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The genus *Stegodyphus* (Arachnida, Araneae).

Sibling species, species groups, and parallel origin of social living

By
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With 266 Figures, 3 Plates, 12 Maps and 7 Tables

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Abstract: The genus *Stegodyphus* is represented in the southern Mediterranean Region and Africa, the Near East and South Yemen, Iran, southern USSR, Afghanistan, India and Central Birma.

Thirty-eight species have been assigned to the genus, and these are revised in this paper. All existing type materials and more than 600 samples (including living specimens) were studied. Only 15 of the previously named species are recognized as valid; additionally, two new species are described. There is now a total of 17 species (plus 1 doubtful species and 1 nomen dubium). Identification keys are given. – Three species groups are defined: *africanus*, *dufourii*, and *mirandus* groups. *Magunia* is a synonym of *Stegodyphus* and refers to the *mirandus* group (subjective synonymy).

Stegodyphus species show an unusual amount of intraspecific variation in structural characters, size and coloration [specimens preserved in alcohol are notoriously faded and normally provide little information on the bright colour patterns of living specimens]. Natural variation in structural characters is superimposed by two kinds of intraspecific, age-dependent variation: (i) Developmental flexibility: sexual maturity may be acquired by different instars, and there is evidence that delayed maturation occurs; (ii) supernumerary moultings: post adult moultings may occur in females and cause unusual differences in genitalic characters. – Post adult moultings have also been observed in males; but they are highly defective with regard to the copulatory organs.

Most representatives of the genus can be regarded as sibling species. Males of different species can be recognized by subtle details in the structure of the terminal lamellae of the genitalic bulbs. The identification of females by genitalic characters alone, however, may be highly unreliable or even impossible. In such cases, careful measurements provide additional and sometimes indispensable data for species discrimination (e.g. proportions of legs, size and ratio of eyes).

Male and female genitalia are analysed with regard to homology and function. The male copulatory organ functions as a glandular bulb (uptake and expulsion of sperm). The vulval structures may be derived from two subparallel folds of the cuticula. The female epigynum does not offer precise structures for anchoring terminal parts of the expanded male bulb; but the conductor of this organ is frequently equipped with adhesive surface structures. Most probably, the male simply touches the epigynum with the terminal apparatus and then squeezes this element into the corresponding groove (with the introductory opening). Only

the extremely thin and pointed tip of the embolus seems to enter into the female genital opening. This may explain the possibility of successful sperm transfer between sexual partners that may be, due to variation, extremely different in size.

There are 14 solitary, but only 3 social living species: *mimosarum* (Africa, Madagascar), *dumicola* (Southern Africa), and *sarasinorum* (India). Each of these belongs to a different species group and has its own non-social sister species. It is concluded that they acquired permanent sociality independently. The hypothesis that permanently social species have evolved by neoteny is strongly supported by morphological and biological evidence. Adults of the permanently social species apparently correspond to inadult instars of their sister species. Various biological properties present in inadults of the non-permanently social species are regarded as pre-adaptations. Unfortunately, the ethology and ecology of the solitary representatives (including the sister species to the three social species) have not yet been studied adequately. – The possibility that the social forms could be merely ecophenotypes is discussed and rejected. The permanently social representatives are regarded as biospecies as they have their own morphological characters and show specialized biological properties; differences are due to their independent origin.

A. Introduction

The first species of the genus *Stegodyphus* SIMON, 1873, was discovered in North Africa on the occasion of NAPOLEON's expedition to Egypt (1798–1801). It was figured and described as *Eresus dufourii* in the "Description de l'Egypte ..." by AUDOUIN (1826). During the subsequent decades, various authors established further species on the basis of materials from Spain, Africa, Madagascar and India. A total of 38 names has been introduced to date. In his catalogue, ROEWER (1954) regarded 10 of them as synonyms, which means that he listed 28 species.

Sizable communities (Pl.3 Fig.4) of one of the social *Stegodyphus* species were described for the first time by O. PICKARD-CAMBRIDGE in 1889. Up to now, many observations have been published on the biology of the gregarious representatives of the genus (e.g. KULLMANN et al. 1972; SEIBT & WICKLER 1988; for reviews see BUSKIRK 1981; D'ANDREA 1987). But this information concerns the three social-living species, i.e. the minority. All others may occur in colonies but then individuals live in isolation – at least in subadult and adult stages. There are few reliable data available on the biology of the more numerous non-social representatives. Until now, only one of these solitary species has been studied in any detail (MILLOT & BOURGIN 1942).

This highly unbalanced situation may be explained by the fact that the nests and webs of major communities of social *Stegodyphus* species are really striking in the field, and, even more, by a general interest of biologists in the study of animal socialities.

However, all previous work has been hampered by the notoriously inadequate knowledge of the taxonomy of the whole group. This is especially true with regard to reproducible results, which led BUSKIRK to conclude in 1981 (: 294): "Since the taxonomy of these species has been confused, at least in the past, natural history literature on the social species is mixed." How could this situation arise?

Nearly all authors who had coined additional names relied solely on previously published data, with the exception of SIMON, who had relatively varied materials at his disposal for comparisons, including the original specimens of six new species he had described between 1876 and 1908. Early workers (e.g. C.L. KOCH, KARSCH, O. PICKARD-CAMBRIDGE) derived diagnoses from pinned specimens, with well preserved coloration, but most of the names were introduced on the basis of spiders preserved in alcohol and faded to greater or lesser degrees. For this reason, descriptions of different colorations are not reliable or even comparable. In several cases where we had previously seen preserved materials only, we were highly surprised when we had the first living individuals with remarkably bright coloration before us (Pl. 1–3). In addition to this, there is no information on variation.

The situation is complicated even further by the fact that details of the male and female copulatory organs have remained inadequately illustrated or even unfigured. Accordingly, the most important characters for species discrimination have been nearly unknown up to now. There are a few isolated sufficiently informative illustrations of such structures (TULLGREN 1910; BERLAND & MILLOT 1940), but these cannot compensate the general lack of comparative data.

This is the background that explains why previous authors were working more or less blind when they tried to identify specimens. Furthermore, they could not have any presentiment of the existence of sibling species. Descriptions of “new species” seem to have been justified primarily by the fact that materials were regarded as different from any previously described in the published data. Names such as *hildebrandti*, *mimosarum* and *gregarius* have been notoriously confused; in collections, immature specimens assumed to represent a social living species are frequently labelled as *gregarius* – irrespective of whether they originate in Africa or India.

The primary aim of the present study is to clear up the taxonomy of the group in order to provide a reliable basis for future research on the biology of *Stegodyphus* species.

This includes the study of variation within populations and also between such units in order to discriminate phenons which may be regarded, with sufficient probability, as biospecies. A re-investigation of all available types and all other materials worked on by earlier authors was necessary not only in order to broaden the basis of this investigation; even more important is that the study of historical specimens permits the association of too many available names with the number of species existing in fact.

This information is basic to the study of distributional patterns and also of relationships within *Stegodyphus*: Are social-living representatives of the genus closely related to each other or not? Do they have different solitary sister species? Are they really separate taxa of specific rank, or only morphs (e.g. ecophenotypes) of solitary species? These questions need answers before we can find whether sociality is of monophyletic origin or may have evolved independently several times. This information on the phylogeny may contribute substantially to the formulation of an hypothesis as to how social behaviour in *Stegodyphus* evolved at all.

B. Material and Methods

I. Material

All materials preserved in various major museum collections and many additional specimens have been studied. In total, we have had 661 samples at our disposal. Living and also recently preserved specimens studied and collected by U. SEIBT & W. WICKLER have been of special importance for the study of variation within natural populations, including coloration. We have also observed *Stegodyphus* species in the field (Mediterranean Region, East and South West Africa) and in the laboratory (*S. lineatus*, *bicolor*, *dumicola* and *mimosarum*).

Fortunately, almost all type materials are still in existence and have been inspected (see note “vid.” [= vidimus] in synonymies).

The types of *doufourii* AUDOUIN, 1826, and *quadriculatus* FRANGANILLO, 1925, are lost, but their identity is evident. The types of *duodimidiavittatus* STRAND, 1906, and *tibifer* STRAND, 1906, were destroyed during World War II; the descriptions do not permit the assignment of these nominal species to any given taxon at all.

All specimens we have seen and identified are recorded with their locality data etc. Corresponding information derived from the previous literature has not been included, however, as the taxonomy of the whole group has hitherto been far too confused. Samples consisting of juvenile or subadult specimens have generally not been considered. Nonetheless, they are mentioned in exceptional cases when no better evidence was available for single localities and the identification was reliable.

II. Methods

1. Recognition of adult stages

As in other spiders, adult males can be easily recognized by their fully developed copulatory organs, but isolated adult males may occasionally occur that do no longer have this structure (Fig. 1–2). They have passed a post-adult moulting; the bulb and sometimes other distal parts of the pedipalp break off during the course of this unusual event and remain with the exuvia.

Female entelegyne spiders are normally recognized by a fully developed epigynum. But in *Stegodyphus* (as well as in other representatives of the Eresidae) subadult females show a pre-epigynum that is unusually close to the final structure. In doubtful cases, preparation of the internal parts is advisable in order to decide whether a complete, functional (!) vulva has already developed or not; in the last subadult instar, major quite highly sclerotized *anlagen* of vulval structures may be unusually close to the definite organs, but they are not functional. – Females may also pass post-adult

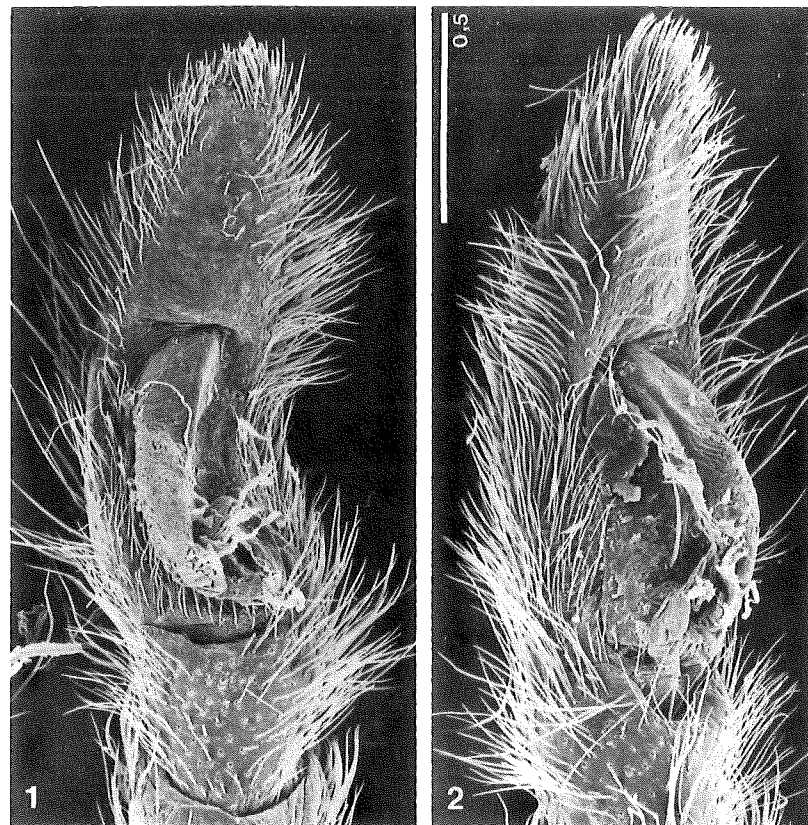


Fig. 1–2: Left (1) and right (2) male pedipalp of *Stegodyphus lineatus* after post-adult moulting. – 1) Ventral; 2) ventro-lateral view.

moultings. The epigynum and vulva I are moulted completely; we suppose that the equivalent structures (epigynum plus vulva II) are functional, but they are considerably different from the previous ones (Fig. 3–4).

In principle, the first *anlagen* of the epigynum (and vulva) occur very close to the epigastric furrow or even vertically in it. In most species, these chitinous parts of the female genitalia leave their original position gradually in the course of successive moultings until they reach their final position on the ventral side of the opisthosoma. But there are also species in which epigynum (and vulva) maintain their original position in the epigastric furrow (see *mirandus* group, for example Fig. 254–258). As this position is close to vertical, only the most anterior region of an epigynum may be visible (Fig. 195). The whole structure appears when pressure is applied on the ventral surface of the opisthosoma (with a preparation needle or another suitable instrument) in such a way the epigastric furrow opens; but preparation is needed for a more detailed study.

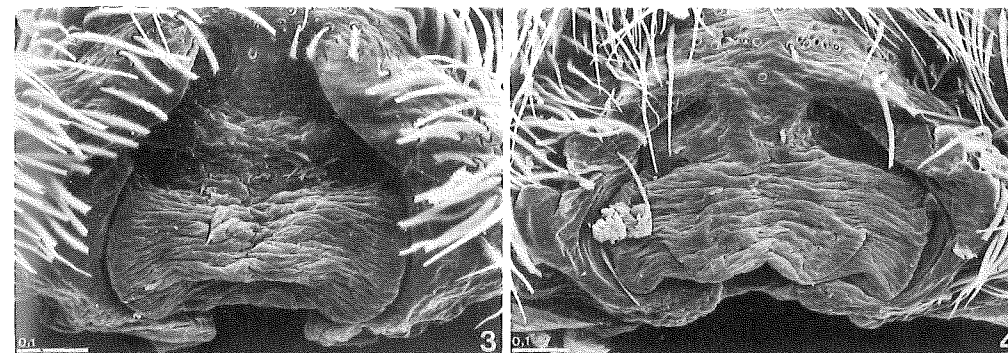


Fig. 3–4: Epigynum I and II of *Stegodyphus mimosarum*. – 3) Epigynum I of sexually mature female (SEM photo taken from exuvia); 4) Epigynum II after post-adult moulting.

2. Preparation

Male palps (usually the right ones) have been removed for study. As far as necessary, female genitalia were also carefully removed under a stereomicroscope with micro-scalpels. Maceration (e.g. with KOH, 5%) can cause artefacts and was avoided; after “shaving” off the hairs covering the genitalic region and careful removal of major internal musculature and other tissues by hand (high-power dissecting microscope!), the objects were sufficiently cleared by embedding in HOYERS’s mixture (KRAUS 1984). All non-permanent slides were made by mounting the objects on large cover-glasses (24×60 mm) under normal ones (18×18 mm). This permits microscopical inspection from both sides. All parts (especially male pedipalps and female genitalia) were removed from temporal preparations and put back in alcohol in microvials.

3. Measurements

If not stated otherwise, all measurements were taken in millimeters (mm) by means of micrometers.

Total and prosoma length are not always correlated. Animals with a large total length and large appearance may have smaller prosoma measurements than seemingly smaller specimens. Thus, all other measurements are more characteristic than the total length of an animal.

The length of the leg segments was measured between retrolateral articulations. Measurements of diameters and relative positions of eyes were taken in profile view (in order to measure corneae and not iris-like structures); for details see Fig. 5–6. Sufficiently precise measurements of eyes and relative eye positions necessitate careful and partial removal of plumose hairs surrounding the AME and PME; removal of such hairs may also be necessary for measuring the anterior prosoma width (otherwise the cuticula may be hardly visible).

4. Microscopy

Light microscopy.—A combination of a high-quality microscope and powerful illumination is essential for the preparation and study of male and female genitalia and most other characters, and also for taking measurements. We had a "Stereomikroskop LEITZ TS" at our disposal. Details were studied and all drawings were made with a compound microscope equipped with a camera lucida (LEITZ Orthoplan, LEITZ Dialux).

Electron microscopy.—SEM studies were carried out initially with a CAMBRIDGE S4 and later with a CAMSCAN DV4.

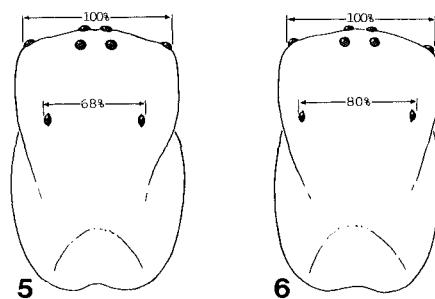


Fig. 5-6: Position of eyes: Measurements and ratios.

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6. Abbreviations

BMNH	British Museum Natural History, London (GB);
HEC	Hope Entomological Collections, University Museum, Oxford (GB);
MCSN	Museo Civico di Storia Naturale "Giacomo Doria," Genova (I);
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge (USA);
MNHM	Museum National d'Histoire Naturelle, Paris (F);
MRAC	Musée Royal de l'Afrique Centrale, Tervuren (B);
NCP	National Collection of Araneae, Pretoria (RSA);
NM	Natal Museum, Pietermaritzburg (RSA);
NMW	Naturhistorisches Museum, Wien (A);
NRS	Naturhistoriska Riksmuseet, Stockholm (S);
SAM	South African Museum, Cape Town (RSA);
SMF	Senckenberg-Museum, Frankfurt a. M. (D);
TM	Transvaal-Museum, Pretoria (RSA);
UBZD	Universidad de Barcelona, Depart. de Zoologia, Barcelona (E);
ZIM	Zoologisches Institut und Zoologisches Museum, Hamburg (D);
ZMB	Museum für Naturkunde, Humboldt Universität, Berlin (DDR);
ZMK	Zoologisk Museum, København (DK).

<i>A</i>	Alveolus	<i>max</i>	Maximal
<i>ALE</i>	Anterior lateral eyes	<i>mH</i>	Median haematodocha
<i>AME</i>	Anterior median eyes	<i>Mt</i>	Metatarsus
<i>ant</i>	Anterior	<i>P</i>	Petiolus
<i>bH</i>	Basal haematodocha	<i>PLe</i>	Posterior lateral eyes
<i>C</i>	Conductor	<i>PME</i>	Posterior median eyes
<i>dH</i>	Distal haematodocha	<i>Pros</i>	Prosoma
<i>diam</i>	Diameter	<i>Pt</i>	Patella
<i>E</i>	Embolus	<i>S</i>	Spermophor
<i>FD</i>	Fertilization duct	<i>ST</i>	Subtegulum
<i>Fe</i>	Femur	<i>T</i>	Tegulum
<i>IO</i>	Introductory opening	<i>Ti</i>	Tibia
<i>L</i>	Length	<i>W</i>	Width

In Synonymies: D Diagnosis

N Note (on nomenclature, distribution etc.)

C Citation (name mentioned)

C. Taxonomy

I. General: Presuppositions

The situation explained in the introduction necessitates an analysis of structural characters, including function and biological data. Up to now, it has remained uncertain which character expressions can be regarded as species-specific and which other differences are due to various types of variation. Adequate information is essential for recognition of the actually existing species and also for their definition.

1. Characters and variation

a) General Characters

All characters that are not derived from details of the genitalia are regarded as "general." These are discussed first.

a¹) Size and Proportions

Representatives of *Stegodyphus* (and also of other eresid genera) can be rather large spiders, but there is a quite unusual degree of interspecific variation. In *Stegodyphus*, the total length varies between 23 and 3.5 mm (smallest male of *mimosarum*).

Intraspecific variation: largest female individuals of *Stegodyphus lineatus* can reach a total length of 23, while the smallest specimen we have seen measured 10.6 (prosoma: 8.1–5.1). Wide variation in size is also seen in males. In *S. africanus*, males vary between 7.6 and 10.2 (total length; prosoma: 4.1–5.6). These and all other measurements taken demonstrate that the size of the opisthosoma may be misleading with regard to the real size of the specimens. For example, we have measured a subadult and an adult female of *S. africanus* both having a total length of 13.5; but the prosoma length was 5.1 in the subadult and in the adult 6.7. The opisthosoma may extend or shrink to some extent (due to uptake / loss of water; egg production / egg laying).

Representatives of social living species vary accordingly; data are given in Fig. 264. They are distinctly smaller than their solitary relatives; with one exception (largest females in *dumicola*), there is even a gap between the largest social and smallest solitary individuals. For explanation of this feature see section D.2.

KULLMANN et al. (1972: 102, Fig. 23) reported that in males of *S. lineatus* sexual maturity may be reached after the 7th, 8th or 9th moulting [presumably after leaving the cocoon]. Accordingly, he was able to separate three size classes. He notes that the same observation has been made in *pacificus* and *sarasinorum*. KULLMANN et al. state that female specimens of *lineatus* become sexually mature after the 9th moult or later.

The enormously wide range in size variation of *Stegodyphus* species seems to be caused mainly by this flexibility.

In addition to this, adult spiders may continue to moult: moultings of sexually mature females of *S. lineatus* were first assumed by KULLMANN et al. (1972: 102): "In fünf Fällen ergab sich, daß reife Weibchen, die nicht zur Kopulation gekommen waren, sich erneut häuteten." We have also observed such post-adult moultings in *lineatus* males (!) and in females of the social species *mimosarum*. Males which have suffered post-adult moultings are easily recognizable, as this process is highly deleterious to their copulatory organs (Fig. 1–2). Post-adult stages in females are much more difficult to distinguish (Fig. 3–4, 18, 99).

The reasons for supplementary post-adult moultings are unknown. We could not find any information to confirm KULLMANN's explanation; he stated that this occurs in sexually mature females which had remained virginal. As this happens in both sexes, we think that such moultings are induced by some kind of physiological mechanism in relatively old, surviving individuals. The possibility cannot be excluded that there might be a need for renewal of the delicate spinning apparatus in such spiders; but this is not supported by the available facts. The cribellum of the exuvia of an adult female has been inspected by SEM: all the spigots were present, completely and well preserved (but this concerns the surface structure only). – The variable number of preadult and the potential occurrence of post-adult moultings may also cause variation in other characters correlated to age and size. For this reason, various ratios have been calculated, which might be more informative than direct comparisons of measurements.

As in all Eresidae, the anterior part of the prosoma [i.e. SIMON's "pars cephalica"] is raised and convex, descending steeply backwards to the posterior region. In general, this feature is markedly well developed in adult males (Pl. 3 Fig. B) and somewhat less so in females, and it is completely lacking in early instars. In general, adults of comparatively large body size show the most distinctive anterior elevations; they are most prominently developed in the largest males. Relatively small but adult animals are comparable to juveniles or subadults, having less prominent elevations or even none at all (Fig. 261, 263). This is true for males and females of the smallest species (especially *S. mimosarum*; *dumicola* is somewhat less extreme). But there are exceptions at the interspecific level. The anterior elevation is quite striking in *S. sarasinorum*, which is a small representative of the genus. Some intraspecific variation occurs; it is apparently correlated with size and most obvious in *dufour* (see p. 208).

Modified legs I in males occur in various apparently unrelated species. They show more or less inflated tibiae (Fig. 40–45, 109–115, 207–211) bearing dorsal and ventral fringes of long hairs (BERLAND & MILOT 1940 Fig. 11 b). In *mimosarum* the degree of modification of leg I is possibly correlated with size, but this is not true for *dufour* (see p. 208).

a²) Coloration

Colour variation shows an unusually wide range, even at the same locality, or, in social species, in closely related individuals inhabiting the same nest. This has already been illustrated by KULLMANN et al. (1972 Fig. 21: *lineatus*) and is documented here by Pl. 1 Fig. C–F, Pl. 2 Fig. E–D, Pl. 3 Fig. C–D (*mimosarum*, *dumicola*, *lineatus*).

S. mimosarum females in the same nest (from Nakuru, Kenya), for example, showed the following variation in coloration: the hair zone in the basal half of the chelicerae and of the frontal eye triangle varied from white to grey and light brown. The colours of the opisthosoma were bright orange with small black spots, pale greyish orange, silvery grey, light grey with orange stripes, or dark grey with reddish orange stripes; even juveniles showed different tendencies to predominantly orange or predominantly greyish coloration.

Males and females of various species may be extremely sexually dimorphic in coloration (Pl. 1 Fig. B, C–F). The coloration of adult *mimosarum* males is strikingly different from that of juveniles and females (as in all species of the *africanus* group). But occasionally very small adult males have been found which had maintained their juvenile colour patterns; this is true for the type specimen of *simoni* [= syn. of *mimosarum*], for example.

At present, information based on living materials is fragmentary, and the coloration of museum specimens preserved in alcohol is notoriously faded; the dark coloration of males, for example, changes rapidly to cinnamon brown or pale yellow. The bright colour patterns of many eresids are predominantly caused by zones of white or pigmented plumose hairs; the pigments are unstable or can even be destroyed in alcohol. It may therefore be difficult to imagine what living spiders of a given species might look like for someone familiar only with preserved specimens. – The colouring of preserved materials is described here (i) because there is often no other information available, and (ii) in order to facilitate the identification of materials collected in the field (such specimens are almost exclusively preserved in alcohol).

b) Copulatory organs: structure and function

b¹) Male pedipalps

The segments of the male pedipalps are unremarkable, with no peculiarities; a tibial apophysis is lacking and there is no terminal claw at the tip of the cymbium.

In unexpanded bulbs (Fig. 7), basal haematodocha (*bH*) and subtegulum (*ST*) (terminology according to KRAUS 1978, 1984; see also LAMORAL 1973) are not visible. They are covered and thus hidden in the alveolar cavity (*A*) of the Cymbium (*C*) by the large broad basis of the subglobular tegulum (*T*). A narrow haematodocha (*mH*) is discernible between cymbium and the most basal part of the bulb in its normal contracted position. According to the analysis below, this is the median haematodocha located between subtegulum and tegulum.

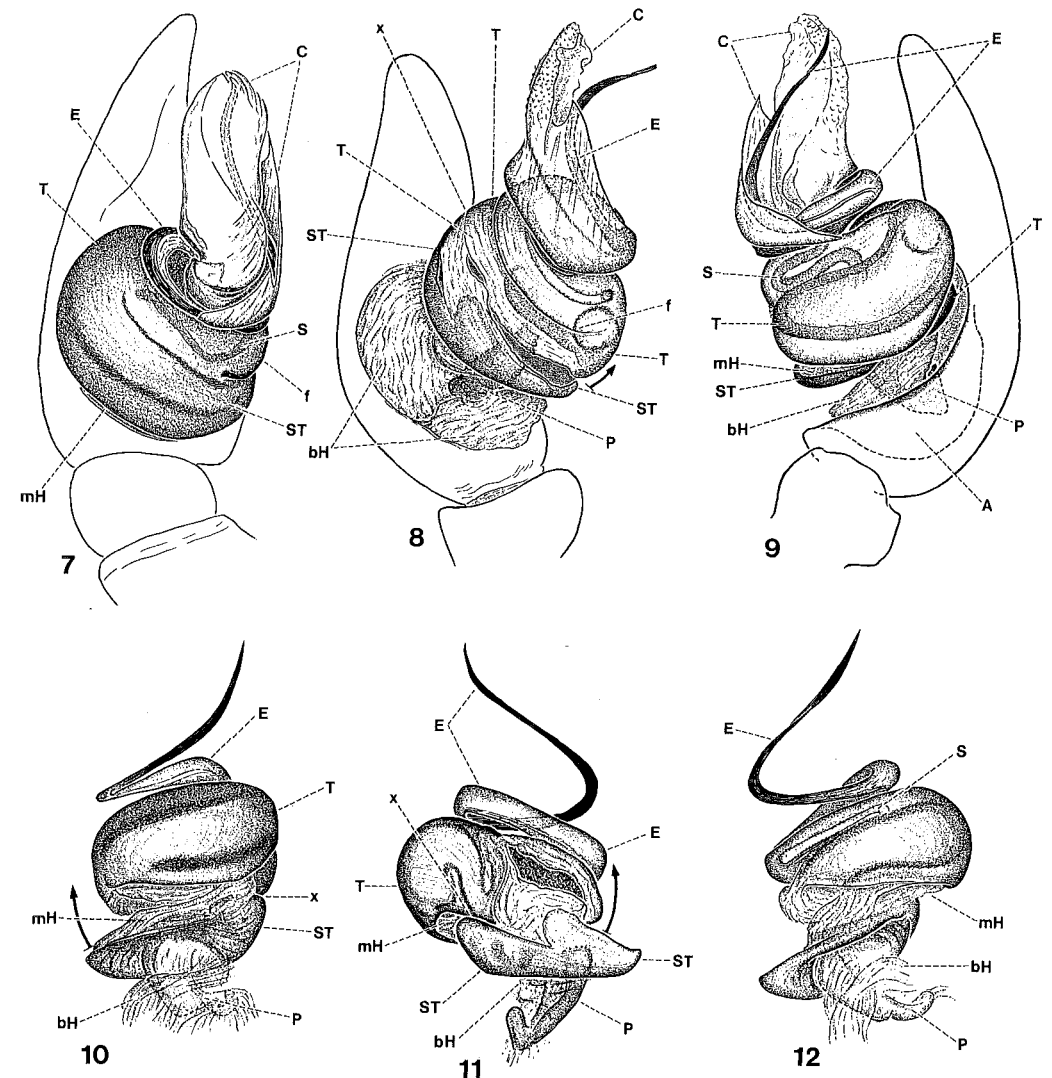


Fig. 7–12: Male pedipalp: Homology and function. – 7) Bulb not expanded; 8–9) bulb artificially expanded [note deep pocket in Fig. 8 formed by median haematodocha, close to arrow]; 10–12) various aspects of bulb, conductor [= terminal lamella] removed. – Fig. 7: *S. tingelin*, all others *mimosarum*.

Artificially expanded bulbs (Fig. 8–9) permit the study of the various components of the male sperm transfer organ. There is a very wide alveolar groove (*A*) on the ventral side of the cymbium. Its borders are connected with the subtegular sclerite by a voluminous basal haematodocha (*bH*); a sclerotized petiolus (*P*) (LAMORAL 1973) forms a link between cymbium and subtegulum. This element (*ST*) has a small hole in the middle; the distal process of the petiolus passes through this opening like a finger and extends into the lumen of the more terminal parts of the bulb (Fig. 8, 11).

The bulb is mechanically stabilized by this "finger" in the hole of the subtegulum, but rotation of the copulatory apparatus (as an entity) is also possible. The median haematodocha (*mH*) forms a very deep pocket (Fig. 10) on one side of the bulb. On the opposite side, subtegulum and tegulum are directly connected mechanically (*x* in Fig. 8, 10–11). The effect of the expansion of the median haematodocha is to tilt the tegulum as indicated in Fig. 8, 10–11 by an arrow. The distal haematodocha (*dH*) is minute and is confined to the narrow stalk of the terminal sclerites (conductor *C* guiding the embolus *E*). This permits rotation of these parts around the longer axis. It is important to note at this point that the base of the embolus is tightly fused with the apical region of the tegulum (*f* in Fig. 7–8). The rotation of the terminal element is directed against the spiral curve of the embolus. Accordingly, the proximal region of the embolus glides into an ascending spiral lamella of the conductor (Fig. 13–14). The tip of the bristle-like embolus (which is also guided by lamellae, see Fig. 128, 131, for example) thus leaves the terminal apparatus and may penetrate into the female copulatory opening (*IO*, see Fig. 143).

The fundus of the large spermophor (*S*) is fused with the chitinous wall of the bulb. The spermophor itself is equipped with a broad zone of glandular pores on one side only; but its terminal tubular region, which is much narrower, has such pores on all sides.

With regard to uptake and expulsion of sperm, the male copulatory organ of *eresids* apparently functions as a glandular bulb. This explains the globular shape of the inflated tegulum, which is almost completely occupied by equivalent whitish glandular systems. But functional changes in the relative position of the various chitinous parts of the bulb (rotation and tilting) are regulated by hydraulic mechanisms, with the exception of the terminal apparatus (see p. 166).

b²) Female epigynum and vulva

In principle, the epigynum has the shape of a semicircular or trapezoid chitinous plate (Fig. 24–26). A wide median depression is more or less completely bordered by chitinous ridges (Fig. 16), at least in the anterior region. Introductory openings (*IO*) are located at the anterior lateral border of the central field, very close to the lateral ridges or rims (exceptions in *lineatus* and *nathistmus* are only gradual, see Fig. 230, 234). In various species of the *mirandus* group the epigynum has a more or less vertical position actually *in* (!) the epigastric furrow. Details are explained on p. 171; see also introduction to this species group (p. 221).

The vulval structures (Fig. 19–20) may be derived from two folds of the cuticula, which converge at their anterior ends. They have extended deeply and formed receptacula with rather thick, heavily sclerotized walls. In principle, the construction is the same as in the pisaurid genus *Thalassius* (see SIERWALD 1987: 69, 71). The nature of the origin of the vulval structures explains how adult females are able to moult the chitinous parts of their genitalia completely (Fig. 3–4, 98–99); it is also evident why the introductory openings are locally broadened slits.

The vulvae show three intergrading regions. The first is located in front of the introductory openings; the anterior tips are normally equipped with glandular structures. A second region (in most cases with relatively wide lumina) usually forms more or less prominent loops which may bulge out towards the median line. The third and posterior part of the vulva is close to the epigastric furrow and bears a dorsal subglobuliform enlargement with multilocular receptacular cavities. Fertilization ducts form part of this region of the vulva (*FD* in Fig. 19).

Various species of the *mirandus* group (see p. 221) seem to differ considerably; the most extreme representatives are *S. tentoriicola* and *dumicola* (Fig. 195–198, 255–258). But this is primarily due to the unusual orientation already mentioned. The second and, even more, the third region of the vulva is divided into a large number of protuberances with inside receptacular cavities. As a result of the steep position of these organs, fertilization ducts are not located close to the epigastric furrow; they are remote from the usual ventral position and have been shifted much deeper into the opisthosoma (*FD* in Fig. 250).

Many but not all individuals of *tentoriicola* and *dumicola* show paired, membranous, non-sclerotized appendages; they are extensible and located at the posterior border of the epigynum (*in situ* position), i.e. at the epigastric furrow (Fig. 254, 257–259). The insertion of these delicate structures is very close to the introductory openings. They may be contracted when they show numerous folds (Fig. 254, 258), or expanded (Fig. 257, 259). One possible reason why these parts of the epigynum have hitherto been overlooked is that they are easily lost, especially during preparation. Their function remains unknown; in various cases we have seen that they may contain sperm.

b³) Sperm transfer: contact and linkage

In *eresids*, the mechanics of linkage between male and female copulatory organs has not yet been observed in detail. Obviously, the female epigynum does not offer precise structures for anchoring terminal parts of the expanded male bulb. But as posterior parts of the median field of the epigynum are often unsclerotized (see, for example, Fig. 15–18), it cannot be excluded that such pillow-like transverse structures may be expanded to fit the bulb. The conductor of the male palp is frequently equipped with adhesive surface structures (see, for example, Fig. 53, 214). At present, it seems most probable that the male simply touches the epigynum with the terminal apparatus of its bulb, and then squeezes this element into the corresponding groove with the introductory opening. We assume that this causes the rotation of the conductor described on p. 164, and thus the tip of the embolus enters into the female genital opening.

S. tentoriicola and *dumicola* (Fig. 31) are different as one lamella of the conductor forms a claw-like structure. In both species, the epigynum shows corresponding sclerotized grooves for anchorage of these parts. This could also improve the mechanical rotation mechanism of the conductor by tension.

Rotation of the terminal apparatus (which is functionally correlated with the appearance of the free tip of the embolus) has been carried out artificially under the stereomicroscope with suitable instruments. As soon as the conductor is released it returns

to its original position by means of a spring-like mechanism; it functions automatically. The rotation of the conductor is not regulated by haemolymph pressure, and thus the extreme reduction of a distal haematodocha can be functionally explained.

