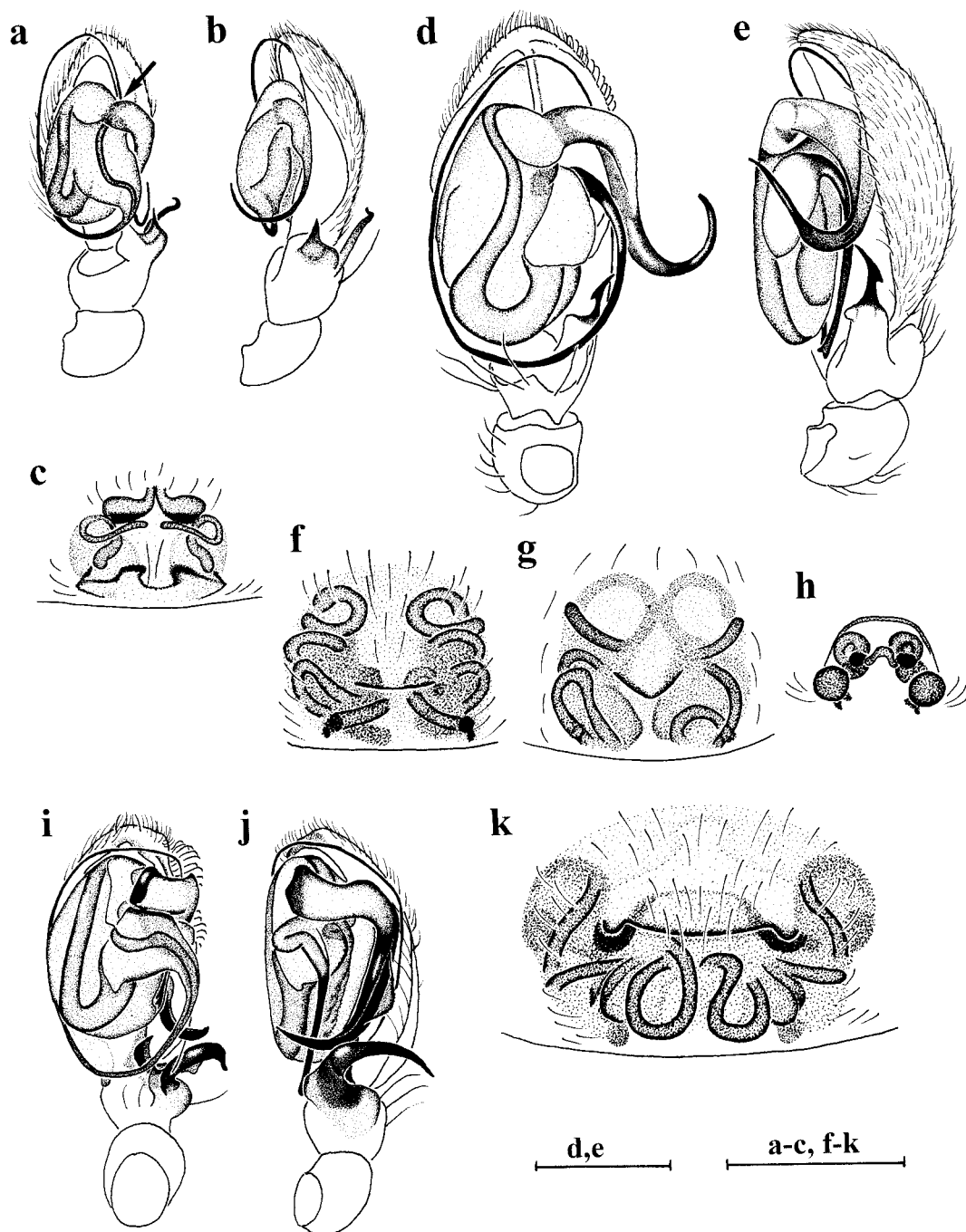


Fig. 21. **a, b.** *Hortipes bjorni*, new species, male left palp, ventral and retrolateral views. Arrow indicates insertion of MA on tegulum. **c.** *Hortipes amphibolus*, new species, epigyne. **d–f.** *Hortipes hastatus*, new species. **d, e.** Male left palp, ventral and retrolateral views. **f.** Epigyne. **g.** *Hortipes horta*, new species, epigyne. **h.** *Hortipes angariopsis*, new species, epigyne. **i–k.** *Hortipes falcatus*, new species. **i, j.** Male left palp, ventral and retrolateral views. **k.** Epigyne. Scale lines: 0.25 mm.

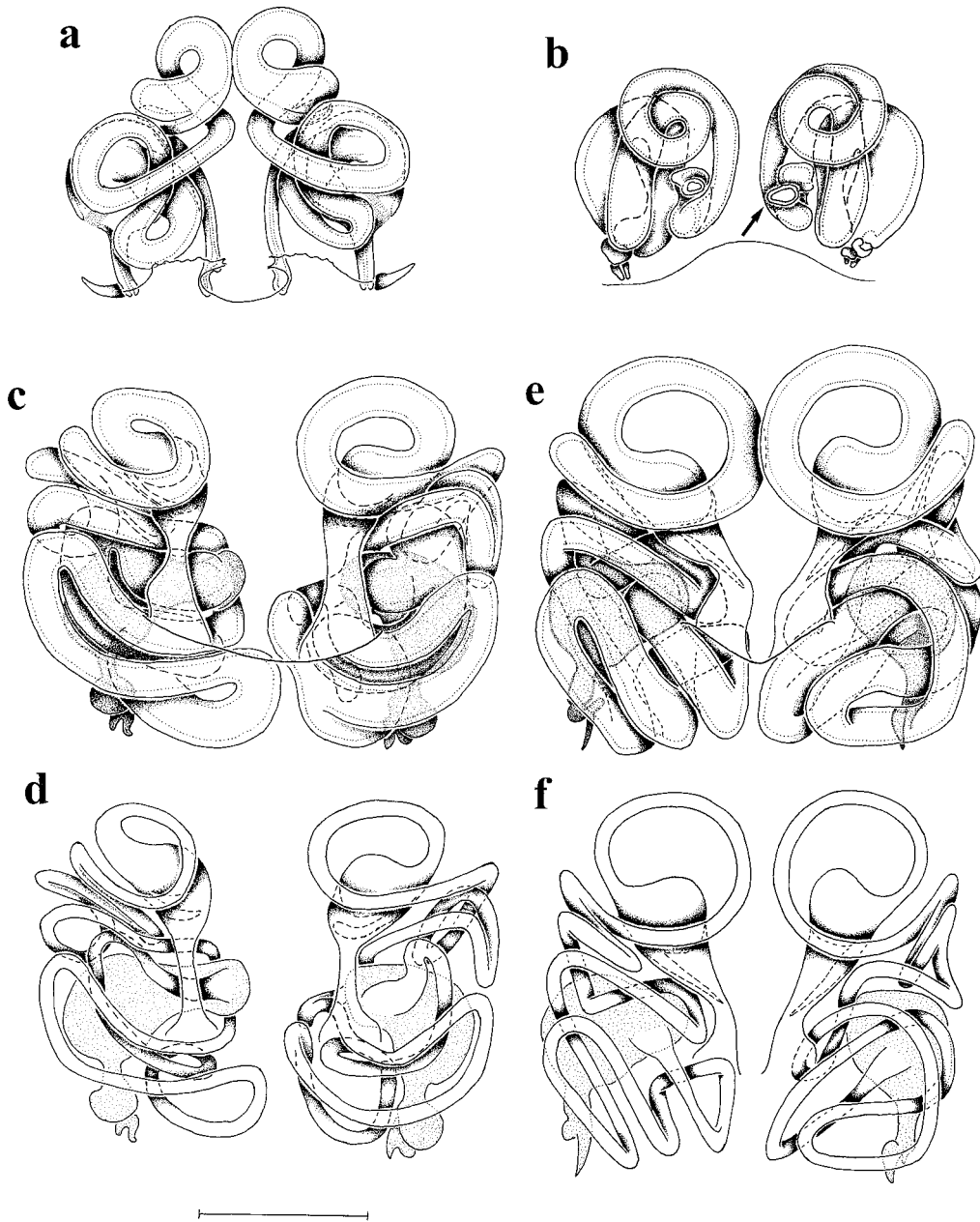


Fig. 22. **a.** *Hortipes amphibolus*, new species, vulva, ventral view. **b.** *Hortipes delphinus*, new species, vulva, ventral view. Arrow indicates ID entrance. **c, d.** *Hortipes hastatus*, new species. **c.** Vulva, ventral view. **d.** Vulva, schematic representation. **e, f.** *Hortipes horta*, new species. **e.** Vulva, ventral view. **f.** Vulva, schematic representation. Scale line: 0.1 mm.

not unlike that of *H. creber* but more complex: ID consisting of first, straight, weakly sclerotized stretch running in frontal direction, followed by wider, more heavily scler-

otized part associated with gland. Wider part connected to ST1 by stretch with two consecutive 360° loops and final hairpin loop (figs. 21c, 22a).



**DISTRIBUTION:** Known only from the type locality.

***Hortipes hastatus*, new species**

Figures 21d–f, 22c, d; Map 3

**TYPES:** Male holotype: montane forest with bamboo, elev. 2800 m, Uvira region, Kahololo heights, Congo S03°12', E28°51' (January 1960; N. Leleup) (MRAC 202.487). Paratypes: 1 ♂ from sifting forest litter, elev. 1740 m, Kitahurira, Bwindi Impenetrable National Park, Rukungiri district, Uganda S00°58', E29°41' (17–19 September, 1996; C. Griswold) (CAS); 1 ♀ in pitfall trap in forest, elev. 1740 m, same locality (14–24 September 1996; C. Griswold, G. Mayoba, J. Vindum) (CAS); 1 ♂ in humus, elev. 2400 m, Mt. Lubwe, SE of Butembo, Kivu, Congo S00°02', E29°18' (15 April 15 1971; M. Lejeune) (MRAC); 1 ♀ in litter in *Arundinaria alpina* forest, elev. 2400 m, Bwindi Impenetrable National Park, along Kabale Kayonza road, Kabale District, Uganda S01°05', E29°48' (16 September 1996; C. Griswold) (CAS).

**ETYMOLOGY:** The species is named *hastatus* because the RTA of the male palp has the shape of a spear head.

**DIAGNOSIS:** Males of *H. hastatus* are recognized by the RTA with harpoon-shaped frontal tip and the thick MA. Females are close to those of *H. horta* but differ from the latter species by the almost straight epigynal slit and the ID passing along the dorsal side of ST1 and entering ST1 anteriorly and from the outside instead of posteriorly and from the inside.

**MALE: Measurements.** Total length 2.30; carapace 1.08 long, 0.84 wide; length of fe: I 0.89, II 0.95, III 0.76, IV 1.03. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace and legs orange, sternum and chelicerae yellowish brown. Abdomen greyish white, covered with pointed grey setae interspersed with grey feathery hairs. **Palp.** Tibia with medium-sized RTA directed forward, with harpoon-shaped frontal tip and basal knob; cymbium fairly elongate, narrow as seen from above, with deep retrolateral concavity without series of long curved setae; tegulum with fairly large oval

swelling at base of embolus; sperm duct with wide basal part and not much narrower distal part without visible turn; MA solid, gradually tapered from thick base to sharp tip, sinuous and curved down, without median flap; embolus originating far in front on tegulum, long, whiplike, looped over 540° (fig. 21d, e).

**FEMALE: Measurements.** Total length 2.97; carapace 1.22 long, 0.95 wide; length of fe: I 0.92, II 1.00, III 0.78, IV 1.11. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace, sternum, and legs yellowish brown, chelicerae yellow. Abdomen pinkish grey, covered with pointed grey setae interspersed with grey feathery hairs. **Genitalia.** Epigyne a simple, slightly curved, transversal slit (fig. 21f). Vulva: ID consisting of first, straight, weakly sclerotized stretch running in frontal direction, followed by wider, more heavily sclerotized part associated with gland. Wider part connected to ST1 by very complex stretch consisting of several circular and hairpin loops completely covering ventral side of ST1 and even passing along its dorsal side (fig. 22c, d).

**OTHER MATERIAL EXAMINED: Uganda:** 1 ♂ from sifting litter in forest, elev. 1400 m, Bushoma Bwindi, Impenetrable National Park, Rukungiri district S00°59', E29°36' (20–24 September 1996; C. Griswold) (CAS). **Congo:** 1 ♂ in humic substrate, elev. 2200 m, montane forest, Lubero, Kivu S00°10', E29°14' (January 1952; R.P. Celis) (MRAC); 1 ♂ in humus, elev. 2000 m, Kabare, Lwiro, Kivu S02°15', E28°48' (1953; N. Leleup) (MRAC); 2 ♂ in litter, elev. 2100 m, Lubero-Goma road, 18 km S of Lubero, Bikara, Kivu S00°15', E29°12' (December 1976; M. Lejeune) (MRAC).

**VARIABILITY:** The exact course of the coils and loops of ID is somewhat variable.

**DISTRIBUTION:** Kivu, Congo, and SW Uganda, between elev. 1400 and 2800 m.

***Hortipes horta*, new species**

Figures 21g, 22e, f; Map 3

**TYPES:** Female holotype: in humus in Lui-ko gold mine, Mwenga, Kivu, Congo S03°03', E28°26' (19 February 1952; N. Le-



leup) (MRAC 092.411). Paratypes: 1 ♀ in humus in bamboo forest, elev. 2700 m, Itombwe, Mwenge territory, Lungwe lake, Kivu, Congo S03°03', E28°49' (August 1953; N. Leleup) (MRAC); 1 ♀ near Talia source N, elev. 2500 m, Lubero, Kivu, Congo S00°10', E29°14' (9 October 1952; R.P.J. Celis) (MRAC); 1 ♀ in humus layer, elev. 1750 m, Butembo, Kivu, Congo N00°09', E29°17' (February–March 1975; M. Lejeune) (MRAC).

**ETYMOLOGY:** The species name is a noun in apposition and a patronym in honor of the famous Jugendstil architect and designer Victor Horta (1861–1947). The elegant curves and angles of the ID of the present species remind some of the Horta designs (fig. 22e, f).

**DIAGNOSIS:** Females are close to those of *H. hastatus* but differ from the latter species by the bluntly triangular epigynal slit, the ID not passing along the dorsal side of ST1, and the ID entering ST1 posteriorly and from the inside instead of anteriorly and from the outside.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.97; carapace 1.22 long, 0.95 wide; length of fe: I 0.92, II 1.00, III 0.78, IV 1.11. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace, sternum, and legs yellow brown, chelicerae yellow. Abdomen pale yellow, no pattern. **Genitalia.** Epigyne a bluntly triangular slit (fig. 21g). Vulva: ID consisting of first, straight, weakly sclerotized stretch running in frontal direction, followed by wider, more heavily sclerotized part associated with gland. Wider part connected to ST1 by very complex stretch consisting of several circular and hairpin loops completely covering ventral side of ST1 (fig. 22e, f).

**DISTRIBUTION:** Kivu region, Congo, from Mwenga in the south to Butembo in the north.

#### *Hortipes angariopsis*, new species

Figures 21h, 26d; Map 2

**TYPES:** Female holotype: in litter in montane rain forest, elev. 1800–1850 m, Mwanihana Forest Reserve above Sanje, Uzungu

wa mountains, Tanzania (28–29 September 1984; N. Scharff) (ZMUC).

**ETYMOLOGY:** The species' epithet refers to *Angaria delphinus* (L., 1758) (Mollusca, Gastropoda, Trochidae). The coiled IDs of the present species resemble the loosely wound shells of this attractive gastropod.

**DIAGNOSIS:** Females are easily recognized by the short and stout, looped ID entering ST1 on the dorsal side.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.65; carapace 1.08 long, 0.89 wide; length of fe: I 0.95, II 1.00, III 0.81, IV 1.11. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown, lighter at the fovea and with eight brown radial striae. Chelicerae yellow, sternum pale yellow. Legs yellow. Abdomen pale yellow, no pattern. **Genitalia.** Vulva: ID short and stout, looped over 360°, entering ST1 on dorsal side and associated with gland that is situated close to entrance (figs. 21h; 26d).

**DISTRIBUTION:** Known only from the type locality.

#### *Hortipes falcatus*, new species

Figures 21i–k, 23a, b; Map 3

**TYPES:** Male holotype: in dead wood, elev. 2200 m, Musyenene Forest, Kyondo, Kivu, Congo S00°00', E29°24' (4 April 1976; M. Lejeune) (MRAC 160.052). Paratypes: 2 ♂, 1 ♀ from sifting litter in forest, elev. 2300 m, "Nature Trail," Ruhizha, Bwindi Impenetrable National Park, Kabale District, Uganda S01°03', E29°47' (15 September 1996; C. Griswold) (CAS); 2 ♀ collected in humus, elev. 2250 m, Mt. Lubwe, SE of Butembo, Kivu, Congo, N00°02', E29°18' (12 April 1971; M. Lejeune) (MRAC; 1 ♀ in AMNH); 1 ♂ among fern leaves in forest, elev. 2200 m, Musyenene region, Kyondo, Kivu, Congo, S00°00', E29°24' (7 April 1976; M. Lejeune) (MRAC); 1 ♂, one subadult male from sifting forest litter, elev. 2300 m, Nyungwe Forest, Institut National de Recherche Scientifique site, 4 km W of Pindura, Rwanda S02°29', E29°13' (7 September 1985; R. Jocqué, Nsengimana and Michiels) (MRAC).