Male copulatory organs vary enormously in size (according to the size of the individuals) but not in shape. The female organs also vary widely in size, but there is also very wide intraspecific variation in the shape of the epigynum and vulva. This is demonstrated by Figs. 156–173 and 237–242). Variation in size may be another argument in favour of our assumption that copulating males simply touch and then squeeze against the relevant parts of the epigynum. As the tip of the embolus can be characterized as an extremely fine cannula, it may function independently of the relative size of sexual partners. Is intraspecific variation of the epigynum and vulva less controlled by means of functional coadaptation under such circumstances? But what possible explanation could there be for the remarkably constant shape of the corresponding male organs?

2. Species discrimination

Details of sexual behaviour and other potential isolating mechanisms have not yet been studied. There is no information available that would permit the recognition of biospecies by direct reference to biological barriers between such units. We rely on indirect approaches (MAYR 1975: 167–181).

a) Specimens found at the same locality (syntopic materials) or even in the same colony or nest are regarded as representing biospecies, unless there is evidence to the contrary. Variation occurring in samples of this kind is interpreted with acceptable reliability as intraspecific. Careful extrapolations have been made with regard to other, similar materials.

b) Phenae have been defined. Primarily, they were singled out according to differences especially in male, but also in female genitalia. Many measurements were taken to find out whether such phenae are also different in other characters, e.g.: proportions of prosoma, relative size and position of eyes, relative length of legs (especially the ratio of the length of leg I to the length of the prosoma); in addition to this, several phenae prove to have typical colour patterns (e.g. transverse bands of differently coloured plumose hairs on the front of the chelicerae, specific markings on legs I [as in *manicatus*] etc.). In cases in which it was possible to assign every single individual to a distinct phenon, and no doubtful or even transitional specimens remained, we conclude that the phenon in question corresponds to a separate gene pool, which is protected from others by isolating mechanisms. Such phenae are thus regarded as biospecies.

This approach even functions in situations where genitalic differences are limited to extremely subtle details of the male conductor (see Fig. 52–63, 243–248). We refer to the sibling species *tentoriicola* and *dumicola*; even in this case, it is possible to assign any given male.

According to this indirect recognition of separate species, all social-living representatives of the genus are also biospecies. Additional evidence for this conclusion is presented in section D. 1.

Precise measurements may provide decisive data not only for the separation of species but also for the recognition of males and females of the same species:

BERLAND & MILLOT (1940) described a new species, *S. assumptioni*, on the basis of a single male specimen; they had associated two females captured at a different locality to *assumptioni*. Our measurements (in combination with other characters [coloration]) clearly indicated that this could not be realistic. The females belong to *dufourii*, and the male type of *assumptioni* proved to be nothing but the hitherto unknown male of *manicatus*. But what had been described (SIMON 1908; BERLAND & MILLOT 1940) as the male of *manicatus* was recognized as *dufourii*.

A few taxonomic decisions remain uncertain at present (species borders of *S. dufourii*, identity of male associated to *hildebrandti* [type is ♀], validity of *lineifrons* [♂ unknown], assumed identity of *simplicifrons* [Madagascar] with *mimosarum* [Africa]. These problems are due solely to lack of information and are individually discussed later.

II. Taxa

1. Genus *Stegodyphus*: Definition

Synonymy:

- 1873 *Stegodyphus* SIMON, Ann. Soc. ent. France, 5 (3): 336 (D).
- 1892 *Stegodyphus*, – SIMON, Hist. natur. Ar., 1: 253 (D).
- 1900 *Stegodyphus*, – POCKOCK, Fauna Brit. India (Arach.), :208 (D; key 5 species).
- 1955 *Stegodyphus*, – ROEWER, Kat. Aran., 2b: 1297 (C).
- 1958 *Stegodyphus*, – BONNET, Bibl. Aran., 2(4): 4145 (C).
- 1963 *Stegodyphus*, – TIKADER, J. Univ. Poona, 24: 32 (N; key 4 species).
- 1967 *Stegodyphus*, – LETHINEN, Ann. zool. Fennici, 4: 265, 371, 388 (D).
- 1967 *Magunia* LEHTINEN, Ann. zool. Fennici, 4: 246, 387, 388 (D).

Type species of *Stegodyphus*: *Eresus lineatus* LATREILLE, 1803. Three nominal species were originally included by SIMON, *lineatus*, *Eresus adpersus* C.L. KOCH, 1846, and *E. molitor* C.L. KOCH, 1846; on page 338 of the original publication SIMON stated: "Ces deux derniers *Stegodyphus* [i.e. *adpersus* and *molitor*] rapellent par leur coloration les variétés les plus blanches de l'espèce type." This remark is regarded as an indication that *E. lineatus* is the type species (by original designation).

Type species of *Magunia*: *Stegodyphus tentoriicola* PURCELL, 1904 [see also introduction to the *mirandus*-group of *Stegodyphus* on p. 220).

Diagnosis:

The genus *Stegodyphus* is defined here according to SIMON (1892): Ocular quadrangle formed by ALE and PLE visibly narrower posteriorly (width of PLE measures 65–90% of width of ALE). Diameter of AME and PME not strikingly different (PME 1.0–1.7 times larger than AME). Relative length of legs I : IV : II : III.

We have seen many representatives of other eresid genera. But there has never been any doubt in assigning specimens to *Stegodyphus*. So this taxon apparently forms a monophyletic unit. A final definition of the genus *Stegodyphus* is not yet possible as its sister group remains unknown. We hope that this problem will be solved shortly, as a revision of all other eresids is in preparation.

Data on the biology of the solitary species are scarce. In a few instances, we report the fragmentary information available (derived from materials we have had direct access to) at the end of the systematic descriptions of single species. Literature data are incorporated only in exceptional cases, as most previous identifications are unreliable.

2. Species groups

The species included here in the genus *Stegodyphus* fall into three groups. They are primarily defined by different character expressions in the male and female genitalia. We assume that these subtaxa form monophyletic entities. At present, any attempt to explain the interrelationships between species groups would be based on speculation.

It is hardly possible to define species groups on the basis of characters derived from their general morphology. Only the *africanus* group can also be characterized by a typical distribution of dark pigmentation on legs I and II.

Eyes: Most species in the *africanus* group have PME considerably larger than AME (1.4 times in *mimosarum*, 1.5–1.6 times in other species); but *africanus* shows comparatively little difference between PME and AME (ratio 1.3–1.4). There is less difference between PME and AME in the *mirandus* and *dufouri* groups (ratio 1.0–1.3); but in *manicatus* [*dufouri* group], the ratio is 1.3–1.5, and in *tibialis* [*mirandus* group] it is as much as 1.6.

Legs: Most species of the *africanus* group have shorter legs I (only 2.1–3.3 times the length of the prosoma) in proportion than most representatives of the two other species groups (ratio 2.5–3.6), but there are exceptions: e.g. ♂ in *africanus* and *mimosarum* (ratio 2.5–2.8) [*africanus* group]; ♀ in *tibialis*, *nathistmus* and *lineatus* (ratio 2.0–2.4) [*mirandus* group]; ♂ and ♀ in *sarasinorum* and ♀ in *manicatus* (ratio 2.1–2.2) [*dufouri* group].

Other measurements (e.g. ratio of length of prosoma to anterior / maximal width; ratio of width of ALE : PLE; ratio of leg lengths I : II : III : IV) are even less characteristic for the definition of groups.

This indicates that such characters, especially eye size and leg length, are more closely related to the biology of single species. They may be diagnostic for species, but seem to have no value for the definition of species groups.

S. africanus group

Males: Bulb with a tongue-shaped, hyaline terminal lamella, distally divided into various folds and tips; surface of distal half of lamella with rows of numerous scale-like protuberances (Fig. 13–14).

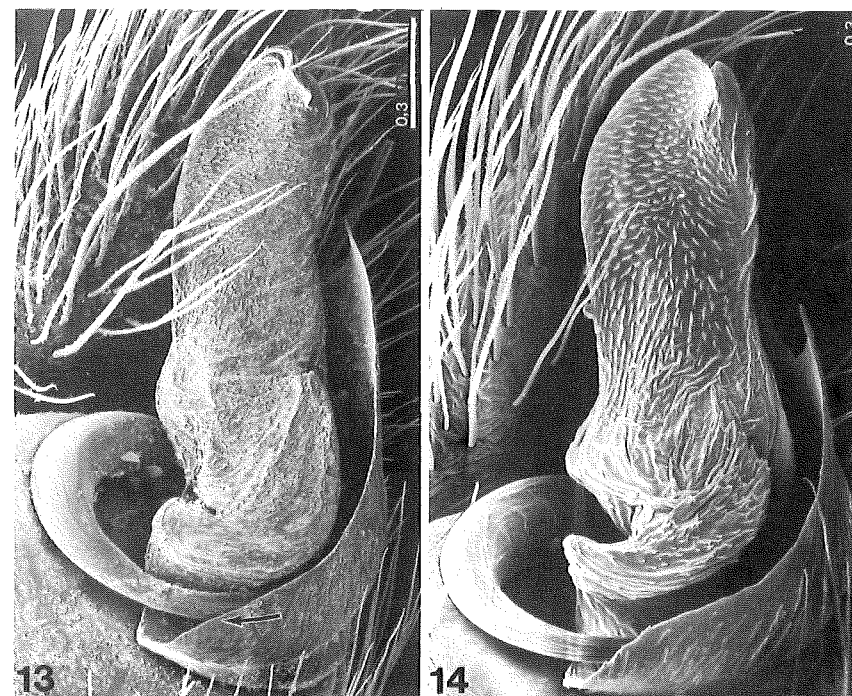


Fig. 13–14. *S. africanus* group: Embolus and terminal element [= conductor] of male bulbs; direction of rotation of conductor indicated in Fig. 13 (arrow). – 13) *Stegodyphus africanus*; 14) *S. mimosarum* [note difference in size].

Females: Epigynum completely on ventral surface of opisthosoma, bordered by two curved and anteriorly converging sclerotized rims; these borders in anterior third of epigynum only moderately curved, more or less subparallel, separated by an obtuse angle from the posterior two-thirds of rims. Posterior field of epigynum occupied by a broad, membranous and whitish (i.e. less sclerotized) transverse pillow-like structure (Fig. 15–18). Vulva see Fig. 19–20.

Femora I + II very dark or even black, tibia I + II black on prolateral side.

Africa (south of the Sahara) (Map 1–3).

S. dufouri group

Males: Terminal element of bulb (guiding the embolus) spirally curved, not sclerotized (or only moderately sclerotized in basal parts); apically narrowed to form 1 or 2 tips (Fig. 21–23).

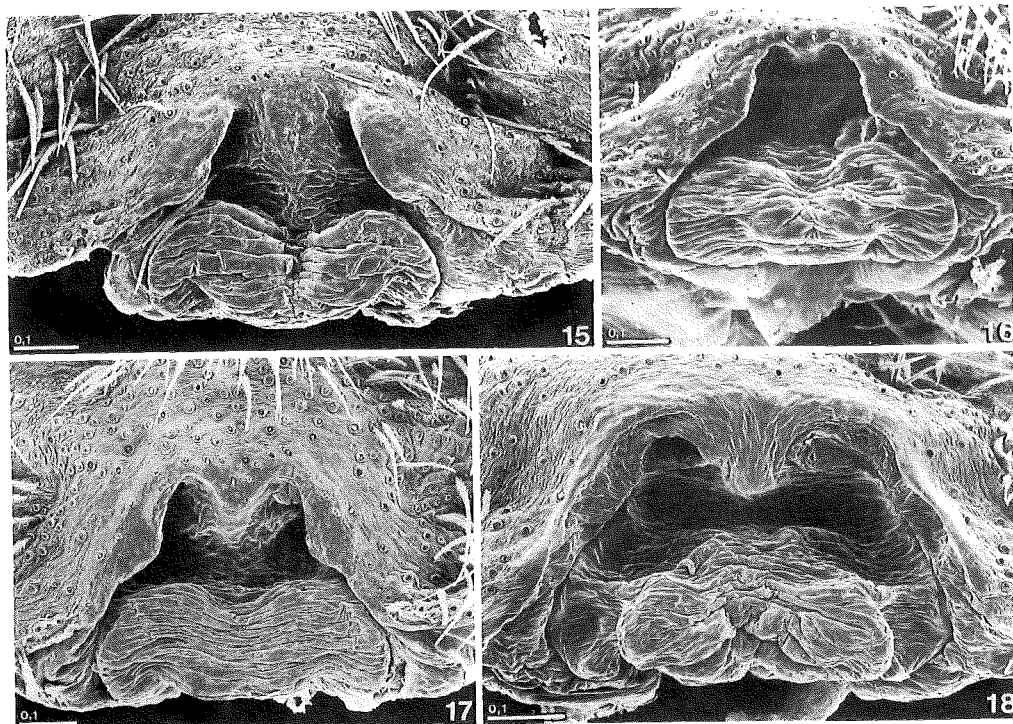


Fig. 15-18: *S. africanus* group: Shape of epigynum and intraspecific variation in *Stegodyphus mimosarum*. Fig. 18 presumably represents an epigynum II (see Fig. 4).

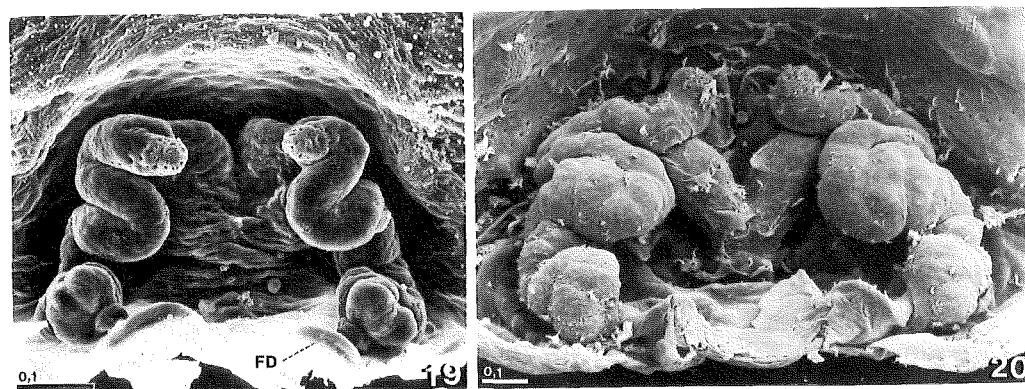


Fig. 19-20: *S. africanus* group: Shape of Vulva. - 19) *Stegodyphus mimosarum*; 20) *S. hildebrandti*.

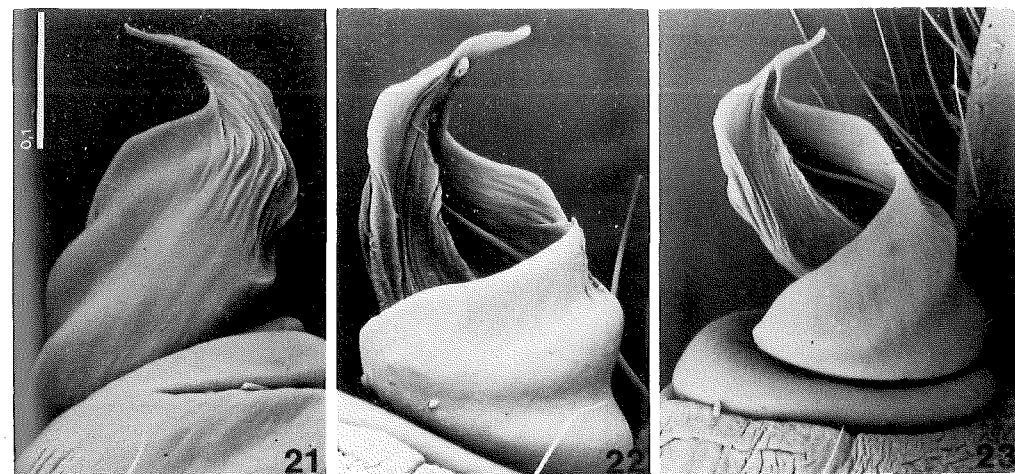


Fig. 21-23: *S. dufouri* group: Embolus and terminal element [= conductor] in *Stegodyphus sarasinorum*, various aspects.

Females: Epigynum completely on ventral surface of opisthosoma; bordered anteriorly by a weak, approximately semicircular fold. Epigynal plate inside this border with two sclerotized rims converging anteriorly in posterior two-thirds; continuation of these rims in anterior third, never converging [as in *africanus* group], but diverging. Between lateral rims a central broad membranous and whitish (i.e. less highly sclerotized) field showing a more or less pronounced brownish (i.e. moderately sclerotized) longitudinal median zone (Fig. 24-26, 142). Vulva see Fig. 27.

Dark pigmentation of legs (if present): annulated or (*manicatus*) femora and tibiae black on ventral and prolateral sides.

Africa (including North Africa), Arabian Peninsula, Iran, Pakistan, Nepal, India, Sri Lanka (Map. 6, 9-11).

S. mirandus group

Males: Bulb with a heavily sclerotized terminal element; at least terminal apparatus with a separate and conspicuous sclerotized lamella or claw-like hook (Fig. 28-31).

Females: Epigynum and vulva in most species in an oblique or even vertical position: *in situ*, posterior elements to varying degree in epigastric furrow (seen from behind [!]) they show a median approximately heart-shaped plate [Fig. 231, 252]). This effects position of vulval structures (Fig. 196). This feature less extreme in *lineatus*, *nathistmus*, *tibialis*.

Dark pigmentation of legs, if present, different (compared with *africanus* group): more or less annulated or all legs blackish (*mirandus*).

Spain, Sicily, Greece, Creta, Rhodos, Turkey, Northern Africa, Near East and South Yemen, Iran, Southern USSR, India, Birma; South Africa (Map 4-5, 7-8, 12).

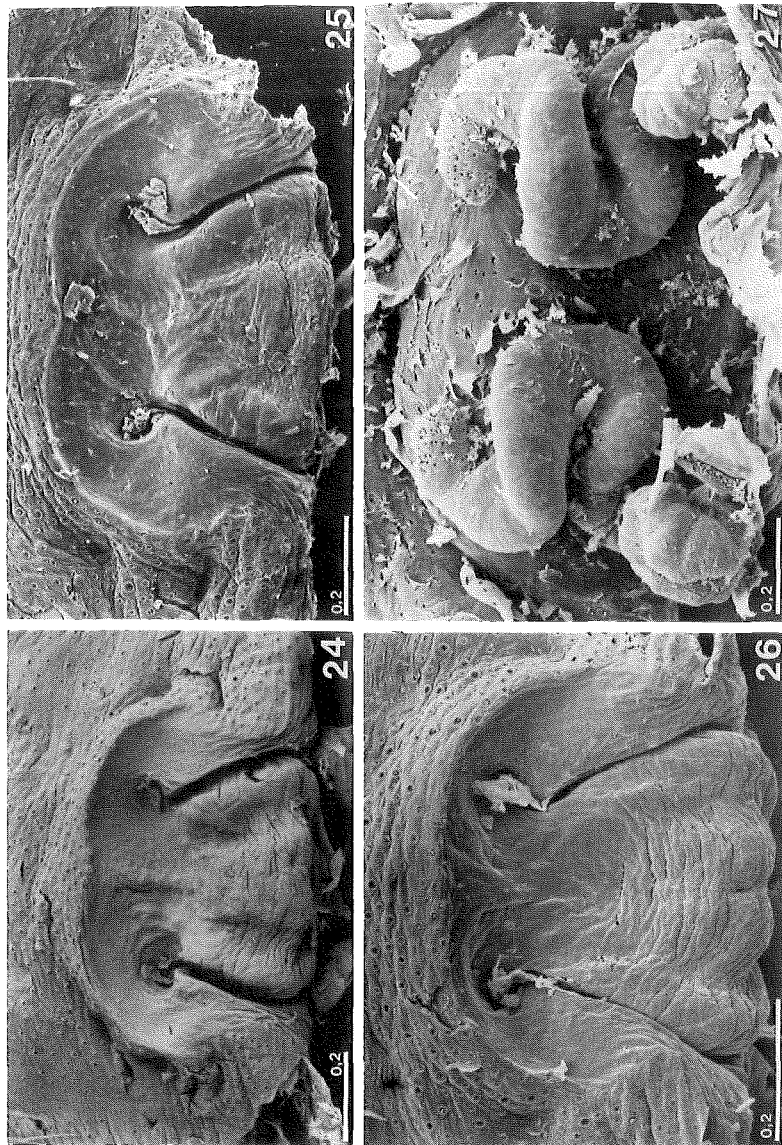


Fig. 24–27: *S. dufouri* group: Shape of epigynum and vulva in *Stegodyphus sarasinorum* [note intraspecific variation of epigynum].

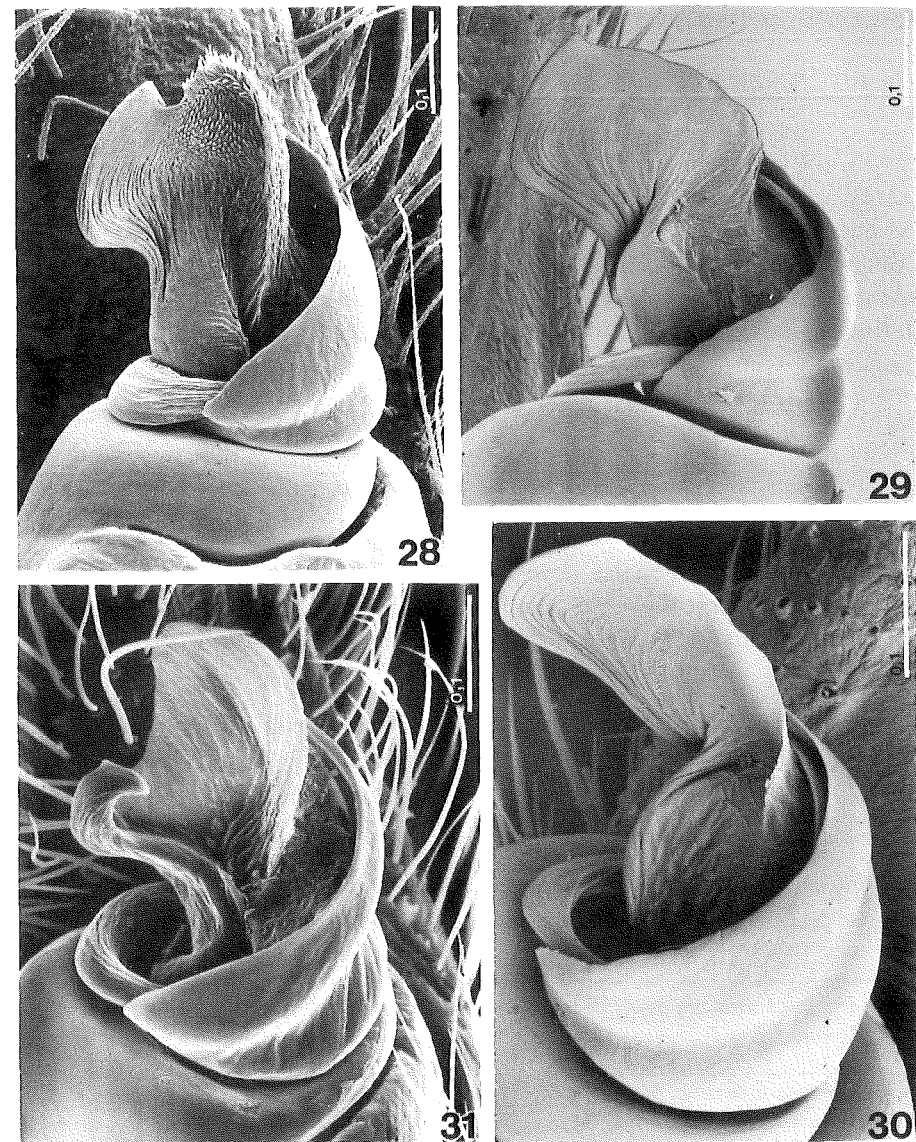


Fig. 28–31: *S. mirandus* group: Embolus and terminal element [= conductor]. – 28) *Stegodyphus lineatus*; 29–30) *S. nathistmus*; 31) *S. dumicola*. – Blade-like terminal lamella perspective shortened in Fig. 29.

3. Descriptions (with keys to species)

a) *S. africanus* group

At present, the *africanus* group comprises seven species, but both sexes are known in only three: *africanus*, *hildebrandti*, and *mimosarum*. In all other instances, one sex has not yet been found and thus remains unknown (see Table 1). It may well be that *tingelin* n. sp. (♂) from tropical West Africa represents a separate species, but we cannot exclude the possibility that it is the male of one of the three species for which only the female has so far been described. It would be risky at present associate males and females with sufficient reliability in such cases of remote geographical origin.

As far as is known, adult males and juvenile specimens + females are strikingly dimorphic in coloration. We cannot exclude the possibility that tiny adult males in social species may maintain their juvenile colour pattern; but this observation comes from alcohol-preserved materials and may also be due to fading.

Species discrimination in males necessitates a careful study of the shape (including proportions) of the apical tongue-like lamella of the bulb and also of the apical hyaline elements of this part (Fig. 13–14). Different colour patterns provide additional characters.

Species discrimination in females can be unusually difficult. We rely on reproducible combinations of characters. For example, it seems hardly possible to separate *africanus* and *sabulosus* on the basis of differences in shape and construction of the epigy-

Tab. 1: *S. africanus* group: Synopsis: Proportions and ratios derived from measurements.

	L prosoma : W pros. anteriorly	L prosoma : max. W pros.	Diam. PME : diam. AME	W PME : W AME	W PLE (% of W ALE = 100%)	Relative L of legs ¹⁾	L leg I : L pros.
<i>africanus</i> ♂	1.6	1.45	1.25 .. 1.4	1.5	80 .. 88%	118:87:72:100	2.6 .. 2.8
<i>africanus</i> ♀	1.6	1.5	1.3 .. 1.4 ²⁾	1.5	65 .. 78%	113:85:73:100 118:88:73:100	2.2 .. 2.4
<i>hildebrandti</i> ♂	1.66	1.5	1.6	1.65	75%	115: :68:100	2.6
<i>hildebrandti</i> ♀	1.6 .. 1.7	1.4 .. 1.6	1.5 .. 1.6	1.5 .. 1.7	71 .. 74%	114:88:73:100	2.0 .. 2.2
<i>sabulosus</i> ♀	1.6 .. 1.8	1.4 .. 1.6	1.3 .. 1.6 ²⁾	1.5 .. 1.7	73 .. 79%	109:85:69:100 117:89:71:100	2.1 .. 2.3
<i>lineifrons</i> ♀	1.6	1.5	1.5	1.6	73 .. 75 %	112:87:69:100 114:88:73:100	2.2 .. 2.3
<i>tingelin</i> ♂	1.6	1.4	1.6	1.7	80%	108:83:71:100	2.1
<i>simplicifrons</i> ♀	1.65	1.55 .. 1.60	1.6	1.7	75%	111:85:71:100	2.3
<i>mimosarum</i> ♂	1.7	1.5	1.4	1.4 .. 1.5	75%	116:84:62:100	2.5
<i>mimosarum</i> ♀	1.7	1.5	1.4	1.4 .. 1.5	75%	102:84:62:100	2.1

¹⁾ In 3 cases two relations are given; they refer to the largest (first position) and smallest specimens (second position), but in *lineifrons* 112.. refers to *affinis* (synonym) and 114.. to *lineifrons* s. str.

²⁾ Lowest values in largest specimens.

L : length; W : width (for eyes see Fig. 5–6)

Tab. 2: *S. africanus* group: Variation of total length in different species.

	<i>africanus</i>	<i>hildebrandti</i>	<i>sabulosus</i>	<i>lineifrons</i>	<i>tingelin</i>	<i>simplicifrons</i>	<i>mimosarum</i>
♂	7.6 .. 10.2	5.9	?	?	7.6	?	3.5 .. 5.2
♀	14.2 .. 22.4	12.6 .. 18.1	14.3 .. 17.1	15.3 .. 16.0	?	10.5 .. 12.0	6.0 .. 12.4

num and vulva. But the two species differ in details of the shape of the prosoma, and also in the size and proportions of their median eyes/eye field. These differences in structures are supplemented by different colour patterns. *S. hildebrandti* is even more difficult to differentiate, especially from *africanus*, but we are able to associate each individual to one of these species. *S. lineifrons* appears to differ in its unique vulval structures (see note (4) on p.192). The status of *simplicifrons* from Madagascar remains uncertain: the few female specimens known to date (preserved in alcohol for more than 80 years) do not permit a final evaluation, and no males of this species have yet been discovered; further details are discussed below (under *simplicifrons*).

Provisional key to species (Table 1, 2):

1. Males 2
- Females 5
2. Prosoma length between 1.7 and 2.4; “cephalic” part of prosoma low as in juveniles of other species (Fig. 49). Terminal tongue-like lamella of bulb comparatively short. Coloration see Pl.1 Fig. B; Fig. 37–39 *mimosarum*
- Prosoma length at least 3.1, in most cases much more, up to 5.6; “cephalic” part of prosoma elevated. Terminal tongue-like lamella of bulb longer, subparallel 3
3. Anterior surface of chelicerae (except for a narrow region close to the claws) densely covered by white plumose hairs; opisthosoma with a broad median longitudinal zone of such hairs, but yellowish, contiguous with terminal broad spot (Fig. 35). First pair of legs short, only about 2.1 times as long as prosoma. Pedipalp see Fig. 56–57 *tingelin*
- Anterior surface of chelicerae with a narrow transverse band of white plumose hairs in basal half, or without such hairs at all; light median zone of opisthosoma not connected with terminal broad spot. First pair of legs at least 2.6 times as long as prosoma 4
4. Prosoma length approx. 3.1. Two small spots of white plumose hairs close to inner margins of PLE. PME 1.6 times as large as AME; ratio W PME : W AME accordingly 1.65. Terminal lamella of bulb (see Fig. 54–55) with apical hyaline folds and sinoidal lamellae extending only slightly beyond tip of this piece *hildebrandti*
- Prosoma length 4.1–5.6. No spots of white hairs close to inner margins of PLE. PME only 1.25–1.35 times as large as AME; ratio W PME : W AME accordingly 1.5 Terminal lamella of bulb (see Fig. 13; 52–53) with apical hyaline folds and sinoidal lamellae helmet-shaped, extending considerably beyond tip of this piece *africanus*
- Note: ♂ of *S. lineifrons*, *sabulosus* and *simplicifrons* are still unknown.
5. Remarkably dark spiders (Pl. 2 Fig. B; Fig. 36), prosoma close to black; no transverse zone of plumose white hairs in basal half of chelicerae. Prosoma relatively long and narrow. Epigynum and vulva (see Fig. 91–95) not significantly different from corresponding structures in *africanus* (which differs in coloration and proportions of eyes) *sabulosus*
- Spiders not blackish, with transverse zone of white or orange hairs in basal half of chelicerae 6
6. PME only 1.3–1.4 times as large as AME; ratio W PME : W AME accordingly 1.4–1.5 7
- PME 1.5–1.6 times as large as AME; ratio W PME : W AME accordingly 1.5–1.7 8



Fig. 32-39: Dorsal colour patterns of opisthosoma. – 32-33) *Stegodyphus africanus*; 34) *S. hildebrandti*; 35) *S. tingelin*; 36) *S. sabulosus*; 37-39) *S. mimosarum*. – Fig. 32-35, 37-39 ♂; Fig. 36 ♀.

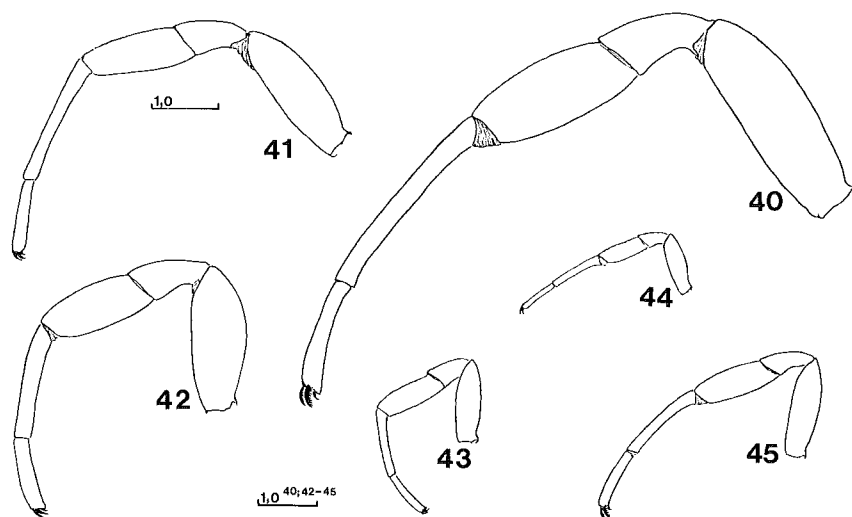


Fig. 40-45: Legs I of males, retrolateral aspect. – 40) *Stegodyphus africanus*; 41) *S. hildebrandti*; 42) *S. tingelin*; 43-45) *S. mimosarum* [45: specimen from Madagascar].

7. Hair zone in basal half of chelicerae and also hairs in frontal eye triangle (formed by ALE + PME) orange. Relatively large spiders (prosoma L 6.1-8.4). Vulva see Fig. 78-84 *africanus*
- Hair zone in basal half of chelicerae and also hairs in frontal eye triangle from white to orange. Relatively small spiders (prosoma L 3.0-5.8) *mimosarum*
8. Epigynum with a broad trapeziform median plate (Fig. 100); paired vulval structures compact (Fig. 101). Relatively small spiders (prosoma L 4.3-4.7) *simplicifrons*
- Epigynum with a narrow trapeziform median groove, laterally bordered by sclerotized rims (Fig. 85; 89; see also *africanus*!); paired vulval structures with heavily inflated parts in their middle region and relatively long, converging anterior tubes forming an obtuse angle (Fig. 86; 90). Medium sized to very large spiders (prosoma L 5.7-8.8) 9
9. Vulva as in Fig. 86-88; epigynum (Fig. 85) with V-shaped structure *hildebrandti*
- Vulva as in Fig. 90; epigynum (Fig. 89) without V-shaped structure (i.e., funnel-like structure invisible from outside) *lineifrons*

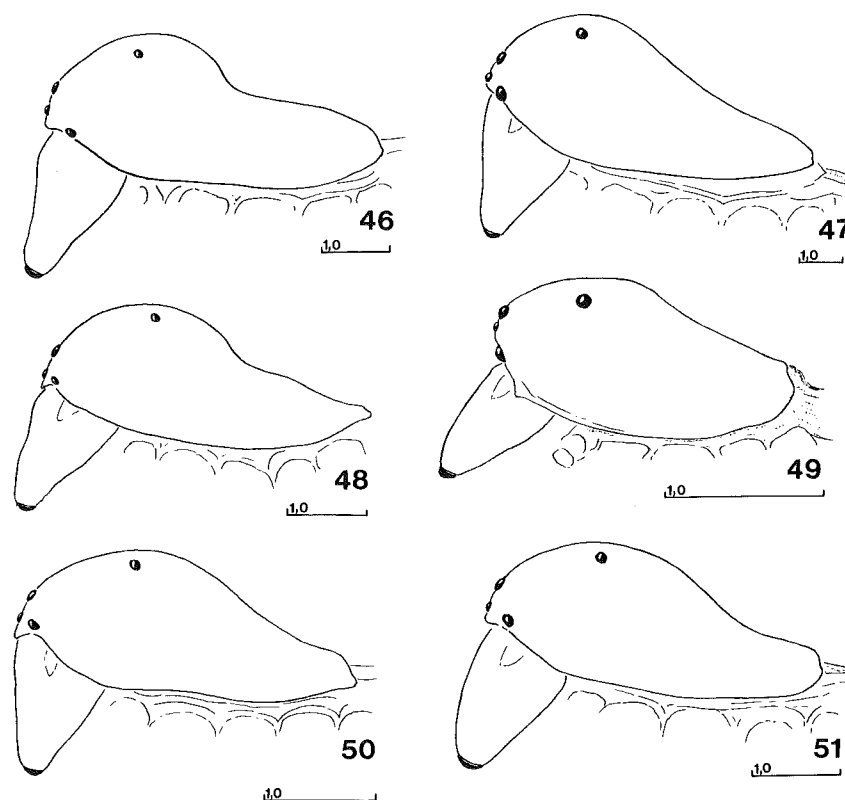


Fig. 46-51: Profile of prosoma. – 46) *Stegodyphus africanus*, ♂; 47) ♀; 48) *S. tingelin*, ♂; 49) *S. mimosarum*, ♂; 50-51) ♀.

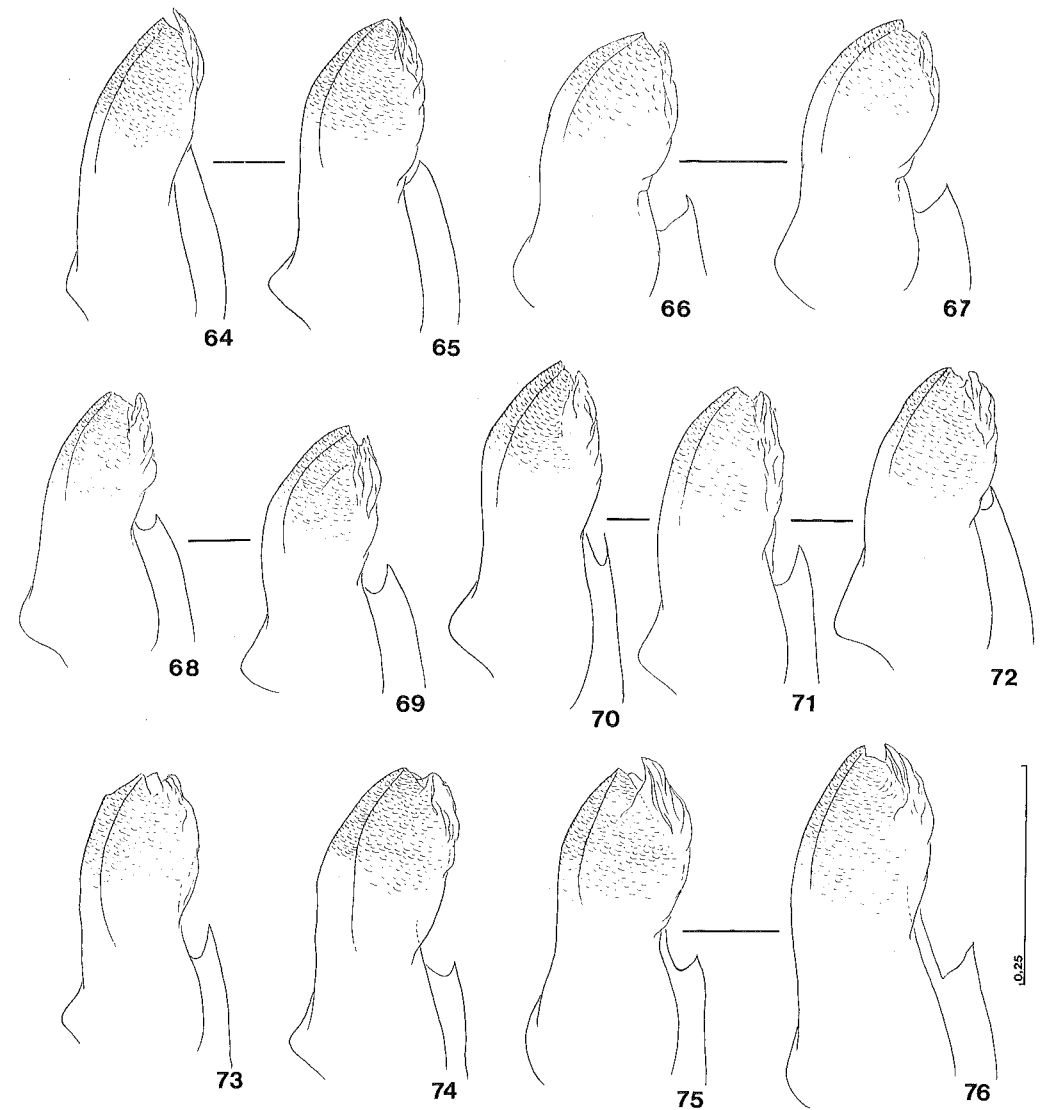
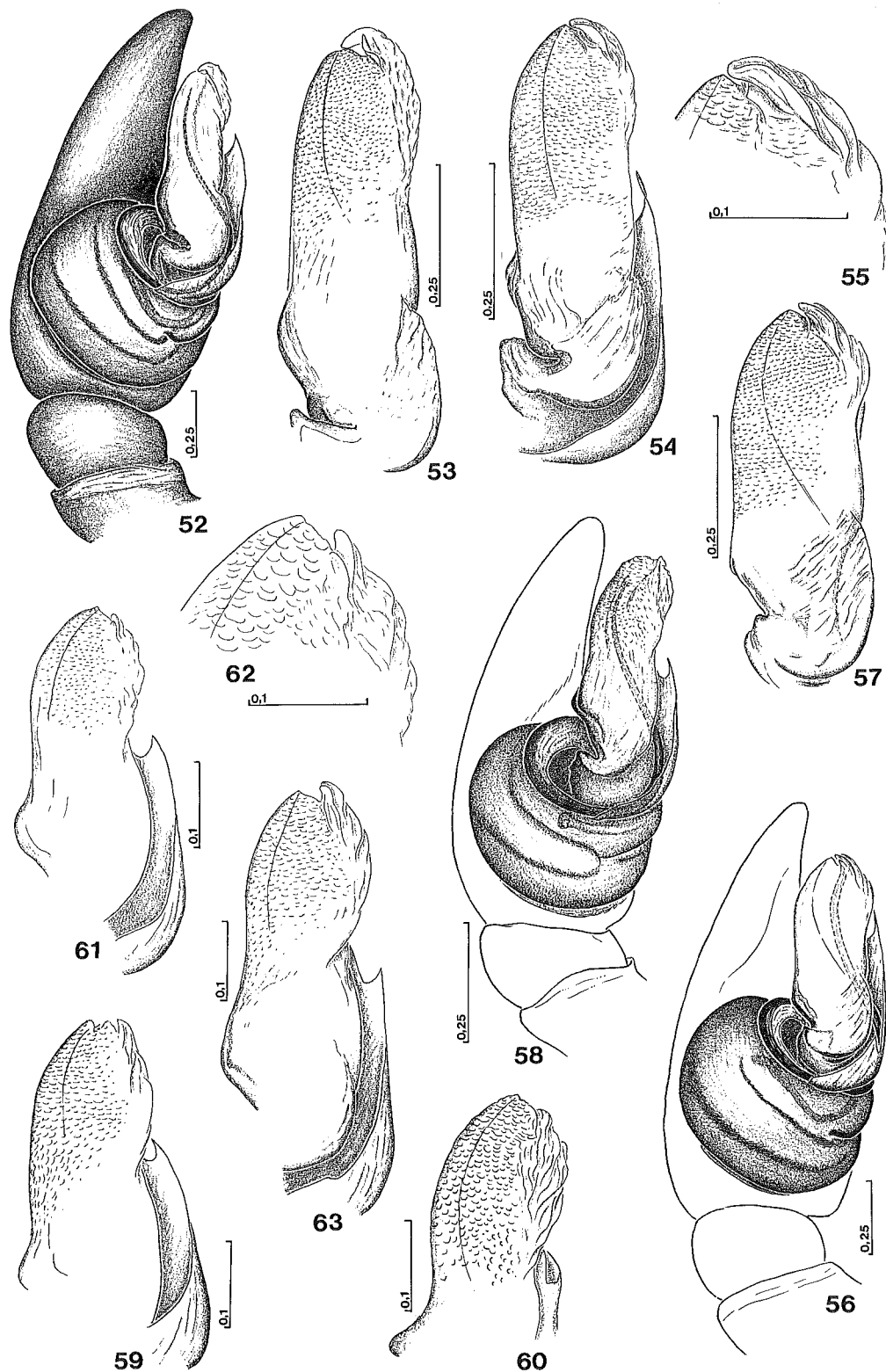


Fig. 64-76: Intraspecific variation of terminal lamella in *Stegodyphus mimosarum*. - 64-65) Congo; 66-67) Serengeti; 68-69) Durban; 70-72) Natal; 73) Kruger Park; 74) Transkei coast; 75-76) Madagascar. - Note (a) differences at same locality; (b) similarities at remote localities [e.g. Fig. 64-65 compared with Fig. 75-76]; (c) differences in size. - All drawings at same scale.

Fig. 52-63: Male palps and details of terminal lamellae. - 52-53) *Stegodyphus africanus*; 54-55) *S. hildebrandti*; 56-57) *S. tingelin*; 58-63) *S. mimosarum* [63: specimen from Madagascar].

Stegodyphus africanus (BLACKWALL, 1866)

(Pl. 1 Fig. A; Pl. 2 Fig. A; Fig. 13, 32–33, 46–47, 52–53, 77–84; Map 1)

1866 *Eresus africanus* BLACKWALL, Ann. Mag. natur. Hist., (3) 18: 453 (D ♀) – vid.!

1906 *Stegodyphus luctuosus* SIMON, Ann. Soc. ent France, 50: 306 (D ♂) – vid.!

?1906 *Stegodyphus tibifer* STRAND, Zool. Anz., 30 (19–20): 687 (D ♂).

?1907 *Stegodyphus tibifer*, – STRAND, Societas entomol., 22: 65 (D ♂).

Strand described the same male specimen on two occasions. According to its size it is certain that *tibifer* is different from *mimosarum*. As the species has remained unfigured and the type was lost in World War II, it is not possible to solve the problem of its identity. It is merely suggested that STRAND had a specimen of *africanus* in his hands – the most common species of the group in the region of the type locality.

Up to now, it has remained quite uncertain what BLACKWALL really had named. He described one adult and one immature female (syntypes). However, the tube containing his material also contains two adult males; in their condition [of preservation] they are very close to the syntypes. It therefore seems that these males may have been part of the original series. [Perhaps BLACKWALL did not mention them in his original description?]. The males are clearly conspecific, but according to the author's original description they do not have any status as types.

S. africanus seems to be the most common non-social species in the group.

Proportions of legs not significantly different between males and females, close to identical. But length of leg I is 2.6–2.8 times length of prosoma in males, and in females only 2.2–2.4 times. Leg I of male is distinctively modified: tibia very thick and fusiform (Fig. 40); patella and tibia with striking fringes of long dark hairs, dorsally less developed than ventrally.

Male pedipalps see Fig. 13; 52–53. Terminal lamella very large, tongue-shaped, borders of distal two-thirds nearly parallel; at distal end a small but clearly visible lamella, sinoidal in shape; it extends beyond another lamella and forms a semicircular hook; both elements extend considerably beyond other parts of the terminal lamella and are characteristic for the species. Proximal lamella C of terminal apparatus guiding the embolus forms part of an ascending spiral fused on one side with terminal lamella (as in *mimosarum*).

Female genitalia see Fig. 77–84. Epigynum very broad posteriorly, bordered by paired, anteriorly converging and heavily sclerotized rims; these sclerotized borders in the anterior one-third of epigynum only moderately curved, nearly straight, separated by an obtuse angle from posterior border. Anterior part of epigynal groove with a median piece, roughly rhomboid in shape, sometimes assymetrical. Broad introductory funnels on each side of rhomboidal median piece, arranged like a 'V'. Posterior part occupied by a broad membranous and whitish (i.e., less highly sclerotized) transverse pillow-like structure, characteristically divided into an (often bipartite) anterior and a homogenous posterior part. – Vulva as in Fig. 78–79; variation see Fig. 80–84.

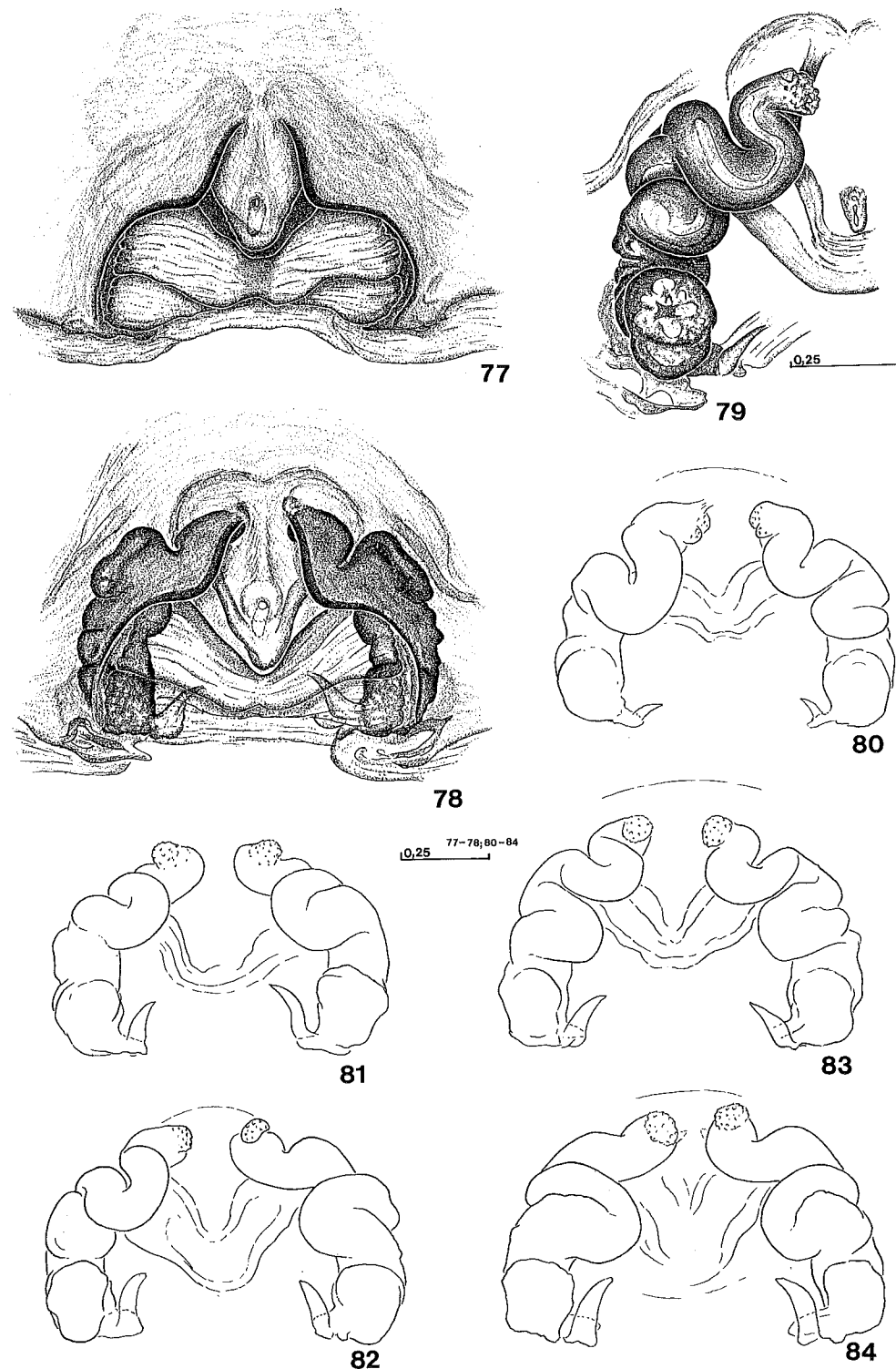


Fig. 77–84: *Stegodyphus africanus*. – 77) Epigynum; 78) epigynum and vulva, ventral view; 79) vulva, dorsal view; 80–84) variation of vulva.

Colour: The coloration of a living female is illustrated in Pl.1 Fig.A; Pl.2 Fig.A. Males and females are strikingly different.

Males (in alcohol): Prosoma (Fig. 46) very dark red-brown, also chelicerae, all femora, legs I and pedipalps [two specimens from Zambia show a slight blue-metallic iridescence]; other parts of legs and sternum only red-brown. There are several zones of white plumose hairs: at lateral margins of prosoma, as a barb at anterior border of clypeus, and also arranged in a transverse zone in the basal half of the chelicerae; such hairs also present at the end of pedipalpal femur (only dorsally), on patella (all sides), and on tibia (dorsomedian only). Opisthosoma covered dorsally and laterally with dark brown plumose hairs, in its anterior two-thirds with a median narrow longitudinal white band (Fig. 32) formed by plumose hairs and extending from the anterior border posteriorly [interrupted in one individual only (Fig. 33)]; each lateral side with a white longitudinal band, descending posteriorly and terminating into two large paramedian spots on the ventral side. Two additional white spots may occur in front of the epigastric furrow on both sides of the genital region.

Females (in alcohol): Prosoma (Fig. 47) light red-brown, also chelicerae and legs I. All other appendages and sternum lighter brown. All femora marmorated with black pigment. There are very obvious zones of black hairs on legs I and II (I: half ventral, prolateral and half dorsal zone of femur, ventral and prolateral part of tibia; II: half ventral and prolateral side of femur, half ventral and prolateral part of tibia); especially tibiae I + II on ventral side with relatively long black hairs, similar to the (much more conspicuous) fringes present in males. Various broad zones are covered with white plumose hairs: prosoma (but not in front) and all appendages in those regions not covered by black hairs. Triangle between clypeus with ALE and PME with a light reddish pubescence which also forms clypeal fringes ('barb'); same pubescence forms a broad band, covering the basal half of the front of chelicerae; other hairs on chelicerae black. Opisthosoma yellowish grey, dorsally with pale reddish hairs (in most cases now pale), crossed by a few narrow transverse rows of white hairs in posterior part. Lateral and ventral sides marmorated with greyish pubescence; two diffuse white bands on each sides, descending posteriorly and forming diffuse paramedian spots between epigastric furrow and spinnerets.

Discussion. In doubtful cases, the species can be recognized by the relations of size and width of the anterior eye field (Table 1). We have found this to be a reliable, reproducible character. – For further details, especially with regard to males, see discussion under *hildebrandti*.

Biology. Specimens from Kisenge, Zaire (7♀, MRAC 126.091) are accompanied by the following note on the museum label: "sorti de nids tubulaires dans la terre, prof.

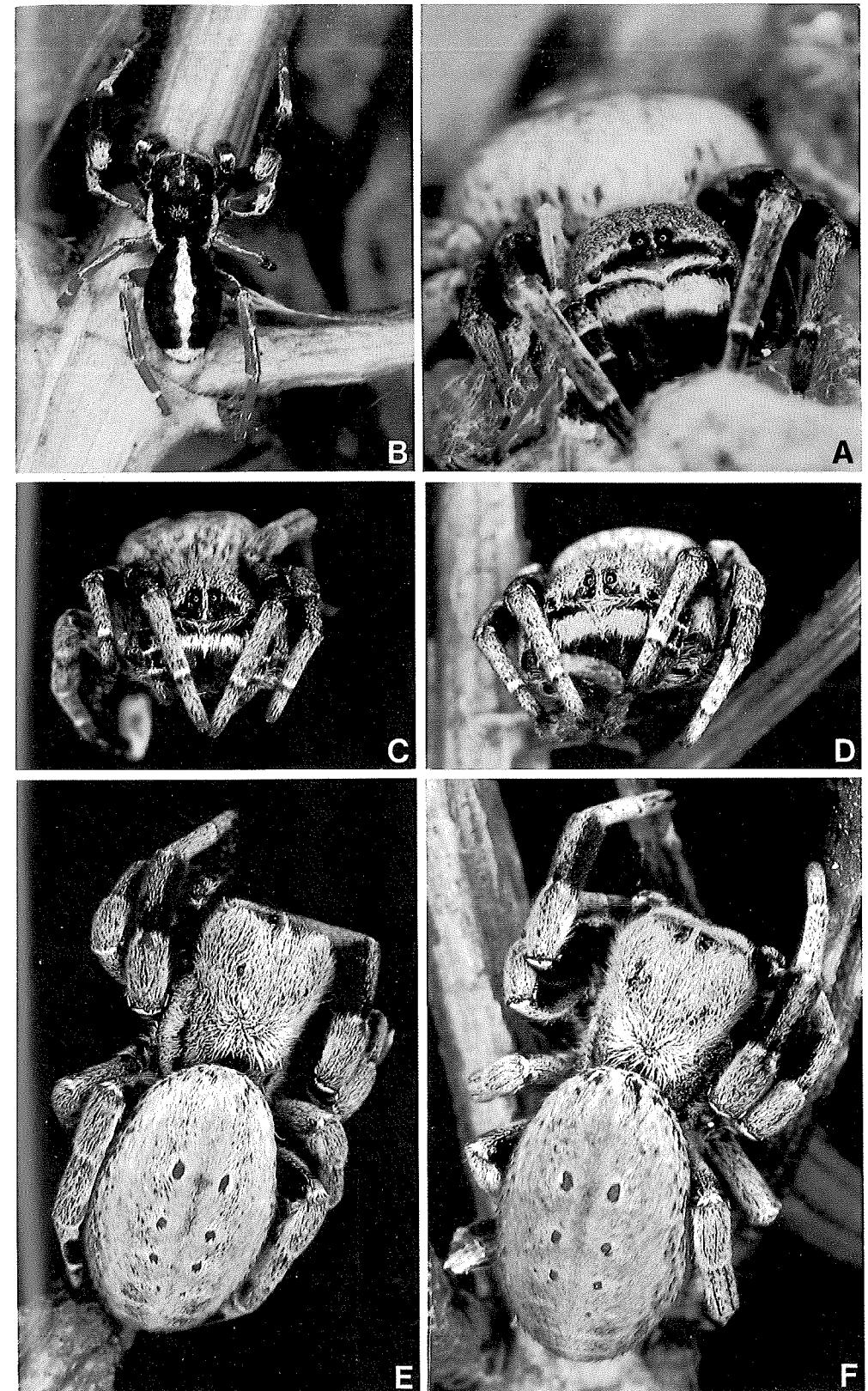


Plate 1

Fig. A: *Stegodyphus africanus*, ♀.

Fig. B–F: *S. mimosarum*. – B) ♂; C–D) types "black face" and "orange face" from same nest [note close similarity between A and D]; E–F) colour variation in ♀ from same nest.

15–20 cm.” This has not yet been reported in other instances. A careful study of all characters of these specimens (coloration, measurements, proportions, epigynal and vulval structures) did not reveal any difference from our present concept of the species *africanus*. – See also SEIBT & WICKLER (1988, Fig. 9).

Among other specimens WICKLER & SEIBT (1988) found a single large female inhabiting the nest of the social species *S. dumicola* as a solitary parasite; it was observed catching and eating the much smaller *dumicola* specimens (see also corresponding remarks under *S. sabulosus* and *hildebrandti*).

Perhaps the species is relatively flexible with regard to its habits. Additional observations seem to be promising.

Measurements. ♂: Total L 9.0, prosoma L 5.0, W ant 3.1, max W 3.4; diam AME 0.21, PME 0.27; W AME 0.50, PME 0.79, ALE 2.5, PLE 1.9. – ♀: Total L 20.0, prosoma L 8.2, W ant 5.1, max W 5.6; diam AME 0.27, PME 0.35; W AME 0.75, PME 1.05, ALE 4.1, PLE 3.2.

Localities and materials. Cameroon: Yaounde (4♂ SMF RII/9085).

Cabinda: Luali (2♂ MRAC 27.582–4; FREYNE leg. 1937).

Angola: Pungo Andongo (4♀ BMNH 04.7.9.65–84 part.; ANSORGE leg.). – Benguela, Caconda (5♀ BMNH 1906.5.28.13–16; leg. 25. XII. 1905). – Moçâmedes (1♀ SMF RII/4828). – Lomba (2♂ BMNH 02.4.6.6–7; SHARPE leg.).

Zaire: Kasai: Tshbala, Mission de Soeurs (1♀ MRAC 66.131; leg. 1949). – Kamina (1♀ SMF 36656). – Katanga: Kisenge (4♀ MRAC 127.583; REGNARD leg. XII. 1964. – 37♀ MRAC 127.978 REGNARD leg. 1965). – Katanga: Bianos (1♀ MRAC 57.321; SEYSEL leg. 13. VIII. 1935). – Malonga, Luashi (2♂ MRAC 2335–6; FREYNE leg. XI. 1938). – Dilolo (7♀ MRAC 126.091; REGNARD leg. 1963). – Kapiiri (1♂ MRAC 30.829; 5♀ MRAC 24.754–8; 5♀ MRAC 29.965–9; CHARLIERS leg. 16.–24. XI. 1913). – Kakanda (2♂ MRAC 77.173–74; DE CATER leg. XII. 1953). – Kakanda, Mutaka (1♂ MRAC 80.755; DE CATER leg. XII. 1953). – Jadotstad [= Likasi] (1♂ MRAC 97.129; DE DECKER leg. I. 1957).

Mozambique: Vallée sous Pungone Guengère (1♂ 1♀ MNHN; VASSE leg. 1906). – Delagoa Bay [= B. de Lourenço Marques] (2♀ HEC 516).

Zimbabwe: Mashonaland: Umluli River and Salisbury [= Harare] (1♀ 1♀ juv. Syntypes, 2♂ BMNH 1896.1.15). – Mashonaland (1♂ Holotype of *luctuosus* MNHN AR 935).

R. South Africa: Transvaal: Zoutpansberg (2♂ MNHN AR 933). – Shiluvane, Naphuno (7♀ TM 13978–79, 13981–85; MAPHOVE leg. I. 1910). – Kruger Nat. Park: Punda Milia, Maseya Sandveld Block N 15 (2♀ 1♀ subad. NM; LAWRENCE leg. 19. XII. 1962). – Kruger Nat. Park: between Shingwedzi and Letaba (2♀ pre-epig.; SEIBT & WICKLER leg. 30. X. 1986). – Kruger Nat. Park: Babalala–Shingwedzi (1♀; SEIBT & WICKLER leg. XI. 1987). – Sangwana, Underberg (1♀ 1♀ pre-epig. TM 7368, 7370; MARLEY leg. XI. 1931).

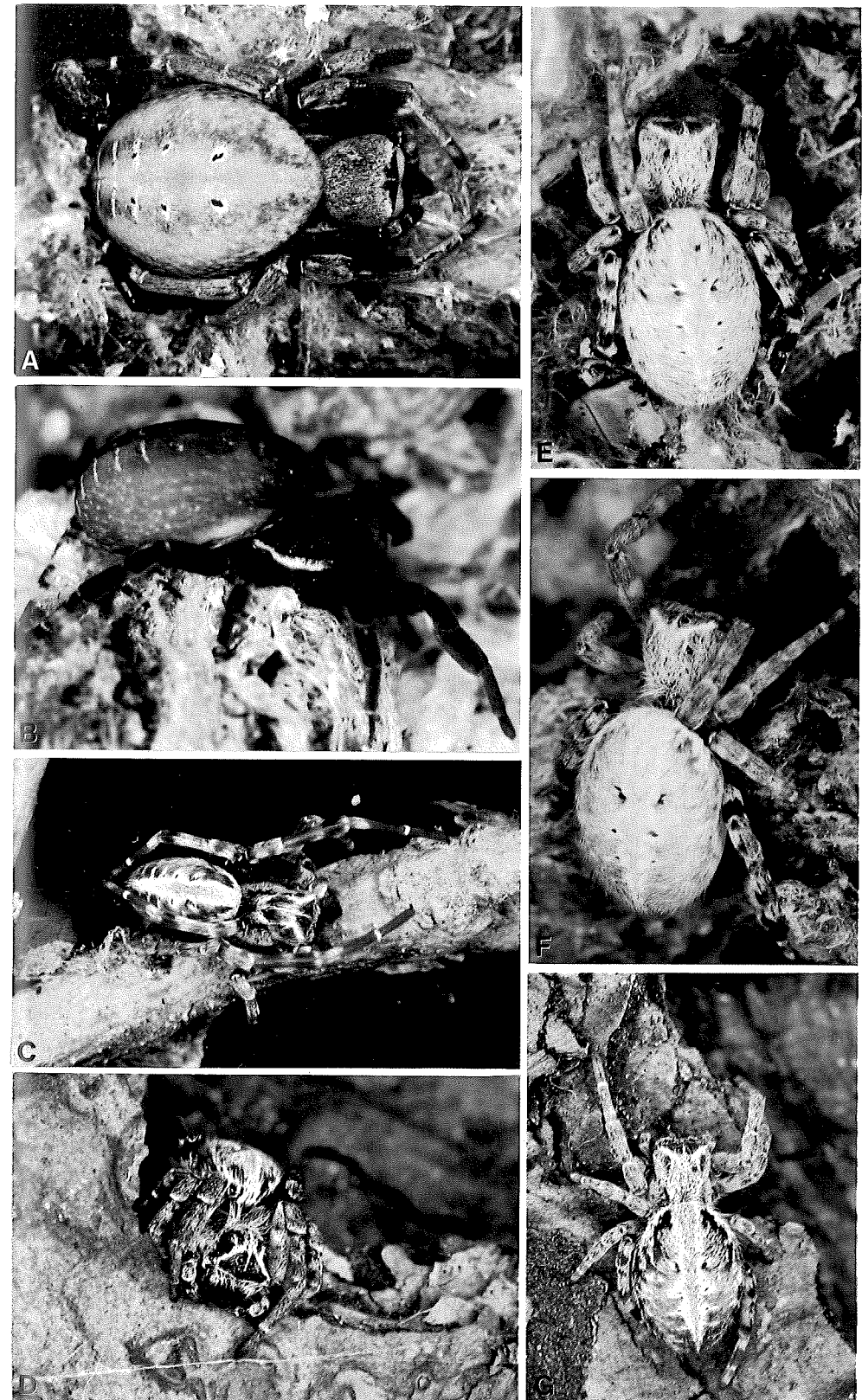
Swaziland: between Siteki and Manzini, Mpaka Stn. (1♀; SEIBT & WICKLER leg. 12. XI. 1986).

Plate 2

Fig. A: *Stegodyphus africanus*, ♀ [same specimen as Fig. A on Pl. 1].

Fig. B: *S. sabulosus*, ♀.

Fig. C–G: *S. dumicola*. – C) ♂; D–G) colour variation with types “black face” and “brown face”, ♀ [D + G and E + F from same nest].



Stegodyphus hildebrandti (KARSCH, 1878)

(Fig. 20, 34, 41, 54–55, 85–88; Map 2)

1878 *Eresus Hildebrandti* KARSCH, Z. ges. Naturwiss., 51: 319 Pl. 8 Fig. 7 (D♀) – vid.!

?1898 *Stegodyphus bettoni* POCKOCK, Proc. zool. Soc. London, 1898: 517 (D subad. ♀) – vid.!

?1947 *Stegodyphus hildebrandti*, – CAPORACCO, Ann. hist.-nat. Mus. nat. Hungar., 40(3): 101 (N).

non *hildebrandti* sensu TULLGREN 1910 (:95); see also STRAND 1913 (:329) and CAPORACCO 1947, who argue that the species is different from *mimosarum*. A few other authors have used the name, but it seems hardly possible to state what they identified as *hildebrandti*.

Fortunately, Dr. MORITZ (ZMB) has been able to trace the type specimen. The single female seems to have been preserved in alcohol but has been dried out. We were successful in rehydrating the specimen and have even been able to dissect and study its epigynum and vulva (Fig. 85–86). In combination with additional materials, including a male (see discussion), we are now able to state for the first time what *hildebrandti* really is.

S. bettoni has been characterized on the basis of a single immature female (total length 11.0); it does not even show traces of an epigynum. But the specimen coincides with *hildebrandti* in all details (including measurements and ratios); this is also true for the type locality of *bettoni* (Samburu). *S. bettoni* is probably a junior synonym of *hildebrandti*.

See also note (4) following the synonymy of *lineifrons*.

Proportions of legs very similar between male and female: relative length of leg I in male not different from equivalent values in females, but leg I of male 2.6 times as long as prosoma (in females 2.0–2.2 times) with its tibia inflated (Fig. 41): tibia I has conspicuous fringes of dense hairs dorsally and ventrally, ventrally much longer. Metatarsus and tarsus I with numerous blunt, cone-shaped protuberances on ventral surface, forming the basis of setae.

Male pedipalp (Fig. 54–55) as in other species of the *africanus* group. Terminal lamella subparallel, with apical hyaline folds and lamellar sinoidal structures similar to those in other representatives of the group. For a detailed comparison see below (Discussion).

Female genitalia see Fig. 85–88. Epigynum relatively broad posteriorly (more or less as in *sabulosus*), its central field bordered by paired anteriorly converging and heavily sclerotized rims (more or less as in *africanus*, *sabulosus* and *lineifrons*). Anterior part of epigynal groove with a median blunt piece narrowing posteriorly. A broad V-shaped structure corresponds to interior funnels (see vulva). It seems hardly possible to state significant differences from the other species mentioned immediately above. Vulva (Fig. 20; 86–88) with inflated parts opposed to each other in the middle region of the

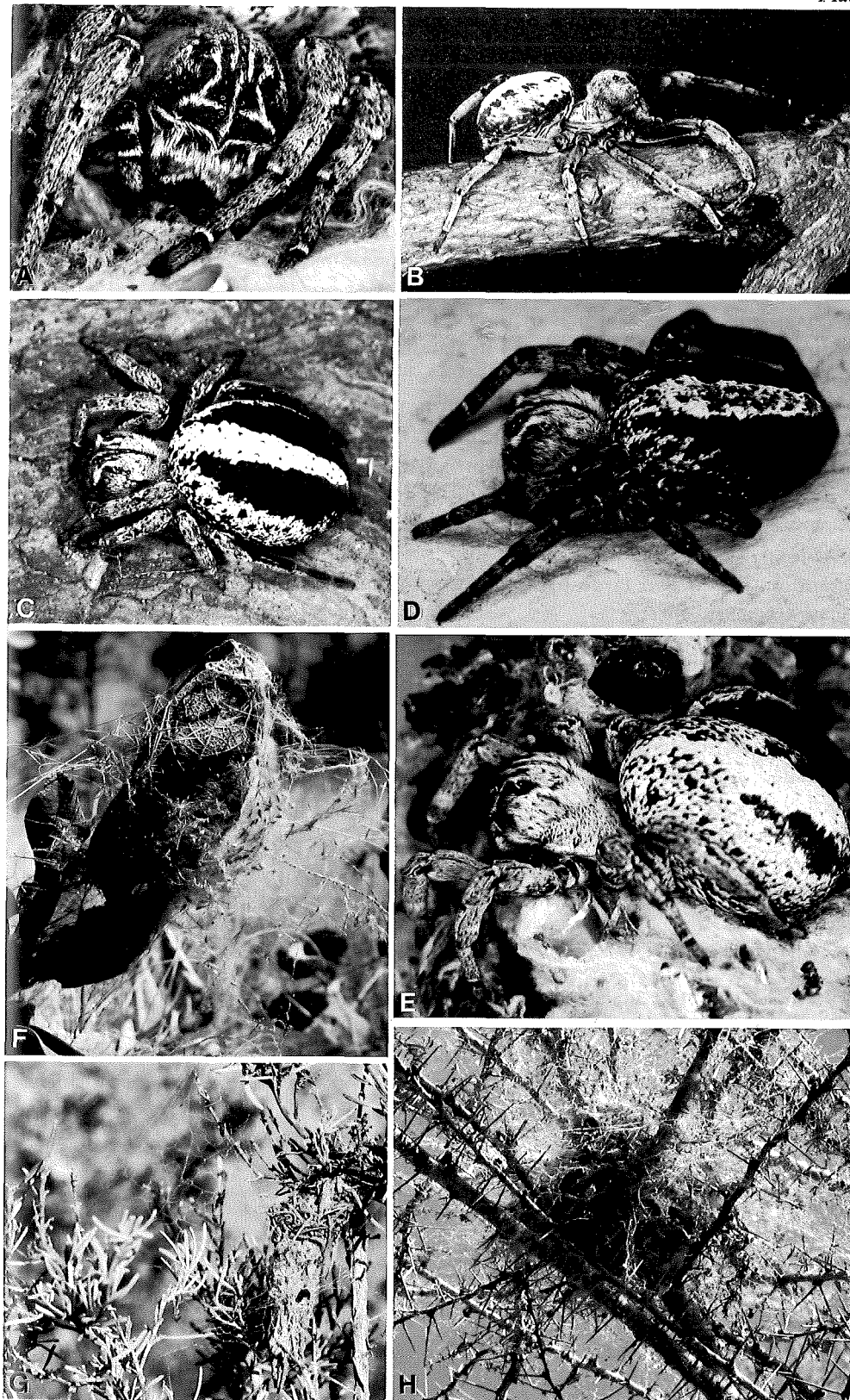


Plate 3

Fig. A–E: *Stegodyphus lineatus*. – A) ♀, “Face”; B) ♂ [note elevation of “pars cephalica”]; C–E) ♀ colour variation [C + D from same locality, E from Israel].