**ETYMOLOGY:** The species' epithet *falcatus* refers to the sickle-shaped RTA.

**DIAGNOSIS:** Males of *H. falcatus* are recognized by the flat falciform RTA in combination with the solid MA with a median flap. *Hortipes lejeunei* is similar but has a large triangular RTA. Females are close to those of *H. lejeunei* and *H. narcissus* but differ from both species by the ST1, which are closer together in the present species.

**MALE: Measurements.** Total length 2.84; carapace 1.27 long, 1.11 wide; length of fe: I 1.11, II 1.19, III 0.95, IV 1.38. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0–1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace lemon yellow, lighter at the fovea. Chelicerae and legs yellow, sternum yellowish white. Abdomen yellowish white, no pattern. **Palp.** Tibia with large, falciform RTA with an additional thin, blade-shaped central, anterior spike, pointing forwards; cymbium fairly elongate and narrow as seen from above, with deep retrolateral concavity without series of long curved setae; sperm duct with wide basal part and not much narrower distal part with shallow turn just in front of embolus; MA solid, gradually tapered from thick base to sharp tip, curved down, with two almost orthogonal bends in ventrolateral view, with large, thin flap along dorsal median margin; embolus with fairly broad, triangular base, long, whiplike, looped over 450° (fig. 21i, j).

**FEMALE: Measurements.** Total length 3.24; carapace 1.49 long, 1.24 wide; length of fe: I 1.16, II 1.22, III 1.00, IV 1.35. **Leg spination.** Fe: I rv 2–3; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange brown, chelicerae and sternum brownish yellow. Legs orange yellow. Abdomen peach, speckled with small orange dots. **Genitalia.** Epigyne a slightly curved transversal slit flanked by two small protruding lobes (fig. 21k). Vulva: entrances of IDs separated by about half the width of entire vulva. ID consisting of wide and very thick-walled, looped first stretch associated with gland and connected to ST1 through long and tortuous duct consisting of several circular and horseshoe loops. Spermathecae 1 separated by less than their own diameter (fig. 23a, b).

**OTHER MATERIAL EXAMINED: Rwanda:** 3♂ in pitfall traps, INRS site, Nyungwe Forest S02°30', E29°12' (8 November–5 December

1985; Jocqué, Nsengimana and Michiels) (MRAC). **Congo:** 1♂ in litter underneath ferns, 18 km S of Lubero, Lubero Goma road, elev. 2100 m, Bikara, Kivu S00°15', E29°12' (December 1976; M. Lejeune) (MRAC 177.093); 1♂ in humic substrate in overhanging soil, Kyondo, elev. 2200 m, Musyenene region, Kivu S00°00', E29°24' (10 April 1976; M. Lejeune) (MRAC 159.958). **Uganda:** 1♀ on roadcut at night, Ruhizha, Bwindi Impenetrable National Park, elev. 2300 m, Kabale District S01°02', E29°46' (25 September 1996; C. Griswold) (CAS); 1♀ from same locality, forest, "Nature Trail," elev. 2300 m, S01°03', E29°47' (13–16 September 1996; C. Griswold) (CAS); 1♀ from sifting forest litter, Buhoma, Bwindi Impenetrable National Park, elev. 1400 m, Rukungiri District S00°59', E29°36' (20–24 September 1996; C. Griswold) (CAS).

**VARIABILITY:** The number of retrolateral ventral spines on fe I (2 or 3) of females, the number of plt spines on mt III of males (0 or 1) and the exact course of the coils and loops of ID are somewhat variable.

**DISTRIBUTION:** Kivu, Congo, SW Rwanda, and SW Uganda, between elev. 1400 and 2300 m.

### *Hortipes lejeunei*, new species

Figures 24a–c, 26a, b; Map 3

**TYPES:** Male holotype and paratype collected among dry fern leaves, Ruwenzori north slope, Kikura camp, valley of the Ruanoli, Kivu, Congo N00°35', E29°57' (July–August 1974; M. Lejeune) (MRAC 154.105). Paratypes: 1♂ together with holotype; 2♀ at elev. 2000 m, Ruwenzori N slope, Kikura camp, Kivu, Congo N00°35', E29°57' (July–August, 1974; M. Lejeune) (MRAC; 1♀ in AMNH); 1♀ on overhanging soil, elev. 1700 m, Kahuha Forest, km 7 on the road Butembo-Beni, Kivu, Congo N00°09', E29°17' (15–20 April 1974; M. Lejeune) (MRAC).

**ETYMOLOGY:** The species is named in honor of the reverend M. Lejeune, who collected the type specimens.

**DIAGNOSIS:** Males of *H. lejeunei* are recognized by the flat triangular RTA in combination with the solid MA with a median

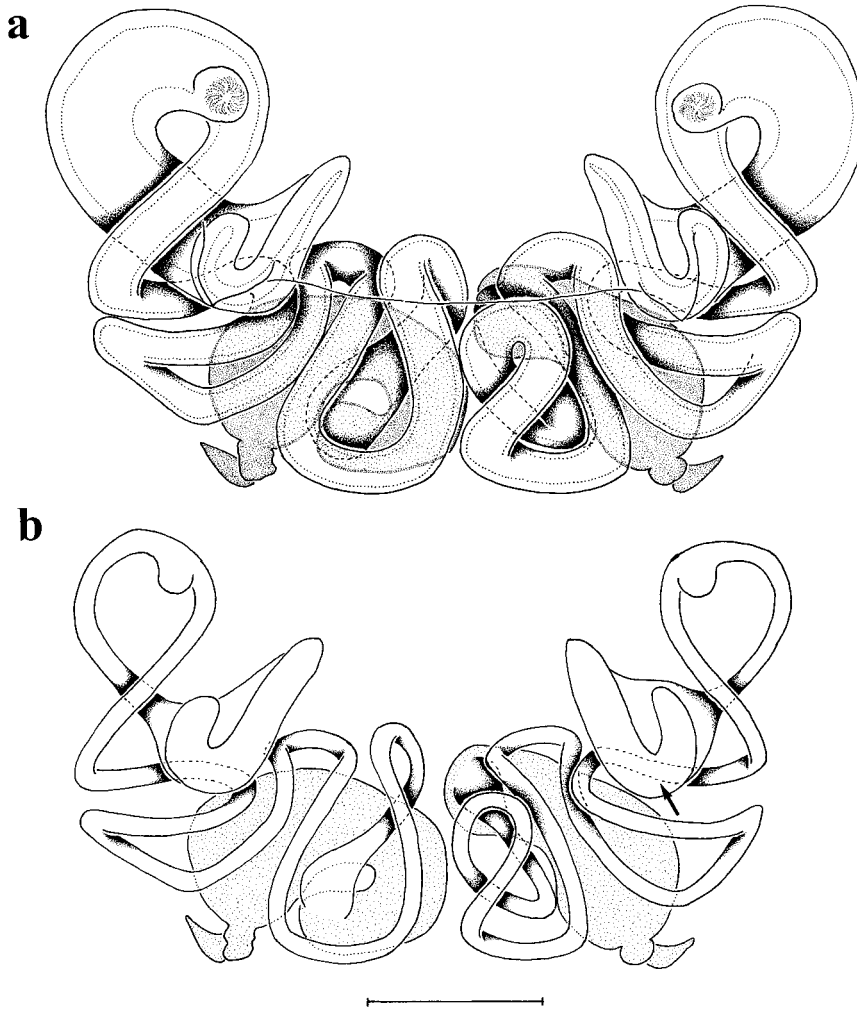


Fig. 23. a, b. *Hortipes falcatus*, new species. **a.** Vulva, ventral view. **b.** Vulva, schematic representation. Arrow indicates ID entrance. Scale line: 0.1 mm.

flap. Females are close to those of *H. falcatus* and *H. narcissus* but differ from both species by the entrances of the IDs, which are separated by more than half the width of the entire vulva in *H. lejeunei*.

**MALE: Measurements.** Total length 2.57; carapace 1.16 long, 0.97 wide; length of fe: I 0.95, II 1.03, III 0.78, IV 1.16. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange yellow, lighter at the fovea. Chelicerae, legs, and sternum yellow. Abdomen yellowish white, no pattern. **Palp.** Tibia with large, flat triangular RTA, itself with triangular incision along

dorsal rim, thus delimiting smaller proximal triangle, and with small tooth-shaped anterior spike, pointing inward; cymbium with large, ill-defined retrolateral bend with series of widely spaced long setae; sperm duct with wide basal part and not much narrower distal part with shallow turn just in front of embolus; MA large, curved down and sickle shaped and with large, thin indented flap along dorsal median margin; embolus with fairly broad, triangular base, long, whiplike, looped over 450° (fig. 24a, b).

**FEMALE: Measurements.** Total length 3.38; carapace 1.38 long, 1.16 wide; length of fe: I 1.11, II 1.16, III 0.92, IV 1.30. **Leg**

**spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange brown, chelicerae, and sternum yellow, legs orange yellow. Abdomen peach, no pattern. **Genitalia.** Epigyne a slightly curved transversal slit (fig. 24c). Vulva: entrances of IDs separated by more than half the width of entire vulva; ID consisting of wide and very thick-walled, looped first stretch associated with gland and connected to ST1 through long and tortuous duct consisting of several circular and horseshoe loops; ST1 separated by at least their own diameter (fig. 26a, b).

**OTHER MATERIAL EXAMINED:** 1♂ in humic substrate in forest, Itombwe, Uvira region, Mulenge station, Nyalengwe, elev. 2300 m, Kivu, Congo S03°07', E29°00' (November 1959; N. Leleup) (MRAC); 1♀ by sifting forest litter, elev. 2300 m, INRS site, 4 km W of Pindura, Nyungwe Forest, Rwanda S02°29', E29°13' (7 November 1985; Jocqué, Nsengimana and Michiels) (MRAC).

**VARIABILITY:** The shape of the sickle-shaped RTA process and the exact course of the coils and loops of ID are somewhat variable.

**DISTRIBUTION:** Kivu, Congo and SW Rwanda, between elev. of 1700 and 2300 m.

### *Hortipes narcissus*, new species

Figures 24d–f, 25a, b; Map 3

**TYPES:** Male holotype: in residual forest, elev. 2200 m, 4 km south Mt Kabobo, Haute-Kiyambi, Katanga, Congo S05°07', E29°03' (October 1958; N. Leleup) (MRAC 112.989). Paratypes: 3♂, 2♀ in humus layer, elev. 1700 m, Mt. Kabobo, same locality (October 1958; N. Leleup) (MRAC; 1♂, 1♀ in AMNH); 1♀ in humus layer, elev. 1800 m, Mt. Kabobo, same locality (October 1958; N. Leleup) (MRAC).

**ETYMOLOGY:** The species is named in honor of Dr. Narcisse Leleup, collector of all the specimens available.

**DIAGNOSIS:** Males of *H. narcissus* are recognized by the huge sickle-shaped MA and the smaller sickle-shaped RTA. Females are close to those of *H. lejeunei* and *H. falcatus* but differ from both species by the absence of a plt spine on mt III and by the epigyne, which has a central bulge.

**MALE: Measurements.** : Total length 2.70; carapace 1.19 long, 0.92 wide; length of fe: I 1.03, II 1.08, III 0.84, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace yellow ochre, chelicerae yellow. Sternum lemon yellow. Legs yellow. Abdomen pale peach, no pattern. **Palp.** Tibia with large, sickle-shaped RTA having a sickle-shaped prong with upward curved tip and knob-shaped base, a second, narrow, almost straight prong pointing inward; cymbium with large, ill-defined retrolateral bend with series of long setae; sperm duct with wide basal part and not much narrower distal part with sharp turn just in front of embolus; MA large, curved down, sickle-shaped, and with thin flap along dorsal median margin; embolus with fairly broad, triangular base, long, whiplike, looped over 450° (fig. 24d, e).

**FEMALE: Measurements.** Total length 3.24; carapace 1.54 long, 1.32 wide; length of fe: I 1.38, II 1.49, III 1.19, IV 1.57. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 1 vt 1 rlt 1. **Coloration.** Carapace orange yellow. Chelicerae and sternum yellow. Legs orange yellow. Abdomen peach, no pattern. **Genitalia.** Epigyne a transversal slit with central bulge (fig. 24f). Vulva: entrances of IDs separated by about half the width of entire vulva; ID consisting of wide and very thick-walled, looped first stretch associated with gland and connected to ST1 through long and tortuous duct consisting of several circular and horseshoe loops; ST1 separated by at least their own diameter (fig. 25a, b).

**VARIABILITY:** The shape of the sickle-shaped RTA process and the exact course of the coils and loops of ID are somewhat variable.

**DISTRIBUTION:** Mt. Kabobo, Katanga, Congo between elev. of 1700 and 2200 m.

### *Hortipes auriga*, new species

Figure 27a, b; Map 3

**TYPES:** Male holotype: Nyungwe Forest, elev. 2100 m, Congo S02°30', E29°15' (March 1951; N. Leleup) (MRAC 092.537).

**ETYMOLOGY:** The species is named *auriga*, the charioteer, because its palps, unusually



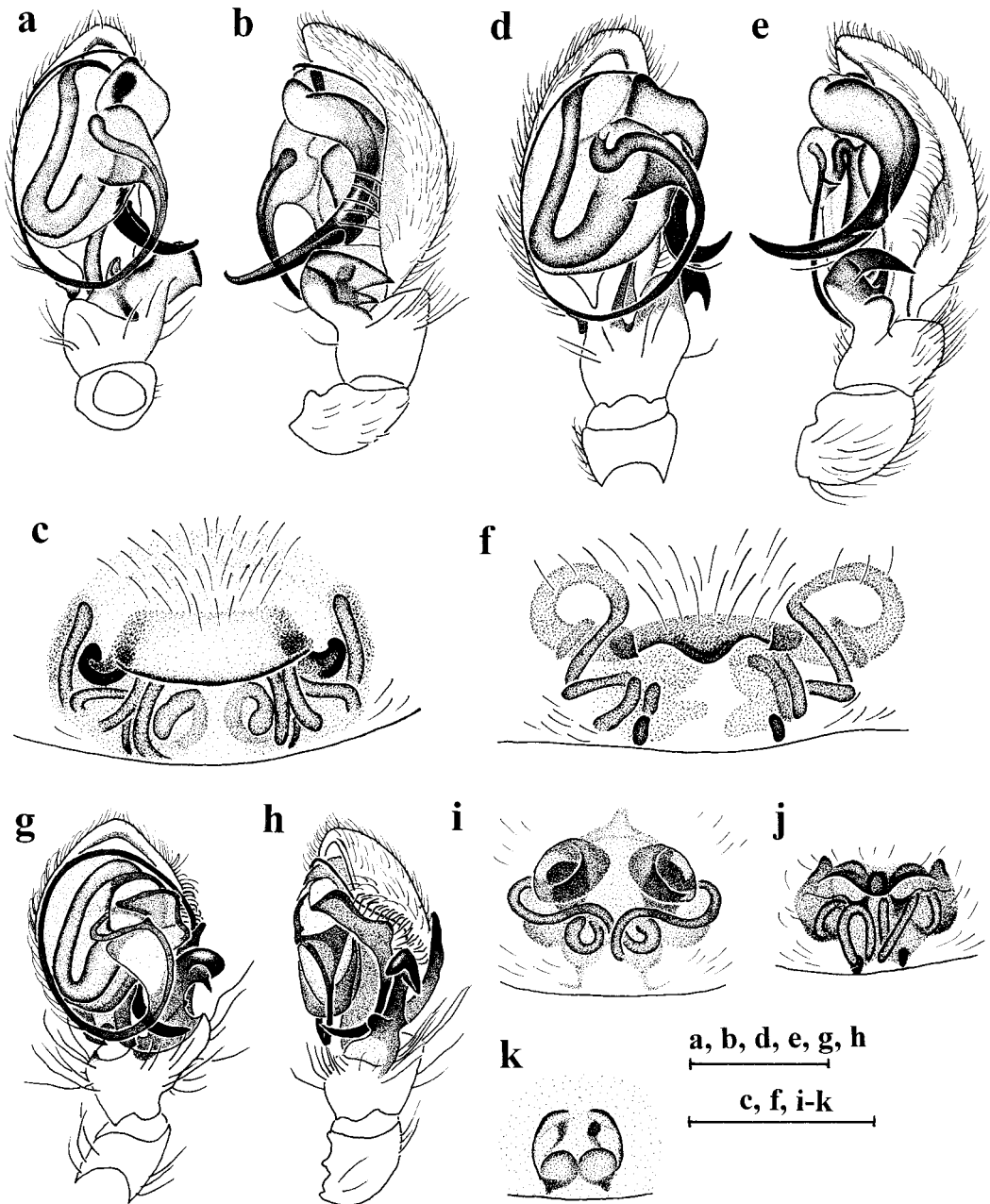


Fig. 24. a–c. *Hortipes lejeunei*, new species. a, b. Male left palp, ventral and retrolateral views. c. Epigyne. d–f. *Hortipes narcissus*, new species. d, e. Male left palp, ventral and retrolateral views. f. Epigyne. g–i. *Hortipes machaeropolion*, new species. g, h. Male left palp, ventral and retrolateral views. i. Epigyne. j. *Hortipes puylaerti*, new species, epigyne. k. *Hortipes chrysothemis*, new species, epigyne. Scale lines: 0.25 mm.



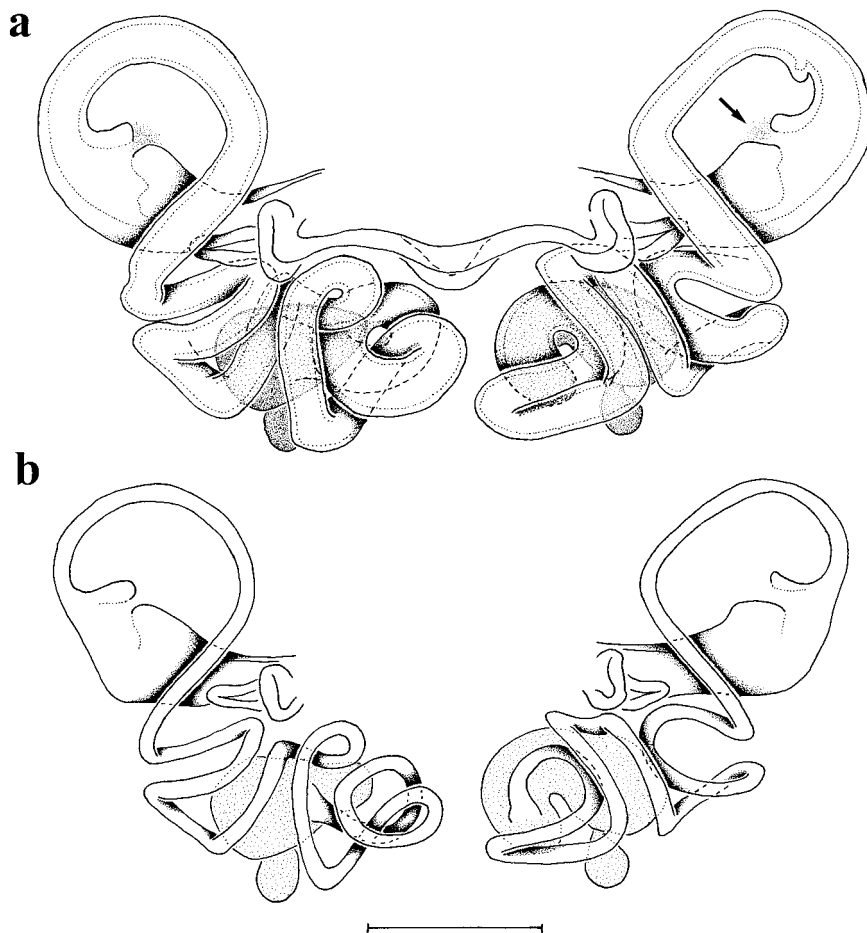


Fig. 25. a, b. *Hortipes narcissus*, new species. a. Vulva, ventral view. Arrow indicates gland associated with widened portion of ID. b. Vulva, schematic representation. Scale line: 0.1 mm.

large for the genus, bear a very long, whip-like embolus.

**DIAGNOSIS:** Males of *H. auriga* are recognized by the semicircular course of the MA in dorsolateral view in combination with the peculiar shape of the RTA.

**MALE: Measurements.** Total length 2.73; carapace 1.22 long, 0.97 wide; length of fe: I 0.95, II 1.00, III 0.81, IV 1.16. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 0 vt 0 rlt 0; IV plt 0–1 vt 1 rlt 0–1. **Coloration.** Carapace yellow, lighter at the fovea. Chelicerae yellow. Sternum and legs pale yellow. Abdomen yellowish white, no pattern. **Palp.** Tibia with dorsoventrally flattened RTA with triangular tip, provided

with flat, blade-shaped central, anterior extension, pointing forward; cymbium fairly elongate and narrow as seen from above, with deep retrolateral concavity without series of long curved setae; sperm duct with wide basal part and not much narrower distal part with shallow turn just in front of embolus; MA solid, gradually tapered from thick base to sharp tip, semicircular in dorsolateral view, with two almost orthogonal bends in ventrolateral view; MA with a gutter along most of its length, giving the structure the appearance of an inrolled grass leaf, with one of the rims of the gutter sticking out as a poorly developed, thin flap; embolus with fairly broad, rounded base, very long

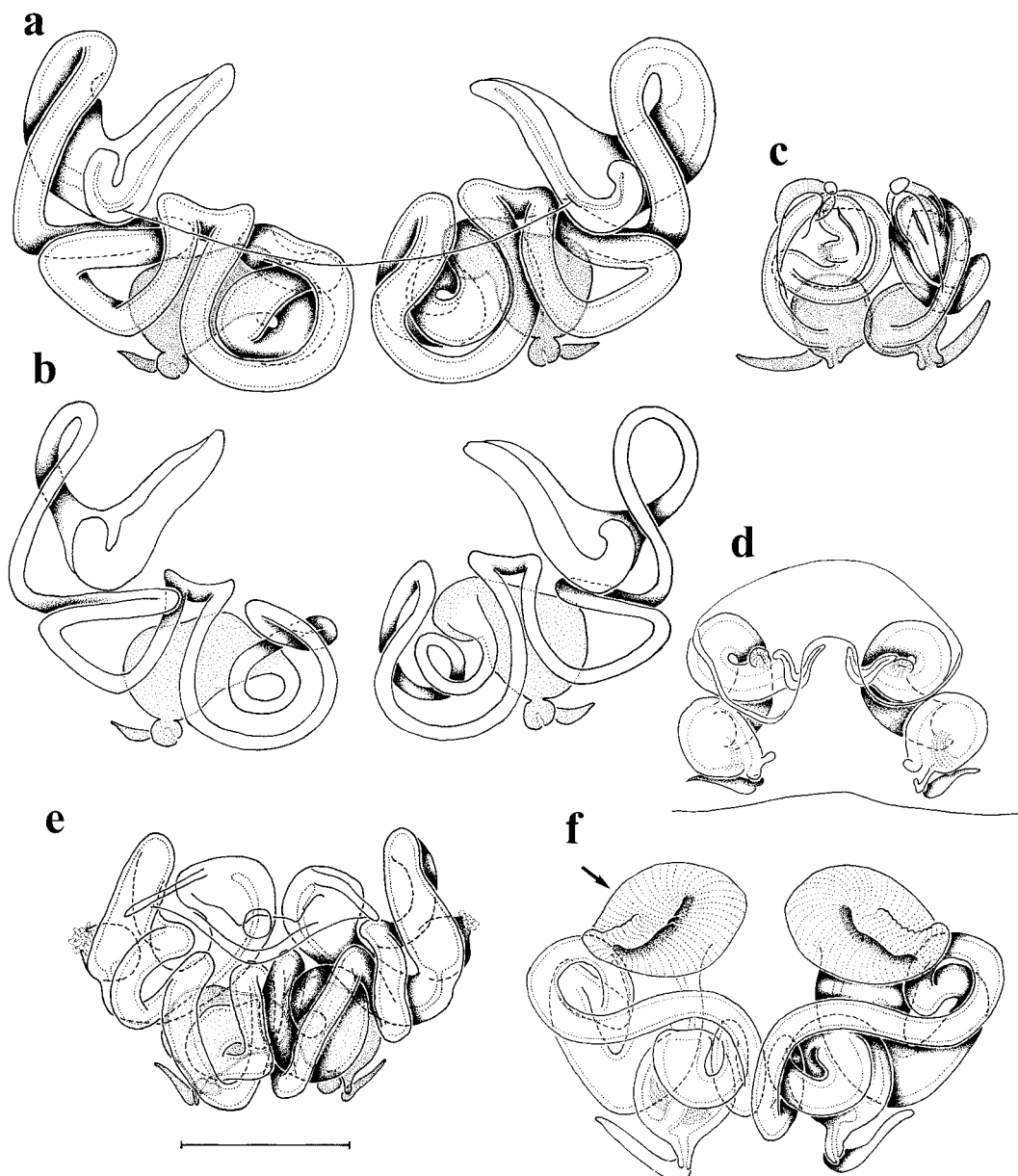


Fig. 26. a, b. *Hortipes lejeunei*, new species. a. Vulva, ventral view. b. Vulva, schematic representation. c. *Hortipes chrysothemis*, new species, vulva, ventral view. d. *Hortipes angariopsis*, new species, vulva, ventral view. e. *Hortipes puylaerti*, new species, vulva, ventral view. f. *Hortipes machaeropolion*, new species, vulva, ventral view. Arrow indicates ID entrance. Scale line: 0.1 mm.

and thin, whiplike, looped over  $540^\circ$  (fig. 27a, b).

FEMALE: Unknown.

DISTRIBUTION: Known only from the type locality.

***Hortipes puylaerti*, new species**

Figures 24j, 26e; Map 5

TYPES: Female holotype: sieved from litter in forest, Olounou, Cameroon  $N02^\circ49'$ ,

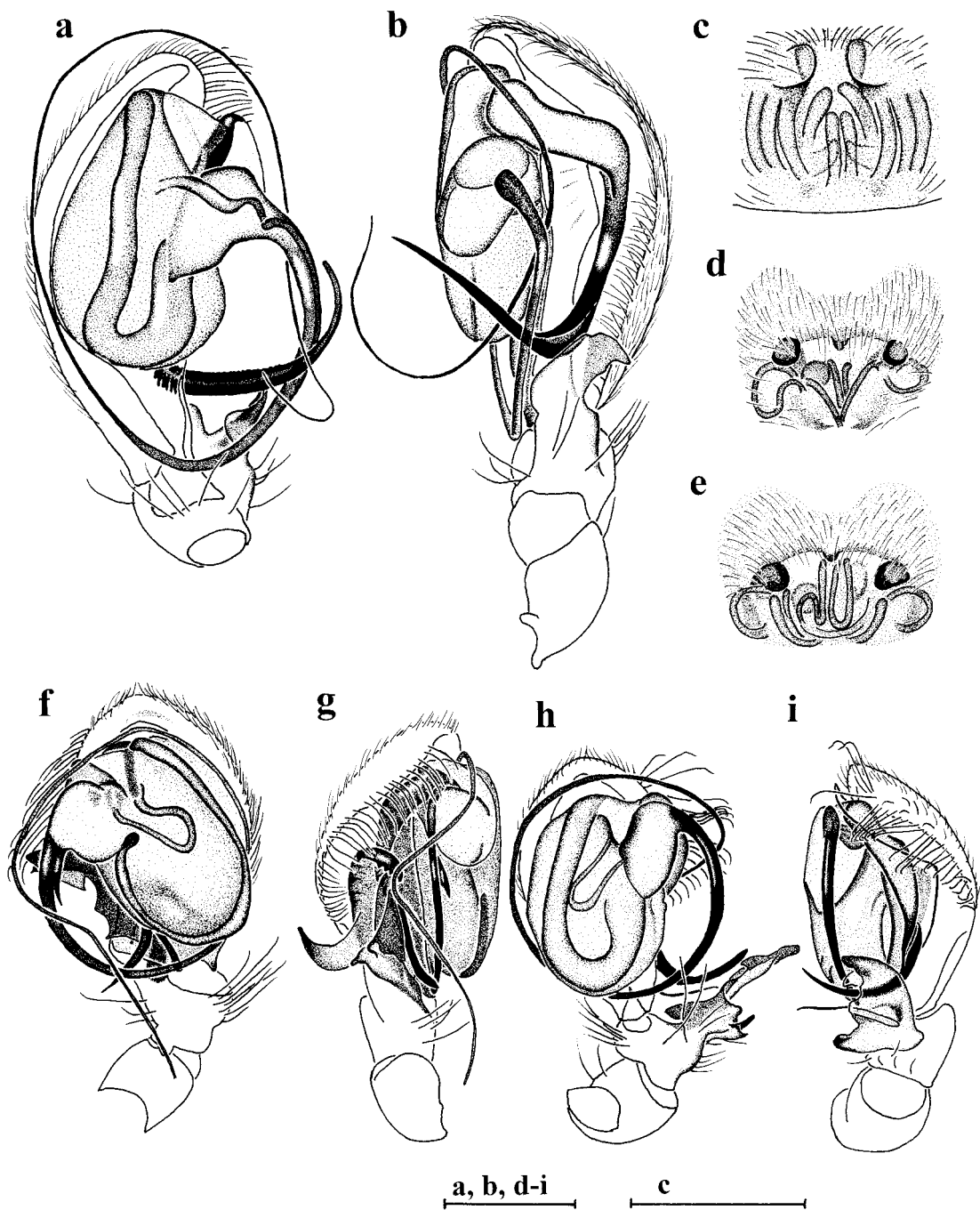


Fig. 27. **a, b.** *Hortipes auriga*, new species, male left palp, ventral and retrolateral views. **c.** *Hortipes centralis*, new species, epigyne. **d–g.** *Hortipes tarachodes*, new species. **d, e.** Epigynes. **f, g.** Male right palp, ventral and retrolateral views. **h, i.** *Hortipes terminator*, new species, male left palp, ventral and retrolateral views. Scale lines: 0.25 mm.

E12°08' (11–19 September 1971; F. Puylaert) (MRAC 141.303).

**ETYMOLOGY:** The species is named in honor of F. Puylaert, who collected the holotype.

**DIAGNOSIS:** Females of the species are easily recognized by the combination of a bluntly triangular epigynal scape with a central depression and circular ID loops covering the ventral side of ST1.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.38; carapace 1.11 long, 0.92 wide; length of fe: I 0.95, II 0.97, III 0.76, IV 1.05. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown. Sternum pale yellow. Chelicerae and legs yellow. Abdomen yellowish white, no pattern. **Genitalia.** Epigyne a bluntly triangular scape with circular central depression near tip (fig. 24j). Vulva: ID consisting of wide and very thick-walled, outward-running first stretch associated with large globular gland and connected to ST1 through duct consisting of a few horseshoe loops and circular loop close to ST1. Spermathecae 1 touching each other on symmetry axis of vulva (fig. 26e).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes chrysothemis*, new species

Figures 24k, 26c; Map 5

**TYPES:** Female holotype: lowland rain forest, elev. 500 m, Etinde, Cameroon (March 1981; R. Bosmans) (MRAC).

**ETYMOLOGY:** This small and relatively simple-structured species, of which only a single female is known, is named after Agamemnon's daughter Chrysothemis, who led a lonely life and kept a low profile in the shadow of her brother and sisters.

**DIAGNOSIS:** Females are easily recognized by the short, outward-looping ID and the globular ST1 touching each other.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.30; carapace 1.03 long, 0.78 wide; length of fe: I 0.92, II 0.95, III 0.81, IV 1.05. **Leg spination.** Fe: I rv 3; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown.

Chelicerae, sternum and legs yellow. Abdomen pale yellow, no pattern. **Genitalia.** Epigyne a shallow square depression with rounded corners (fig. 24k). Vulva rather simple, ID consisting of wide and thick-walled first stretch associated with gland and connected to ST1 through duct describing wide outward loop. Spermathecae 1 globular, touching each other on symmetry axis of vulva (fig. 26c).