Fig. F–H: Retreats and nests. – F) *S. bicolor*, nest in a bush [*Lonchocarpus nelsii*]; G) *S. lineatus* retreat of an adult, old ♀. – H) *S. mimosarum*, nest in an *Acacia* tree.

receptacula; anterior tubes relatively long, converging. Two of the specimens (1♀ from Malindi, 1♀ from Mombasa) show assymetrical vulval structures; but the long tube-like anterior part of the vulva is present on at least one side.

Colour not well preserved, coloration of living specimens unknown. Description below refers to materials preserved in alcohol.

Male: Prosoma bright red-brown, also chelicerae; femora and tibiae I brown, pedipalps and all other segments of legs light horn-brown. Fringes on tibia I now dark golden brown, apparently faded. Several zones and also spots of white plumose hairs: an unusually broad band on lateral margins of prosoma and two small spots close to the inner margins of PLE, a narrow barb on anterior border of clypeus, and a narrow transverse zone in the basal half of the chelicerae; such hairs also present at the end of pedipalpal femur and especially on its patella (dorsal and lateral sides), and almost completely absent on tibia; other groups of white hairs at tip of femur I and on pro- and retrolateral sides of patella I; distribution on all other legs similar, these with dorsal narrow zones of white hairs from femur to tibia in addition. Opisthosoma dorsally and laterally covered with cinnamon-brown hairs, with a white longitudinal band (Fig. 34) extending from the anterior border backwards but not reaching the transverse white spot at the posterior end of opisthosoma; lateral sides each with a white longitudinal band (connected anteriorly with median zone, descending posteriorly and terminating in two large paramedian spots on ventral side; two white spots in front of epigastric furrow.

Female: Prosoma and chelicerae red-brown, irregular spots of dark pigment on prosoma present in one specimen only; pedipalps and legs horn-brown, but metatarsi and tarsi I red-brown; femora and tibiae I and also II (less conspicuously) with extended reticulate black pigmentation on prolateral and ventral sides; femora III and IV similarly shaded, but with an unpigmented annulus in the middle. White plumose hairs uniformly distributed on prosoma (more densely in its anterior part), forming two less prominent, diffuse lateral bands (sic!); such white hairs also present on chelicerae (forming a broad transverse band) and on metatarsi and tarsi I. Opisthosoma pale, slightly darker on lateral sides. The opisthosoma of largest specimen (from Katanga) shows a golden-brown pubescence on lateral sides and dorsally two similar diffuse paramedian zones.

Discussion. The single male is larger than *mimosarum* males but (as far as is known) smaller than the males of all other species of the group (Table 1). It differs from *mimosarum* in the elevated "cephalic" part of its prosoma and in the subparallel shape of the tongue-like terminal lamella; other species showing a similar shape of this element have different apical details. Males of *africanus* differ considerably in the size of AME and PME (and also in ratios, see Table 1). With regard to the eyes the male is

closer to *tingelin*, but this species has considerably shorter legs and a distinctly different coloration (yellow!) of the frontal side of the chelicerae; *tingelin* also differs in the dorsal colour pattern of its opisthosoma. Four of the five females known to date (including the type from Zanzibar) have been found in adjacent parts (e.g. Kenya) of East Africa, and we do not expect that two different species of the same group may exist in East Africa between Somali, Zanzibar and Mombasa. In addition to this geographical aspect, we have found a high degree of conformity in all measurements and ratios. We therefore think there is sufficient justification for regarding the male specimen and the females as conspecific. – But see note (4) on the synonymy and taxonomic status of *lineifrons*.

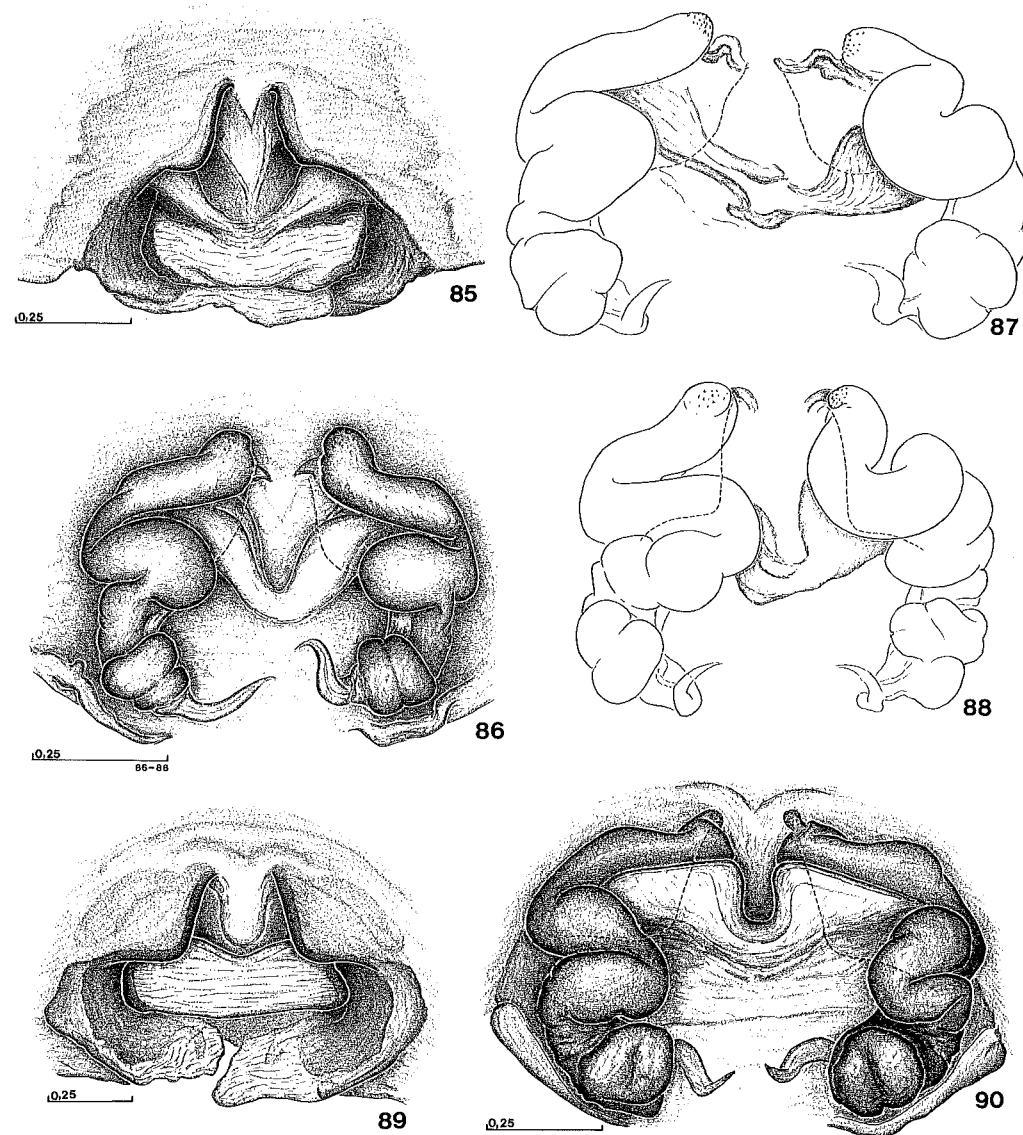


Fig. 85–88: *Stegodyphus hildebrandti*. – 85) Epigynum; 86) vulva, dorsal view; 87–88) variation of vulva.

Fig. 89–90: *Stegodyphus lineifrons*. – 89) Epigynum; 90) vulva, dorsal view.

Biology. The specimens from Malindi are accompanied by a note indicating that the animals were found as "*Portia* associates." But the reverse explanation may be more probable as *Portia* "invades diverse types of alien webs where they feed on the host spider (JACKSON 1987: 135) [= Araneophagy]. *Portia* is a salticid spider producing extensive web materials. See also WICKLER & SEIBT 1988.

Measurements. - ♂: Prosoma L 3.2, W ant 1.9, max W 2.2; diam AME 0.15, RME 0.25; W AME 0.36, PME 0.61, ALE 1.6, PME 1.2. - ♀ (according to specimen from Malindi; measurements of largest known ♀ from Katanga in ()): Prosoma L 5.7 (8.8), W ant 3.5 (5.3), max W 3.7 (6.2); diam AME 0.21 (0.28), PME 0.33 (0.41); W AME 0.59 (0.77), PME 0.91 (1.20), ALE 3.05 (4.3), PLE 2.2 (3.2).

Localities and materials. Somalia: Dinsor (1 ♂ MRAC 131.288; ACCIGLIARO leg. 1945).

Kenya: Malindi (1 ♀ 2 juv. BMNH; JACKSON leg. 19.II.1982). - Küstenebene bei Mombasa (1 ♀ SMF 36657; GRASSHOFF leg. 25.XII.1969). - "Brit. East Afr., Mbunyi" [= Samburu, Mbunyunyi?] (1 ♀ MCZ; LAVERIDGE leg. 15.V.1916).

Tanzania: Zanzibar-Gebiet (1 ♀ Holotype ZMB 2838; HILDEBRANDT leg.).

Zaire: Katanga: near Elisabethville [= Lubumbashi] (1 ♀ MRAC 121.179; LIPS leg. I.1962).

Stegodyphus sabulosus TULLGREN, 1910.

(Pl. 2 Fig. B, Fig. 36, 91-95; Map 2)

1910 *Stegodyphus sabulosus* TULLGREN, Kilimandjaro-Exped., 3(20; 6): 97; nec Pl. 1 Fig. 6 a-c (D♀) - vid.!

TULLGREN's syntypes are incomplete now: The series from Usambara (Mombo) consisted originally of 2 ♀, but only 1 ♀ remained with the epigynum removed and missing. But the series from Meru (Ngare Nanyuki), 1 ♀, now includes the chelicerae of a second specimen.

TULLGREN's Fig. 6 a-c refers to *S. lineifrons*; details are explained at the beginning of the description of this species.

Proportions of legs see Table 1.

Female genitalia see Fig. 91-95. Epigynum very broad posteriorly, with two curved, anteriorly converging and heavily sclerotized rims; variation see Fig. 91; 93; 95. These sclerotized elements in anterior half of epigynum nearly straight, with trapezoid median groove of considerable length between them; lateral parts of sclerotized rims subparallel to epigastric furrow. Anterior part of epigynal groove with a median element, approximatively subcylindrical in shape which bears in two specimens a blunt median carina. Broad introductory funnels on each side of median piece open into wide atria. Posterior part occupied by a broad membranous and whitish (i.e., less highly sclerotized) transverse pillow-like structure; it is characteristically divided by an irregular furrow into two anterior parts and a homogeneous posterior part. Vulva as in Fig. 92-94. Paired atria arranged in a V-like position, each having the shape of a rounded cup. Anterior part of vulva linked with opisthosomal cuticula by paired, conspicuous chitinous ridges: they have the shape of two inclined boards, closely connected ventrally with the converging rims of the epigynum (x in Fig. 92, but difficult to see in other specimens).

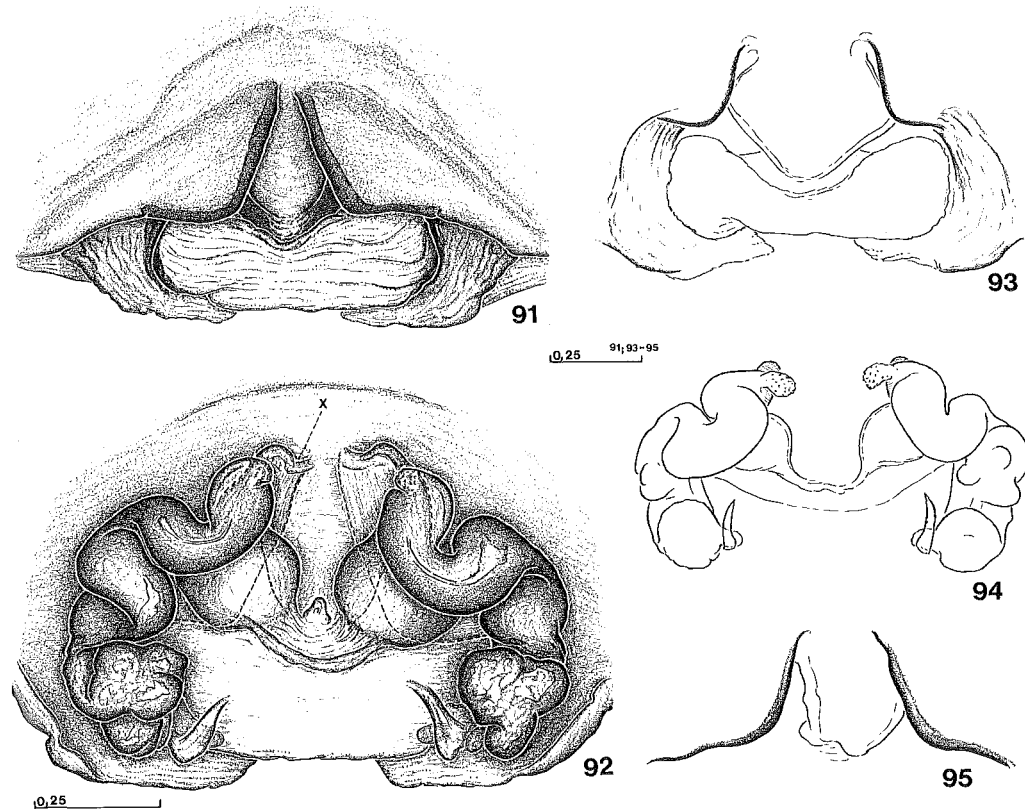


Fig. 91-95: *Stegodyphus sabulosus*. - 91) Epigynum; 92) vulva, dorsal view; 93-94) variation of vulva; 95) difference in shape of anterior ridges of epigynum.

Colour. Living specimen (Pl. 2 Fig. B): Prosoma and all appendages very dark, velvety black, with very narrow yellowish dorsal tips on all femora; posterior two-thirds of prosoma with narrow yellowish bands at margins. - Opisthosoma also dark, greyish brown with small irregular light spots and narrow transverse zones in posterior part of dorsal side.

In alcohol: Generally unusually dark in appearance. Prosoma very dark red brown, also chelicerae, all legs and pedipalps; sternum and coxae horn-brown. Few zones of white plumose hairs: at lateral margins of prosoma and on legs (scattered on half dorsal and retrolateral side of femora I, on half dorsal and retrolateral side of patella and tibia II, and on all sides of metatarsi and tarsi I + II, also on all segments of legs III + IV). All other parts of prosoma and appendages covered by blackish hairs; they are relatively long and obvious on the front of the chelicerae, on femora I (especially ventrally) and on tibiae I (especially on prolateral and ventral sides); dark pubescence of legs II similar, but less conspicuous. Opisthosoma: Cuticula yellowish grey, covered with dark olive-brown plumose hairs (arranged in narrow transverse dorsal stripes and irregular small spots in dorsolateral and lateral regions).

Discussion. The species is easily recognizable by its dark coloration combined with the narrow shape of the prosoma and peculiarities of its eye positions.

Biology. A ♀ of *sabulosus* has been found as a solitary parasite in a colony of the social species *dumicola* (see WICKLER & SEIBT 1988).

Measurements. ♀ (taken from smallest known ♀ from Meru [TULLGREN]; measurements of largest ♀ from Usambara [also TULLGREN] known to us in ()): Prosoma L 6.3 (8.5), W ant 4.0 (4.8), max W 4.2 (5.9); diam AME 0.22 (0.25), PME 0.33 (0.40); W AME 0.59 (0.67), PME 0.98 (1.10), ALE 3.34 (3.96), PLE 2.64 (3.0).

Localities and materials. Kenya: Molo, Mau Escarpment, Riv. Molo, 2150–2200 m (1♀ MRAC 145.953; BASILEWSKY & LELEUP leg. 11.–12. IV. 1957). – Machakos Distr., Makueni, 3500 ft. (3♀ 2♀ pre-epig. MRAC 128.377; SIHLER leg. IV. 1965).

Tanzania: Meru, Ngare Nanyuki (1♀ Syntype NRS; SJÖSTEDT leg.). – Usambara, Mombo (1♀ Syntype NRS; SJÖSTEDT leg.).

R. South Africa: Transvaal, Kruger Nat. Park, Nwambiya Pan (1♀ juv. NM; LAWRENCE leg. 23. XI. 1963).

Swaziland: Mpaka (1♀ SEIBT & WICKLER leg. XI. 1987).

Stegodyphus lineifrons POCKOCK, 1898

(Fig. 89–90; Map 1)

1898 *Stegodyphus lineifrons* POCKOCK, Proc. zool. Soc. London, 1898: 516 Pl. 42 Fig. 13 (D♀) – vid.!

1910 *Stegodyphus affinis* TULLGREN, Kilimandjaro-Exped., 3(20; 6): 97 Pl. 1 Fig. 6 a–c (D♀) – vid.!

(1) We have seen the types of the two nominal species synonymized here. They coincide with regard to all available characters.

(2) TULLGREN's Fig. 6 and his description clearly refer to vulval structures as in *lineifrons*; the line "Pl. 1 Fig. 6 a–c" seems to have been simply misplaced (printing error?)!

(3) TULLGREN's type from Meru (Ngare Nanyuki), 1♀, has the epigynum removed; it is now lacking. Presumably, the original author had prepared a slide, as the vulval structures indicated in his Fig. 6 cannot have been taken from an intact specimen. It is possible, however, that the definite loss of epigynum and vulva was caused by a later author. Fortunately, TULLGREN's illustrations and the remaining *torso* of the type specimen permit an evaluation of its identity.

(4) A ♀ assigned by us to *hildebrandti* has been found in "British East Africa" at "Mbunyi." This place may be identical with the type locality of *lineifrons* (Samburu: Mbuyuni). The two species cannot be differentiated on the grounds of measurements, ratios etc. The coloration is only very inadequately indicated by alcohol-preserved materials. No ♂ assigned to *lineifrons* is known to date. As the vulval structures of *lineifrons* deviate strikingly from those seen in other *Stegodyphus* specimens, and as the difference seems to exceed the normal intraspecific variation, we preliminarily recognize *lineifrons* as a separate species, even though this means that two similar species would occur sympatrically, provided that Mbunyi and Mbuyuni are the same locality. A single male from Somali is assigned to *hildebrandti* as we are in doubt with regard to the definite status of *lineifrons*. The scant information at present is insufficient for final decisions.

Proportions of legs see Table 1.

Female genitalia see Fig. 89–90. Epigynum very broad posteriorly; in its anterior half bordered by two curved, heavily sclerotized rims; their posterior borders are close to a transverse line, anterior borders converge. Anterior median field separated into two grooves by an obtuse median elevation and bordered posteriorly by the usual pillow-

like transverse structure. Posterior part of epigynum in part membranous, bipartite (bipartition becomes apparent after slight maceration). Vulva as in Fig. 90. The paired deep grooves of the anterior part of the epigynum widen interiorly and form conspicuous atria having the shape of inverse oblique cones; these atria are bordered by a light-brown chitinous membrane, which has an irregular net-like surface structure. Receptacula heavily sclerotized and thus much darker than paired atria.

Colour (in alcohol): Prosoma red-brown, also chelicerae; legs and sternum lighter brown, with conspicuous zones of black hairs on legs I and II (I: half ventral, prolateral and half of dorsal zone of femur, ventral and prolateral part of tibia; II: prolateral part of femur, half ventral and prolateral part of tibia); tibia I on ventral side with relatively long black hairs, less prominent in tibia II. There are broad zones covered by white plumose hairs: uniformly distributed on prosoma (also clypeus with white 'barb'), basal half of front side of chelicerae (but separated from clypeus by a narrow dark brown zone), and those regions of appendages without black pubescence; pedipalps show white hairs in the apical parts of femur and tibia and on patella. Opisthosoma covered with light red-brown plumose hairs, ventrally somewhat darker brown. The single specimens do not show any trace of colour patterns, no bands etc.

Measurements. ♀ (according to the type of *lineifrons*; measurements of type of *affinis* in ()): Prosoma L 7.6 (5.9), W ant 4.7 (3.7), max W 5.1 (3.9); diam AME 0.25 (0.22), PME 0.39 (0.31); W AME 0.64 (0.54), PME 1.03 (0.87), ALE 3.74 (2.92), PLE 2.72 (2.20).

Localities and materials. Kenya: Samburu, Mbuyuni (1♀ Holotype BMNH 1897. 11. 20. 64–65; BETTON leg. 6.–13. IV. 1897).

Tanzania: Meru, Ngare Nanyuki (1♀ Holotype of *affinis* NRS).

Stegodyphus tingelin n. sp.

(Fig. 35, 42, 48, 56–57; Map 1)

Proportions of legs see Table 1. Leg I (♂) moderately modified (Fig. 42), tibia slightly swollen; tibia has a thick fringe of long dark hairs only on ventral side.

Male pedipalp see Fig. 56–57. Tongue-shaped terminal lamella relatively broad and strong, borders in the middle parallel, broadened in distal one-third on lamellar side; a series of three prominent curved apical lamellae (the second largest) surpasses other parts of terminal lamella only slightly.

Colour (in alcohol): Prosoma very dark red-brown, also chelicerae; pedipalps, femur and tibia of leg I and sternum only dark red-brown, other segments of appendages red-brown. There are several zones of white plumose hairs: at lateral margins of prosoma, a 'barb' at the border of clypeus, and all over the whole front side of the chelicerae except for the region close to the claws. Such hairs are also present in dorsal and ventral longitudinal rows on the pedipalpal femur and, dorsally, in the distal part of its patella; sternum, gnathocoxae and all legs also covered with such white hairs (more densely grouped in dorsal and ventral longitudinal zones [but lacking on tibia I] and at the distal end of all segments of legs).

Opisthosoma (Fig. 35) covered dorsally and laterally with black-brown plumose hairs, with a distinctive broad yellowish longitudinal band extending from the anterior margin to a posterior yellowish broad transverse spot; lateral sides each with a yellowish white longitudinal band, descending posteriorly and joining two paramedian zones of white plumose hairs.

Discussion. – See general discussion under *hildebrandti*.

Measurements. ♂: Prosoma L 4.4, W ant 2.7, max W 3.2; diam AME 0.18, PME 0.29; W AME 0.44, PME 0.75, ALE 2.24, PLE 1.80.

Locality and materials. Cameroon: Montagne du T'ingelin, sous pierres le long d'un ruiss. (1♂ Holotype MRAC 143.670; PUYLAERT leg.).

Doubtful species

Stegodyphus simplicifrons SIMON, 1906

(Fig. 100–101; Map 2)

- 1906 *Stegodyphus simplicifrons* SIMON, Ann. Soc. ent. Belg., 50: 306 (D♀) – vid.!
- ?1908 *Stegodyphus gregarius* var. *simplicifrons*, –STRAND, Nyt. Mag. Naturv., 46(1): 8 (N).
- ?1908 *Stegodyphus gregarius* var. *simplicifrons*, –STRAND, Zool. Jb. Syst., 26(4): 457 (N).
- ?1928 *Stegodyphus Gregarius* var. *simplicifrons*, –CAMBOUÉ, Bull. Acad. malgache, (NS) 10: 29–31 (N).

Female genitalia see Fig. 100–101. Epigynum with paired, heavily sclerotized rims only in anterior half; they border a transverse subrectangular anterior region of the epigynum. – Vulva as in Fig. 101, without the prominent pouches present in most other species of the group.

Colour (in alcohol, badly preserved): Prosoma and chelicerae darker brown than appendages; a dark reticulate pigmentation on sternum, coxae, femora and tibiae I, but also, less intensive, on femora II–IV. White plumose hairs on prosoma, denser in the anterior region, but there is no real 'barb'; the chelicerae bear a transverse band of such hairs in the basal half. Tibiae without any prominent pubescence. Opisthosoma similar to Fig. 37 (= *mimosarum*!), but without posterior white spot (perhaps no longer visible in the old original material).

Discussion. The nominal species was based on 3♀ (syntypes). They uniformly show an epigynum which is less arcuate than that of *mimosarum*, and the paired elements of the vulva have a different shape. There are also differences in measurements, especially in the proportion of the prosoma and in ratios of the eyes (see Table 1).

As few specimens are available and males are totally lacking, it seems impossible to decide what *simplicifrons* really is. *S. simplicifrons* may well be a separate social-living species of Madagascar that is very close to *mimosarum*, and it is also possible that *simplicifrons* is only a subspecies or even a form of *mimosarum*. This second alternative could be supported by the observation that the few (2!) adult males we have seen from Madagascar do not seem to be differentiable from African *mimosarum* speci-

mens. For this reason they (and also various ♀) have been recorded, with locality data, under *mimosarum*.

Specimens from Madagascar have two relatively dark paramedian zones on the dorsal side of the opisthosoma (see CAMBOUÉ 1928); but *mimosarum* from Africa (preserved in alcohol) occasionally shows the same feature.

Measurements. – ♀: Prosoma L 4.6, W ant 2.8, max W 2.85; diam AME 0.17, PME 0.27; W AME 0.46, PME 0.78, ALE 2.38, PLE 1.78. – Two other specimens: Prosoma L 4.3 (4.7), W ant 2.6 (2.85).

Locality and materials. – Madagascar: Nossi-Bé, Diego-Suarez (3♀ Syntypes MNHN AR788). – Further materials from Madagascar are listed under *mimosarum*; they belong potentially to *simplicifrons*.

Stegodyphus mimosarum PAVESI, 1883

(Pl. 1 Fig. B–F, Pl. 3 Fig. H; Fig. 14–19, 37–39, 43–45, 49–51, 58–76, 96–99; Map 3)

- 1883 *Stegodyphus mimosarum* PAVESI, Ann. Mus. civ. Genova, 20: 81 (D♂♀) – vid.!
- 1889 *Stegodyphus gregarius* O. PICKARD-CAMBRIDGE, Proc. zool. Soc. London, 1889: 42 Pl. 2 Fig. 2 (D♂♀) – vid.!
- 1906 *Stegodyphus corallipes* SIMON, Ann. Soc. ent. Belg., 50: 305 (D♂) – vid.!
- 1910 *Stegodyphus Hildebrandti*, –TULLGREN, Kilimandjaro-Exped., 3(20; 6): 95 Pl. 1 Fig. 5 a–f (D♂♀).
- 1913 *Stegodyphus mimosarum*, –STRAND, Wiss. Ergebn. dtsch. Zentr.-Afr. Exped., 4 (Zool. 2): 329 (N).
- 1927 *Stegodyphus simoni* GILTAY, Rev. zool. Afr., 15(1): 105 Fig. 1–6 (D♂♀) – vid.!

The reasons why *corallipes* is synonymized here with *mimosarum* are explained in detail in the discussion (see below). GILTAY's original description of the female has been based on a subadult specimen; thus he has figured a pre-epigynum.

Size highly variable (see Tab. 1). According to SEIBT & WICKLER (1988) female body size is negatively correlated with colony size.

Anterior part of prosoma in adult males exceptionally low, without the prominent elevated "pars cephalica" present in nearly all other species; similarly low also in females. (Fig. 49–51).

Proportions of legs different in males and females: males have longer legs I than females in proportion to their prosoma length. Leg I in males slightly modified (Fig. 43–45): tibia I with moderate fringes of long dark hairs, especially on ventral side; amount of modification of leg I is correlated with size.

Male pedipalps (Fig. 14; 58–76) with a relatively broad terminal lamella, shorter as in all other species of the group, and not subparallel in shape. Tiny oblique terminal lamellae not extending beyond other parts of the great lamella distally. There is some variation in details (see Fig. 64–76), but specimens from the same place are very similar. Proximal lamella of terminal apparatus (which guides the embolus) fused on one side with terminal lamella.

Female genitalia see Fig. 15–19; 96–97. Epigynum trapezoid in shape, sclerotized lateral margins arched, converging anteriorly. Epigynal groove with a moderately sclerotized median zone forming a diffuse median ridge in anterior deeper part. Posterior part occupied by the usual membranous, whitish (i.e., less sclerotized) pillow-like

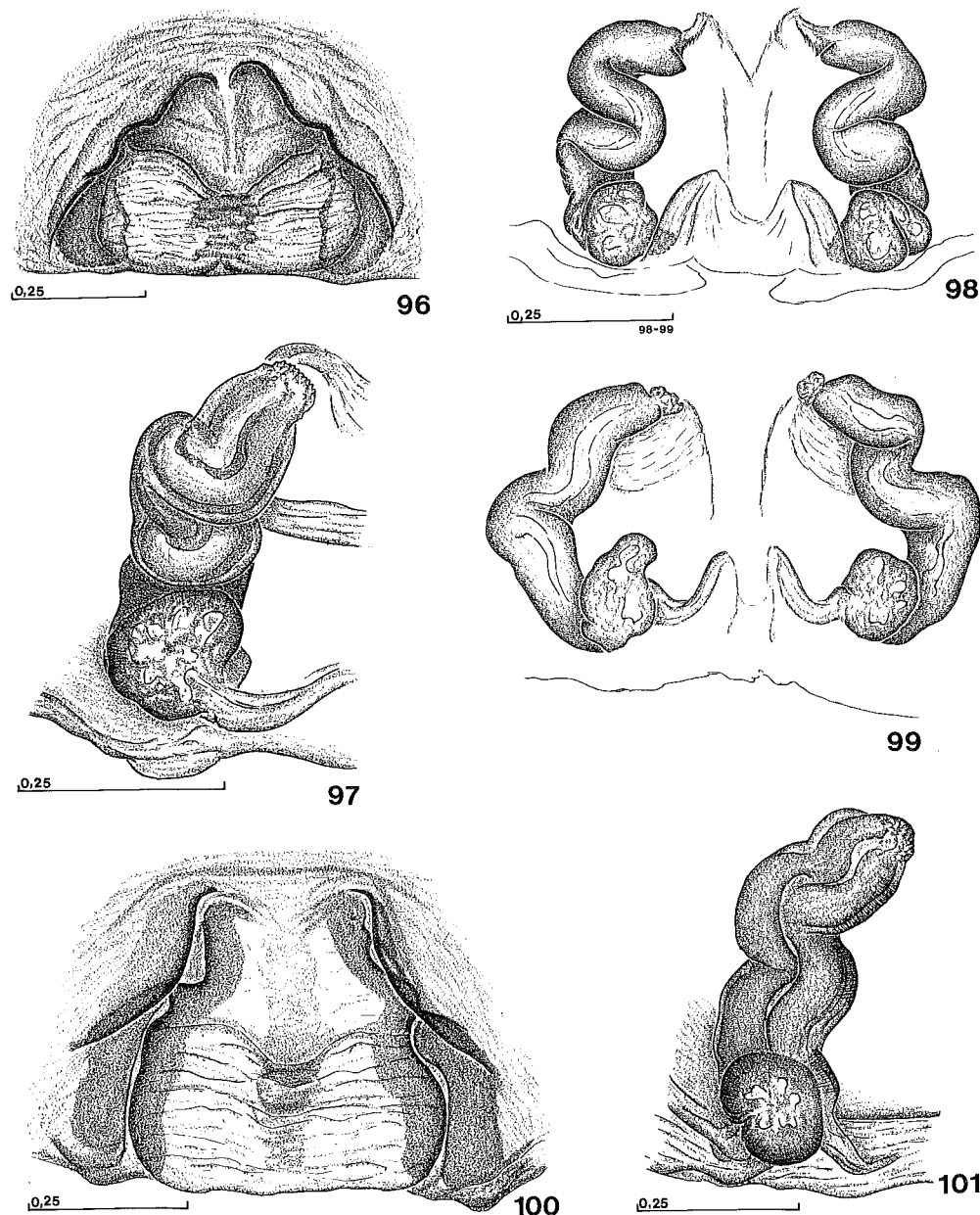


Fig. 96-99: *Stegodyphus mimosarum*. - 96) Epigynum; 97) vulva, dorsal view; 98) vulva I of sexually mature female, moulting [this vulva forms part of the exuvia]; 99) vulva II after post-adult moulting.

Fig. 100-101: *Stegodyphus simplicifrons*. - 100) Epigynum; 101) vulva, dorsal view. - Syntype.

structure. Vulva see Fig. 19; 97. See also Epigynum I and II, Vulva I and II in Fig. 3-4 and Fig. 98-99 (moultings of sexually mature females!).

Colour: For coloration of living specimens see Pl. 1 Fig. B-F. With a few exceptions, males and females are strikingly different (independent of size). Most males very dark brown, close to black, ornamented with bright white bands and spots formed by plumose hairs (see Pl. 1 Fig. B). Females with white or orange eye triangle and transverse band on chelicerae (Pl. 1 Fig. C-D; this difference can be seen between individuals of the same colony). We have also seen males showing a female colour pattern with reduced white stripes and marks; see Fig. 37-38.

Specimens preserved in alcohol show reduced coloration owing to fading. Males (Fig. 37-39) are no longer black, but \pm brownish, and females have more or less lost their bright orange colours: prosoma red-brown, legs uniformly lighter brown; traces of leg annulation may be preserved. Opisthosoma pale yellowish grey, with two paramedian and two marginal darker longitudinal zones; lateral regions and ventral side light, with irregular dark spots.

Discussion. As far as we have seen, specimens from Madagascar are slightly larger than animals from Africa (σ : total L up to 6.3, prosoma L 2.9 [type specimen of *corallipes* measures total L 5.3, prosoma L 2.4]; ϕ : total L up to 13.8, prosoma L 5.0). However, there are no other significant differences, even in male and female genitalia (see Fig. 63, 75-76, illustrating the species-characteristic terminal lamella of the male bulb of specimens from Madagascar; but see also Fig. 64-65). We therefore regard *corallipes* and materials we have seen from Madagascar as conspecific with *mimosarum*. The type specimen of *corallipes* (Fig. 63) (prosoma L 2.4) is the largest known male of *mimosarum*; the collector of the series from Tamatave has indicated on his label that these spiders have been found in "un unique nid." This and the presence of males indicate that these spiders also live gregariously.

Biology. For details see SEIBT & WICKLER 1988. We have observed relatively small nests with living inhabitants at the end of the dry season in Nakuru/Kenya; the silk material was completely covered with dust and there were no captive threads at all. But once they had access to water the animals became active and produced webs.

Measurements (variation see Tab. 1). - σ (small specimen, measurements of large σ in ()): Prosoma L 2.0 (5.0), W ant 1.18 (2.96), max W 1.33 (3.24); diam AME 0.10 (0.19), PME 0.14 (0.27); W AME 0.26 (0.48), PME 0.39 (0.74), ALE 1.00 (2.56), PLE 0.75 (1.92). - Type of *corallipes*: Prosoma L 5.3, W ant 1.5, max W 1.8; diam AME 0.12, PME 0.19; W AME 0.30, PME 0.46, ALE 1.23, PLE 1.00. - ϕ (example, ϕ from Tamatave/Madagascar in ()): prosoma L 5.0 (5.0), W ant 2.96 (3.0), max W 3.24 (3.4); diam AME 0.19 (0.19), PME 0.27 (0.29); W AME 0.48 (0.54), PME 0.74 (0.82), ALE 2.56 (2.60), PLE 1.92 (2.02).

Localities and materials. Cameroon: Lolodorf (4 ϕ 1 ϕ pre-epig. SMF RII/9675).

Zaire: Leopoldville [= Kinshasa] (4 ϕ σ ϕ juv. MRAC 59.134-223; 1 ϕ σ ϕ juv. MRAC 59.031-46; 3 σ ϕ juv. MRAC 59.059-133; DARTEVELLE leg. I. 1947. - 1 σ 1 ϕ pre-epig. SMF 36658). - Kimvula-Kingoma 1 ϕ pre-epig. MRAC 61.380; VANDENHOECK leg. 22. VI. 1948). - Kasai (5 σ 2 ϕ 8 σ subad. 2 juv., Syntypes of *simoni* MRAC 4.984-5.000; 3 ϕ 4 ϕ pre-epig. MNHN; GHESQUIÈRE leg. IX. 1921). - Luebo (1 ϕ MRAC 30.803; SCHOUTEDEN leg.). - Loange, Lornami (3 ϕ 1 ϕ pre-epig. MRAC 31.016-19; QUARRÉ leg. 10. I. 1930). - Luluabourg [= Kananga] (1 ϕ MRAC 3.566; DEHEYM leg. 15. IV. 1939). - Katanga, Kashats (1 σ 2 σ + 14 ϕ juv. MRAC 67.431-48; DE WITTE leg. II. 1931). - Kasindi Steppe near Albert-Edward-See (1 σ

17♀ 4♀ pre-epig. 10 juv. ZMB 24752-5; Exped. Herzog, Adolf Friedr. zu Mecklenburg leg. XII. 1907-I. 1908).

Ethiopia: Shoa, Daimbi (1♂ 3♀ subad. Syntypes of *mimosarum* MCSN; leg. 22.IV.-18.V. 1879).

Rwanda: Kissegnie [= Gisenye] (1♂ 5♀ 3♀ pre-epig. MRAC 5.001-9; VAN SACEGHEM leg. 1923).

Burundi: Mague [= Magoje] (6♀ BMNH 99.3.7.29-32; DARLING leg. 1899).

Kenya: Samburu (6♀ BMNH; JACKSON leg. III. 1982). - Nairobi Nat. Park (numerous juv. BMNH; JACKSON leg. 6.III. 1982). - Nakuru (1♂ 35♀; KRAUS & KRAUS leg. 24.II. 1986). - Masai Mara 8♂ 22♀ 6♀ subad.; KRAUS & KRAUS leg. 26.II. 1986).

Tanzania: Meru (10♀ ZMB 24743; SJÖSTEDT leg.). - Meru, Ngare Nanyuki (9♀ 1♀ pre-epig. MNHN; SJÖSTEDT leg. 1905-06). - Serengeti, Bolonja Bush (1♂ 7♀ pre-epig. SMF 36659; KLINGEL leg. 2.II. 1963). - Serengeti, Seronera (7♀ ZMK; MEYER leg. 23.XII. 1975). - Rubeho Mts., Mangalisa Village, 2200 m (120-150 juv. ZMK; SCHARFF leg. 19.IX. 1984).

Zambia: Mbala (2♀ MRAC 151.941; STJERNSTEDT leg. 10.III. 1978).

Mozambique: Tete (1♀ 1♀ pre-epig. SMF RII/9847). - Choa (1♂ 5 juv. MNHN AR 934).

Zimbabwe: Victoria Falls (2♀ NM 1699; AKERMAN leg. VII. 1910).

Botswana: Maun, Thalamakane Riv. (1♀ BMNH; WANLESS & SMITH leg. III. 1976).

Swaziland: Hlane Game Sanctuary (2♂ 1♀ subad.; SEIBT & WICKLER leg. 12.XI. 1986). - Ingwawuma (1♀ 1♀ subad.; SEIBT & WICKLER leg. 14.XI. 1986). - Lavumisa (1♀; SEIBT & WICKLER leg. 14.XI. 1986).

R. South Africa: Transvaal: 5 km S. Hoedspruit (1♂ 4♀; SEIBT & WICKLER leg. 28.X. 1986). - Sandrivierspoort, Waterberg (3♀ 1♀ pre-epig. TM 14138-41; HOLM leg. 15.XII. 1972). - Kruger Nat. Park (3♀ NCP 88/271; FILMER leg. 30.XI. 1987). - Kruger Nat. Park, Punda Milia (1♀ NM; LAWRENCE leg. 19.XII. 1962). - Skukuza (1♂ 2♀ pre-epig.; SEIBT & WICKLER leg. 28.X. 1986). - Near Shitlhavedam (1♀; SEIBT & WICKLER leg. 10.XI. 1986). - Zululand, Ndumo Game Res. (6♂ 8♀ 5♀ subad. NM 9833; DUTTON leg. XII. 1969). - Natal, Mseleni (2♀ NM; TOPKIN leg.). - Mkuze (3♂ 6♀; SEIBT & WICKLER leg. 14.-26.XI. 1986). - Hluhluwe-Ubuzane (23♂ 137♀; SEIBT & WICKLER leg. XII. 1982, III. 1983, XI. 1984, XI. 1987). - Spioenkop Dam SW Ladysmith (3♂ 2♀ 1♀ pre-epig. NM; GRISWOLD & GRISWOLD leg. 9.X. 1985). - Verulam (1♀ BMNH; leg. 7.II.). - Pinetown (4♀ NM; YATES leg. X. 1964). - Durban (1♂ 3♀ 8♀ subad., Syntypes of *gregarius* BMNH 89.2.10.1-14; 1♀ BMNH 03.7.12.32; 5♂ 9♀ 22♀ subad. HEC 519, WALSINGHAM leg. XI. 1888). - RICHMOND (5♂ 19♂♀ juv. NM 2062; NICHOLSON leg. X. 1920). - Lusikisiki Distr.: Transkei coast, Mzimhlava R. mouth (1♂ MRAC; BADDELEY leg. XII. 1979).

Madagascar: Majunga (1♀ MNHN; DECORSE leg. V. 1899). - Tamatave (1♀ MNHN 26243, 2♂ 4♀ 1♀ pre-epig. MNHN; leg. V. 1926). - Tulear (1♀ MRAC 133.681; BIGOT leg. 1966). - Ambovombé (1♂ Holo-type of *corallipes* MNHN AR 804, 2♀ MNHN, ALLUAUD leg. 1901).

Nomen dubium

Stegodyphus duodimidiavittatus STRAND, 1906

1906 *Stegodyphus 2½-vittatus* STRAND, Zool. Anz., 30(19/20): 667 (D♂♀).

1908 *Stegodyphus 2½-vittatus*, -STRAND, Arch. Naturgesch., 74 (I; 1): 70 Pl. 2 Fig. 5 a (D♂♀).

STRAND described the same specimen two times. The small size of the male could justify its allocation to *mimosarum*, but the description of the female coloration differs. As the syntypes were lost in World War II it is not possible to state the true identity; it is not even certain whether STRAND described a single or a composite species.

b) *S. dufouri* group

At present, the *dufourii* group comprises four or five species. Both sexes are known in all taxa of specific rank, but males are relatively rare in collection materials - with the exception of the social-living species *sarasinorum*.

S. pacificus (India) and *dufourii* (Africa north of 4° Lat.) are unusually similar. This is true of their colour patterns (including dorsal side of opisthosoma [as far as one can judge on the basis of specimens preserved in alcohol]), but also of their structural characters: in both species the diameters of PME and AME are subequal (1.0-1.1 in nearly all specimens), and it is hardly possible to distinguish *pacificus* and *dufourii* on the basis of genitalic characters, even in males. But as far as we have seen, in *pacificus* males leg I exceeds the length of the prosoma 3.6 times, while the corresponding value in *dufourii* males is 3.1-3.2. Male specimens from Aden (MNHN 791) have leg I 3.3 times as long as the prosoma; for this reason and because the width of PLE in females measures 75% of the width of ALE (74-79% in *dufourii*-♀, 84-90% in *pacificus*-♀) we regard the Aden material as *dufourii*. We cannot exclude the possibility that *pacificus* and *dufourii* are subspecies of a single biospecies. This explanation of the close similarity seems to be supported by the observation that females of *dufourii* from regions south of the Sahara and from southern Abyssinia have relatively shorter legs I (mean value 2.4) than specimens from North Africa (2.7; see Tab. 3). This difference is discussed in detail at the end of the description of *dufourii*.

Tab. 3: *S. dufouri* group: Synopsis: Proportions and ratios derived from measurements.

		L prosoma : W pros. anteriorly	L prosoma : max. W pros.	Diam. PME : diam. AME	W PME : W AME	W PLE (% of W ALE = 100%)	Relative L of legs	L leg I : L prosoma
<i>pacificus</i>	♂	1.7 .. 1.8	1.4	1.1	1.2	77% (84%)	148:97:71:100 138:93:70:100	3.6
	♀	1.7 .. 1.8	1.5	1.0 (1.1)	1.3	84% (90%)	134:92:72:100 134:94:74:100	2.4 .. 2.7
<i>sarasinorum</i>	♂	2.3	1.9	1.2	1.2	83%	130:92:72:100	2.1
	♀	1.8	1.6	1.1	1.2	73%	118:88:70:100	2.3
<i>dufourii</i> ¹⁾	♂	1.7 .. 1.8	1.4	1.0 (1.1)	1.2	78% (87%)	140:96:71:100 134:90:67:100	3.1
	♀	1.9	1.4	1.0 (1.1)	1.3	78% (79%)	135:93:74:100	2.4 .. 2.9
<i>dufourii</i> ²⁾	♂	1.7	1.3	1.1	1.2	82%	139:94:73:100	3.2
	♀	1.8	1.5	1.1	1.3	83%	128:94:72:100	2.4
		α) 1.8	1.3	1.2	1.3	74%	125:92:71:100	2.4
		β) 1.8	1.5	1.0	1.3	84%	133:93:74:100	2.4
		γ) 1.8	1.5	1.1	1.3	84%	127:92:74:100	2.4
<i>bicolor</i>	♂	1.6 .. 1.7	1.4	1.2 (1.3)	1.25	78%	133:94:73:100 135:98:74:100	3.0 .. 3.2
	♀	1.8	1.4 .. 1.5	1.2	1.3	72%	128:94:74:100 121:88:73:100	2.5
<i>manicatus</i>	♂	1.7	1.4 .. 1.5	1.3 (1.5)	1.4 .. 1.5	88% (90%)	118:86:75:100 118:86:70:100	2.5 .. 2.9
	♀	1.8 .. 1.9	1.5	1.3	1.4 .. 1.5	86% (90%)	110:83:70:100 105:81:69:100	2.2

¹⁾ Specimens from North Africa (north of Sahara).

²⁾ Specimens from regions south of the Sahara and from southern Abyssinia (α) Abyssinia septentr., MNHN 790; β) Niger, MRAC 137.719, γ) Mali, MNHN 789)

L : length; W : width (for eyes see Fig. 5-6)

Tab.4: *S. dufouri* group: Variation of total length in different species.

		<i>pacificus</i>	<i>sarasinorum</i>	<i>dufouri</i> ¹⁾	<i>dufouri</i> ²⁾	<i>bicolor</i>	<i>manicatus</i>
Total length	♂	9.5 .. 12.2	5.2 .. 6.8	6.4 .. 12.5	9.3	6.4 .. 10.4	7.6 .. 11.4
Prosoma length	♂	5.7 .. 6.0	2.3 .. 3.9	3.3 .. 6.4	4.7	3.7 .. 5.1	2.4 .. 6.2
Total length	♀	14.0 .. 20.0	8.8 .. 11.6	10.6 .. 21.0	9.0 .. 25.0	11.0 .. 23.0	8.6 .. 21.0
Prosoma length	♀	7.5 .. 9.1	4.1 .. 4.9	4.8 .. 9.5	3.6 .. 11.1	5.2 .. 9.1	4.1 .. 8.0

¹⁾, ²⁾ See explanation in Tab.3.

S. pacificus + *dufouri* and the remaining species of the group are clearly differentiable by characters that permit the identification even of individuals:

Key to Species (Table 2-3):

- 1. ♂ 2
- ♀ 6
- 2. Prosoma relatively narrow, length 1.5 times maximal width, 2.3 times longer than wide anteriorly; leg I only 2.1 times as long as prosoma; small species (prosoma length 2.3-3.9). Pedipalp Fig. 125 *sarasinorum*
- Prosoma broader, length 1.3-1.5 times maximal width, only 1.6-1.8 times longer than wide anteriorly; leg I 2.5-3.6 times as long as prosoma; usually larger (prosoma length 2.4-6.4) 3

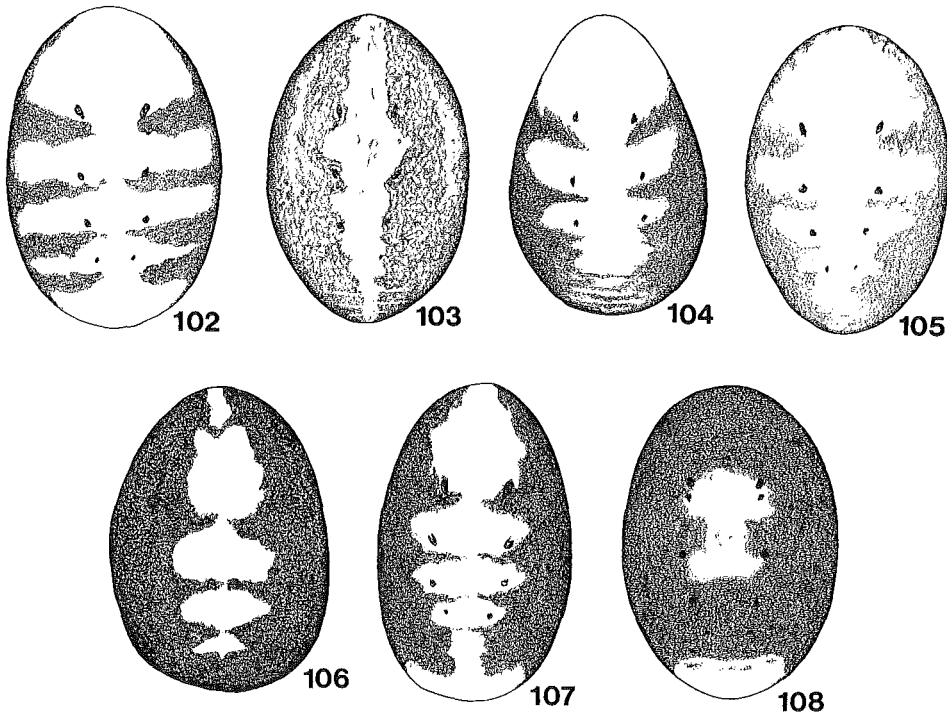


Fig. 102-108: Dorsal colour patterns of opisthosoma (♂). 102) *Stegodyphus pacificus*; 103) *S. sarasinorum*; 104-105) *S. dufouri* [104: Egypt, Djebel Mokattam; 105: Aden]; 106-107) *S. bicolor* [106: type]; 108) *S. manicatus*.

- 3. Terminal apparatus of bulb relatively short and stout, with a hyaline lamella terminating apically into fringes (Fig. 188-190). Legs I relatively short (2.5-2.9 times as long as prosoma). Row of PME 1.4-1.5 times width of row of AME (as PME are considerably larger than AME) *manicatus*
- Terminal apparatus of bulb longer, without a hyaline lamella as in *manicatus*. Legs I longer (3.0-3.6 times length of prosoma). Row of PME only 1.2 times width of row of AME (as PME are not larger, or only slightly larger, than AME) 4
- 4. Bulb inflated; terminal lamella guiding the embolus relatively broad, with typical incisions in its apical part (Fig. 176) *bicolor*
- Bulb not inflated; terminal lamella different *pacificus* + *dufouri* ... 5
- 5. Leg I relatively long (3.6 times longer than prosoma) *pacificus*
- Leg I shorter (3.1-3.2 times longer than prosoma) *dufouri*
- 6. Prosoma relatively narrow, 1.6 times longer than maximal width; small species (prosoma length 4.1-4.9). Epigynum (Fig. 139) relatively flat, without deeper depressions anteriorly *sarasinorum*
- Prosoma broader, 1.3-1.5 times longer than maximal width; usually larger (prosoma length 3.6-11.1). Epigynum with anterior depressions 7
- 7. Legs I relatively short (2.2 times as long as prosoma). Row of PME 1.4-1.5 times width of row of AME (as PME are considerably larger than AME). Pubescence: femora and tibiae I strikingly black, with white stripes on retrolateral sides; frontal and frontolateral region of prosoma, chelicerae and pedipalps also black. Epigynum and vulva see Fig. 192-194 *manicatus*
- Legs I longer (2.4-2.9 times as long as prosoma). Row of PME only 1.0-1.3 times width of row of AME. Coloration different, less striking 8

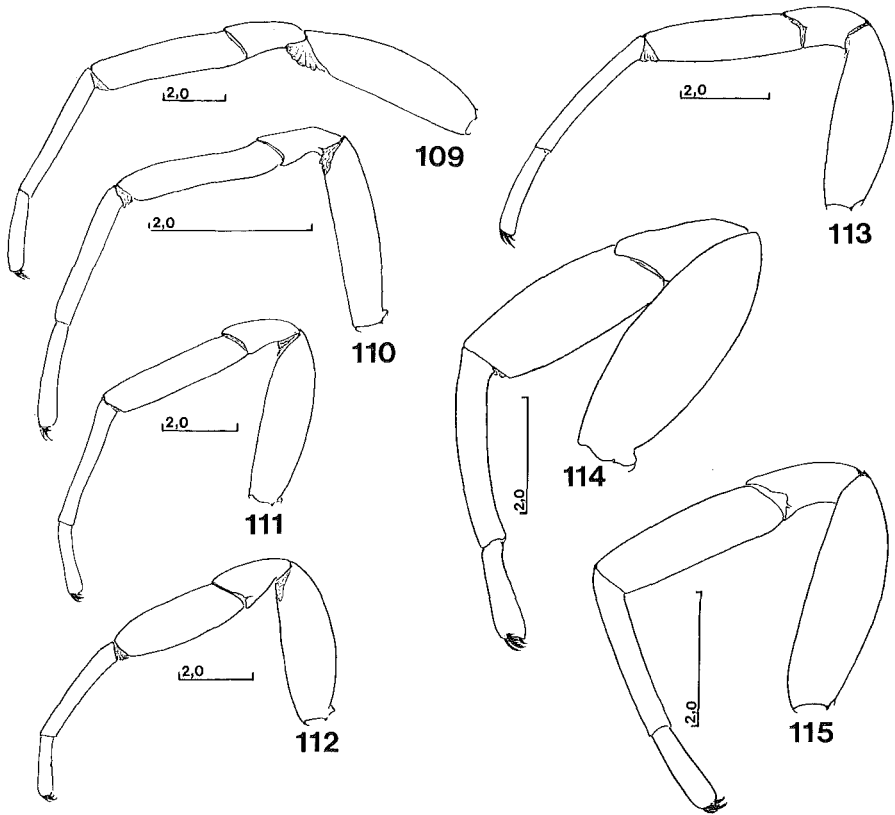


Fig. 109-115: Legs I of males, retrolateral aspect. - 109) *Stegodyphus pacificus*; 110) *S. sarasinorum*; 111-112) *S. dufouri*; 113) *S. bicolor*; 114-115) *S. manicatus*.

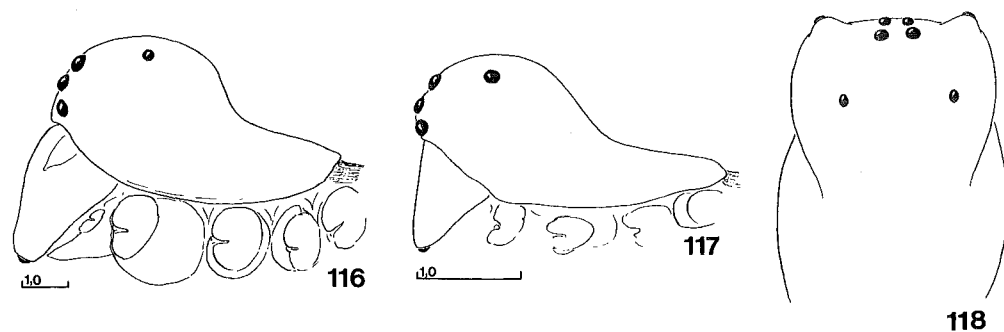


Fig. 116–117: Profile of prosoma. – 116) *Stegodyphus pacificus*, ♂; 117) *S. sarasinorum*, ♂.
Fig. 118: *Stegodyphus bicolor*, ♀, dorsal view of prosoma [note protuberances bearing ALE].

8. Trapeziform eye field formed by ALE and PLE relatively narrow posteriorly (ratio 100 : 72); ALE on projecting tubercles (Fig. 118); PME 1.2 times larger than AME. Epigynum with broad anterior depression *bicolor*
- Trapeziform eye field formed by ALE and PLE broader posteriorly (ratio from 100 : 78 up to 100 : 90); projecting tubercles bearing ALE less obvious or quite lacking; PME and AME subequal (Tab. 3). Anterior depression of epigynum usually not so broad (but see Fig. 134!) *pacificus + dufouri* . . . 9
9. Prosoma narrower, length 1.5 times maximal width; maximal width 1.1–1.2 times anterior width. Trapeziform eye field formed by ALE and PLE relatively broad posteriorly (ratio from 100 : 84 up to 100 : 90). Anterior glandular tips of receptacula knob-like (Fig. 133) *pacificus*
- Prosoma generally broader, length 1.3–1.4 (in isolated cases 1.5) times maximal width; maximal width 1.3–1.4 times anterior width. Trapeziform eye-field formed by ALE and PLE narrower posteriorly (ratio from 100 : 74 up to 100 : 84). Anterior glandular tips of receptacula not knob-like (Fig. 151; but see also Fig. 152–155) *dufourri*

Stegodyphus pacificus Pocock, 1900

(Fig. 102, 109, 116, 119, 121–124, 132–138; Map 10)

- 1900 *Stegodyphus pacificus* Pocock, Fauna brit. India, Arachn., : 209 (D♂♀) – vid.!
- 1935 *Stegodyphus pacificus*, – Dyal, Bull. Dept. Zool. Panjab Univ., 1: 131 Pl. 11 Fig. 2 (N).
- 1963 *Stegodyphus pacificus*, – Tikader, J. Univ. Poona (Sci. Technol.), 24: 33 Fig. 1 (N).

So far, diagnostic features of the species have not been figured (Tikader's Fig. 1 only represents the habitus of some eresid spider). The following description is based primarily on the syntypes.

Anterior part of prosoma very distinctively elevated in males, less so in females. ALE on projecting tubercles. Surface of prosoma of male covered by numerous prominent tubercles, each of them bearing a hair on its anterior base.

Leg I of male relatively long and stout, only very slightly modified (Fig. 109): tibia a little inflated, but *in toto* cylindrical; femur I ventrally and also on pro- and retrola-

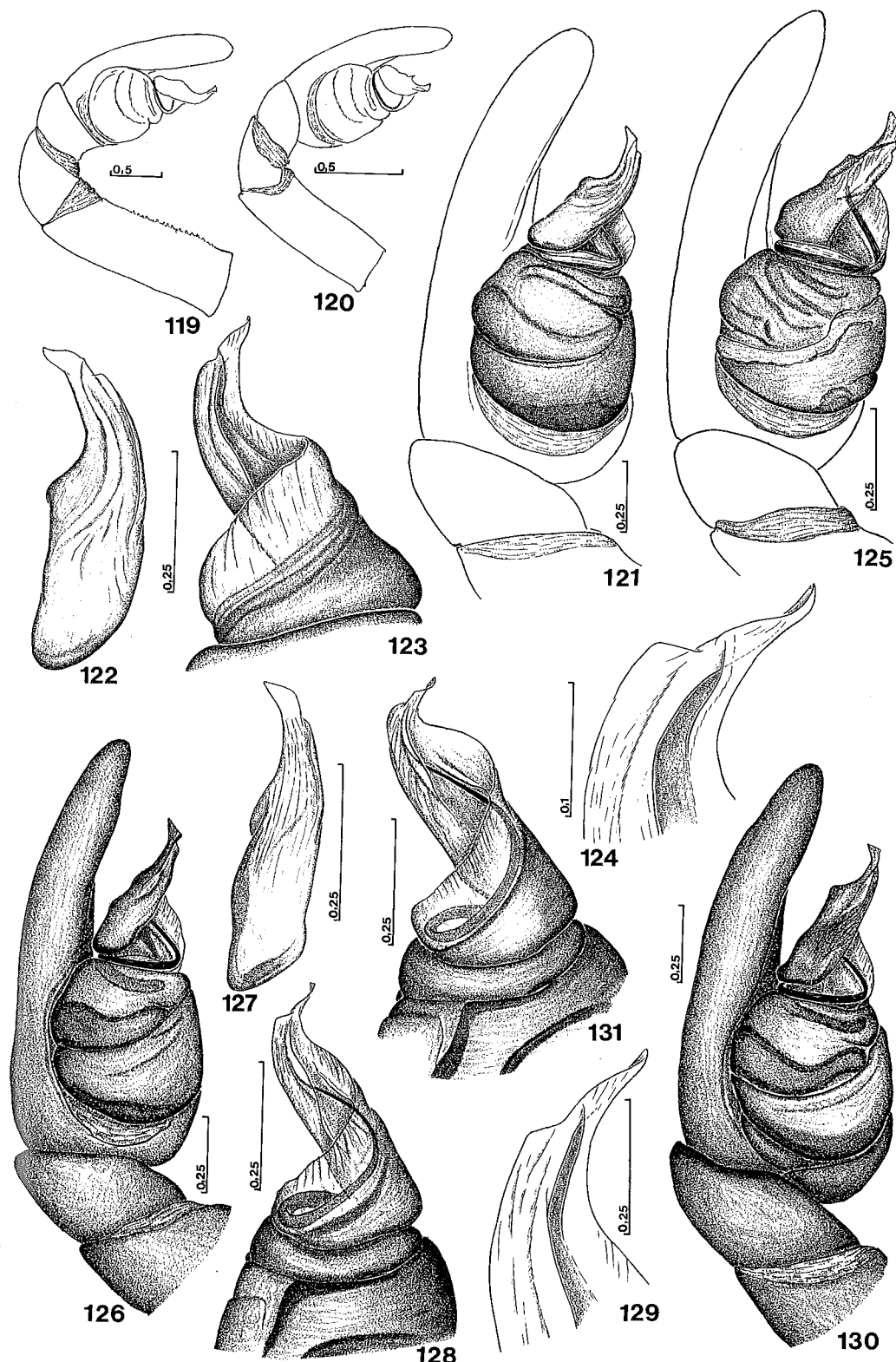


Fig. 119–120: Different proportions of male palps. – 119) *Stegodyphus pacificus*; 120) *S. sarasinorum*.

Fig. 121–131: Male palps and details of terminal lamellae. – 121–124) *Stegodyphus pacificus*; 125) *S. sarasinorum*; 126–129) *S. dufouri* [126–129: Egypt, Djebel Mokattam; 130–131: Aden].

teral sides and tibia I ventrally with sparse long and also shorter hairs close to the basis of sclerotized blunt cuticular protuberances (some of these protuberances, with hairs, also present on metatarsi and in basal half of tarsi).

Male pedipalp see Fig. 119, 121–124. Diagnostic characters especially in details of apical part of terminal lamella guiding the embolus.

Female genitalia see Fig. 132–137. Epigynal groove semicircular anteriorly, forming a deep depression in front of a triangular median piece; this element has a more or less conspicuous longitudinal brownish (i.e., sclerotized) zone which may be narrowed posteriorly (Fig. 132) or not (Fig. 134). – Variation in shape of vulva (compare Fig. 133, 137 with Fig. 135, 138) may in part be due to moulting of adult specimens.

Coloration not well preserved in alcoholic materials available to us. Pocock's original description is very short. We therefore refer to DYAL's discussion of colour pattern variation. The following data are drawn from the type material. – Males: Hairs of prosoma now white, triangular frontal eye field with brownish hairs. Legs I (especially coxae + femora and metatarsi + tarsi) darker brown, all other segments yellowish brown. Only tibia I with two ventral dark zones (one subbasal, the other subdistal). – Opisthosoma with darker dorsolateral longitudinal and four darker transverse zones, which are interrupted in the median region (cf. Fig. 102).

Females: As male, but appendages more conspicuously annulated, especially at the end of femora II–IV, patellae, and two dark annuli on tibiae. – Opisthosoma: Ventral side with a broad rectangular spot bordered laterally by broad white longitudinal zones.

Measurements. (Types, data taken from second specimen in()): ♂: Total L 12.2 (9.5), Prosoma L 6.0 (5.7), W ant 3.6 (3.1), max W 4.4 (4.0); diam AME 0.33 (0.28), PME 0.36 (0.30); W AME 0.75 (0.68), ALE 3.0 (2.4), PLE 2.3 (2.0). – ♀: Total L 20, prosoma L 9.1 (7.5), W ant 3.6, max W 4.4; diam AME 0.33, PME 0.36; W AME 0.75, PME 0.90, ALE 3.0, PLE 2.3.

Localities and materials. Iran: Mafiabad near Varamin (1♀ MCZ; DORR leg. X. 1949). – Sabzavaran [= Jiroft] 1♂ SMF RII/11458).

Pakistan: Hazara Dist.: Jabri (1♀ MCZ; PAYNTER leg. 18. XII. 1958).

India: Ambala (1♀ MCZ). – Dehra Dun (2♀ MNHN AR 939). – Eastern Khandesh (1♂ 2♀ numerous juv. Syntypes BMNH 99.9.21.217–290, 99.11.2.79; MADAN leg. VIII. 1899). – Eastern Distr. of Poona (6♀ 43 juv. Syntypes BMNH 99.11.2.122–127, 99.12.5.36–70; WROUGHTON leg.). – Bombay (1♂ 1♀ 1♂ 6♀ subad. HEC 152/153). – Dekan: Nilgiris (1♀ SMF RII/3540).

Stegodyphus sarasinorum KARSCH, 1891

(Fig. 21–27, 103, 110, 117, 120, 125, 139–141; Map 11)

1891 *Stegodyphus sarasinorum* KARSCH, Berlin. ent. Z., 36(2): 275 Pl. 10 Fig. 4 (D♀).

1900 *Stegodyphus sarasinorum*, –POCOCK, Fauna Brit. India, Arach., : 209 (D♀).

1905 *Stegodyphus sarasinorum*, –JAMBUNATHAN, Smithson. misc. Coll., (47) 2(1573): 365 (N♂♀).

1935 *Stegodyphus sarasinorum*, –DYAL, Bull. Dept. Zool. Panjab Univ., 1: 119–152 (D♀).

The type material seems to be no longer in existence, but the identity is unequivocal.

Even though the social species *S. sarasinorum* has been frequently mentioned in more general literature, the male has not yet been described accurately.

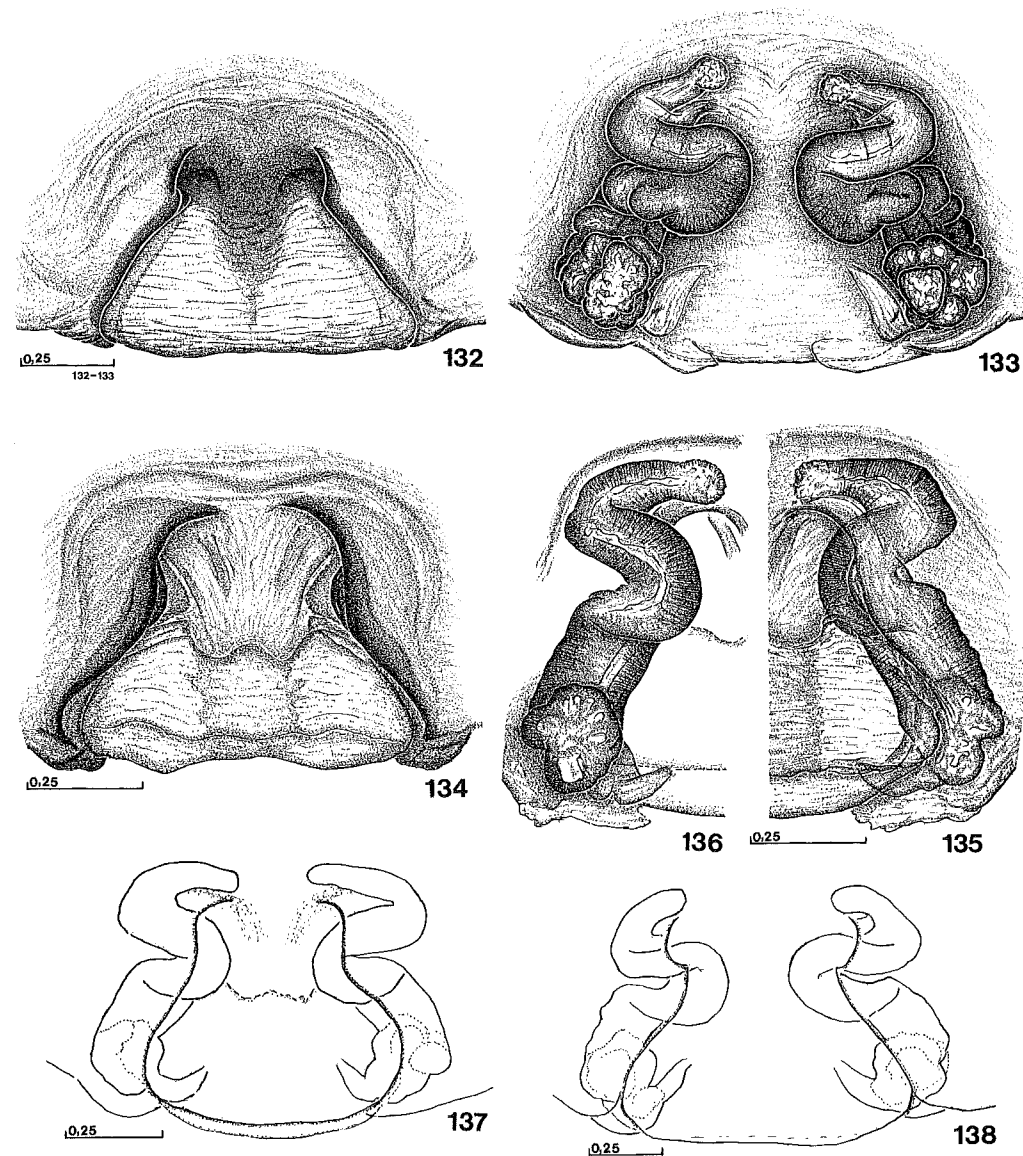


Fig. 132–138: *Stegodyphus pacificus*. – 132–133) Epigynum and vulva [dorsal view] of same specimen; 134–136) epigynum and vulva [ventral and dorsal view] of same specimen) 137–138) variation of vulva [ventral view].