**DISTRIBUTION:** Known only from the type locality.

*Hortipes machaeropolion*, new species

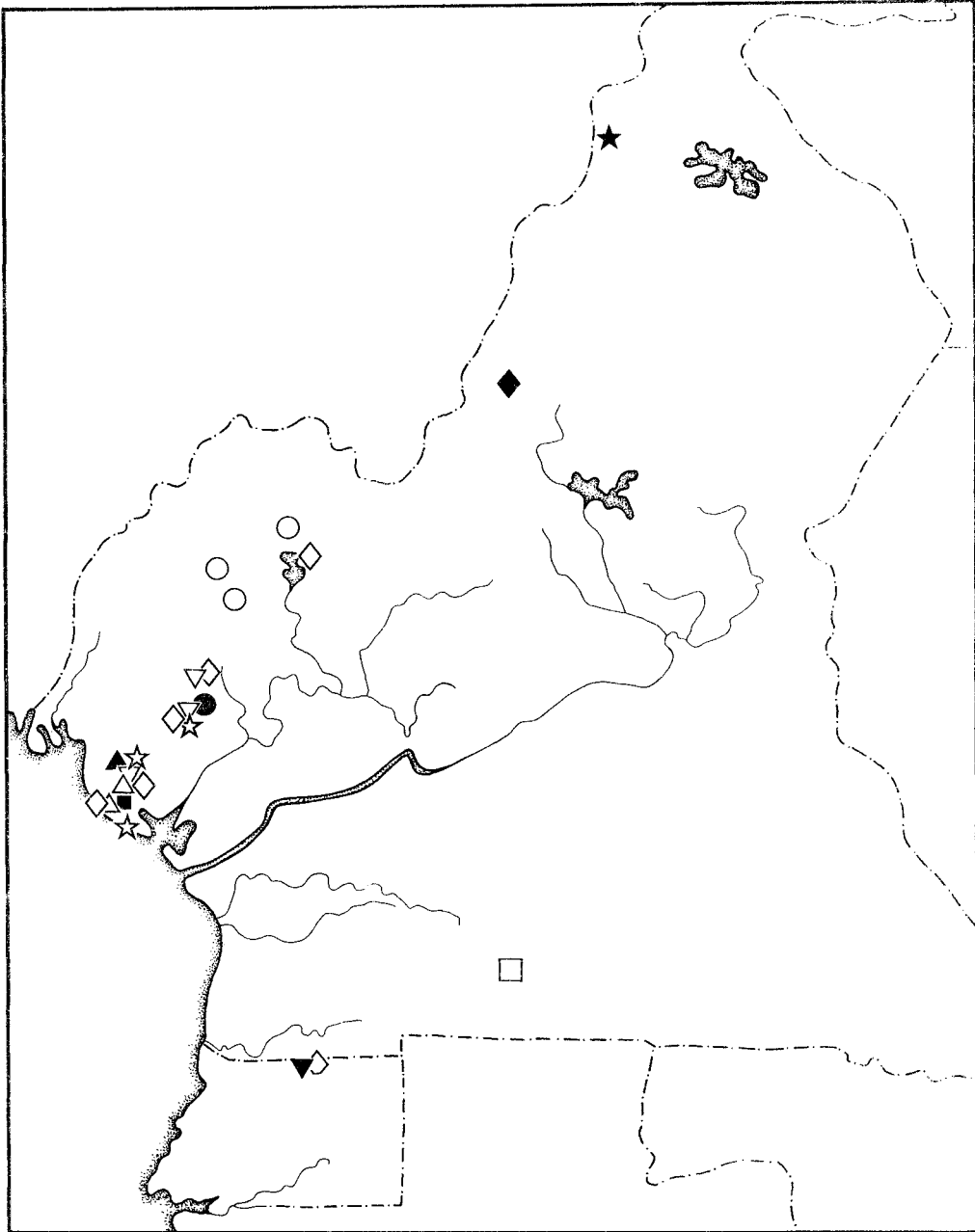
Figures 24g–i, 26f; Map 1

**TYPES:** Male holotype and female paratype: in bush fallow near golf course, Ibadan, International Institute of Tropical Agriculture (IITA), Nigeria N07°14', E03°30' (24 February 1982; A. Russell-Smith) (MRAC 177.245).

**ETYMOLOGY:** The ancient Greek word μαχαίροπωλιον, arms shop, is used here as a noun in apposition. The species' epithet points to the many sharp processes and apophyses on the ti of the male palp.

**DIAGNOSIS:** Males of *H. machaeropolion* are recognized by the complex RTA with long prongs of which the lower has a bifid, outward-curved tip whereas the superior prong is straight and much longer than the former. Females can be recognized by the large, trumpet-shaped first stretch of ID and the circular ID loops covering the ventral side of ST1.

**MALE: Measurements.** Total length 2.30; carapace 1.03 long, 0.78 wide; length of fe: I 0.92, II 0.95, III 0.81, IV 1.05. **Leg spination.** Fe: I rv 3; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace and legs yellow brown, chelicerae and sternum yellow. Abdomen yellow, no pattern. **Palp.** Tibia with large RTA, provided with long prongs, base knob shaped; inferior prong basically sickle shaped but with extra tooth just before tip giving it a bifid appearance; superior prong straight, slender, widening toward obliquely truncated tip; cymbium with large retrolateral bend with regular series of long setae; sperm duct with wide basal part and narrower distal part with sharp turn; MA with long, thick



Map 5. Distribution of *Hortipes* species in Cameroon. *Hortipes abucoletus* ★, *H. alderweireldti* △, *H. anansiodatus* ●, *H. architelonis* △, *H. bosmansi* ▽, *H. calliblepharus* ▲, *H. chrysothemis* ■, *H. depravator* ◆, *H. fortipes* ▼, *H. hormigricola* ◇, *H. puylaerti* □, *H. robertus* ☆, and *H. sceptrum* ○.

base with sinuous upper margin and with fairly thin and short, curved distal part; embolus with fairly large triangular base, long, whiplike, looped over  $450^\circ$  (fig. 24g, h).

**FEMALE: Measurements.** Total length 2.30; carapace 1.03 long, 0.78 wide; length of fe: I 0.92, II 0.95, III 0.81, IV 1.05. **Leg spination.** Fe: I rv 3; IV plt 1 rlt 1; ti: I, II



vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace, chelicerae and legs yellow. Sternum pale yellow. Abdomen yellowish white, no pattern. **Genitalia.** Epigyne with two heavily sclerotized, funnel-shaped entrances of IDs (fig. 24i). Vulva: ID consisting of trumpet-shaped, wide, and very thick-walled outward-running first stretch associated with gland and connected to ST1 through diagonal stretch running inward, looped before entering globular ST1 (fig. 26f).

OTHER MATERIAL EXAMINED: 2 females, 1 male in 7–10-year-old fallow bush regrowth, Ibadan, IITA, elev. 300 m, Nigeria N07°30', E03°54' (4 July 1974; A. Russell-Smith).

DISTRIBUTION: Known only from the type locality.

*Hortipes centralis*, new species

Figures 27c, 29a, b; Map 1

TYPES: Female holotype: humus in swamp forest, Coquilhatville, Ikela region, Lusosa River 20 km N of Ikela, Congo S01°11', E23°16' (August 1959; N. Leleup) (MRAC 127.745).

ETYMOLOGY: The species is named *centralis* because it was collected in the central part of Congo, the so-called *cuvette centrale*.

DIAGNOSIS: Females are easily recognized by the simple epigyne combined with very complex, heavily looped IDs almost completely hiding the ST from view.

MALE: Unknown.

FEMALE: **Measurements.** Total length 2.59; carapace 1.13 long, 0.92 wide; length of fe: I 0.95, II ?, III 0.78, IV 1.13. **Leg spination.** Fe: I rv 2–3; IV plt 0 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 0 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace and legs yellow, chelicerae and sternum pale yellow. Abdomen peach, without pattern, rather densely covered with thin, pointed grey setae. **Genitalia.** Epigyne restricted to two hemicircular ID entrances, situated anterior to ST and close to symmetry axis (fig. 27c). Vulva: first stretch of ID wide, thick walled, and associated with gland, connected to ST1 through complex sequence of horseshoe loops and coils, 2 × passing along dorsal side of ST1 (fig. 29a, b). Spermathecae 1 with internal spikes.

DISTRIBUTION: Known only from the type locality.

*Hortipes tarachodes*, new species

Figures 27d–g, 29e–g; Map 1

TYPES: Male holotype: marshy forest near Kikoli source, elev. 850 m, Kwango, Feshi region, at 15 km and to the right of road to Popokabaka, Congo S06°08', E18°09' (March 1959; J. Leleup) (MRAC 113.551). Paratypes: 1 ♀ together with holotype; 1 ♂, 1 ♀ from small, inundated swamp forest, elev. 840 m, Kwango, Feshi region, left bank of Kwenge River, Congo S06°08', E18°09' (February 1959; J. Leleup) (MRAC; now in AMNH); 1 ♀ from small, inundated swamp forest, elev. 840 m, Kwango, Feshi region, left bank of Kwenge River, Congo S06°08', E18°09' (February 1959; J. Leleup) (MRAC).

ETYMOLOGY: The species' epithet is a latinization of the Greek *ταραχῶδης*, confusing. The name refers to the very complex and highly coiled ID of the vulva.

DIAGNOSIS: Males of *H. tarachodes* are recognized by the broadly truncated and finely toothed distal prong of the RTA in combination with the toothed embolar base. Females are easily recognized by the large ST1, completely wrapped in a very complex series of ID loops and coils and flanked on the outside by two superimposed circular ID loops.

MALE: **Measurements.** Total length 2.43; carapace 1.16 long, 1.00 wide; length of fe: I 1.00, II 1.05, III 0.86, IV 1.24. **Leg spination.** Fe: I rv 2; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown with a brown line at the fovea. Chelicerae and sternum yellow. Legs pale yellow. Abdomen pale yellow, no pattern. **Palp.** Tibia with complex RTA, equipped with two prongs beside the teeth at the base of the ventrolateral attachment; dorsal prong flat, pointing upward, tapered toward the blunt tip; frontal prong broad, twisted, and bent outward, broadly truncated and with serrated distal edge; cymbium with large, retrolateral bend with regular series of long setae; tegulum with large subcircular swelling at base of embolus; sperm duct with wide basal part and thin distal part with deep, sharp turn; MA

with thick basal part and thin, slightly curved distal part; embolus inserted far in front on tegulum, with tooth at base, long, whiplike, looped over more than  $540^\circ$  (fig. 27f, g).

**FEMALE: Measurements.** Total length 3.16; carapace 1.35 long, 1.05 wide; length of fe: I 1.11, II 1.13, III 0.89, IV 1.32. **Leg spination.** Fe: I rv 2–3; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown with a brown line at the fovea. Chelicerae, legs, and sternum yellow. Abdomen pale yellow, no pattern. **Genitalia.** Epigyne a concave anterior scape with median blunt tooth pointing backward, flanked on both sides by heavily sclerotized entrances of IDs (fig. 27d, e) Vulva: first stretch of ID wide, thick walled, and associated with gland, followed by two superimposed circular loops situated to outside of large ST1. Spermathecae 1 itself completely wrapped in very complex series of loops and coils of ID (fig. 29e–g).

**VARIABILITY:** The transparency of the vulva and the exact course of the coils and loops of ID are somewhat variable (fig. 27d, e).

**DISTRIBUTION:** Kwango, Feshi region, Congo.

*Hortipes terminator*, new species

Figure 27h, i; Map 1

**TYPES:** Male holotype: humus in forest near Sengi source, Kwango, Feshi region, Kianza, Congo, S06°13', E19°15' (March 1959; J. Leleup) (MRAC 113.586).

**ETYMOLOGY:** The species is named *terminator* because the male RTA, observed from the ventral side, looks like a futuristic gun.

**DIAGNOSIS:** Males of *H. terminator* are recognized by the complex RTA with flat, translucent frontal part and short, sharp, upward-curved tip on inferior prong; the MA lacks a median flap.

**MALE: Measurements.** Total length 2.54; carapace 1.16 long, 0.89 wide; length of fe: I 0.95, II ?, III 0.81, IV 1.24. **Leg spination.** Fe: I rv 2; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow ochre, with darker, radiating striae and a brown line at the fovea. Chelicerae and sternum yellow, legs pale yellow. Abdomen pale yellow, no pattern. **Palp.**

Tibia with large, flat, translucent RTA composed of two parts, both standing out; frontal and superior one long, with bifid tip, one tip pointing forward, the other one downward; posterior and inferior part with short, sharp tip, curved upward; cymbium with large, retrolateral bend with series of widely spaced long setae in distal half; tegulum with retrolateral swelling at base of embolus; sperm duct with wide basal part and thin distal part with sharp, deep turn; MA solid, gradually tapered from thick basal to tip, distal part curved down; embolus with fairly broad, triangular base, long, whiplike, looped over more than  $540^\circ$  (fig. 27h, i).

**FEMALE:** Unknown.

**DISTRIBUTION:** Known only from the type locality.

*Hortipes baerti*, new species

Figure 28a, b; Map 1

**TYPES:** Male holotype in pitfall trap in forest, Bossematié Classified Forest, Apouesso, Ivory Coast (January 29, 1995; R. Jocqué and K. Tanoh) (MRAC 204.228).

**ETYMOLOGY:** The species is named in honor of Dr. Léon Baert.

**DIAGNOSIS:** Males of *H. baerti* are easily recognized by the male palp with a very large RTA provided with four prongs: two short ones at the base in the middle, one directed backward and one directed forward.

**MALE: Measurements.** Total length 2.43; carapace 1.22 long, 0.97 wide; length of fe: I 0.97, II 1.05, III 0.81, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace light olive brown, paler in the cephalic region. Chelicerae, sternum, and legs pale yellow. Abdomen pale yellow, no pattern. **Palp.** Tibia with large, complex RTA; long frontal prong broad, retrolaterally concave, with denticle in middle of its ventral margin, and distal tip curved outward; posterior prong narrow, retrolaterally concave, curved outward at tip; central prongs near base short, inferior one triangular, superior one slightly more elongate; cymbium with large retrolateral bend with regular series of long setae; tegulum with retro-

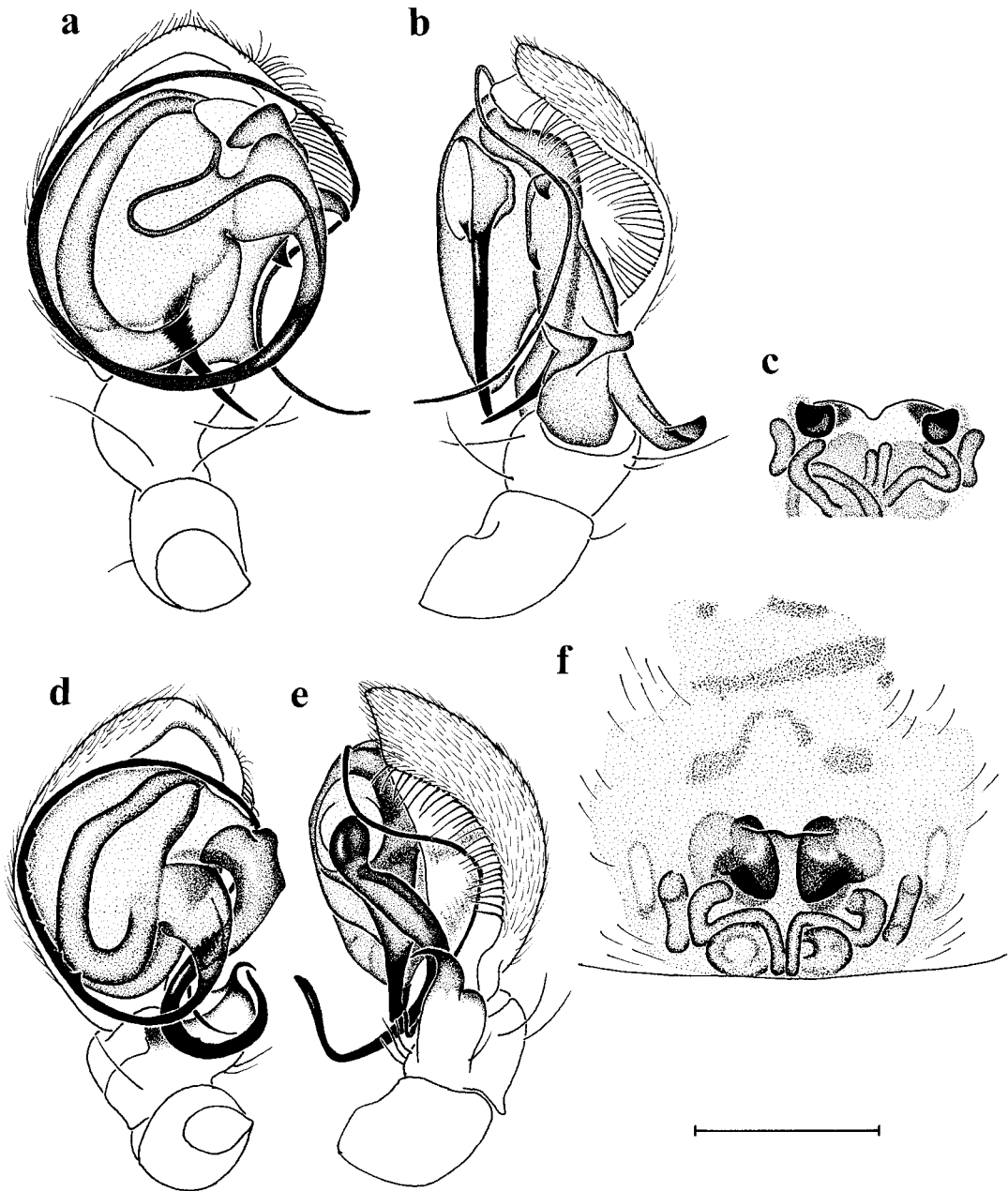


Fig. 28. **a, b.** *Hortipes baerti*, new species, male left palp, ventral and retrolateral views. **c.** *Hortipes abucoletus*, new species, epigyne. **d–f.** *Hortipes robertus*, new species. **d, e.** Male left palp, ventral and retrolateral views. **f.** Epigyne. Scale line: 0.25 mm.

lateral swelling at base of embolus; sperm duct with wide basal part and thin distal part with short, deep turn; MA with short, thick base and fairly long, slender distal part, slightly curved in anticlockwise direction;

embolus long, whiplike, looped over more than  $540^\circ$  (fig. 28a, b).

FEMALE: Unknown.

DISTRIBUTION: Known only from the type locality.

*Hortipes robertus*, new species

Figures 28d–f, 29c; Map 5

**TYPES:** Male holotype in pitfall trap in rain forest, 900 m, Mt. Koupé, Cameroon (8 February 1983; R. Bosmans) (MRAC 207.359). Paratypes: 1♂, 1♀ in forest, 800–1200 m, Mt. Koupé above Nyassosso, Cameroon N04°50', E09°41' (16–19 February 1992; Griswold, Scharff, Wanzie, Larcher and Masongo) (CAS); 1♀ in rough grassland with low shrubs, 1200 m, Mt. Cameroon, Cameroon (March, 1981; R. Bosmans) (MRAC); 2♂ in pitfall trap in rain forest, 1300 m, Mt. Koupé, Cameroon (31 January 1983; R. Bosmans) (MRAC); 1♂ in AMNH).

**ETYMOLOGY:** The species' epithet *robertus* is a noun in apposition. The name is given in honor of Dr. Rop Bosmans, who collected the holotype. In addition to that, the species' name is a reminiscence to the theridiid genus *Robertus*, which also consists of small, litter-dwelling species.

**DIAGNOSIS:** Males of *H. robertus* are easily recognized by a row of denticles on the embolus. Females can be recognized by the very large, heavily sclerotized and thick-walled first stretch of ID and by the circular ID loops covering the posterior ventral side of ST1.

**MALE: Measurements.** Total length 2.75; carapace 1.19 long, 0.97 wide; length of fe: I 1.00, II 1.08, III 0.81, IV 1.13. **Leg spination.** Fe: I rv 2; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace and legs yellow brown, chelicerae and sternum pale yellowish brown. Abdomen yellowish white, no pattern. **Palp.** No femoral apophysis. Tibia with short, broad RTA, prolaterally concave and with sharp, outward-curved tip; cymbium with large retrolateral bend with regular series of long setae; tegulum with retrolateral swelling at base of embolus; sperm duct with wide basal part and thin distal part with sharp, deep turn; MA with long, thick proximal part and knob-shaped base, distal part fairly short, relatively thick with tiny denticle on inner margin, tip slightly widened, strongly curved in anticlockwise direction; embolus long, whiplike, looped over slightly more than 360°, provided with 6 den-

ticles on inner side of prolateral part (fig. 28d, e).

**FEMALE: Measurements.** Total length 3.83; carapace 1.59 long, 1.24 wide; length of fe: I 1.38, II 1.43, III 1.16, IV 1.65. **Leg spination.** Fe: I rv 3–4; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace dull brown, with radiating striae. Chelicerae, sternum, and legs yellow brown. Abdomen yellow ochre, no pattern, sparsely covered with light grey feathery hairs. **Genitalia.** Epigyne a short, straight slit, opening toward anterior side. Heavily sclerotized entrances of IDs clearly visible through tegument (fig. 28f). Vulva: first stretch of ID very large, heavily sclerotized and thick walled, associated with gland and followed by triangular loop and diagonal, inward-running stretch, looped before entering ST1 (fig. 29c). Spermathecae 1 with internal spikes.

**OTHER MATERIAL EXAMINED: Cameroon:** 1♀, Mabete, Victoria Division (24 May–7 June 1949; B. Malkin) (CAS); 1♂, Mt. Koupé, no further data (1983; R. Bosmans) (MRAC); 1♂; hand captured in mountain rain forest alongside track to super high frequencies (SHF) radio mast, elev. 1600 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); 1♂ hand captured in mountain rain forest alongside track to SHF radio mast, elev. 1500 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); 1♂ hand captured in mountain rain forest with tree ferns, alongside track to SHF radio mast, NE slope, elev. 1400 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); 1♀ hand captured under dead vegetation on the slope of a stream valley, elev. 1200 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); 1♀ hand captured in *Eucalyptus* plantation with *Juniperus* sp., elev. 1200 m, close to Buea, Mt. Cameroon (March 1981; R. Bosmans) (MRAC).

**DISTRIBUTION:** From Victoria, S of Mt. Cameroon, to Mt. Koupé, Cameroon, 0–1600 m.

*Hortipes abucoletus*, new species

Figures 28c, 29d; Map 5

**TYPES:** Female holotype: Winkler extraction of dead leaves in forest, Touroua, Cam-



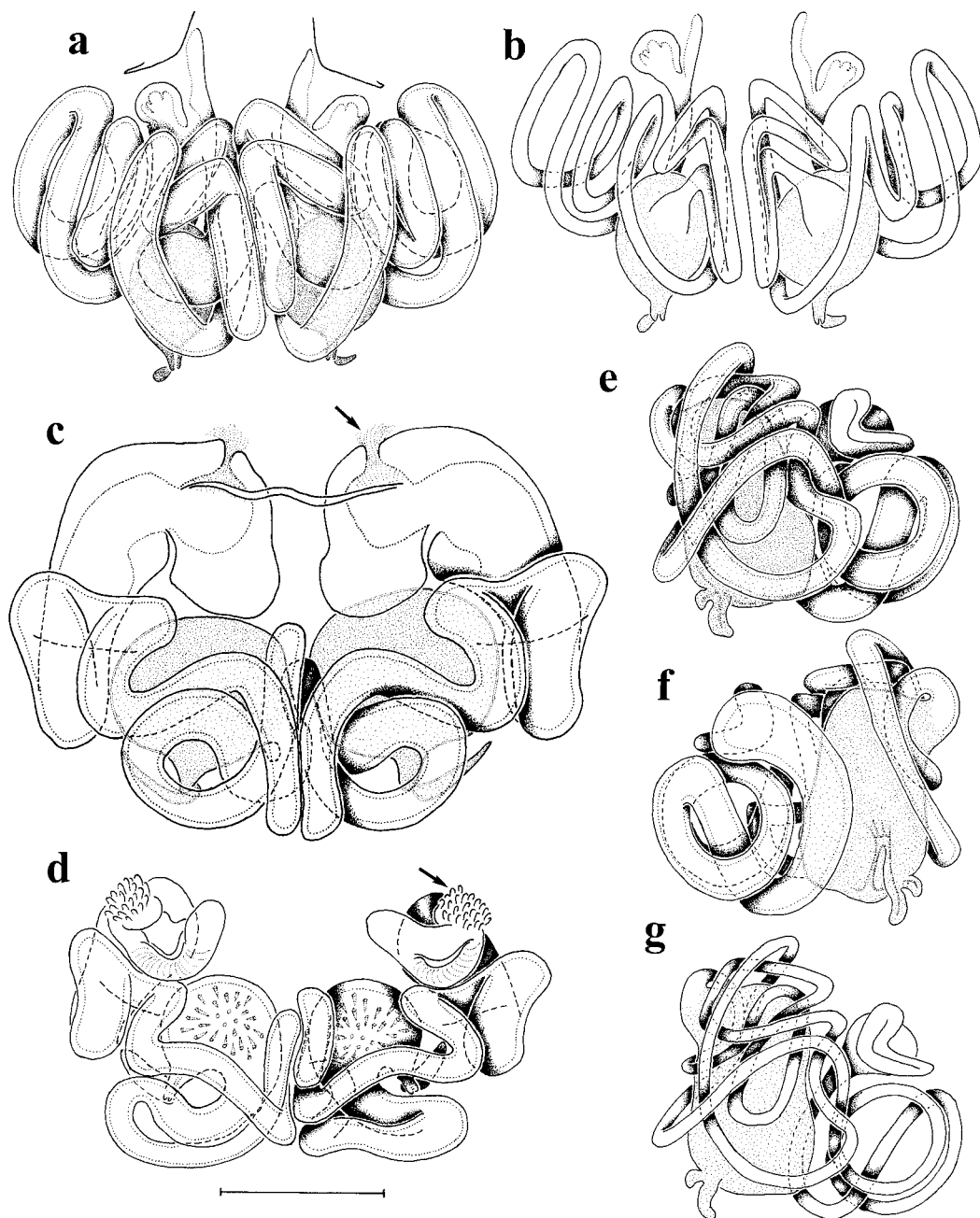


Fig. 29. a, b. *Hortipes centralis*, new species. a. Vulva, ventral view. b. Vulva, schematic representation. c. *Hortipes robertus*, new species, vulva, ventral view. Arrow indicates gland associated with widened portion of ID. d. *Hortipes abucoletus*, new species, vulva, ventral view. Arrow indicates gland associated with widened portion of ID. e–g. *Hortipes tarachodes*, new species. e, f. Vulva, left half, ventral and dorsal views. g. Vulva, left half, schematic representation. Scale line: 0.1 mm.



eroon, N09°05', E12°58' (15 January 1976; F. Puylaert) (MRAC 148.331).

**ETYMOLOGY:** The species' epithet is a latinization of  $\alpha\beta\omicron\nu\kappa\omicron\lambda\eta\tau\omicron\varsigma$ , the classical Greek for "neglected." The single specimen was at first not recognized as a separate species and classified as a somewhat aberrant form of *H. robertus*.

**DIAGNOSIS:** Females can be recognized by the concave scape of the epigyne, flanked by the sclerotized ID entrances, in combination with the diagonal, inward-running ID stretch and the ID loop posterior to ST1.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.57; carapace 1.24 long, 0.97 wide; length of fe: I 1.05, II 1.11, III 0.86, IV 1.24. **Leg spination.** Fe: I rv 3; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown, chelicerae, legs, and sternum yellow. Abdomen pale apricot, no pattern, sparsely covered with thin, pointed grey setae. **Genitalia.** Epigyne a concave anterior scape with median blunt tooth pointing backward, flanked on both sides by heavily sclerotized entrances of IDs (fig. 28c). Vulva: first stretch of ID wide and thick walled, associated with cauliflower-like gland and followed by triangular loop, next by a diagonal, inward-running stretch, then by a hairpin loop between ST1 and finally by an ID loop posterior to ST1, connected to the latter (fig. 29d). Spermathecae 1 with conspicuous internal spikes.

**DISTRIBUTION:** Known only from the type locality.

***Hortipes alderweireldti*, new species**

Figure 30a, b; Map 5

**TYPES:** Male holotype in pitfall trap in relatively dry open forest with ferns, Micomeseng, Equatorial Guinea N02°08', E10°37' (18–27 July 1989; M. Alderweireldt) (MRAC 170029).

**ETYMOLOGY:** The species is named in honor of Dr. Mark Alderweireldt, who collected the type specimen.

**DIAGNOSIS:** Males of *H. alderweireldti* are recognized by the male palp having a thick, prolaterally grooved, almost straight RTA with a large hook at the tip; the large sub-

circular tegular swelling at the base of the embolus is equally characteristic.

**MALE: Measurements.** Total length 2.24; carapace 1.11 long, 0.89 wide; length of fe: I 0.86, II 0.92, III 0.73, IV ?. **Leg spination.** Fe: I rv 2; IV plt ? rlt ?; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt ? vt ? rlt ?. **Coloration.** Carapace, chelicerae and sternum yellow brown, legs pale yellow. Legs IV of the only specimen available are missing. Abdomen pale peach, no pattern. **Palp.** Tibia with thick, almost straight RTA, with grooved prolateral side, swollen dorsal margin, and large hook with tip curved down; cymbium with retrolateral bend with regular series of closely set, long setae; tegulum with large, subcircular, posterior swelling at base of embolus; sperm duct with wide basal part, thin distal part only partly visible; MA with thick, sinuous distal part and sharply bent, slender distal part; embolus long, whiplike, looped over almost 540° (fig. 30a, b).

**FEMALE:** Unknown.

**DISTRIBUTION:** Known only from the type locality.

***Hortipes architelines*, new species**

Figures 31a–c, 33a, b; Map 5

**TYPES:** Male holotype: forest, 900 m, Mt. Febe, Cameroon (21 February 1981; R. Bosmans) (MRAC 207.363). Paratypes: 1♂, four juveniles from lowland rain forest, 500 m, Etinde, Cameroon (March 1981; R. Bosmans) (MRAC); 1♀ from strongly degraded mountain rain forest, dominated by elephant grass (*Pennisetum purpureum*), 1300 m, Mt. Cameroon, Cameroon (March 1981; R. Bosmans) (MRAC); 1♀ in pitfall trap in transition zone toward mountain rain forest with some sparse tree ferns, 700 m, Etinde, Cameroon (February 1981; R. Bosmans) (MRAC).

**ETYMOLOGY:** Because the complexity of palp and vulva of the present species seriously frightened the first author initially, the species is designated with the classical Greek word  $\alpha\rho\chi\iota\tau\epsilon\lambda\omega\nu\eta\varsigma$ , "the tax inspector," used as a noun in apposition.

**DIAGNOSIS:** Males of *H. architelines* are recognized by the male palp which has a large, almost straight RTA with a bifid tip and a MA with a clear denticle, not longer

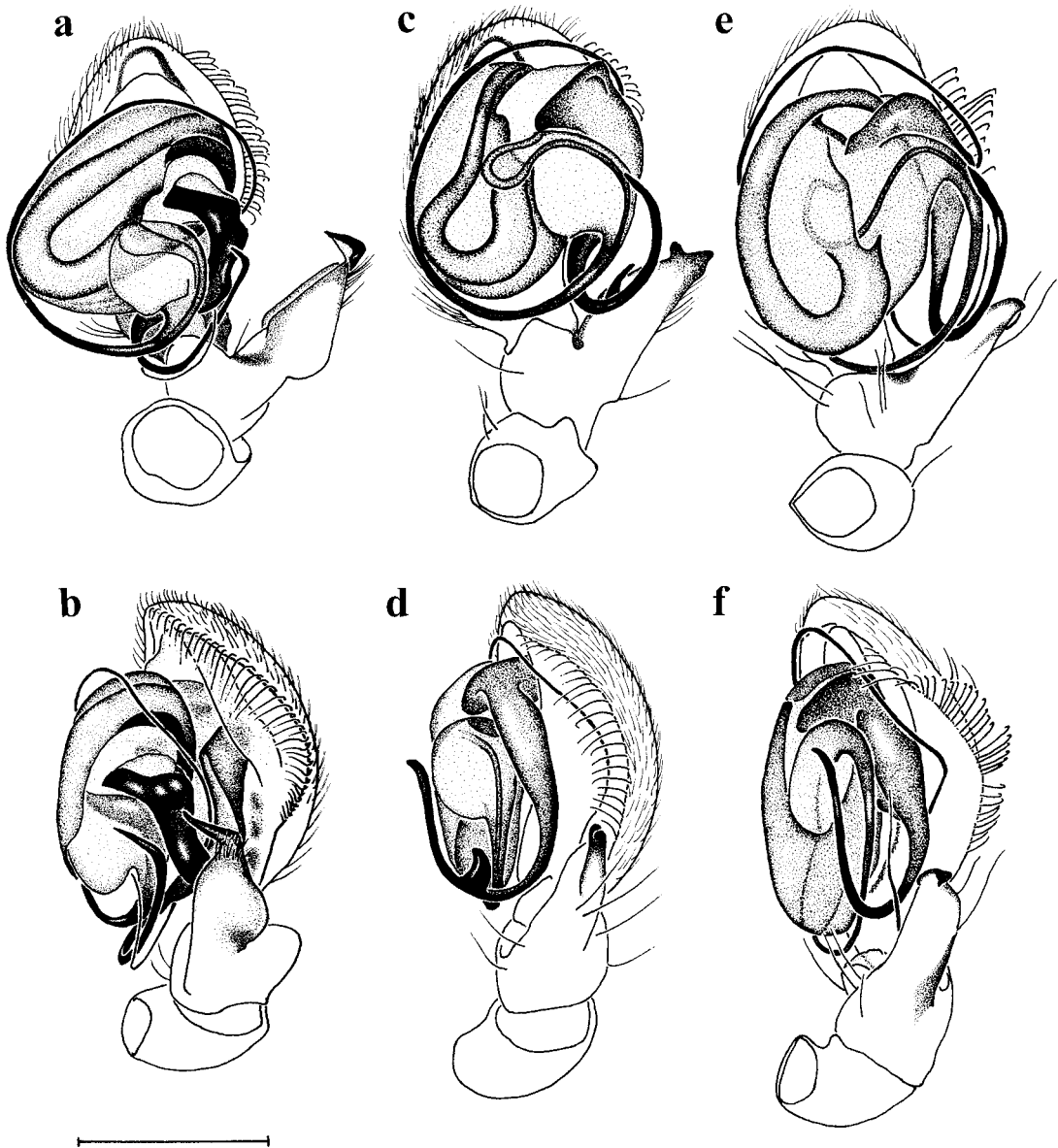


Fig. 30. **a, b.** *Horticpes alderweireldti*, new species, male left palp, ventral and retrolateral views. **c, d.** *Horticpes fortipes*, new species, male left palp, ventral and retrolateral views. **e, f.** *Horticpes callilepharus*, new species, male left palp, ventral and retrolateral views. Scale line: 0.25 mm.

than the diameter of the apophysis itself, halfway along its length. Females can be recognized by a combination of the epigyne being a trapezoidal depression enclosing the ID entrances and the very complex loops and coils of the ID itself.