Anterior part of prosoma as distinctively elevated in males (Fig. 117) as in solitary species, and also in females. Prosoma relatively long in relation to its width. Coarse tubercles with bristles on surface of male prosoma only (especially in its anterior lateral regions); these are almost completely absent in females.

Leg I of male (Fig. 110) relatively short, not modified at all. Prominent tubercles (as on prosoma) present on ventral side of femur only; lacking in females.

Bulb of male pedipalp relatively short (Fig. 120), compact; terminal apparatus coniform in shape (Fig. 125), relatively large (compared with remaining basal and median parts of bulb).

Female genitalia see Fig. 24–27; 139–141. Epigynal groove subtrapeziform; triangular median piece with a distinctively broad longitudinal brownish (i.e., sclerotized) zone, in many specimens even broader as illustrated in Fig. 139. – Vulva characterized by extremely broad loops bulged towards the median line.

Coloration (in alcohol): Males: Prosoma (Fig. 117) red-brown, also chelicerae and sternum. Appendages, including pedipalps, yellowish brown. Greyish, dark pigment on all femora (leaving a narrow light zone in the middle); tibia I–IV with a subbasal and a subdistal darker annulus. Prosoma sparsely covered by longer dark and shorter white hairs, also in frontal eye triangle. White hairs also present as a very narrow zone on clypeus and on lateral sides of chelicerae. Tufts of white hairs in apical region of all femora, patellae and tibiae, broader zones of such hairs especially on patellae and on tibiae. Opisthosoma approximately as in female, light median band dilatated in the middle.

Female very close to male in coloration, prosoma lighter brown. Opisthosoma see Fig. 103.

Biology. The species has been found in SW India in rice fields, but also in a forest region at the foot of a hill (400 ft.). A locality in NE Sri Lanka is characterized by the collector as dry zone of a scrub jungle. KULLMANN & al. (1972: 90) report that the species occurs in E Afghanistan and has been found there only along the banks of the river Kunar, from Kodkai to Barikot.

For further data on life history, bionomics and behaviour see JACKSON & JOSEPH (1973), and for information on sexual biology and morphology of reproductive organs see BRADDOO (1976). Many data (especially on social living) are reported by BUSKIRK 1981; D'ANDREA 1987; SEIBT & WICKLER 1988).

Measurements. Variation: ♂: Total L 5.6–6.8, prosoma L 2.5–3.9 – ♀: Total L 8.8–11.6, Prosoma L 4.1–4.6.

Examples: ♂: Total L 5.8, Prosoma L 3.9, W ant 1.7, max W 2.05; diam AME 0.18, PME 0.22; W AME 0.43, PME 0.51, ALE 1.40, PLE 1.16 – ♀: Total L 10.1, Prosoma L 4.9, W ant 2.8, max W 3.1; diam AME 0.23, PME 0.25; W AME 0.56, PME 0.69, ALE 2.32, PLE 1.70.

Localities and materials. Nepal: Baglung (1♀ BMNH 152; HYATT leg. 12.VI.1954). – Khabar (numerous ♂♀ MNHN; HUBERT leg. 1966–7).

India: NW Himalayas (1♀ BMNH; FISHER leg. 22.VII.1924). – Dehra-Dun (215♀ numerous juv. MNHN AR 930–1; KAIRCH leg.). – East Khandesh (3♂ numerous juv. BMNH 99.11.2.80–100; MADAN leg.). – 13♂ 4♀ subad. BMNH 99.9.21.297–9). – Nasik (1♂ 3♀ 7♀ subad. BMNH 99.11.2.47–55; MITTEL leg.). – Maharashtra (1♀ MCZ; EBERHARD leg. XII.1983). – Bombay (17♀ 9♀ subad. HEC 508/153; HANSEN leg.). – Poona (1♀ BMNH). – Madhya Pradesh, Distr. Bastar, Gobindapur (4♀ Zool. Surv. Ind.; AHMED leg. 21.X.1979). – Bangalore, Karnataka (1♀ MCZ; EBERHARD leg. XI.1979). – Bangalore, Ulsoor (2♂ 1♀ subad. BMNH 99.12.9.2–4). – Vellore (6♀ 9♀ pre-epig. 1♂ 3♀ juv. ZMK; LÖVENDAL leg.). – Madras (2♀ 1♂ juv. SMF 1156. – 1♂ BMNH; JAMBUNATHAN leg. 21.XII.1923. – 2♀ BMNH 1923.12.21.8–9; JAMBUNATHAN leg.). – Chingleput (1♂ 1♀ BMNH 98.10.1.5–6; WEST leg.). – Pondicherry (2♂ 17♀ MNHN AR 937). – Calicut (3♂ 15♀ SMF 17604; JOSEPH leg. 29.I.1965). – Ferokeh, in rice fields (21♂ 14♀ 5♀ pre-epig.

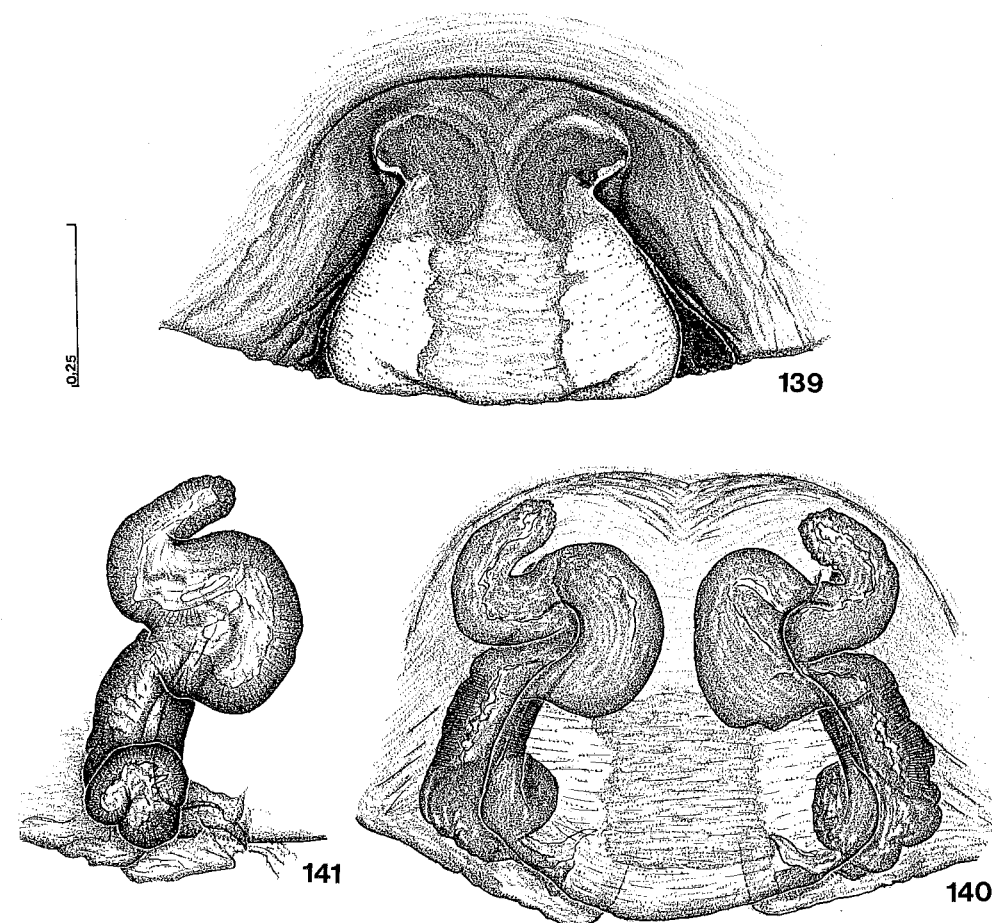


Fig. 139–141: *Stegodyphus sarasinorum*. – 139) Epigynum; 140) epigynum and vulva, ventral view; 141) vulva, dorsal view.

SMF 17602; JOSEPH leg. 1.II.1965. – 37♂ 15♀ SMF 17603; JOSEPH leg. 1.III.1965). – Nilgiris (34♂ 123♀ numerous juv. ZMK; SHERRIFFS leg.). – Tamil Nadu, Ootacamund, near Mudamalai Sanct. (2♂ 2♀ MCZ; EBERHARD leg. XII.1983). – Trichur (1♂ 2♀ juv. BMNH; leg. 6.VIII.1936). – Trivandrum (2♀ BMNH 99.5.17.15; leg. II. 1896). – Travancore, Madalunas (1♀ BMNH 99.1.17.35; FERGUSON leg. III.1896). – Travancore, Ponnudi (1♀ BMNH 99.1.17.53; leg. III.1896).

Sri Lanka: (3♂ 9♀ 5♀ subad. HEC 509; THWAITES leg. – 4♀ 11♀ subad. HEC 511; THORELL leg. – 1♀ 2♀ juv. MNW). – Colombo (1♂ 45♀ MNHN AR 936. – 2♂ 12♀ 37 juv. BMNH 06.11.14.132–162 part.; WELTEY leg. 29.VI.1906). – Nilaveli [dry zone, scrub jungle on vegetation] (numerous juv. BMNH 27.30.10.1982). – Trincomalee (1♂ BMNH 10.4.10.1; BAINBRIGGE-FLETCHER leg. – 1♂ juv. 54♀ juv. BMNH; JACKSON leg. 29.I.1982). – Werawewa (40♀ ad. + juv. BMNH; JACKSON leg. I.1982). – Wirawila (numerous juv. BMNH; leg. 18.X.1982).

Stegodyphus dufouri (AUDOUIN, 1826)

(Fig. 104–105, 111–112, 126–131, 142–173; Map 9)

1826 *Eresus dufouri* AUDOUIN, Explic. Egypte, 1(4): 376 Pl. 4 Fig. 12 (D♀).

1846 *Eresus molitor* C.L. KOCH, Die Arachniden, 13: 7 Fig. 1082 (D♀) – vid.!

1846 *Eresus fusciformis* C.L. KOCH, Die Arachniden, 13: 9 Fig. 1084 (D♀) – vid.!

1846 *Eresus semicinctus* C.L. KOCH, Die Arachniden, 13: 12 Fig. 1086 (D♂) – vid.!

1908 *Stegodyphus niloticus* SIMON, Bull. Soc. ent. Egypte, 1908(3): 80 (D♀) – vid.!

1910 *Stegodyphus dufouri*, – SIMON, Ann. Soc. ent. France, 79: 287 Fig. 4B (D♂♀).

1910 *Stegodyphus niloticus*, – SIMON, Ann. Soc. ent. France, 79: 288 (D♀).

The name *E. dufouri* is attributed to AUDOUIN 1826. Reasons are explained by TOLLITT in Bull. zool. Nomencl., 43(1): 107–110; 1986.

All available names mentioned above refer to materials collected at localities north of the Sahara and from the Sudan (*niloticus*). Specimens from southern populations have remained unnamed; see discussion below.

Anterior part of prosoma moderately (small specimen from Biskra) to markedly elevated in male, less so in female. Surface of prosoma of male covered by numerous prominent and coarse tubercles (oblique cone-shaped on elevated anterior part), each of them bearing a hair on its anterior base; this structure also present in females, but less densely and less conspicuously.

Leg I of males modified to moderate extent or not at all: tibia I inflated (Fig. 112) or cylindrical (Fig. 111). Ventral side of tibia and metatarsus I and also basal region of tarsus with numerous prominent tubercles (as on prosoma), less dense or lacking on tarsi in small specimens from Biskra.

Bulb of male pedipalps (Fig. 126, 130) less inflated than in *bicolor*. Terminal lamella guiding the embolus narrower, different in shape (Fig. 127–129, 131).

Female genitalia highly variable. See Fig. 142, 144, 146, 148, 150 (epigynum) and Fig. 143, 145, 147, 149, 151–173 (vulva). Triangular median piece of epigynum with a broad longitudinal brownish (i.e., sclerotized) zone, its lateral parts whitish.

Coloration not well preserved and faded in most specimens available to us. – Males: Prosoma dark red-brown, also chelicerae; pedipalps and legs I (patellae I excepted) red-brown, patellae I and all other appendages dark horn-brown. Leg I apparently without, but femora, tibiae and metatarsi II–IV with traces of annulation (faded?): one broad darker ring in basal half, a second shorter ring in distal half. Prosoma densely and uniformly covered with white plumose hairs, accordingly without separate marginal white zones (as in *bicolor*); the clypeus bears a very narrow, inconspicuous white 'barb'; no white hairs on chelicerae, except for a few close to the anterior border of the cheliceral boss. Triangular frontal eye field with orange to fair hairs. Lateral regions of sternum moderately infuscated, uniformly covered by white hairs. Zones of such hairs also present on appendages: end of pedipalpal femur and major parts of patella; all femora show broad white basal rings extending on femora over up to two-thirds of these segments; patellae uniformly covered, tibiae II–IV with a narrow ring in the middle and a terminal tuft (as also on femora II–IV); white hairs and terminal tufts also present on all metatarsi. Opisthosoma, dark or golden brown

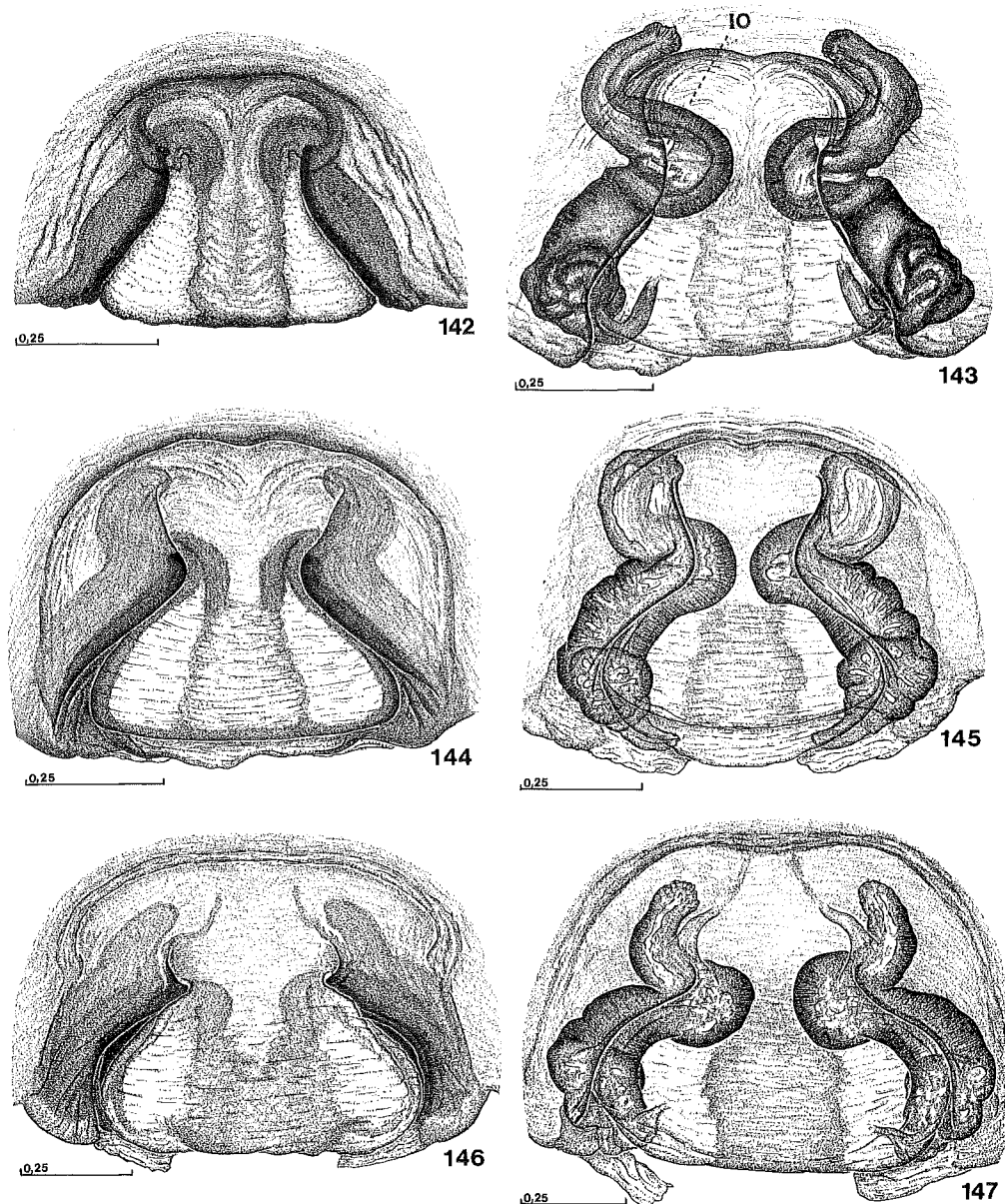


Fig. 142–147: *Stegodyphus dufouri*. Variation in shape of epigynum and vulva [Fig. 142 + 143, 144 + 145, 146 + 147: same specimen. – 142–145 from Aden, 146–147 from Sudan].

(faded?), with a median zone of whitish markings connected along the median line; this median zone may be connected with a terminal white spot or not (Fig. 104–105). Paramedian white bands on ventral side have narrow connections anteriorly with the dorsal median whitish zone and much broader connections with the terminal spot. Ventral region between epigastric furrow and cribellum whitish, with a median darker spot.

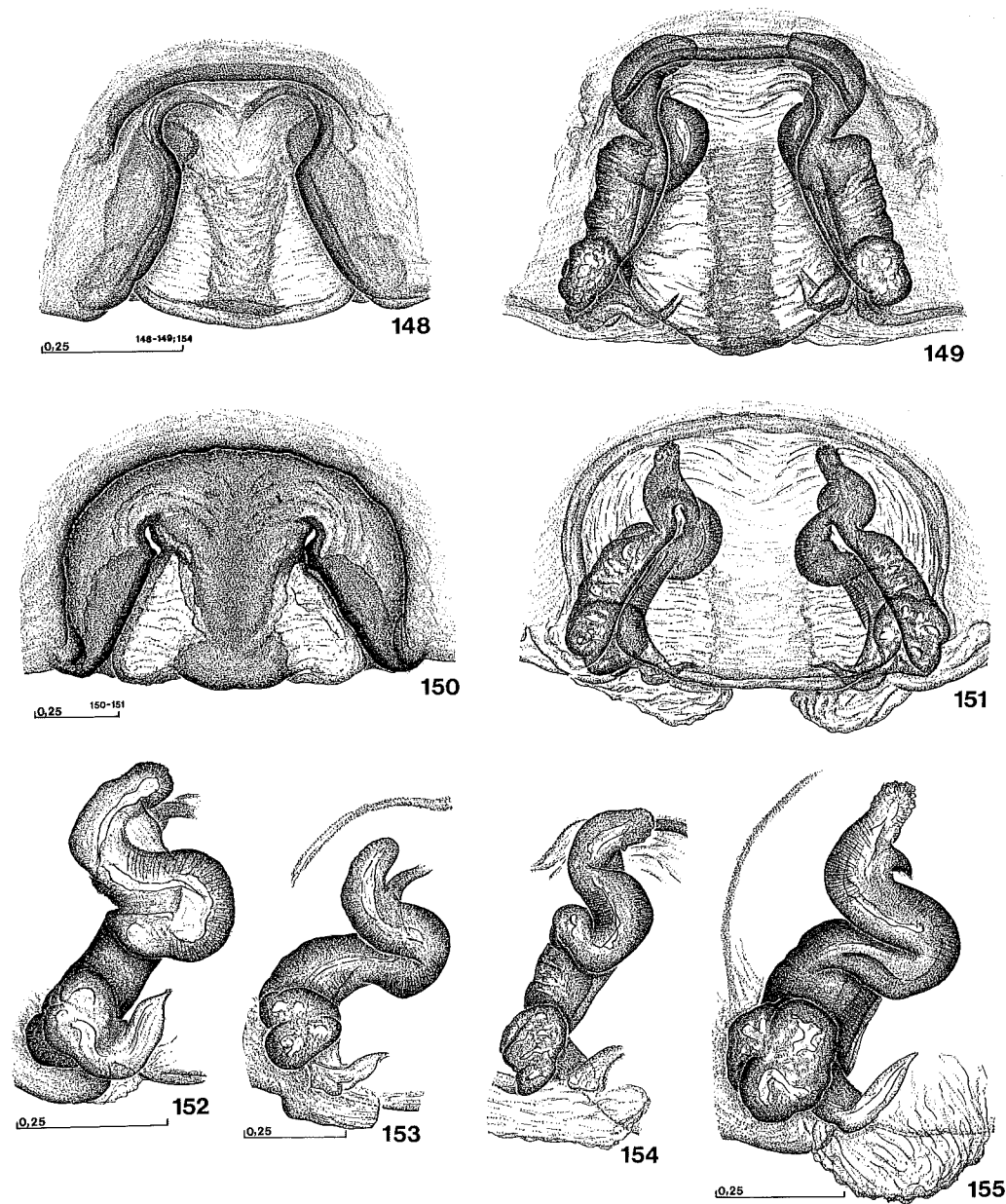


Fig. 148-155: *Stegodyphus dufouri*. Variation in shape of epigynum and vulva. - 148-151) Ventral view [Fig. 148 + 149, 150 + 151: same specimen. - 148-149: type of *niloticus* from Sudan; 150-151: from Mali, Bamako]. - 152-155 dorsal view [152 + 143, 153 + 147, 154 + 149, 155 + 151: same specimen].

Females: Prosoma and chelicerae dark red-brown, legs I red-brown, legs II-IV horn-brown. Distribution of white plumose hairs on prosoma as in males; clypeus with a narrow but distinct white 'barb'; frontal side and part of lateral sides of chelicerae densely covered with white hairs. Triangular frontal eye field with reddish or golden brown hairs (type "red face"), other specimens totally white in this region (type

"white face"). Legs more conspicuously annulated than in males: basal ring ventrally divided by white hairs into a narrow dark zone at the very basis and the remaining broader portion (thus femora and tibiae have dorsally two and ventrally three dark annuli). All metatarsi dark, with a distinctive subbasal white annulus. White hairs also present on femora (especially on prolateral sides) and on all other segments, but not in regions of dark annulation. Sternum as in male, less densely covered with white hairs. Opisthosoma extremely faded in nearly all alcoholic materials, similar to Fig. 105. Freshly collected specimens show a longitudinal, yellowish grey band, narrowing posteriorly and subdivided by a darker median zone; paired projections may cause a subdivision of the light median band into interconnected \pm triangular spots; there is a light zone between dark paramedian bands and marmorated lateral sides of opisthosoma.

Discussion. We have had extreme difficulty in defining *S. dufouri*, for the following reasons:

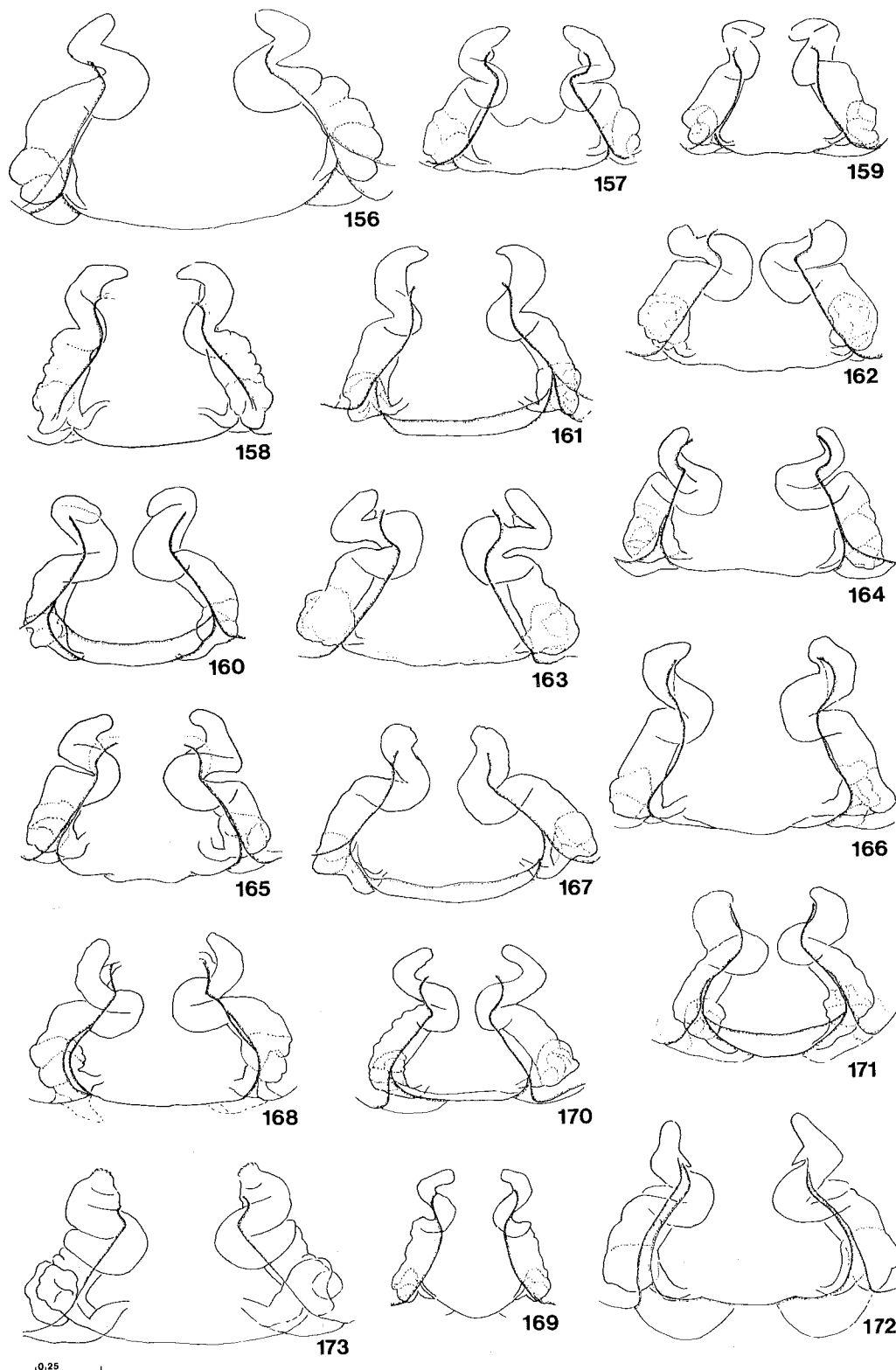
a) There is a "red face" type and a "white face" type. It has not been possible to correlate this difference (as far as it is still preserved in alcoholic material) with any other difference in character expression. We have found a similar variation between living syntopic specimens of *S. mimosarum* and *dumicola*. We do not therefore expect that the difference in the present species necessarily has any taxonomic relevance.

b) There are only a few males known. Some of them have normal, others inflated tibiae I. There is no geographic correlation: inflated tibiae occur in males from Kairo (Mokattam), Siwa and Senegal; males from Biskra and Aden have cylindrical tibiae I. These differences do not seem to be correlated with size or any other differences in measurements.

c) Females from localities north of the Sahara (including Sudan) tend to have proportionally longer legs I than materials from localities south of the Sahara (including tropical West Africa): legs I 2.4-2.9 times as long as prosoma (mean value 2.7) in northern specimens, corresponding value (constant) 2.4 in southern specimens. This difference is also not correlated with any other data.

d) In the smallest male from Biskra the anterior region of the prosoma is only moderately elevated; this may be correlated with size. The most marked elevations have been found in the relatively large males from Siwa and from Senegal. A careful study revealed that there are no definable differences in the structure of the terminal lamellae of the male bulbs.

e) There is enormous variation in the shape of the epigynum and, even more, in details of the vulva. This has been illustrated in Fig. 156-173. We have not been able to correlate such differences with other character expressions or with distribution patterns. We would like to draw attention (i) to a remarkable variation between individuals collected at the same locality, and (ii) to the aspect that part of this variation may be caused by moultings of adult animals. It is therefore assumed that the differences are due to different kinds of variation (variation within local populations and between populations, and age-dependent variation).



We cannot exclude the possibility that the few specimens available from tropical West Africa (different symbols in Map 6) are not conspecific with *dufourii*. But this reservation is based solely on slightly different vulval structures (anterior elements with glandular tips directed forward, not curved towards the middle) and on aspects derived from their distribution. The single male from Senegal does not show any difference.

This discussion of variation in single characters has been based on a large number of detailed measurements taken in all available males and the majority of the females at our disposal. In all other instances of extremely similar species, it has been possible to differentiate between them on the basis of ratios and – at least in males – of reproducible difference in the terminal apparatus of the bulb. But this is not so in the case of the materials under scrutiny here. For this reason it seems most probable that *dufourii* (as defined here) is not a composite species.

Biology. EL-HENNAWY (1986, 1987) has reported that females of *Pseudopompilus humboldti* (DAHLBOM, 1845) (Hymenoptera, Pompilidae) attack and paralyse adult females of *dufourii*.

Measurements. ♂ (from specimen BMNH 1936.2.12.232 from Siwa; extreme data taken from smallest ♂ from Biskra, NHMW, in ()): Total L 10.1 (6.4), prosoma L 5.5 (3.5), W ant 3.0 (2.0), max W 3.9 (2.4); diam AME 0.24 (0.21), PME 0.25 (0.22); W AME 0.55 (0.48), PME 0.69 (0.58), ALE 2.15 (1.61), PLE 1.80 (1.26). – ♀ from specimen BMNH 1939.4.26.173 from Siwa; extreme data taken from relatively large ♀ from Biskra, NMW, in ()): Total L 17.3 (21.0), prosoma L 7.5 (9.0), W ant 4.0 (4.8), max W 5.5 (6.5); diam AME 0.26 (0.33), PME 0.28 (0.31); W AME 0.66 (0.77), PME 0.84 (0.99), ALE 3.05 (3.70), PLE 2.40 (2.90).

Localities and materials. Mauritania: Nouakchott (3♀ MNHN; BERLAND leg. X. 1948).

Mali: Kidal (4♀ MNHN AR792).

Algeria: Biskra (1♂ 1♀ NMW).

Tunesia: Gabès (5♀ MNHN AR799).

Lybia: Brak (1♀ BMNH; leg. IX. 1953). – Al Kufra (10♀ 2 juv. ZMB 3268; STECKER leg. X. 1897. – 1♀ MRAC 135.894; leg. Mission Sci. Belg. 12. X. 1968).

Egypt: No data (2♀ Syntypes of *molitor* ZMB 1523 [pinned specimens]; EHRENBURG leg.). – No data (1♂ Holotype of *semicinctus* ZMB 1522 [pinned specimen]; EHRENBURG leg.). – No data (2♀ SMF 2802, 2804; RÜPPELL leg. 1826. – 7♀ ZMB 551. – 2♀ ZMB 501). – Exabaia (1♀ BMNH 1936.2.12.870; OMER-COOPER Siwa Exped. leg. 17. VIII. 1935). – Siwa (1♂ 4♀ BMNH 1936.2.12.149, 201, 232, 278, 395; 2♂ 2♀ 1939.4.26.171–3, 177; OMER-COOPER Siwa Exped. leg. 29. IV.–8. VIII. 1935). – Sitra (3♀ BMNH 1936.7.10.8–10. – 1♀ BMNH 1936.2.12.1061; OMER-COOPER Siwa Exped. leg. 14.–16. VI. 1935). – Cairo, Center Salam (42♀; HORAK leg. 30. X. 1987). – Djebel Mokattam près du Caire (1♂ MNHN AR 802). – Gizeh (2♀ 4 juv. NMW). – Assuan (1♀ BMNH 1928.4.16.4; HIRST leg. II. 1926). – Barrage du Nil (1♀ MCZ). – Upper Egypt (1♀ ZMB 24738; VALENTINER leg. 1880–1).

Fig. 156–173: Intraspecific variation of vulvae in *Stegodyphus dufouri*, ventral view. – 156) Algeria, Biskra; 157–161) Lybia, Kufra; 162) Egypt [pre-epigynum!]; 163–167) Egypt; 168–169) Sudan [169: type of *niloticus*]; 170–171) Aden; 172) Mali; 173) Niger. – Note (a) differences and also similarities at same locality/in same region [e.g. Fig. 157–160, 170–171]; (b) differences in size. – All drawings at same scale.

Sudan: El Khandaq (6♀ BMNH 20.10.35; Sudan Agric. Res. Serv. leg. 30.III.1936). – Suakim (5♀ 2♀ pre-epig. ZMB 3897; STECKER leg. X. 1886). – Wadi Halfa (1♀ Holotype of *niloticus* MNHN AR929).

Ethiopia: Abyssinia septentr. (2♀ MNHN AR790).

Somalia: Djibouti (4♀ MNHN; leg. 1893).

South Yemen: Aden (1♂ 4♀ 3♀ pre-epig. MNHN AR791).

Senegal: Bambey (1♂ MNHN AR796; RISBEC leg. 1948).

Materials tentatively associated to *dufourii*. – Mali: Bamako (2♀ MNHN AR789).

Upper Volta: Ougadougou (1♀ 1♂ 1♀ juv. MNHN AR794; leg; VII.1937).

Niger: Niamey (1♀ MRAC 137.719; VAN IMPE leg. IX.–X.1970).

Tchad: Tuburi Marsh [= Mayo Kebi W Fianga] (1♀ BMNH; Talbot leg.).

Stegodyphus bicolor (O. PICKARD-CAMBRIDGE, 1869) [nov. comb.]

(Pl. 3 Fig. F; Fig. 106–107, 113, 118, 174–187; Map 9)

1869 *Eresus bicolor* O. PICKARD-CAMBRIDGE, Ann. Mag. natur. Hist., (4)3: 70 Pl. 6 Fig. 66–69 (D♂) – vid.!

1904 *Stegodyphus canus* PURCELL, Transact. South Afr. philos. Soc., 15(3): 134 Pl. 10 Fig. 5 (D♀) – vid.!

1928 *Stegodyphus canus*, – LAWRENCE, Ann. South Afr. Mus., 25(1): 4 (N).

1928 *Stegodyphus filimaculatus* LAWRENCE, Ann. South Afr. Mus., 25(1): 4 Pl. 3 Fig. 56 (D♂) – vid.!

The type materials clearly demonstrate that *bicolor*, *canus* and *filimaculatus* are synonyms. The type of *bicolor* is a pinned specimen; we have been successful in rehydrating the male palp. The syntypes of *canus* are in a worse condition and extremely faded.

Anterior part of male prosoma distinctively elevated in male, less so in female. ALE on projecting tubercles (Fig. 118), directed obliquely downwards. Surface of prosoma of male covered by numerous prominent tubercles (oblique and cone-shaped on elevated anterior part), each of them bearing a hair at its anterior base; this structure also present in females, but less dense and less conspicuous.

Leg I of male (Fig. 113) not modified. Ventral side of tibia and metatarsus I with numerous prominent tubercles (as on prosoma), lacking in female.

Bulb of male pedipalps (Fig. 174) inflated. Terminal lamella guiding the embolus relatively broad, with typical incisions in its apical part (marked by arrows in Fig. 175–176).

Female genitalia see Fig. 178–187. Epigynal groove semicircular anteriorly, in some specimens forming only a shallow depression; triangular median piece with a broad longitudinal brownish (i.e., sclerotized) zone, its lateral parts whitish. – Vulva highly variable in shape and also in size (Fig. 180–187). Anterior curved tubes relatively gracile, an oblique stout rim (arrow in Fig. 181) close to the introductory openings always present; when the broad loops bulging towards the median line are very prominent (as in Fig. 180) they show a flat dorsal side. Posterior tubercular part of receptacula obliquely divided into two parts.

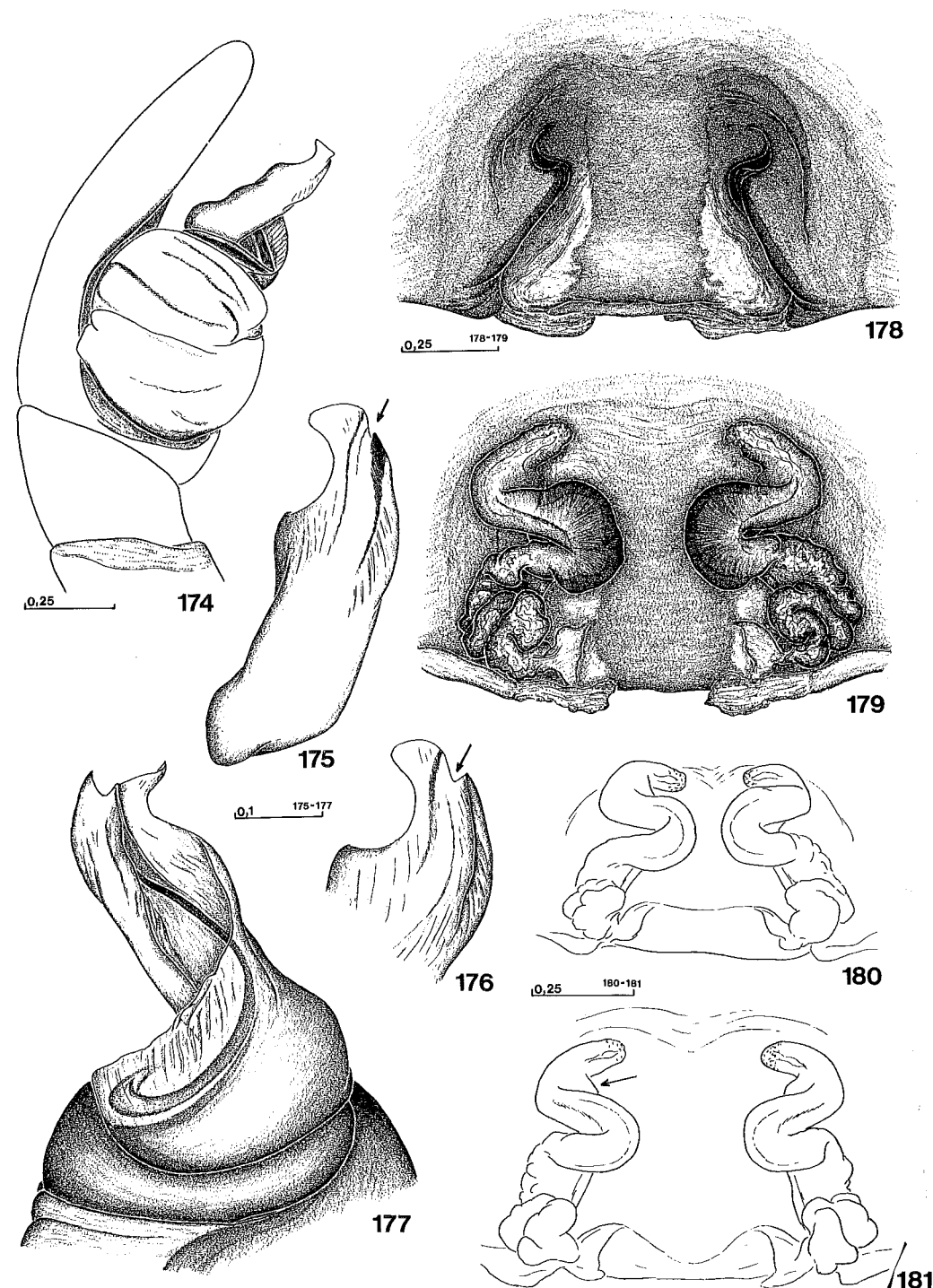


Fig. 174–181: *Stegodyphus bicolor*. – 174–177) Male pedipalp and details of terminal lamella; 178) epigynum; 179) vulva of same specimen; 180–181) variation of vulvae, dorsal view [181: type of *canus*].

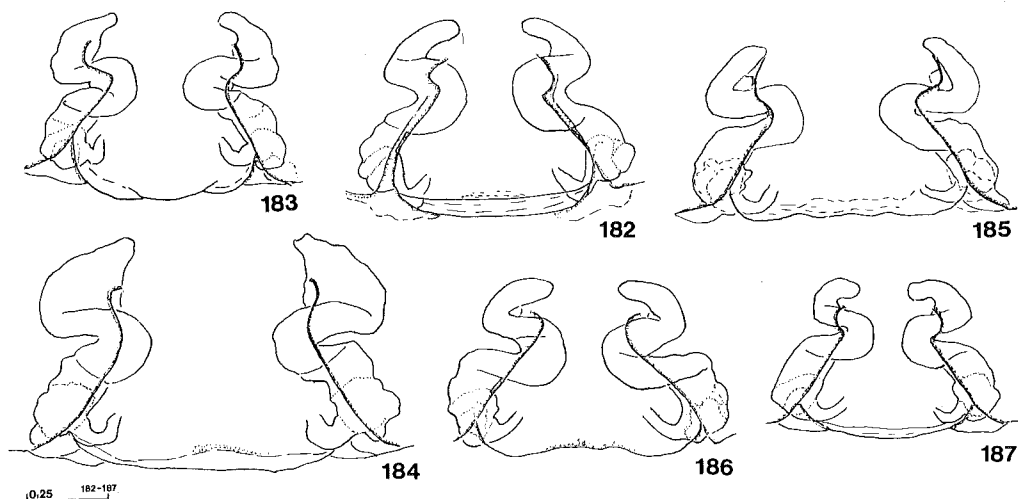


Fig. 182-187: Intraspecific variation of vulvae in *Stegodyphus bicolor*, ventral view. - 182) Tsumeb; 183) Okavango; 184) Botswana; 185) Karibib; 186) Okahandja; 187) Gobabis.

Coloration sexually dimorphic. Males: Prosoma very dark, almost black, also chelicerae; pedipalps and legs red-brown, with dark femora and tibiae I. Other femora, tibiae and all metatarsi annulated: one broad dark ring in basal half, a second in distal half [basal annulus sometimes lacking on femora II and III]. Prosoma bordered by two broad and bright zones of white plumose hairs; also dorsal (not posterior or lateral) region of "cephalic" part of prosoma densely covered with such hairs; further, they form a narrow 'barb' on the clypeus but are nearly lacking on chelicerae (only about four hairs close to the anterior border of the chelicerar boss). Triangular frontal eye field and chelicerae with blackish hairs. Sternum with broad dark margins, uniformly covered with white hairs. Zones of such hairs also present on appendages: end of pedipalpal femur and margin of patella; all femora show broad white basal rings (in Femora II-IV extending approximately to the middle of these segments, especially dorsally); patellae uniformly covered; tibiae with a narrow ring in the middle and a terminal tuft (as in femora); white hairs also present on metatarsi, densely in proximal tufts. - Opisthosoma black, with a white median zone (Fig. 106-107); terminal spot not always present; median zone may be abbreviated posteriorly or connected with terminal spot. Paramedian white bands on ventral side are connected with terminal spot. There are also two transverse white zones, one behind the epigastric furrow, the other (very narrow) in front of cribellum; between these zones a broad black median spot.

Female: Prosoma and chelicerae dark red-brown, close to black. Legs horn-brown; black annulation of appendages I-IV as in male, but even more extended. Prosoma uniformly and very densely covered with bright white plumose hairs; such white hairs also form a narrow clypeal 'barb' and are present on frontal and lateral sides of chelicerae, less densely or lacking in distal region close to claws. Triangular frontal eye

field with reddish-brown hairs, distinctly divided between AME and PME by a longitudinal white zone. Paramedian spots of reddish-brown hairs also present close to posterior lateral borders of PLE, in some of the individuals extending to lateral regions of 'cephalic' part of prosoma. Sternum brown, marmorated, with a broad median and narrower marginal zones of white hairs, less densely as on prosoma. Zones of such hairs also present on appendages, especially between the dark annuli. Opisthosoma dorsally with two paramedian reddish-brown bands, intermingled with irregular little spots formed by groups of white hairs; anterior border of these bands very dark brown. Median region of dorsal side covered by a longitudinal white band; according to segmentation, it is incompletely interrupted by narrow transverse parts of the darker paramedian hair zones in the anterior $\frac{2}{3}$, completely interrupted in the posterior third. Lateral sides densely covered by dark (nearly black) spots. Ventral side as in male, but without transverse white zones between epigastric furrow and cribellum. - Alcoholic materials loose at first the bright reddish-brown coloration of the eye field and other regions of the prosoma; dorsal side of opisthosoma more or less uniformly light brown, ornamentation reduced or even absent.

Biology: Adults have been found to produce nests (Taf. 3 Fig. F) in bushes (between leaves spun together). Between Tsumeb and Grootfontein they live close to the road in bushes of *Lonchocarpus nelsii* GRAY (Papilionideae), but also close to the ground in dry grass. At this locality, they occur syntopically with *S. dunicola*, but this species inhabits thorn bushes. At Cha-re, nests (also incorporating leaves) have been seen in little orange trees. - At the first glance, the nests are similar to those of *dunicola*. But when the superficial silk coverage is opened, a large single and remarkably solid tube appears; it has a striking pale yellow-orange colour

Measurements. ♂ (extreme data taken from further specimens in ()): Total L 7.0 (10.4), prosoma L 4.1 (3.7, 5.1), W ant 2.5 (2.3, 3.0), max W 3.0 (2.6, 3.6); diam AME 0.23 (0.19, 0.22), PME 0.26 (0.22, 0.29); W AME 0.57 (0.48, 0.64), PME 0.71 (0.60, 0.80), ALE 2.08 (1.85, 2.48), PLE 1.6 (1.45, 1.93). - ♀ (same remark applies): Total L 17.5 (13.8, 23), prosoma L 8.1 (5.8, 9.1), W ant 4.6, max W 5.7; diam AME 0.30, PME 0.35; W AME 0.77, PME 1.0, ALE 3.8, PLE 2.8.

Localities and materials. Namibia: Kunene River (1 ♂ Holotype of *filimaculatus* SAM 6144/S AR 2191; leg. III. 1923). - Kaoko Otavi (1 ♂ SAM 6954/S AR 2192; Mus Exped. leg. I.-IV. 1926). - Tsumeb (1 ♀ ZMH; MICHAELSEN leg. 13.-19. VI. 1911). - Between Tsumeb and Grootfontein (4 nests with 4 ♀ [dead] and numerous juv.; KRAUS & KRAUS leg. 30. VII. 1988) - Andara-Kavango, Okavango Riv. (1 ♀ MRAC 152.862; BADDELEY leg. 1979). - Grootberg Mts., Palmfontein Farm (2 ♀ pre-epig. NM 12577; LAMORAL & DAY leg. 26. II. 1969). - Damaraland (1 ♂ Holotype HEC 124). - Annabis (1 ♂ 1 ♀ found in same nest, 1 ♀ pre-epig. NM; LAMORAL leg. 23.-24. II. 1969). - Karibib (1 ♀ SMF RII/5232). - Foot of Groot Spitzkoppe Mts. (1 ♀ NM 11540; LAMORAL & DAY leg. 11. II. 1969). - Okahandja (1 ♀ SMF RII/10618; GAERDES leg. V. 1953). - 20 km S and 20 km W Okahandja, in grass (2 nests, numerous juv.; SEIBT & WICKLER leg. 9. VII. 1988). - Gobabis Flats (1 ♀ NM 7366; LAWRENCE leg. V. 1959). - East Namib, Farm Kromhoek, Cha-re, on orange tree, isolated occurrence in desert region (1 nest with 1 ♀ [dead] and juv.; FILMER leg., KRAUS & KRAUS obs. 16.-18. VII. 1988). - 10 miles E of Great Fish River, semi-desert (1 ♀ NM 11240; LAMORAL & DAY leg. 30. I. 1969). - Vioolsdrift (1 ♀ SAM 2528; MACPHERSON leg. 12. IX. 1983).

Botswana: Ngamiland, Nokaneng (1 ♀ NM 9480; HAACK leg. IV. 1965). - Maun, Kgwebe Hills (1 ♀ BMNH; WANLESS & SMITH leg. 30. III. 1976).

R. South Africa: Great Bushmanland, Naroep (41 ♀ 6 ♀ pre-epig. 3 juv. Syntypes of *canus* SAM 3694/S AR 2199; SCHLECHTER leg. 30. III. 1898). - N Cape Distr., near Augrabies Falls, nest on top strand of barbed wire fence (1 ♀ with egg cocoon NCP 88/667; MITCHELL leg. 6. IV. 1988).

Stegodyphus manicatus SIMON, 1876

(Fig. 108, 114–115, 188–194; Map 6)

1876 *Stegodyphus manicatus* SIMON, Ann. Soc. ent. France, (5)6 (Bull.): 87 (D♀) – vid.!

1908 *Stegodyphus manicatus*, –SIMON, Bull. Soc. ent. Egypte, 1908(3): 79 (D♀, non ♂).

1910 *Stegodyphus manicatus*, –SIMON, Ann. Soc. ent. France, 79: 288 Fig. 4 C (D♀, non ♂).

1940 *Stegodyphus manicatus*, –BERLAND & MILLOT, Ann. Soc. ent. France, 108: 158 Fig. 10 A–D (D♀, non ♂) – vid.!

1940 *Stegodyphus Assomptioni* BERLAND & MILLOT, Ann. Soc. ent. France, 108: 159 Fig. 11 A–D (D♂, nec ♀) – vid.!

SIMON (1908) assigned a male from Kairo to *S. manicatus*, and BERLAND & MILLOT (1940) did the same with another male from the Senegal; but both males belong to *dufouri*! Careful comparison and detailed measurements have now revealed that the males of the species are what BERLAND & MILLOT had described as new: *assomptioni*. (Measurements of type are: PME 1.3 times larger than AME, accordingly width of PME is 1.4–1.5 times width of AME; width of PLE is 86–90% of width of ALE; legs I relatively short, 2.5 times length of prosoma). –The females assigned with some reservations by BERLAND & MILLOT to *assomptioni* belong to *dufouri*.

Anterior part of prosoma very distinctively elevated in males (especially in the largest male [= type of *assomptioni*]), less so in females. Surface of prosoma covered with numerous prominent tubercles, each of them bearing a hair on its anterior base (most dense on lateral sides of elevated part of prosoma, coarser in large male).

Leg I of male relatively short and stout (Fig. 114–115), modified: femur and also tibia moderately inflated (less in small male); tibia with fringes of longer and femur of shorter hairs (see BERLAND & MILLOT, Fig. 11 B), but these not present in small male. Blunt cuticular protuberances with hairs (as on prosoma) present on femora, tibiae, metatarsi and tarsi, especially on ventral side.

Male pedipalp see Fig. 188–191. Terminal apparatus guiding the embolus relatively short and stout, sclerotized on outer margin. A characteristic hyaline lamella terminating apically into fringes arises from the inner (i.e., concave) side of the terminal lamella.

Female genitalia (Fig. 192–194) with a weakly sclerotized triangular median piece having a median depression in its anterior half; no sclerotized median zone. –Vulva with extended multilocular receptacular elements, not limited to paired posterior tubercular part but also present in bulging anterior parts (see Fig. 194, arrow).

Coloration unusually bright. Male: Prosoma very dark red-brown, also chelicerae, sternum and leg I (especially femora and tibiae close to black, patellae lighter); other appendages yellowish brown, no darker annuli. Broad zones of white hairs (see BERLAND & MILLOT Fig. 11 A) at lateral regions of prosoma; white hairs diffusely distributed on lateral sides of elevated part of prosoma, on whole of frontal side of chelicerae, and on patellae I. Frontal triangular eye field covered by dark golden brown hairs. –Opisthosoma (Fig. 108) dark brown, with a median bipartite and a terminal white spot. A broad white zone in the lower frontal region of the opisthosoma extends posteriorly and forms bright white spots on both sides of the lungs; these are connected with two narrow paramedian white zones on the ventral side; spinnerets surrounded by a narrow ring of white hairs.

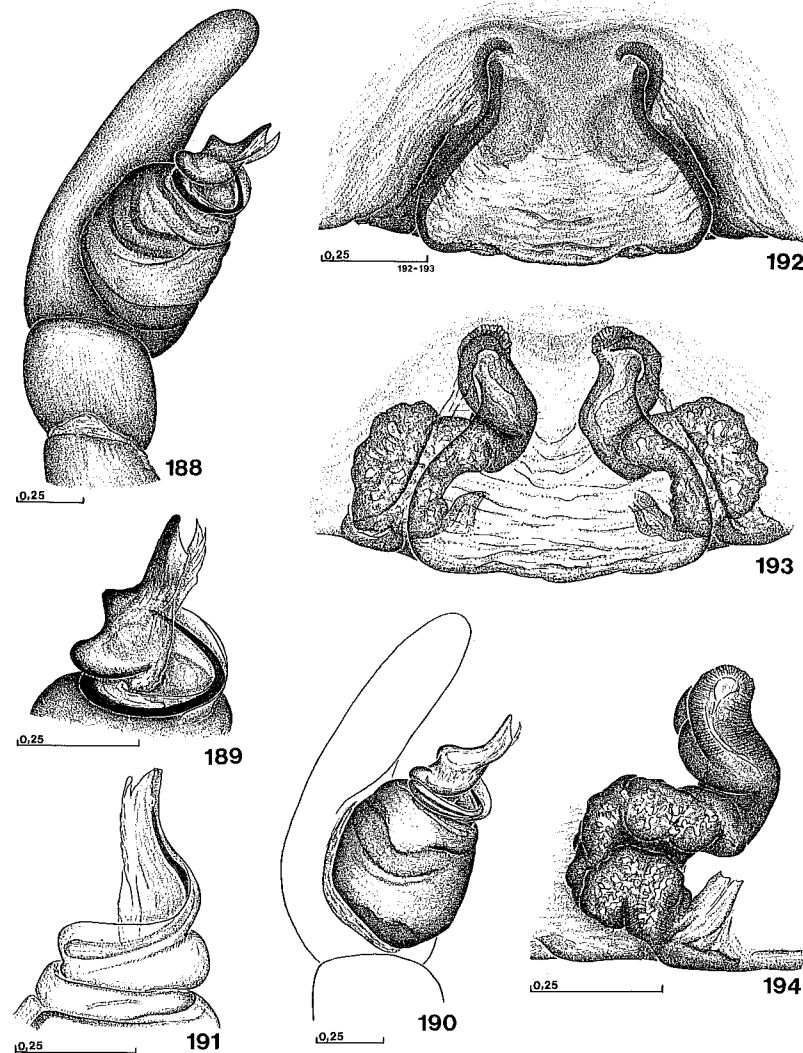


Fig. 188–194: *Stegodyphus manicatus*. – 188–191) Male pedipalp and details of terminal lamella [188–189: type of *assomptioni*, 190–191: other specimen]; 192–194) epigynum and vulva, ventral and dorsal view [type of *manicatus*].

Smaller male: Much paler, but femora and tibiae I also dark; white hairs on prosoma diffusely distributed, no marginal bands, white pubescence lacking on frontal side of chelicerae. Opisthosoma yellowish, with two brownish lateral zones and darker spots on lateral and ventral sides; no bright median zone dorsally, no terminal white spots.

Female: Prosoma and legs I red-brown, elevated anterior part of prosoma and chelicerae almost black, with metallic iridescence. Frontal and fronto-lateral region of prosoma, chelicerae, pedipalps, femora and tibiae I covered with deeply black hairs.

White pubescence on all other parts of the prosoma, on retrolateral sides of femora and tibiae I, and also (somewhat less densely) on patellae, metatarsi and tarsi I, and on all other legs. – Opisthosoma yellowish grey, without detailed colour pattern (according to preserved specimens).

Biology. It is not quite clear whether the species may occur in colonies or may perhaps (!) be a social-living species. MILLOT & BOURGIN (1942: 299) report: “À Gao ... une colonie ... s’était établie sous les balustrades de la résidence de l’Administrateur.” We have seen 13 females (total L 13–21) from Niger (Niamey) which had been collected together with their large nest; it showed funnel-like tubes. Various cocoons contained nymphs and the succeeding instar; they must have been produced nearly simultaneously, i.e., by different females. Many pholcids and salticids were found, including many early instars, but also theridiids (commensalism?).

Measurements: ♂ (data taken from smaller ♂ in ()): Total L 11.4 (7.6), prosoma L 6.2 (2.4), W ant 3.6 (2.4), max W 4.2 (2.9); diam AME 0.22 (0.22), PME 0.34 (0.29); W AME 0.61 (0.54), PME 0.90 (0.73), ALE 2.84 (1.86), PLE 2.5 (1.68). – ♀ (data taken from type and, in (), from another female [MRAC 137.732]: Total L 14.6 (21.0), prosoma L 7.2 (6.9), W ant 4.0 (3.7), max W 4.7 (4.6); diam AME 0.27 (0.28), PME 0.35 (0.36); W AME 0.67 (0.71), PME 0.98 (1.00), ALE 2.9 (3.2), PLE 2.6 (2.75). – Prosoma length of largest ♀ 8.0, of smallest ♀ 4.1.

Localities and materials. Senegal: Dakar (1♀ MRAC 161.812; TYBAERT leg. 1.XII.1983).

Mali: Gao (1♀ MNHN AR 800; BERLAND leg. IX.1937). – Bamako (1♂ Holotype of *assumptioni* MNHN AR 793; leg. XI. 1937).

Niger: Niamey (13♀ MRAC 137.732; VAN IMPE leg. IX.–X. 1970).

Tchad: Massif du Tibesti (24♀ 4 juv. MRAC 132.946, 958, 973, 992; BRANDILY leg. VII.–X. 1965).

Sudan: Khartoum (1♀ MRAC 123.051; CLOUDSLEY-THOMPSON leg.). – Kassala (1♂ MRAC 133.678; CLARKSON leg. 1951). – Suakim (1♀ ZMB [ex 3897]).

Ethiopia: E. interieure (1♀ Holotype MNHN AR 801; RAFFRAY leg.).

c) *S. mirandus* group

1967 *Magumia* LEHTINEN, Ann. zool. Fennici, 4: 246, 387, 388; Fig. 450, 456, 460.

The generic name *Magumia* (type species: *Stegodyphus tentoriicola* PURCELL, 1904) is available but not valid for the *mirandus* group; *Magumia* is a junior subjective synonym of *Stegodyphus* s. str. But we prefer to maintain the broader concept of the well-known genus *Stegodyphus* and see no need to split it into at least three separate taxa with generic rank.

At present, six well-established species are known in the group. With only one exception, they are easy to identify: genitalic characters show distinct differences; these are supplemented by combinations of various general characters. The distinction between the sibling species *tentoriicola* (solitary) and *dumicola* (social) necessitates a very careful inspection to find a slight difference in the terminal lamella of the bulb in males, and can be problematic in females; for details see note at the end of the following key.

Tab.5: *S. mirandus* group: Synopsis: Proportions and ratios derived from measurements.

		L prosoma : W pros. anteriorly	L prosoma : max. W pros.	Diam. PME : diam. AME	W PME : W AME	W PLE (% of W ALE = 100%)	Relative L of legs ¹⁾	L leg I : L prosoma
<i>mirandus</i>	♂	1.8	1.4	1.2	1.3	81%	130:97:74:100	3.0
	♀	1.8	1.5	1.2	1.3	84%	120:93:72:100	2.4
<i>tibialis</i>	♂	1.5	1.4	1.6	1.6	77%	129:92:73:100	2.6
	♀	1.7	1.6	1.7	1.6	84%	107:84:71:100	2.0
<i>nathistmus</i>	♂	1.6	1.4	1.1	1.2	67%	128:95:74:100	3.3
	♀	1.8 (1.9)	1.5 (1.6)	1.2 (1.1)	1.3	66% (69%)	121:93:75:100 117:90:73:100	2.4 2.1
<i>lineatus</i>	♂	1.6	1.5	1.2	1.2	65%	108:82:70:100	2.8
	♀	1.6 .. 1.8	1.3 .. 1.7	1.2	1.2	70 .. 83%	108:82:70:100	2.2
<i>tentoriicola</i>	♂	1.7	1.4	1.2	1.2	82%	126:90:70:100 120:88:68:100	3.5 .. 3.8
	♀	1.6	1.5	1.2	1.3	70%	124:91:77:100 118:87:70:100	2.4 .. 2.6
<i>dumicola</i>	♂	1.7	1.3	1.2	1.2	69 .. 77%	126:88:70:100 123:92:67:100	3.0 .. 3.5
	♀	1.7	1.5	1.2	1.2	69 .. 77%	114:88:75:100	2.5

¹⁾ In 4 cases two relations are given; they refer to largest (first position) and smallest specimens (second position).

L : length; W : width (for eyes see Fig. 5–6)

Tab.6: *S. mirandus* group: Variation of total length in different species.

	<i>mirandus</i>	<i>tibialis</i>	<i>nathistmus</i>	<i>lineatus</i>	<i>tentoriicola</i>	<i>dumicola</i>
♂	11.9	7.5	9.0	7.7 .. 11.0	8.1 .. 10.5	5.4 .. 7.3
♀	23.0	13.3 .. 13.5	13.5 .. 19.4	10.6 .. 22.0	11.0 .. 16.5	7.9 .. 12.3

Key to species (Table 5–6):

Previous authors did not realize that the epigynum (+ vulva) has an oblique or even vertical position in several species, with major parts in the epigastric furrow. So they figured only those anterior parts of the female genitalia that are visible on the ventral side of the opisthosoma (see Fig. 195, 258). This is especially true with regard to PURCELL’s illustrations of *tentoriicola* and *dumicola*. – When inspected *in situ*, posterior (approximately vertical parts) of the epigynum are easily visible when the integument behind the epigastric furrow is pressed down with an appropriate instrument.

1. PME 1.6–1.7 times as large as AME; median eye field 1.6 times as broad posteriorly as anteriorly. Tibiae I of ♂ very thick, fusiform (Fig. 208) *tibialis*
- PME 1.1–1.2 times as large as AME; median eye field 1.2–1.3 times as broad posteriorly as anteriorly. Tibiae I of male not modified 2
2. ♂ 3
- ♀ 7

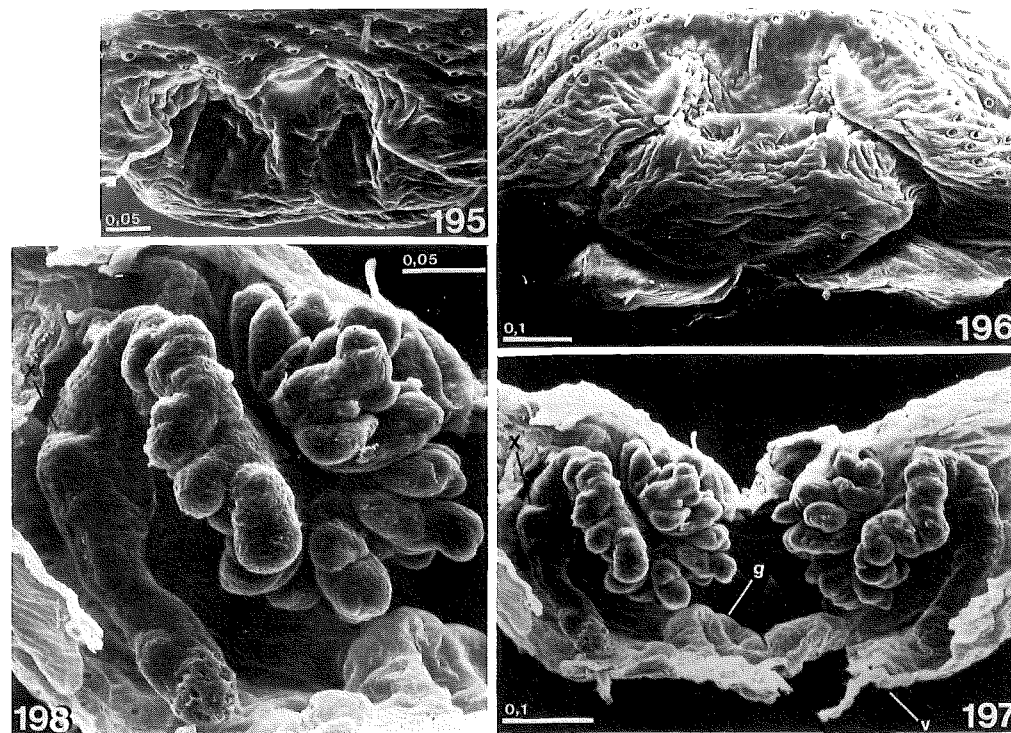


Fig. 195–198: *S. mirandus* group: Oblique to vertical position of female genitalia in *Stegodyphus dumicola*. – 195) Anterior part of epigynum, ventral view; 196) epigynum, obliquely from behind; 197–198) vulva in its obliquely vertical position, seen from in front. – *v*: ventral cuticle of opisthosoma, *g*: ventral bipartite groove corresponding to Fig. 196; accordingly, left part of Fig. 197 and Fig. 198 show the right vulva/receptacular apparatus.

3. Terminal element of bulb with a sclerotized, claw-like hook. 4
- Different 5
4. Terminal claw-like hook and other parts of terminal lamella separated by a deep incision (Fig. 245); hook relatively long. Length of prosoma 4.4–5.4 (total length 8.1–10.5) *tentoriicola*
- Terminal hook and terminal lamella connected, no deep incision between the two elements (Fig. 248); hook shorter. Length of prosoma 2.7–3.1 (total length 5.4–7.3) *dumicola*
5. Width of PLE measures approx. 81% of width of ALE. Terminal apparatus of bulb as in Fig. 212–213 *mirandus*
- Width of PLE measures only about 66% of width of ALE. Terminal apparatus of bulb with a separate obvious and sclerotized lamella 6
6. Sclerotized terminal lamella forming a long rectangular plate which is separated from other terminal elements (Fig. 29–30) *nathistmus*
- Sclerotized terminal lamella curved, fused with a second lamella bearing fringe-like chitinous protuberances; these two parts separated distally by a notch only (Fig. 28) *lineatus*
7. Width of epigynum about twice as broad as long, with a broad T-shaped median element (Fig. 216); posterior elements *in situ* in a more or less vertical position in epigastric furrow. Very large spiders (prosoma L 8.6, total length \pm 23.0) *mirandus*
- Epigynum without such an element. In most cases smaller, often considerably smaller species [exception: largest *lineatus* reach 8.1; 22.0] 8

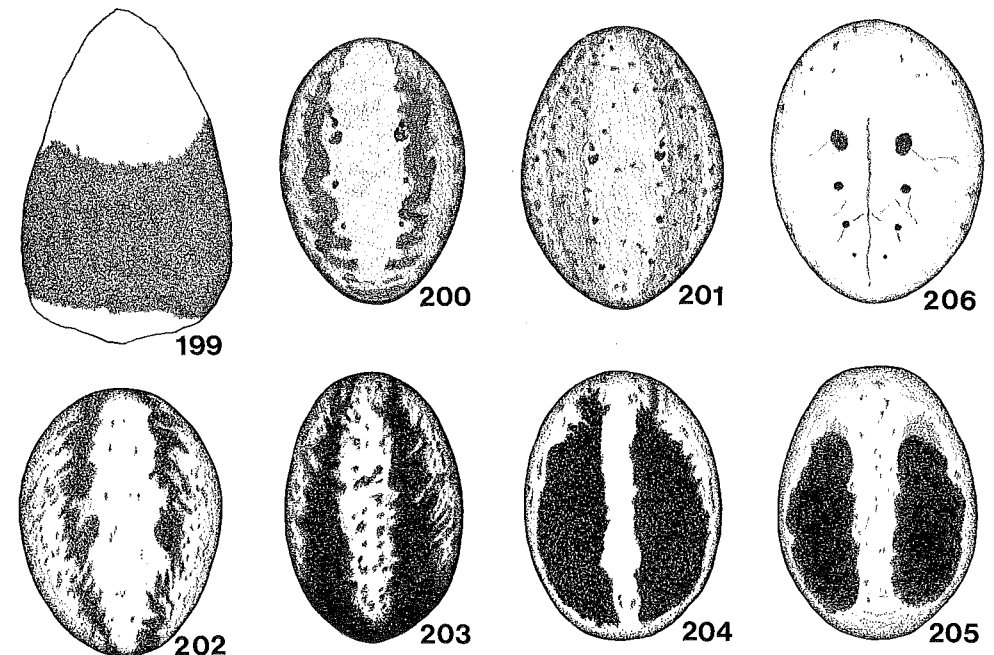


Fig. 199–206: Dorsal colour patterns of opisthosoma. – 199) *Stegodyphus tibialis*, ♂ [type]; 200) *S. nathistmus*, ♂; 201) same, ♀; 202) *S. lineatus*, ♂; 203–205) same, ♀; 206) *S. tentoriicola*, ♀.

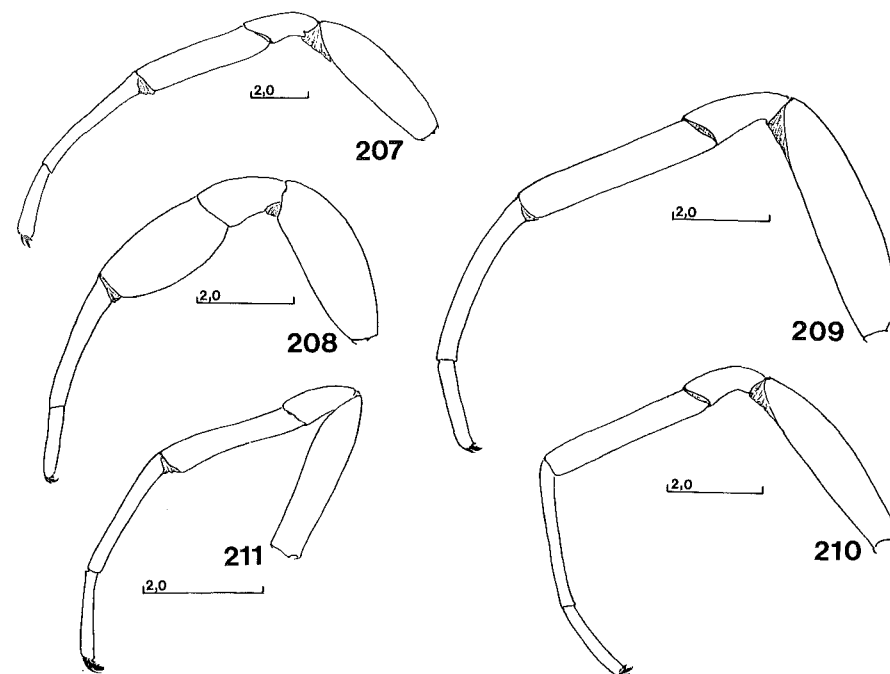


Fig. 207–211: Legs I of males, retrolateral aspect. – 207) *Stegodyphus mirandus*; 208) *S. tibialis*; 209–210) *S. tentoriicola*; 211) *S. dumicola*.