**MALE: Measurements.** Total length 1.89; carapace 1.00 long, 0.81 wide; length of fe:

I 0.86, II 0.92, III 0.73, IV 1.00. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace orange yellow. Chelicerae, sternum, and legs yellow. Abdomen yellowish brown, no pattern. **Palp.** Bulbus partly expanded in all specimens available, no femoral apophysis. Palpal ti with large,

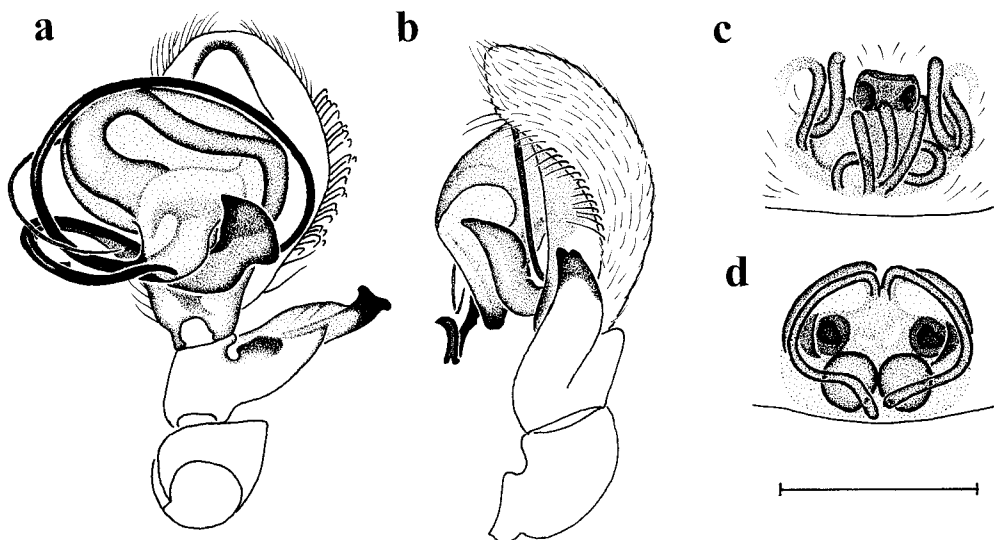


Fig. 31. a–c. *Hortipes architelones*, new species. a, b. Male left palp, partly expanded, ventral and retrolateral views. c. Epigyne. d. *Hortipes anansiodatus*, new species, epigyne. Scale line: 0.25 mm.

broad, almost straight RTA, with bifid tip; cymbium with retrolateral bend with regular series of long setae; tegulum with retrolateral swelling at base of embolus; sperm duct with wide basal part and thin distal part with deep, sharp turn; MA with fairly short, widened distal part and obliquely tapering base, slightly narrowing into distal slender part provided with denticle on inner margin; embolus long, whiplike, looped over almost 720° (fig. 31a, b).

**FEMALE: Measurements.** Total length 2.59; carapace 1.24 long, 1.05 wide; length of fe: I 1.05, II 1.11, III 0.84, IV 1.19. **Leg spination.** Fe: I rv 3; IV plt 0–1 rlt 0–1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace, chelicerae, sternum, and legs yellow brown. Abdomen apricot, no pattern. **Genitalia.** Epigyne a trapezoidal depression with rounded corners, enclosing entrances of IDs and situated in front of ST1 (fig. 31c). Vulva: ID entrances appressed against each other on symmetry axis of vulva, first stretch of ID wide, thick walled, associated with urn-shaped gland and connected to ST1 through very complex sequence of loops and coils passing both along ventral and dorsal side of ST1 (fig. 33a, b).

**OTHER MATERIAL EXAMINED: Cameroon:** 1♀ hand-captured in lowland rain forest, elev. 500 m, Etinde, (February 1981; R. Bos-

mans) (MRAC); 1♀ hand captured in mountain rain forest, elev. 900 m, Etinde (February, 1981; R. Bosmans) (MRAC); 1♀ captured in mountain rain forest alongside track to SHF radio mast, elev. 1600 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC).

**VARIABILITY:** The number of terminal spines on fe IV of females and the exact course of the coils and loops of ID are somewhat variable.

**DISTRIBUTION:** Mt. Cameroon and its immediate surroundings, Cameroon.

### *Hortipes calliblepharus*, new species

Figures 30e, f; Map 5

**TYPES:** Male holotype: alongside dry river bed in mountainous savannah, 2300 m, Mt. Cameroon, Cameroon (March 1981; R. Bosmans) (MRAC 207.364). Paratypes: 1♂, one juvenile in open mountainous rain forest with maccabo (*Xanthosoma poepigii*) fields, 1400 m, Mt. Cameroon, Cameroon (March 1981; R. Bosmans) (MRAC).

**ETYMOLOGY:** The species' epithet is a latinization of the ancient Greek καλλι-βλεφαρος, "with beautiful eyelashes." This refers to the border of long setae on the male palpal cymbium.

**DIAGNOSIS:** Males of *H. calliblepharus* are recognized by the simple lateral RTA on the

male palpal ti, provided with a short, sharp, outward-directed tip, and by the smoothly curved MA of which the thick and thin part gradually merge.

**MALE: Measurements.** Total length 2.19; carapace 1.19 long, 0.92 wide; length of fe: I 0.95, II 1.03, III 0.84, IV 1.08. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace golden brown. Sternum, chelicerae, and legs yellow brown. Abdomen yellow brown, no pattern. **Palp.** No femoral apophysis (fig. 30e, f). Tibia with large, broad RTA, prolaterally concave, and with short, sharp, outward-curved tip; cymbium with large retrolateral bend with regular series of long setae; sperm duct with wide basal part and thin distal part with deep turn; MA with long, thick base without appendages, gradually tapered into slender distal part, smoothly curved around the basal part of the embolus; embolus long, whiplike, looped over more than 540°.

**FEMALE:** Unknown.

**DISTRIBUTION:** Mt. Cameroon, Cameroon, elev. 1400–2300 m.

*Hortipes fortipes*, new species

Figure 30c, d; Map 5

**TYPES:** Male holotype in pitfall trap in evergreen forest, Micomeseng, Equatorial Guinea (13–17 July, 1989; M. Alderweireldt) (MRAC 170.096).

**ETYMOLOGY:** The species is called *fortipes* because of the very strong ventral spines on the ti and mt of legs I and II.

**DIAGNOSIS:** Males of *H. fortipes* can be distinguished from those of the closely related *H. architelones* by the tooth on the MA, which is more than 2 × as long as the diameter of the apophysis and curved forward instead of triangular, and by the larger, stronger ventral spines on legs I and II.

**MALE: Measurements.** Total length 2.03; carapace 1.08 long, 0.89 wide; length of fe: I 0.97, II 1.05, III 0.78, IV 1.08. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 0; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace orange yellow, legs, chelicerae, and sternum pale yellow. Abdomen greyish white, no pattern. Legs I and II with very strong ventral spines on ti and mt.

**Palp.** Tibia with large, solid RTA, projecting upward and forward with bifid extremity, both tips short and blunt; cymbium broad, with deep bend provided with series of long curved setae; tegulum with subcircular swelling at base of embolus; sperm duct with wide basal part and thin distal part with deep, shallow turn just in front of embolus; MA solid, gradually tapering from thick base to fairly blunt tip, curved down, with large blunt tooth in center of its curve; embolus long, whip-like, looped over 540° (fig. 30c, d).

**FEMALE:** Unknown.

**DISTRIBUTION:** Known only from the type locality.

*Hortipes bosmansii*, new species

Figures 32d–f, 33c, d; Map 5

**TYPES:** Male holotype: litter of isolated shrubs in grassland, 2150 m, Manengouba massif, Cameroon (25 March 1983; R. Bosmans) (MRAC 207.360). Paratypes: 1 ♂ together with holotype (MRAC; now in AMNH); 1 ♂, 3 ♀, one juvenile from the thick litter layer of a mountain rain forest, 2250 m, Manengouba massif, Cameroon (25 March 1983; R. Bosmans) (MRAC); 2 ♀ in pitfall trap in rain forest, 1300 m, Mt. Koupé, Cameroon (31 January 1983; R. Bosmans) (MRAC); 2 ♀ from mist forest, 1425 m, Mt. Cameroon, S side, Cameroon N04°06'28", E09°07'10" (26–28 January 1992; Coddington, Griswold, Larcher and Hormiga) (CAS).

**ETYMOLOGY:** The species is named in honor of Dr. Rop Bosmans, who collected the holotype and several paratypes.

**DIAGNOSIS:** Males of *H. bosmansii* are recognized by the male palpal ti having a large RTA with a sharp, inward-curved tip and the MA having a long thick basis with two short appendages and slender twisted distal part. Females can be recognized by the epigyne having a frontal hooded scape and by the very thick walled first stretches of the IDs, connected with each other by a frontal sclerotized ridge.

**MALE: Measurements.** Total length 2.86; carapace 1.35 long, 1.11 wide; length of fe: I 1.05, II 1.16, III 0.95, IV 1.22. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown. Chelic-



erae, sternum, and legs yellow. Abdomen pale pink, no pattern. **Palp.** Only a blunt trace of a femoral apophysis (fig. 32d, e). Tibia with large, broad RTA, prolaterally concave and with sharp, inward-curved tip; cymbium with large retrolateral bend with regular series of long setae; tegulum with retrolateral swelling at base of embolus; sperm duct with wide basal part and thin distal part with deep turn; MA with long, thick base, provided with two short appendages and long, slender, and twisted distal part, strongly curved in anticlockwise direction; embolus long, whiplike, looped over 540°.

**FEMALE: Measurements.** Total length 2.65; carapace 1.38 long, 1.05 wide; length of fe: I 1.13, II 1.22, III 0.92, IV 1.30. **Leg spination.** Fe: I rv 3–5; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace greyish yellow. Chelicerae, sternum, and legs yellow. Abdomen pale yellow, no pattern, covered with rather thick, pointed, light grey setae. **Genitalia.** Epigyne a shallow depression with hooded scape in front, enclosing dark brown, heavily sclerotized ID entrances (fig. 32f). Vulva: first stretch of IDs wide and very thick walled, associated with gland, entrances connected with each other by a frontal sclerotized ridge. First stretch of ID running outward in posterior direction and connected to ST1 by two lateral circular loops, diagonal stretch running inward, hairpin loop close to symmetry axis, and final circular loop connected to ST1 itself (fig. 33c, d).

**OTHER MATERIAL EXAMINED: Mt. Cameroon, Cameroon:** 1 ♂, 6 juveniles hand captured in well-developed mountain rain forest with tree fern undergrowth, elev. 1700 m (March 1983; R. Bosmans) (MRAC); 1 female hand captured in strongly degraded mountain rain forest, dominated by elephant grass, elev. 1300 m (March 1981; R. Bosmans) (MRAC); 1 ♀ hand captured in open mountain rain forest with maccabo fields, elev. 1400 m (March 1981; R. Bosmans) (MRAC), 1 ♀, pitfall trap in well-developed mountain rain forest with tree fern undergrowth, elev. 1500 m (March 1981; R. Bosmans) (MRAC).

**DISTRIBUTION:** Mt. Cameroon, Mt. Koupé and Manengouba massif, Cameroon, elev. 1300–2250 m.

### *Hortipes sceptrum*, new species

Figures 32a–c, 33e, f; Map 5

**TYPES:** Male holotype: pitfall trap, 1600 m, Bali, Bafuchu Mbu, Shum Laka, Cameroon N05°51', E10°05' (December 1991–February 1992; H. Doutrelepon) (MRAC 174.868). Paratypes: 9 ♂, three juveniles from forest, 2150 m, near Lake Oku, Mt. Oku, Cameroon N06°12', E10°27' (7–13 February 1992; C. Griswold, S. Larcher, N. Scharff and C. Wanzie) (CAS); 1 ♂, 1 ♀ from 2219 m, same locality (3 March 1983; R. Bosmans) (MRAC; now in AMNH); 1 ♀ in pitfall trap at 2219 m, same locality (3 March 1983; R. Bosmans) (MRAC); 1 ♂ in pitfall trap, 2350 m, same locality (8–15 March 1983; R. Bosmans) (MRAC); 1 ♀ in pitfall trap close to stream in mountainous savannah with sparse trees and shrubs, 2290 m, Mt. Bamboutos, Cameroon (24 January 1983; R. Bosmans) (MRAC).

**ETYMOLOGY:** The species' epithet is a noun in apposition that refers to the scepterlike appearance of the male palp.

**DIAGNOSIS:** Males of *H. sceptrum* are easily recognized by the large palpal femoral apophysis with slightly curved tip and the twisted RTA. Females can be recognized by the epigyne being a large hooded scape and by the last loop of the ID laterally encircling ST1 on the external side and entering it dorsally.

**MALE: Measurements.** Total length 2.48; carapace 1.16 long, 0.92 wide; length of fe: I 0.95, II 1.00, III 0.81, IV 1.11. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace orange brown, chelicerae, sternum, and legs yellow brown. Abdomen pink, with a dorso-median longitudinal white line on the anterior half that tapers gradually into a point posteriorly. **Palp.** with large lateral apophysis with slightly curved, sharp tip. Tibia with large, broad, strongly sclerotized twisted RTA, prolaterally concave, and with finely serrated dorsal margin; as seen from the ventrolateral side the apophysis may give the impression of being double but the central part is transparent. Cymbium with large retrolateral bend with series of closely set long setae, which are curved inward in proximal part, gradually changing



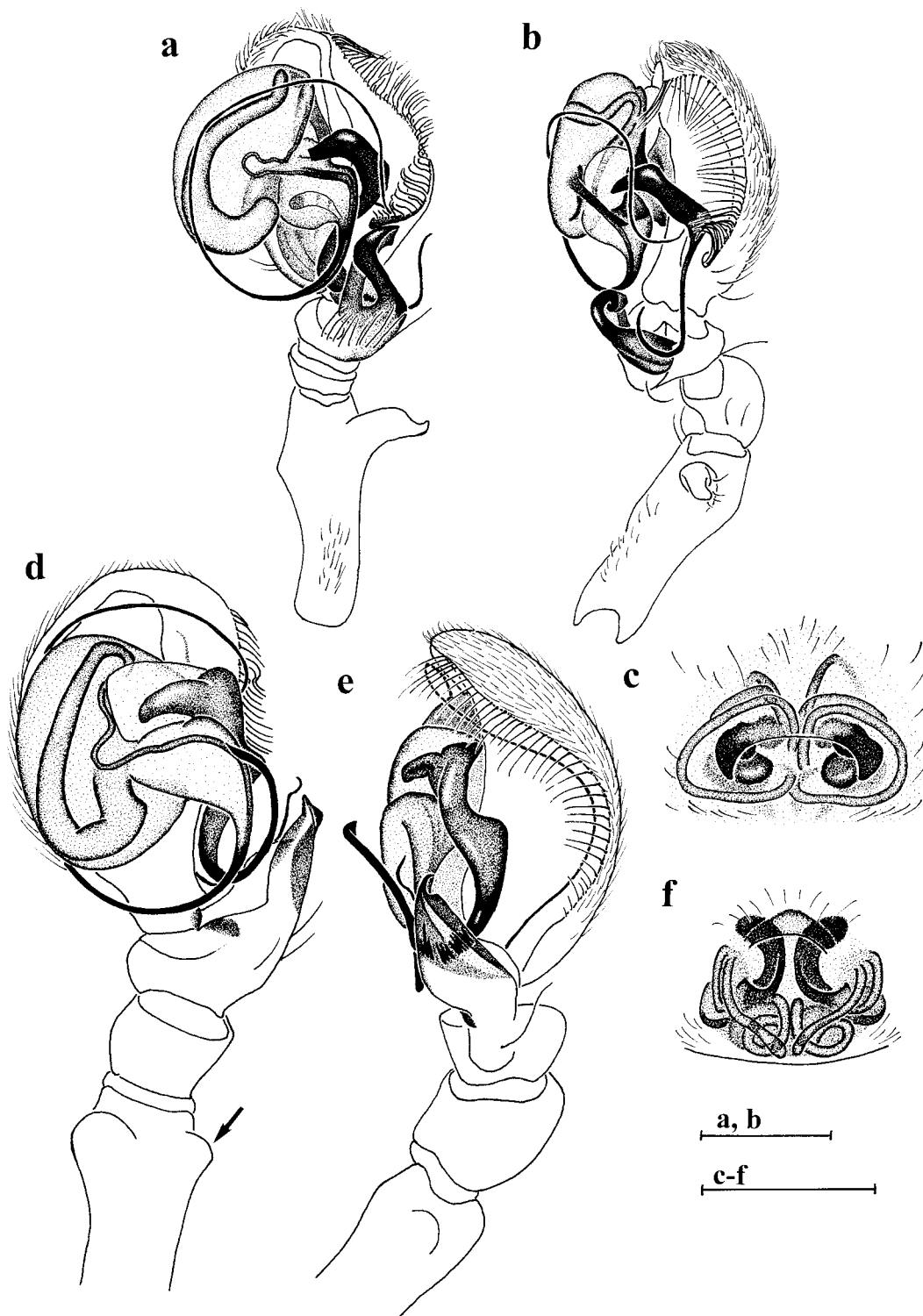


Fig. 32. a–c. *Hortipes sceptrum*, new species. a, b. Male left palp, slightly expanded, ventral and retrolateral views. c. Epigyne. d–f. *Hortipes bosmansii*, new species. d, e. Male left palp, ventral and retrolateral views. Arrow indicates retrolateral femoral apophysis. f. Epigyne. Scale lines: 0.25 mm.

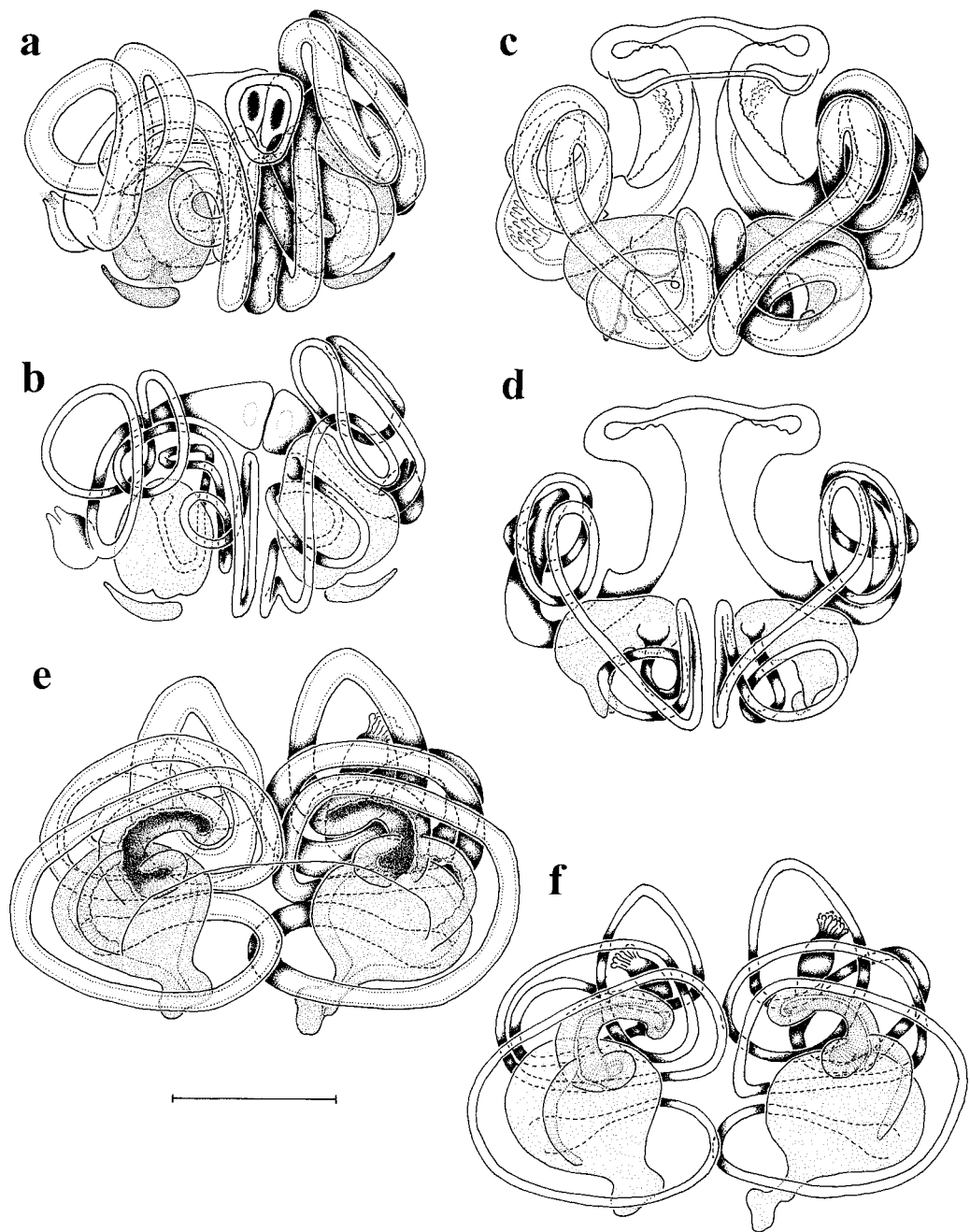


Fig. 33. a, b. *Hortipes architelines*, new species. a. Vulva, ventral view. b. Vulva, schematic representation. c, d. *Hortipes bosmansii*, new species. c. Vulva, ventral view. d. Vulva, schematic representation. e, f. *Hortipes sceptrum*, new species. e. Vulva, ventral view. f. Vulva, schematic representation. Scale line: 0.1 mm.

direction toward distal part of curve; sperm duct with wide basal part and thin distal part with deep turn and sinuous course; MA with long, thick base without appendages, suddenly tapered into slender distal part with shape of short hook; embolus long, whiplike, looped over slightly more than  $540^\circ$  (fig. 32a, b).

**FEMALE: Measurements.** Total length 3.62; carapace 1.40 long, 1.13 wide; length of fe: I 1.13, II 1.16, III 0.95, IV 1.24. **Leg spination.** Fe: I rv 3; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow brown, with eight darker, radiating striae. Chelicerae and sternum yellow, legs yellow brown. Abdomen light pink, no pattern. **Genitalia.** Epigyne a large hooded scape opening toward posterior side; entrances of IDs and globular ST visible in the wide entrance (fig. 32c). First stretch of ID with complex and heavily sclerotized entrance, wide and thick walled, associated with piriform gland, running outward and connected to ST1 through complex series of consecutive circular loops that pass along dorsal side of ST1; last loop laterally encircling ST1 on external side and entering it dorsally (fig. 33e, f).

**OTHER MATERIAL EXAMINED:** 1♀, elev. 2650 m, Mt. Oku, Cameroon (8 March 1983; R. Bosmans) (MRAC).

**VARIABILITY:** The exact course of the coils and loops of ID is somewhat variable.

**DISTRIBUTION:** Mt. Bamboutos, Bali, Mt. Oku, Cameroon, elev. 1600–2650 m.

***Hortipes anansiodatus*, new species**

Figures 31d, 35b; Map 5

**TYPES:** Female holotype in pitfall trap in rain forest, 1600 m, Mt. Koupé, Cameroon (31 January 1983; R. Bosmans) (MRAC).

**ETYMOLOGY:** The species' epithet means dedicated to Anansi. Anansi is a West African spidergod.

**DIAGNOSIS:** Females can be recognized by the large first stretches of the IDs surrounded by the coiled duct itself and by the globular ST1 positioned posterior to these and touching each other.

**MALE:** Unknown.

**FEMALE: Measurements.** Total length 2.78; carapace 1.27 long, 1.05 wide; length

of fe: I 1.08, II 1.13, III 0.92, IV 1.32. **Leg spination.** Fe: I rv 3; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace orange brown. Sternum, chelicerae and legs yellow brown. Abdomen peach, no pattern. **Genitalia.** Vulva: entrance of ID heavily sclerotized, first stretch wide and thick walled, associated with gland, surrounded by two coils of ID, in turn connected to dorsal side of globular ST1 through diagonal, inward-running stretch. Spermathecae 1 touching each other (figs. 31d; 35b).

**DISTRIBUTION:** Known only from the type locality.

***Hortipes hormigricola*, new species**

Figures 34a–c, 35a; Map 5

**TYPES:** Male holotype: “small Mt. Koupé,” 1250 m, Cameroon (7 February 1983; R. Bosmans) (MRAC 207.361). Paratypes: 2♂ from litter in gallery forest alongside mountain stream, 1550 m, W slope of Mbam massif, Cameroon (30 March 1983; R. Bosmans) (MRAC; 1♂ in AMNH); 1♂ in pitfall trap alongside small mountain stream, 2150 m, Mbam massif, Cameroon (30 March 1983; R. Bosmans) (MRAC); 1♂ near Mann's spring, 2050 m, Mt. Cameroon, Cameroon N04°08' 30", E09°07' 01" (21–25 January 1992; Coddington, Griswold, Larcher and Hormiga) (CAS); 3♀ from thick litter layer of dense mountain rain forest, 2250 m, Manengouba massif, Cameroon (25 March 1983; R. Bosmans) (MRAC); 1♀ from litter under isolated shrubs in open grassland, 2150 m, Manengouba massif, Cameroon (March 25, 1983; R. Bosmans) (MRAC); 1♀ from lowland rain forest near stream, 500 m, Etinde, Cameroon N04°06', E09°09' (2 March 1981; Bosmans and Van Stalle) (MRAC); 1♀ hand captured in strongly degraded mountain rain forest dominated by elephant grass, 1300 m, Mt. Cameroon, Cameroon (March 1981; R. Bosmans) (MRAC; now in AMNH).

**ETYMOLOGY:** The species' epithet *hormigricola* is a contraction of the names of the four arachnologists who collected one of the type specimens: G. Hormiga, C. Griswold, J. Coddington, and S. Larcher.

**DIAGNOSIS:** Males of *H. hormigricola* are

easily recognized by the male palp with indented femoral apophysis in combination with the gutter-shaped RTA and the long MA. For difference with *H. depravator* see under that species. Females are characterized by the large, conspicuous, heavily sclerotized ID entrances, the very stout first stretch of the ID, which is running in anterior direction, and the small ST1 externally encircled by the ID.

**MALE: Measurements.** Total length 2.57; carapace 1.08 long, 0.89 wide; length of fe: I 0.81, II 0.89, III 0.68, IV 1.05. **Leg spination.** Fe: I rv 2; IV plt 1 rlt 1; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace dark yellow, chelicerae and legs yellow. Sternum pale yellow. Abdomen pale pink, no pattern. **Palp.** Femur with fairly long, retrolateral, indented apophysis. Tibia with large, downward-pointing and procurved, gutter-shaped RTA holding embolus; cymbium with large retrolateral bend with regular series of long setae; tegulum with retrolateral swelling at base of embolus; sperm duct with wide basal part and thin distal part with short, sharp turn; MA with thick base and long, slender distal part, curved in anticlockwise direction, tip twisted; embolus long, whiplike, looped 540° (fig. 34a, b).

**FEMALE: Measurements.** Total length 3.51; carapace 1.51 long, 1.24 wide; length of fe: I 1.35, II 1.40, III 1.08, IV 1.49. **Leg spination.** Fe: I rv 3; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace, chelicerae, and legs yellow. Sternum pale yellow. Abdomen pale yellow, no pattern, covered with short, pointed grey setae. **Genitalia.** Epigyne a shallow central depression enclosing two large, dark, heavily sclerotized ID entrances, touching each other on symmetry axis (fig. 34c). Vulva: ID entrance large and heavily sclerotized, first stretch of ID very stout and thick walled, associated with cauliflower-like gland, encircled by two ID loops, themselves connected to small ST1 through wide loop completely encircling the latter (fig. 35a).

**OTHER MATERIAL EXAMINED: Cameroon:** 1♂, 1♀, Mt. Koupé, no further data (1983; R. Bosmans) (MRAC); 1♀, hand captured in well-developed mountain rain forest close to

the edge of the tree fern zone, elev. 1800 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); female in pitfall trap near Man's lake, Manengouba massif, elev. 1900 m (17–21 February 1983; R. Bosmans) (MRAC), 1♂, one juvenile captured in a pitfall trap in a clearing in the mountain rain forest, elev. 1900 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); 1♂ hand captured in open mountain rain forest with maccabo fields, elev. 1400 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); 1♂ captured in a pitfall trap in well-developed mountain rain forest with tree fern undergrowth, elev. 1500 m, Mt. Cameroon (March 1981; R. Bosmans) (MRAC); 2♀, one juvenile hand captured in mountain rain forest, elev. 1200 m, Mapanja, Mt. Cameroon (19 March 1983; R. Bosmans) (MRAC).

**VARIABILITY:** The exact course of the coils and loops of ID is somewhat variable.

**DISTRIBUTION:** Mt. Cameroon, Mt. Koupé, the Manengouba and Mbam massifs, Cameroon, elev. 500–2250 m.

### *Hortipes depravator*, new species

Figures 34d, e; Map 5

**TYPES:** Male holotype: thick litter in forest, 1950 m, Tchabal Mbabo NW slope, Cameroon (12 April 1983; R. Bosmans) (MRAC 207.362). Paratypes: 2♂ together with holotype (MRAC; 1♂ in AMNH).

**ETYMOLOGY:** Because the species closely resembles *H. hormigricola*, it is called *depravator*, the counterfeiter.

**DIAGNOSIS:** Males of *H. depravator* are easily recognized by the male palp with sharp-tipped femoral apophysis in combination with the gutter-shaped RTA and the long MA. Males differ from those of *H. hormigricola* by shorter RTA, which is less strongly curved, and the distal end of the MA, which is not twisted.

**MALE: Measurements.** Total length 2.59; carapace 1.27 long, 1.03 wide; length of fe: I 1.03, II 1.05, III 0.84, IV 1.27. **Leg spination.** Fe: I rv 2; IV plt 0 rlt 0; ti: I, II vsp 6; mt: III plt 1 vt 1 rlt 1; IV plt 1 vt 2 rlt 1. **Coloration.** Carapace yellow, lighter at the fovea. Legs and chelicerae pale yellow, sternum yellowish white. Abdomen yellowish

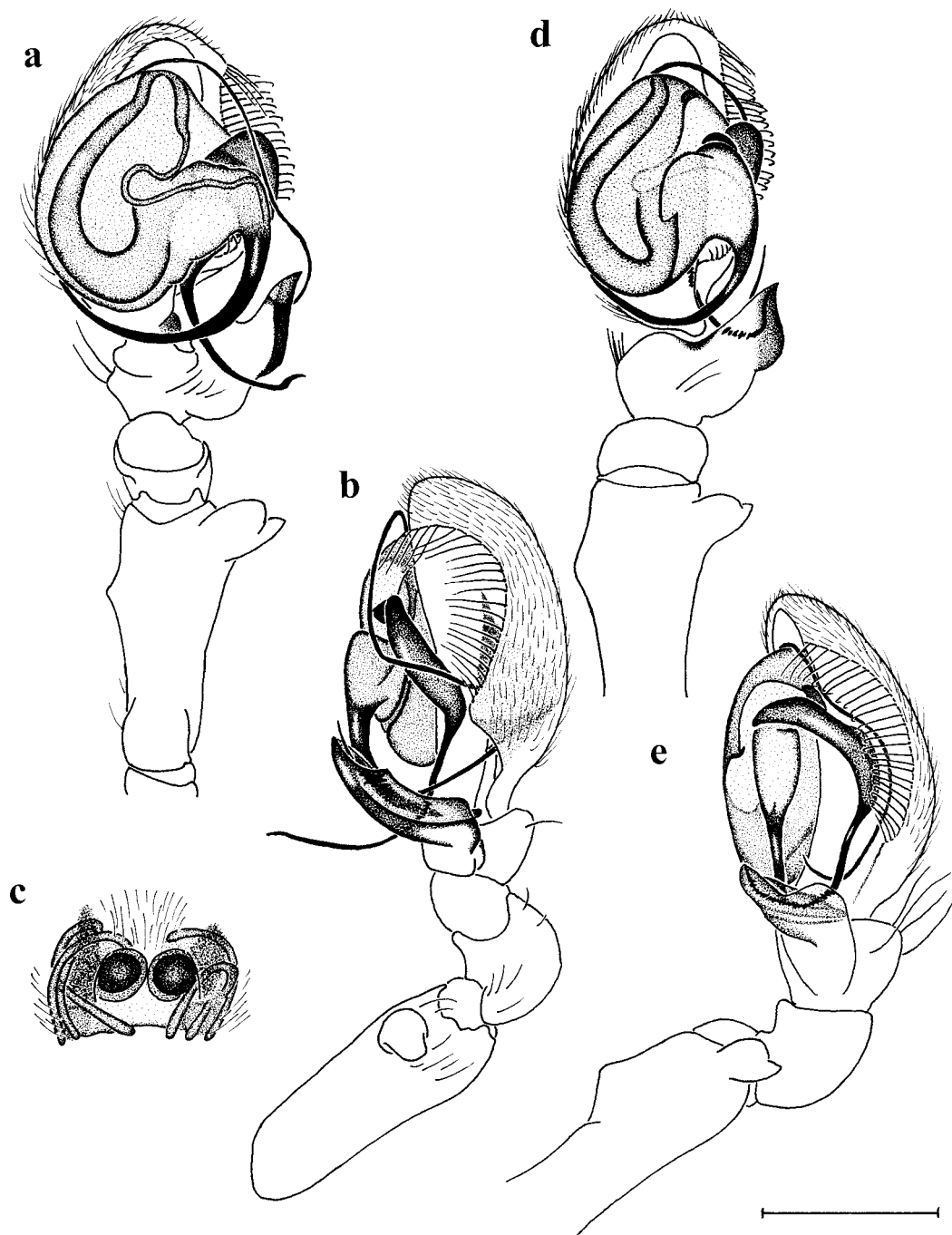


Fig. 34. a–c. *Hortipes hormigricola*, new species. a, b. Male left palp, ventral and retrolateral views. c. Epigyne. d, e. *Hortipes depravator*, new species, male left palp, ventral and retrolateral views. Scale line: 0.25 mm.



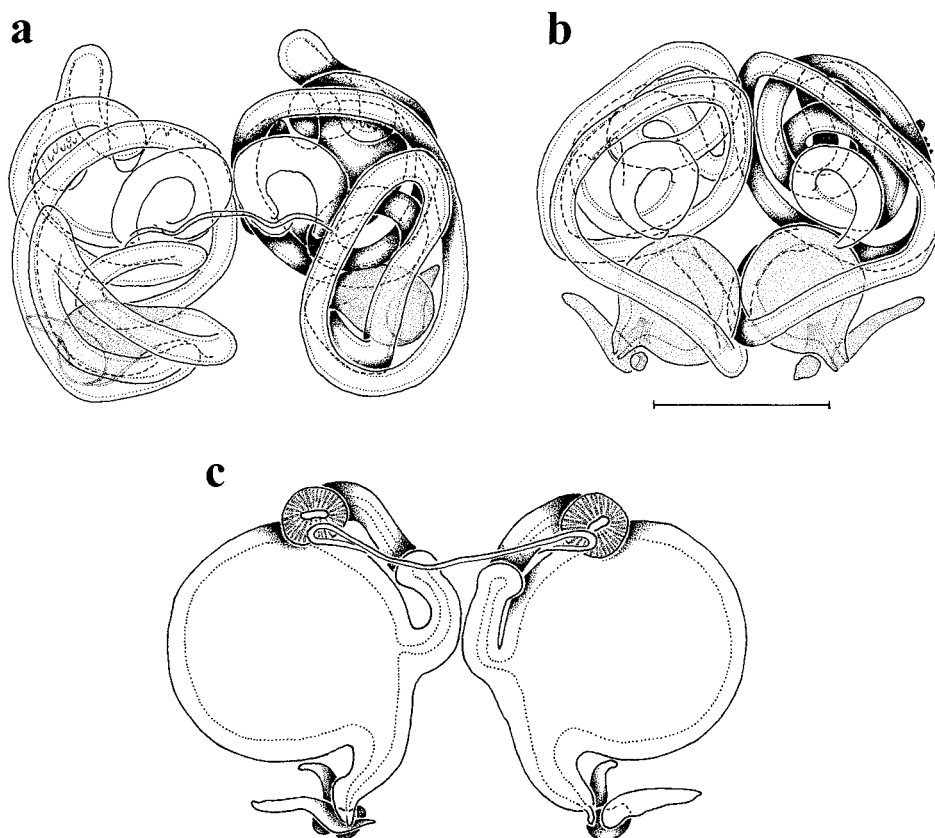


Fig 35. **a.** *Hortipes hormigricola*, new species, vulva, ventral view. **b.** *Hortipes anansiodatus*, new species, vulva, ventral view. **c.** *Hortipes exoptans*, new species, vulva, ventral view. Scale line: 0.1 mm.

white, no pattern. **Palp.** Femur with fairly long, retrolateral apophysis with sharp tip. Tibia with large, down-curved, gutter-shaped RTA holding embolus; cymbium with large retrolateral bend with regular series of long setae; tegulum with retrolateral swelling at base of embolus; sperm duct with wide basal part and unclear thin, distal part with short, sharp turn; MA long with thick base and slender distal part, bent in anticlockwise direction; embolus long, whiplike, looped over almost 540° (fig. 34d, e).

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: 1 ♂ hand captured in litter in a gallery forest alongside a mountain stream, elev. 1500 m, Tchabal Mbabo, Cameroon (11 April 1983; R. Bosmans) (MRAC).

DISTRIBUTION: Tchabal Mbabo, Cameroon, elev. 1500–1950 m.

## DISCUSSION

With 69 species, *Hortipes* is now the largest genus in the Liocranidae and, after *Pardosa* (76 species) and *Oxyopes* (86) (Dippenaar-Schoeman and Jocqué, 1997), the third largest genus of Afrotropical spiders. Moreover, many more *Hortipes* species are to be expected from large parts of Africa where the genus is doubtlessly present but has not been found because these regions were not screened with the appropriate, litter fauna extracting methods. It is exceptional that a recently described spider genus already counts such a high number of known species (Bosselaers and Jocqué, 1998). In addition to that, *Hortipes* may be of great interest for the study of taxa with stable somatic morphology and highly variable genitalic structures, a line of research that might provide new in-

sights into the meaning of secondary sexual characters (Jocqué, 1998).

The wealth of available material enables us to give a cladistic analysis of the data, which is quite unusual for a recently described genus of this size. To date, the number of cladistic analyses for Afrotropical or mainly Afrotropical spider taxa was restricted to seven (Griswold, 1985, 1987, 1990, 1991, 1994; Sierwald, 1997; Björn, 1998).

The preferred tree resulting from our cladistic analysis is depicted in figure 4. As can be seen, a basal dichotomy in the ingroup separates clade 2, consisting of nine species and characterized by a glandular structure opening into the ID lumen through a series of pores (character 64[1]), from the rest of the genus. Besides the enigmatic Western African *H. silvarum*, the only species without a male palpal MA (character 45[1]), clade 2 comprises eight closely related species from the African Eastern Arc Mountains, a mountain range running from Malawi to Kenya. This group, clade 3 (fig. 4), is characterized by a peculiar globular male palp in which the sperm duct follows a typical pattern (character 37[1]), the base of the embolus being implanted at 9 o'clock on the periphery of the tegulum (character 41[3]), and the first stretch of the ID running inward (character 73[1]).

The remaining *Hortipes* species are divided in two large sister clades. The first of these, clade 10, groups 11 species. The core of this clade is formed by nine closely related species from Malawi and South Africa. This clade 12 is clearly delimited and supported by several synapomorphies: MA of male palp implanted centrally on tegulum and laterally flattened (characters 46[2] and 49[2]), RTA implanted ventrolaterally and of type 2 (characters 51[1] and 53[1]), and first stretches of ID fused into one weakly sclerotized entrance chamber (character 65[1]). Moreover, this entire group possesses ST2 (character 84[1]), a feature paralleled by *H. silvarum* in clade 2. Clade 12 is very homogeneous, the single species that differs from the others by several autapomorphies being *H. merwei*. Interestingly, *H. merwei* is the only South African *Hortipes* species that has been found not only in forest but in grassland as well. *Hortipes aurora* and *H. creber*, two

species with relatively simple genitalia, are situated on two consecutive, weakly supported branches below clade 12 at the base of clade 10.

Clade 19 is the sister clade to clade 10, and it also has a few species with simple genitalia branching off on consecutive, weakly supported branches in basal position: *H. leno*, *H. libidosus*, and *H. delphinus*. The core of clade 19 is clade 22, consisting of four species from the Kivu (*H. hastatus*, *H. lejeunei*, *H. falcatus*, and *H. narcissus*), one species from West Congo (*H. tarachodes*), one species from Nigeria (*H. machaeropolion*), and a group of five rather closely related species from Cameroon (*H. architelines*, *H. robertus*, *H. bosmansii*, *H. hormigricola*, and *H. sceptrum*). These 11 species are characterized by rather complex genitalia, featuring a long embolus (character 39[2]) and a widened portion of ID associated with a gland (character 63[1]). Two subclades are very distinct within clade 22. Clade 24, composed of three closely related species from the Kivu, *H. lejeunei*, *H. falcatus*, and *H. narcissus*, is characterized by a type 4 RTA (character 53[3]; fig. 21i, j) and a typical vulvar structure (fig. 23a, b). Clade 26, embracing seven Western African species with very complex genitalia, is firmly supported by several synapomorphies: vt spines on mt III and IV (characters 16[1], 17[1], 22[1], and 23[1]), a fringe of regularly spaced stiff hairs along the retrolateral edge of the cymbium of the male palp (character 36[1]), and a MA with a stout base, gradually or suddenly narrowed into a long, thin, curved terminal portion (character 49[3,4]).

In clades 10 and 19, the species with the largest number of plesiomorphic features are mostly species from Tanzania and the Eastern Arc Mountains, whereas Central, South, and West Africa turn out to be populated by increasingly derived species with complex genitalia.

Most species of the new genus are inhabitants of the litter layer of Afrotropical mountain forests and thickets, a few species inhabit lowland forest, and one species also occurs in grassland. The largest groups of species are described from the Cameroon highlands, the Kivu in the Congo, the Eastern Arc Mountains and coastal mountains in

Tanzania, and the mountain range of eastern South Africa, all known regions of endemism (Hamilton, 1982; Fjeldså and Lovett, 1997). In these regions, several species occur in sympatry and even in syntopy. No representatives of *Hortipes* have been found so far in the coastal East African forest belt nor in the Ethiopian montane forest. The genus may be absent from part of these areas, or it may have been overlooked in some regions, for example Kenya. It appears definitely absent from the Taita Hills, the northernmost part of the Eastern Arc Mountains in Kenya, because recent intensive sampling has not yielded any *Hortipes* specimens there. Samples of the new genus are also lacking from Mozambique, Zambia, Zimbabwe, Angola, and the République Populaire du Congo. Such samples might greatly increase our knowledge of the genus, filling in geographic gaps between regions from which *Hortipes* has already been collected.

All the species described have a small distribution area. The largest areas, which occur in Cameroon and the Kivu, do not exceed 300 km in diameter. In the Tanzanian mountains, almost each species is restricted to one mountain, as has been stated before for forest-dwelling Linyphiidae in the same region (Scharff, 1992). The species displaying the most complex genitalia are found in the Cameroon highlands, a region known for its high species diversity and rich spider fauna (Bosmans and Bosselaers, 1994).

Although most *Hortipes* species have a limited distribution, 37 of the 65 species described here occur sympatrically and 29 of these even syntopically that is, at the same locality with one or more other *Hortipes* species. In South Africa, *H. merwei* and *H. luytenae* have been collected together in the same pine plantation in Ngomi State Forest, Natal. In Malawi, *H. penthesileia* and *H. oronesiotes* occur syntopically at Thuchila on Mt. Mulanje and *H. orchatocnemis* and *H. pollux* have been collected together on the Nyika Plateau at 2150 m in Juniper Forest and at 2300 m in Mwenembwe Forest. In Katanga, Congo, *H. amphibolus*, *H. echo*, and *H. narcissus* live sympatrically in the region close to Kalemie near Lake Tanganyika. *Hortipes echo* and *H. narcissus* have been

captured together in the humus layer of a forest at 1700 m on Mt. Kabobo.

In the Kivu region, *H. falcatus*, *H. lejeunei*, *H. horta*, *H. aurora*, *H. hastatus*, and *H. auriga* occur sympatrically. *Hortipes aurora* and *H. falcatus* occur syntopically at 2200 m at Mt. Lubwe and at the same elevation in Musyenene forest, Kyondo. *Hortipes falcatus* has also been captured together with *H. hastatus* at 1400 m in forest litter at Buhoma in Bwindi Impenetrable National Park, Uganda, and together with *H. lejeunei* at 2300 m in forest litter in Nyungwe Forest, 4 km W of Pindura, Rwanda.

In Tanzania, *H. mulciber* and *H. fastigiensis* occur syntopically at 1900 m on the SW slope of Mt. Rungwe. *Hortipes creber*, *H. exoptans*, *H. ostiovolutus*, *H. cucurbita*, *H. angariopsis* and *H. salticola* occur sympatrically in the Uzungwa Mountains. *Hortipes creber* has been captured together with *H. ostiovolutus* at 1250 m and with *H. cucurbita* at 1650 m in Mwanihana Forest. In the same forest, *H. creber*, *H. cucurbita*, *H. salticola*, and *H. angariopsis* were captured together between 1800 and 1850 m, and *H. creber*, *H. cucurbita*, and *H. ostiovolutus* were collected together at 1000 m. In the Uluguru Mountains, *H. leno* occurs sympatrically with *H. platnicki* and *H. stoltzei*. *Hortipes leno* and *H. stoltzei* have been collected together at 1600 m at Lupanga East.

In Equatorial Guinea, *H. alderweireldti* and *H. fortipes* occur sympatrically in the Micomeseng region. In Cameroon, *H. hormigricola* and *H. robertus*, both species with a rather large distribution area, occur sympatrically with *H. anansiodatus*, *H. chrysothemis*, *H. architelones*, *H. calliblepharus*, and *H. bosmansi*. On Mt. Cameroon and its immediate surroundings, *H. robertus*, *H. hormigricola*, *H. bosmansi*, *H. architelones*, and *H. chrysothemis* occur sympatrically. Each of these species also occurs syntopically with one or more of the others. *Hortipes chrysothemis*, *H. architelones* and *H. hormigricola* were captured together at 500 m in lowland rain forest at Etinde. *Hortipes bosmansi*, *H. architelones*, and *H. hormigricola* were collected together at 1300 m in strongly degraded mountain rain forest dominated by elephant grass. *H. hormigricola* and *H. bosmansi* also occur together with *H. callible-*

*pharus* at 1400 m in open mountainous rain forest with maccabo fields. *Hortipes bosmansii* and *H. hormigricola* also live syntopically at 1500 m in well-developed mountain rain forest with tree fern undergrowth, and *H. architelines* and *H. robertus* were collected together at 1600 m in mountain rain forest. On Mt. Koupé, *H. robertus*, *H. hormigricola*, *H. bosmansii*, and *H. anansiodatus* occur sympatrically. *Hortipes robertus* and *H. bosmansii* have been collected together at 1300 m in rain forest. On Mt. Manengouba, *H. hormigricola* and *H. bosmansii* occur syntopically at 2250 m in dense mountain rain forest. In Ivory Coast, *H. silvarum* and *H. baerti* occur syntopically in Bossematié Classified Forest, Appouesso.

Most *Hortipes* species that have actually been collected together (syntopic species) are closely related and belong to the same clade within the genus. However, there are some notable exceptions, where distantly related *Hortipes* species were found to occur in the same habitat: *H. pollux* and *H. orchatocnemis* on Nyika Plateau, Malawi; *H. echo* and *H. narcissus* on Mt. Kabobo, Congo; *H. aurora* and *H. falcatus* in the Kivu region, Congo; *H. multicribis* and *H. fastigiensis* on Mt. Rungwe, Tanzania; *H. creber* and *H. ostiovolutus*, *H. creber*, *H. cucurbita*, and *H. angariopsis*, *H. creber*, and *H. salticola* in the Uzungwa mountains, Tanzania; *H. silvarum* and *H. baerti* in Bossematié Classified Forest, Ivory Coast.

The sympatric occurrence of so many closely related species is puzzling, but explaining such a peculiar distribution type is beyond the scope of the present work. For example, an extensive literature already exists on the subject of sympatric speciation (Berlocher, 1998; Johnson and Gullberg, 1998; Kondrashov et al., 1998), but that matter is obviously far from settled. Other speciose arthropod genera with close relatives occurring sympatrically and syntopically have recently been described (Yeates and Lambkin, 1998). That all 69 *Hortipes* species have a very similar somatic morphology, while their genitalic structures are widely different, is also very intriguing. A comparable situation exists in the Australian endemic dipterous genus *Thraxan* Yeates and Lambkin, for which the 20 known species are mor-

phologically so similar that they can only be distinguished on the basis of the male genitalia (Yeates and Lambkin, 1998). Several possible explanations have been proposed for the phenomenon of increasingly complex genitalia within an otherwise homogeneous taxonomic group, for example optimization of sperm transfer through Eigen evolution der Kopulationsorgane (Grasshoff, 1975), sexual selection by the female (Eberhard, 1996), and linkage of secondary sexual characters to hidden behavioral traits (Jocqué, 1998). Whereas it is theoretically possible that genitalic complexity decreases in more derived spider taxa, as has been argued for Oonopidae (Heimer, 1990a, 1990b) and the corinnid genera *Corinna* C. L. Koch and *Castianeira* Keyserling (Kraus, 1978, 1984), this seems not to be the case in *Hortipes*: the most complex palpi and vulvae are found in clade 26, which is found in a terminal position at one of the branches in all cladograms found (figs. 4, 5). The only genitalic reduction that is observed within *Hortipes* is the loss of MA in *H. silvarum*, the most enigmatic of all presently known *Hortipes* species.

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