8. Epigynum (ventral view) about as broad as long, with a broad anterior groove bordered posteriorly by a transverse plate (Fig. 221) *tibialis* 9
- Epigynum (ventral view) without such a groove 9
9. Major part of epigynum directly visible on ventral side of opisthosoma 10
- Epigynum in a very oblique position, close to being vertical; thus major part of epigynum *in situ* located in (!) epigastric furrow, invisible on ventral side of opisthosoma (Fig. 195). 11
10. Introductory openings prominent, clearly visible *in situ* (Fig. 234) *lineatus*
- Introductory openings *in situ* covered by anterior border of epigynal groove, less prominent (Fig. 229) *nathistmus*
11. Larger species (prosoma length 5.2–6.8). Ventral membranes of articulations between femora and patellae of legs dark pigmented in nearly all specimens. Prosoma bright red-brown; dorsal side of opisthosoma uniformly greyish white, only paired muscle-insertion points are dark (data recorded in alcohol-preserved materials; coloration of living specimens unknown). Epigynum (posterior aspect) tends to have the median plate broader (Fig. 249). Solitary *tentoriicola*
- Smaller species (prosoma length 3.9–5.5). No pigmentation in ventral membranes between femora and patellae of legs. Bright coloration of pro- and opisthosoma see Pl.2 Fig. C–G (also recognizable in alcohol materials). Epigynum (posterior aspect) tends to have the median plate narrower (Fig. 252). Social *dumicola*

Note: Only males permit reliable discrimination of the two species. For ♀, coloration seems to be the best character. This is also true with regard to size outside the zone of overlap (Table 5; Fig. 264): it is almost certain that specimens with up to 5.0 prosoma length belong to *dumicola* and that specimens having a prosoma length of 5.7 and more belong to *tentoriicola*.

Stegodyphus mirandus Pocock, 1899

(Fig. 207, 212–217; Map 12)

- 1899 *Stegodyphus mirandus* Pocock, J. Bombay natur. Hist. Soc., 12: 750 (D♂♀) – vid.!
- 1900 *Stegodyphus mirandus*, – Pocock, Fauna brit. India, Arachn., :209 (N).
- 1935 *Stegodyphus mirandus*, – Dyal, Bull. Dept. Zool. Panjab Univ., 1: 131 (N).
- 1963 *Stegodyphus mirandus*, – Tikader, J. Univ. Poona, (Sci. technol.), 24: 32 (N).

Up to now, diagnostic features of the species have not been figured. The original description was based on 1♂ and 1♀ (Syntypes). Dyal reported a ♀ from Lahore, and Tikader mentions 2♀ from Poona. The following description has been primarily based on the syntypes.

Proportions of legs different between male and female: the male has longer legs I and II. Leg I of male only slightly modified (Fig. 207), tibia ventrally with sparse and also shorter hairs directly inserting near the basis of sclerotized blunt cuticular protuberances; also present, but less densely, on metatarsi and in basal half of tarsi.

Male pedipalps see Fig. 212–215. Terminal elements (with embolus) relatively small (compared with whole bulb). Terminal lamella stout, in part with subparallel chitinous folds; these folds protrude distally into sclerotized tooth-like structures. Proximal lamella of terminal apparatus (which guides the embolus) forms a short ascending spiral and is fused on one side with the terminal lamella; in its distal half, the lamella bears transverse rows of numerous protuberances having the shape of tiles in the lateral and of broad lamellae in the more central region (Fig. 214).

Female genitalia see Fig. 216–217. Shape of epigynum depends to some extent from orientation (as posterior elements are in a more or less vertical position). Introductory

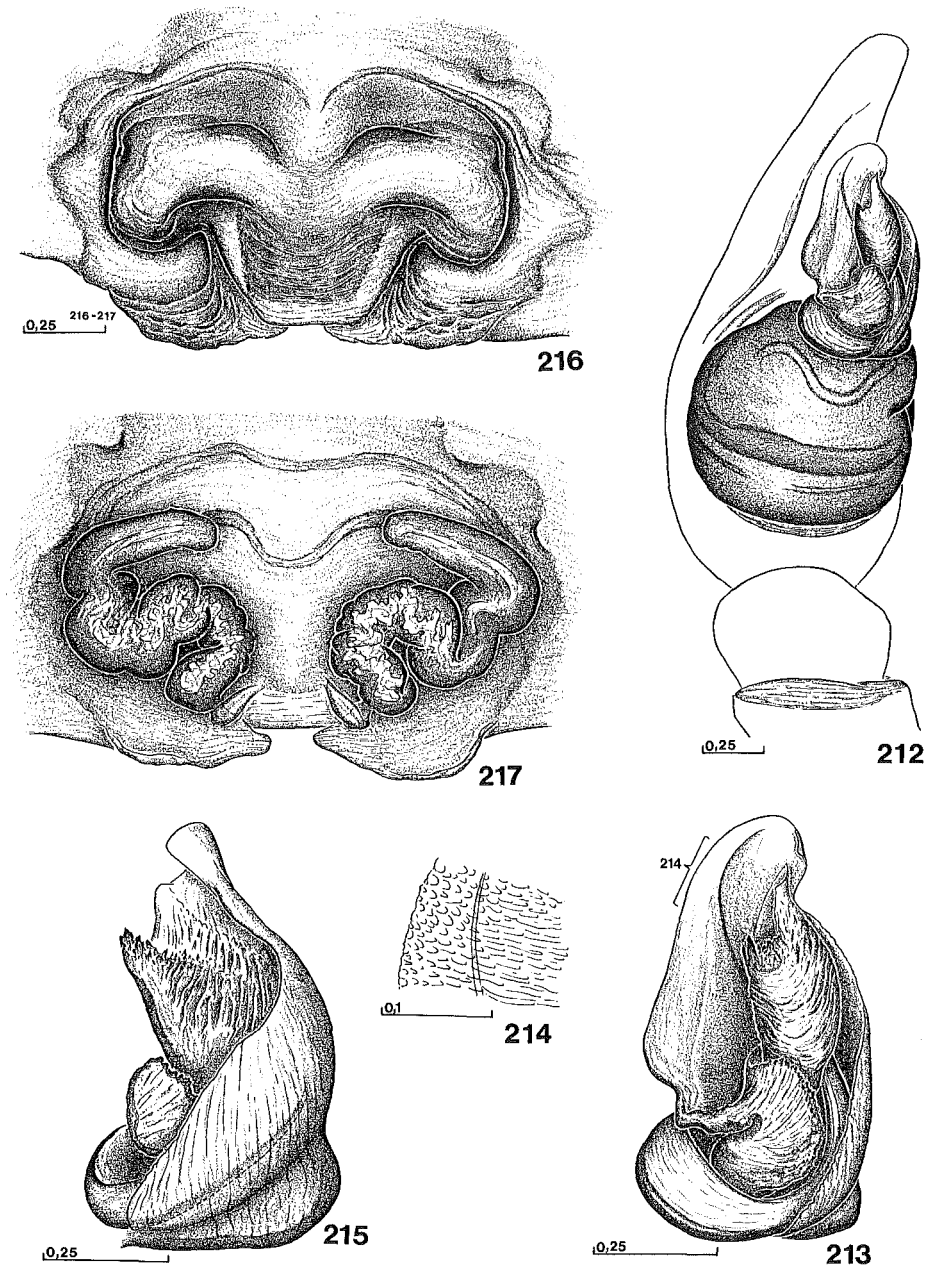


Fig. 212–217: *Stegodyphus mirandus*. – 212–215) Male pedipalp and details of terminal lamella; 216) epigynum; 217) vulva.

openings presumably behind transverse pad of T-shaped median piece. – Vulva as in Fig. 217; as in *dumicola*, shape depends on orientation.

Colour not well preserved in the old alcohol-preserved material. Therefore, we first repeat what Pocock stated 90 years ago: male uniformly black all over, also cheliceræ, sternum and coxae + trochanter of all legs; tibia and tarsus I and legs II, III

and IV bright [yellowish] red. Female: Prosoma and all legs blackish, covered with olive-brown hairs; sternum with narrow dark border, marked with two parallel bands of yellowish grey hairs; dorsal side of prosoma and legs clothed with olive-black hairs. Opisthosoma testaceous, covered with yellowish hairs; spinnerets and anal tubercle black. – Specimens presently less intensively coloured; male prosoma and dark segments of appendages now red-brown, light segments of legs show a yellow-brown chitin, opisthosoma blackish brown. Prosoma of female dark red-brown, darkest anteriorly (“pars cephalica” with slight blue-metallic gloss); opisthosoma highly depigmented, greyish.

Measurements. ♂: Total L 11.9, prosoma L 6.6, W ant 3.7, max W 4.65; diam AME 0.33, PME 0.39; W AME 0.82, PME 1.01, ALE 3.2, PLE 2.6 – ♀: Total L 23.0, prosoma L 8.6, W ant 4.8, max W 5.9; diam AME 0.34, PME 0.40; W AME 0.86, PME 1.13, ALE 3.8, PLE 3.2. – Variation: ♂: Total L 11.9–13.5, prosoma L 6.5–7.8; ♀: Total L 12.5–23.0, prosoma L 6.3–9.1.

Localities and materials. India: Bombay (1♂ 1♀ Syntypes BMNH 1893.12.20.30–31). – Bombay, Bundup (1♀ BMNH 1898.12.9.1). – Poona (19♂ subad. 19♀ pre-epig./subad. BMNH 1899.9.21.300–19, 1899.12.5.1–20; WROUGHTON leg.). – Poona Ghate (numerous specimens BMNH 1899.11.2.200–20; WROUGHTON leg.).

Stegodyphus tibialis (O. PICKARD-CAMBRIDGE, 1869)

(Fig. 199, 208, 218–223; Map 12)

1869 *Eresus tibialis* O. PICKARD-CAMBRIDGE, Ann. Mag. natur. Hist., (4)3: 71 Pl. 6 Fig. 70–71 (D♂) – vid.!

1884 *Stegodyphus tibialis* – SIMON, Ann. Mus. civ. Genova, 20: 243 (N♂) – vid.!

1900 *Stegodyphus tibialis* – POCKOCK, Fauna brit. India, Arach., :210 (N).

1900 *Stegodyphus socialis* POCKOCK, Fauna brit. India, Arach., :209 (D♀) – vid.!

1963 *Stegodyphus tibialis* – PHANUEL, J. Madras Univ., B 33(3): 305 Pl. 1 Fig. 1–9 (“D” ♂♀).

We have seen the single male specimen reported by SIMON (1884) from Central Burma. The distance to the type locality in India (and also to PHANUEL’s collecting site) is about 2500 km, with the Bay of Bengal between. With regard to the original description, SIMON referred to certain differences, but the specimen from Burma and the type specimen (of *tibialis*) are undoubtedly conspecific.

S. tibialis has been characterized on the basis of a single male, and *socialis* of a single female specimen. More than 100 years after the original description, PHANUEL rediscovered *tibialis* males associated with females, and thus described the female of *tibialis* “for the first time.” His descriptive remarks are sufficient to conclude that his female specimens were the same as had been named *socialis* by POCKOCK! – Careful comparison of the type and additional materials demonstrated that *tibialis* and *socialis* are conspecific; the species differs strikingly from other representatives of the *mirandus* group, e.g., in size and proportions of their median eyes and their eye field.

Proportions of legs differ between male and female: the male has longer legs I and II. Leg I of male strikingly modified (Fig. 208); especially tibia very thick and fusiform, with fringes of long dark hairs.

Male pedipalp see Fig. 218–220. Terminal apparatus guiding the embolus forms one single stout element with heavily sclerotized regions. One irregular oval fold shows a coarse surface structure consisting of ridges and scales. Terminal part of embolus conducted by a fold of a bill-like construction.

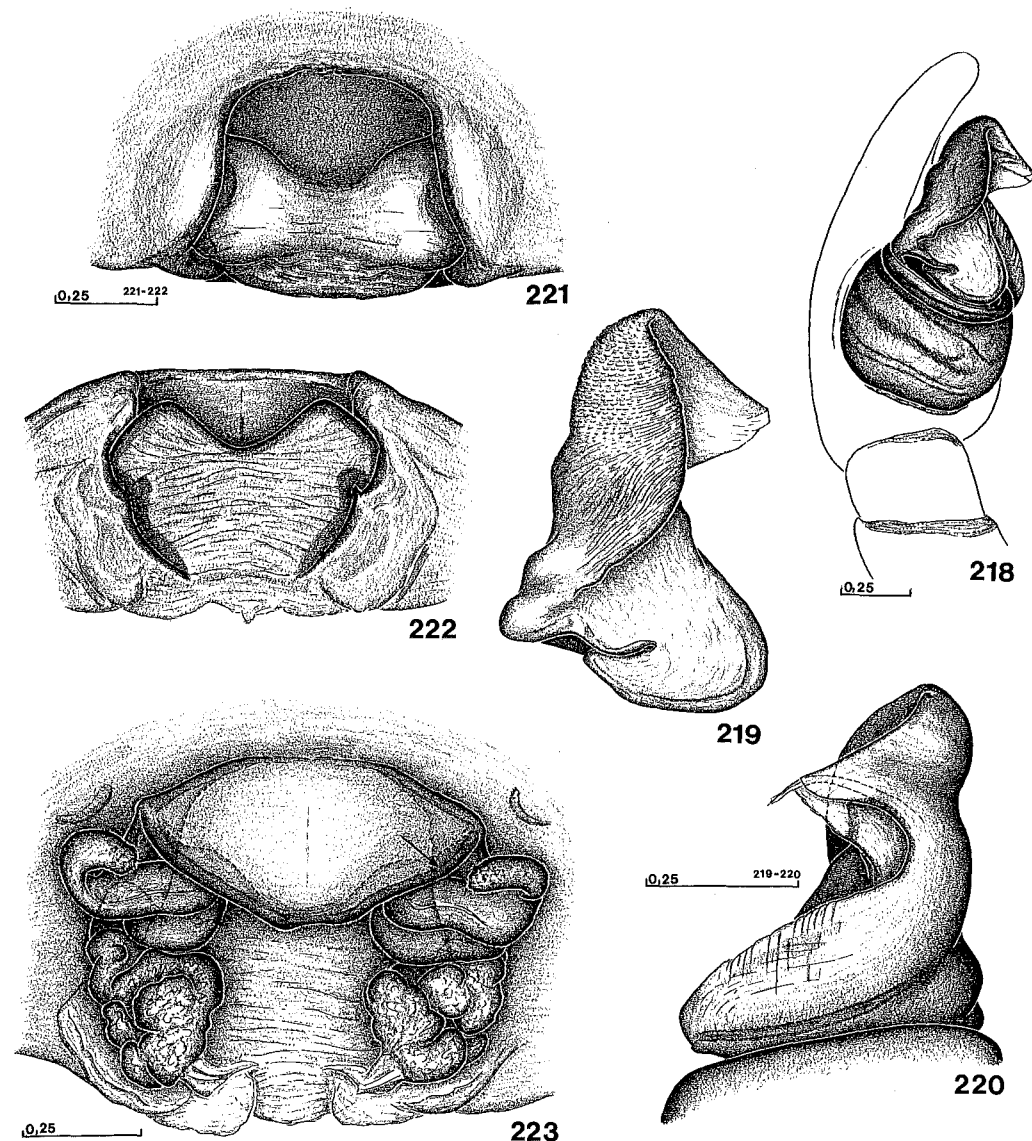


Fig. 218–223: *Stegodyphus tibialis*. – 218–220) Male pedipalp and details of terminal lamella [type of *tibialis*]; 221–222) epigynum, ventral and posterior view; 223) vulva, dorsal view [type of *socialis*].

Female genitalia see Fig. 221–223. Ventral aspect of epigynum shows a broad anterior groove bordered anteriorly and laterally by a sclerotized, curved rim; major posterior part somewhat depressed in its median region, lateral borders more heavily sclerotized. Introductory openings invisible (position indicated in Fig. 223). Posterior view shows an approximately heart-shaped median plate (Fig. 222) which forms the vertical part of the posterior transverse element already described (with regard to the ventral aspect). – Vulva see Fig. 223.

Colour not very well preserved as the pinned type specimen (*tibialis*) has lost major parts of its pubescence and females preserved in alcohol are faded. – Male: Prosoma almost black, as are chelicerae, femora and patellae of pedipalps, tibiae I, femora III + IV and sternum; other appendages red-brown. There are several zones of golden yellow plumose hairs: broad bands and lateral margins of prosoma, a very narrow ‘barb’ at the anterior border of clypeus, and also a bright transverse zone limited to the basis of chelicerae; narrow longitudinal zones of such hairs also present on dorsal side of femora II–IV, less conspicuously also on patellae and tibiae II–IV. Yellow pubescence on sternum very broad, leaving narrow lateral margins only. Opisthosoma (Fig. 199) black, with golden yellow plumose hairs in dorsal and lateral anterior third. [Corresponding data published by PHANUEL are somewhat different: he indicates a “dorsal band” on the male opisthosoma, followed by a “circular patch encircling tip of abdomen and an oval yellow patch in front of spinnerets”.]

Females differ in their uniformly golden grayish pubescence on opisthosoma; white ‘barb’ on clypeus and broad white band on chelicerae apparently present in adult specimens only. [Corresponding data according to PHANUEL: “... with golden yellow hairs on (pro- and opisthosoma); ... grey colour of ... (prosoma) can be seen under the pubescence of golden yellow hairs; ... (opisthosoma) uniformly golden yellow ...”]

Measurements. ♂: Total L 7.5, prosoma L 4.9, W ant 3.2, max W 3.4; diam AME 0.16, PME 0.30; W AME 0.51, PME 0.83, ALE 2.56, PLE 2.14. – ♀: Total L 13.5, prosoma L 6.6, W ant 3.9, max W 4.2; diam AME 0.21, PME 0.35; W AME 0.56, PME 0.91, ALE 3.2, PLE 2.7. – Variation: Total L of ♀ 13.5–14.6, prosoma L 6.5–6.6.

Localities and materials. India: Poona District (2♀ pre-epig ex BMNH 99.9.21.300–19 + 99.12.5.1–20; WROUGHTON leg.) – Mysore (1♂ Holotype HEC 125). – Bangalore, Lal Bagh (1♀ Holotype of *socialis* BMNH 99.12.9.1; STAUNTON leg.). – Madras, Jalarpet (1♀ BMNH 1902.12.3.30; STAUNTON leg.). – Madras, Tambaram, from scrub jungles (9♂ 32♀ PHANUEL publ. 1963). – Coonor, Nilgiris (1♀ pre-epig. ZMK; SHERRIFFS leg.). – Nadu, 5 km W Rajapalayam, Ayyanar Falls, 390 m (1♀ MCZ; EBERHARD leg. XI. 1979).

Birma: Minhla, Irrawaddy River (1♂ MCSN; C.B. COMOTTO leg.).

Stegodyphus nathistmus n. sp.

(Fig. 29–30, 200–201, 224–226, 229–233; Map 8)

1882 *Stegodyphus molitor*, – SIMON, Ann. Mus. civ. Genova, 18: 230 (N) [non *Eresus molitor* C. L. KOCH, 1846!].

Derivatio nominis. The new species was found by ourselves in the collections of the BMNH, later also of the MNHN and SMF.

Proportions of legs only slightly different between male and female: males have somewhat longer legs I and II. Leg I of male not modified, without cuticular protuberances and hair fringes.

Male pedipalps see Figs. 29–30, 224–226. Terminal lamella forms a tongue-like, sub-parallel dark lamella; shape different in various orientations and views (perspectively shortened in Fig. 29, 224–225, total length according to Fig. 30, 226). Basis of terminal lamella supported by a curved sclerotized ridge showing several blunt protuberances

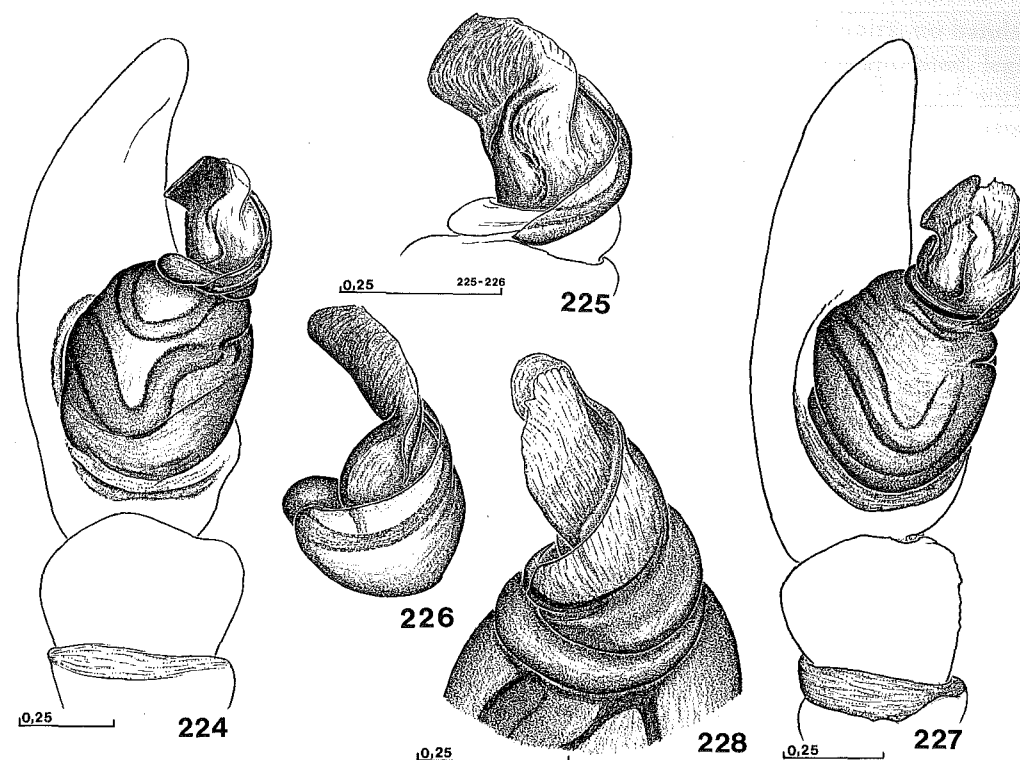


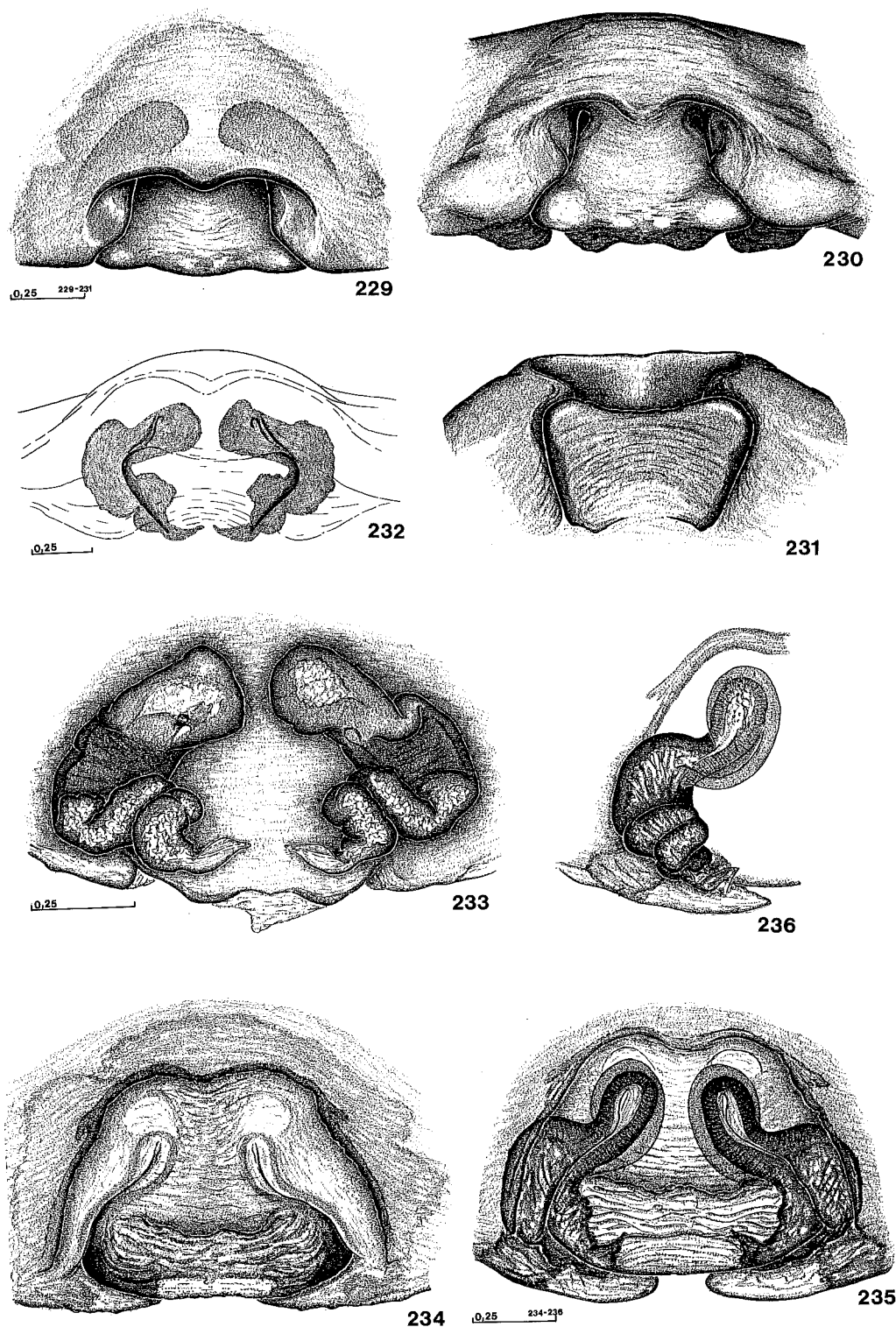
Fig. 224–226: *Stegodyphus nathistmus*. – Male pedipalp and details of terminal lamella [perspectively shortened in Fig. 225].

Fig. 227–228: *Stegodyphus lineatus*. Male pedipalp and terminal lamella [perspectively shortened in Fig. 227].

on one side of its broadened basis. Proximal lamella C of terminal apparatus (which guides the embolus) limited to a short ascending spiral, distally fused with terminal lamella.

Female genitalia see Fig. 229–233. As in other species of the group, posterior elements of epigynum hidden in epigastric furrow (in a more or less vertical position). Accordingly, shape different, depending from orientation: ventral view: introductory openings invisible (!), covered by a broad transverse fold, somewhat pointed in the middle (Fig. 229); posterior-ventral view: introductory openings and broad lateral grooves under transverse fold are visible, also part of vertical elements of epigynum (Fig. 230); posterior view shows a trapeziform median plate (Fig. 231). – Vulva as in Fig. 232–233; shape depends heavily on orientation: Fig. 223 shows almost directly dorsal and Fig. 232 posterior aspect.

Colour not very well preserved, apparently similar to *lineatus*. Dorsal surface of prosoma bright red brown in male, blackish brown in female; densely covered with white hairs, especially in female, no additional hair stripes or spots. No conspicuous ‘barb’



on clypeus; frontal region of chelicerae with long white and greyish hairs, no bands. Sternum and legs lighter brown than prosoma, sternum and coxae marmorated, legs annulated by dark pigmented regions; all these parts predominantly covered with bright white hairs, with a few dark hairs intermingled. – Opisthosoma pale, with two paramedian dark bands in male (Fig. 200); in female only traces of such bands and many irregular dark spots (Fig. 201). Variation unknown.

Discussion. *S. nathistmus* seems to be the sister species of *lineatus*. Males differ in the shape of the terminal lamella of the bulb; this element forms a sclerotized, fairly long rectangular plate in *nathistmus*, and is composed of two parts divided by a terminal notch in *lineatus*. Females of *lineatus* show a broad epigynum (ventral aspect), with prominent introductory openings; in *nathistmus* the epigynum has a more oblique position, and thus the less prominent introductory openings are more or less covered by the anterior border of the epigynal groove (Fig. 229). Differences in the shape of the vulvae are illustrated in Fig. 233 and 236.

Biology. P. D. HILLYARD found a female in *Quercus* woodland; the web was attached to shrubs and the spider occupied a spherical cell high (about 1 m) up on a shrub. The cell carried the remains of many beetles etc. – He found the male in stony grassland, presumably wandering around.

Measurements. ♂: Total L 9.0, prosoma L 4.6, W ant 2.8, max W 3.2; diam AME 0.27, PME 0.29; W AME 0.63, PME 0.76, ALE 2.4, PLE 1.6. – ♀: Total L 19.4, prosoma L 7.1, W ant 4.0, max W 4.8; diam AME 0.30, PME 0.35; W AME 0.78, PME 1.0, ALE 3.2, PLE 2.1.

Localities and materials. Morocco: Tizi n'Test, 2100 m, High Atlas (1♂ Holotype, 1♀ juv. BMNH; HILLYARD leg. 8. V. 1977). – Near Oulmès, 1050 m (1♀ Paratype BMNH; HILLYARD leg. 5. V. 1977). – Meknès (2♀ Paratypes MNHN AR; leg. VI. 1918). – Azrou (1♀ Paratype SMF RII/3538). – Fès, Weg zum Dj. Taghat (2♀ Paratypes SMF RII/3537; leg. 25. V. 1930).

“Hisp., Sic., Alg.” (1♀ Paratype, MNHN [coll. SIMON]).

South Yemen: Aden (1♀ Paratype BMNH 171; DORIA leg.) [see SIMON 1882].

Stegodyphus lineatus (LATREILLE, 1817)

(Pl. 3 Fig. A–E, G; Fig. 28, 202–205, 227–228, 234–242; Map 7)

1817 *Eresus lineatus* LATREILLE, Nouv. Dict. Hist. natur., 10: 393 (D♀).

1826 *Erèse acanthophile*, – DUFOR, Ann. gén. sci. phys., 6: 302 Pl. 95 Fig. 4 (D♂♀).

1837 *Eresus Acanthophilus* WALCKENAER, Hist. natur. Ins. Apt., 1: 399 Pl. 11 Fig. 1 D, d, C (D♂♀).

1837 *Eresus Dufourii*, – WALCKENAER, Hist. natur. Ins. Apt., 1: 400 (N).

1846 *Eresus unifasciatus* C. L. KOCH, Die Arachniden, 13: 5 Fig. 1081 (D♀).

1846 *Eresus lituratus* C. L. KOCH, Die Arachniden, 13: 11 Fig. 1085 (D♀) – vid.!

1875 *Eresus arenarius* KRONEBERG, Putesestvie v Turkestan, (Zool.) 2: 44 Pl. 5 Fig. 32 a–c (D♂).

Fig. 229–233: *Stegodyphus nathistmus*. – 229) Epigynum, ventral view; 230) same, posterior-ventral view; 231–232) same, posterior view [232: view intermediate between Fig. 230 and 231, position of vulva indicated]; 233) vulva.

Fig. 234–236: *Stegodyphus lineatus*. 234–235) Epigynum and vulva, ventral view; 236) vulva, dorsal view.

- 1908 *Stegodyphus lineatus deserticola* SIMON, Zool. Jb. (Syst.), 26: 421 (D♀).
 1908 *Stegodyphus lineatus deserticola*,—SIMON, Bull. Soc. ent. Egypte, 3: 79 (N).
 1910 *Stegodyphus lineatus deserticola*,—SIMON, Ann. Soc. ent. France, 79: 287 (D♀).
 1925 *Stegodyphus quadriculatus* FRANGANILLO, Bol. Soc. ent. Espan., 8: 38 (nom. nud.).
 1926 *Stegodyphus quadriculatus*,—FRANGANILLO, Bol. Soc. ent. Espan., :75 (D).
 1929 *Stegodyphus lineatus* BACELAR, Bull. Soc. portug. Sci. natur., 10(21): 252 Fig.6–7 (N).

The original description of *arenarius* is inadequate. We have not seen any type materials or other specimens from the type locality ("Stepi Kizil-Kum", a region extending westwards and northwestwards from Tashkent, Kazakhstan). But we have have studied female specimens from "Stepi Golodnaja" (in the southwest of Tashkent). As they belong to *lineatus* [largest representatives of the species we have ever seen!], we assume that *arenarius* is a synonym of *lineatus*.

S. l. deserticola has been introduced for specimens "de la région désertique du nord de l'Afrique, de la Mer Rouge au Maroc occidental." We have seen SIMON's original materials and conclude that the name apparently refers to relatively small animals of desert regions, perhaps not even an ecophenotype.

Size, especially of females, unusually variable. Total length of smallest female 10.6, of largest 22.0. Variation of ratios in females not correlated with body size.

Proportions of legs not significantly different between males and females.

Male pedipalps see Fig. 28, 227–228. Terminal lamella divided into two parts by an incision: one of them distally rounded, blackish (due to slight sclerotization); the other distally serrated, weak and hyalinous. Both are fused with the proximal lamella of the terminal apparatus which forms part of an ascending spiral and guides the embolus. By rotation of the terminal apparatus, the embolus passes the incision described. (Note: terminal apparatus drawn with perspectively shortening in Fig. 227).

Female genitalia see Fig. 234–236. Epigynum forming an approximately trapezoid groove, bordered anteriorly and laterally by a slightly sclerotized margin. A great median element, triangular in shape, is bordered by deep folds anteriorly, forming narrow but clearly visible introductory openings; they are surrounded by a brownish (i.e. sclerotized) zone. Posterior view of epigynum as in *nathistmus* (see Fig. 231).—Variation in vulva is illustrated in Fig. 237–242. Anterior elements of receptacula form different angles and may be widely separated or very close together along the median line, but the distance between the introductory openings shows much less variation. Lateral hooks of heavily sclerotized receptacula in some specimens less prominent than in others. One specimen from Biskra differs in that it has a median rim dividing the epigynal groove; introductory openings are wider apart than in all other materials investigated (Fig. 234), but there are no other differences.

Colour: Dorsal surface of prosoma uniformly dark red brown, with white and (fewer) blackish hairs; lateral parts of the "pars cephalica" with more dark than white hairs. There are two paramedian white stripes running forward (Pl. 3 Fig. A) from the anterior border of the PLE and diverging towards the ALE; here they widen to form two white spots. Border of clypeus with a 'barb' of white hairs. Sternum and legs much lighter brown than prosoma, sternum marmorated and legs annulated by dark pigmented regions; covered by blackish and white hairs.—Opisthosoma (Pl. 3 Fig. C–E; Fig. 202–205) pale, with two very prominent paramedian black stripes and a bright

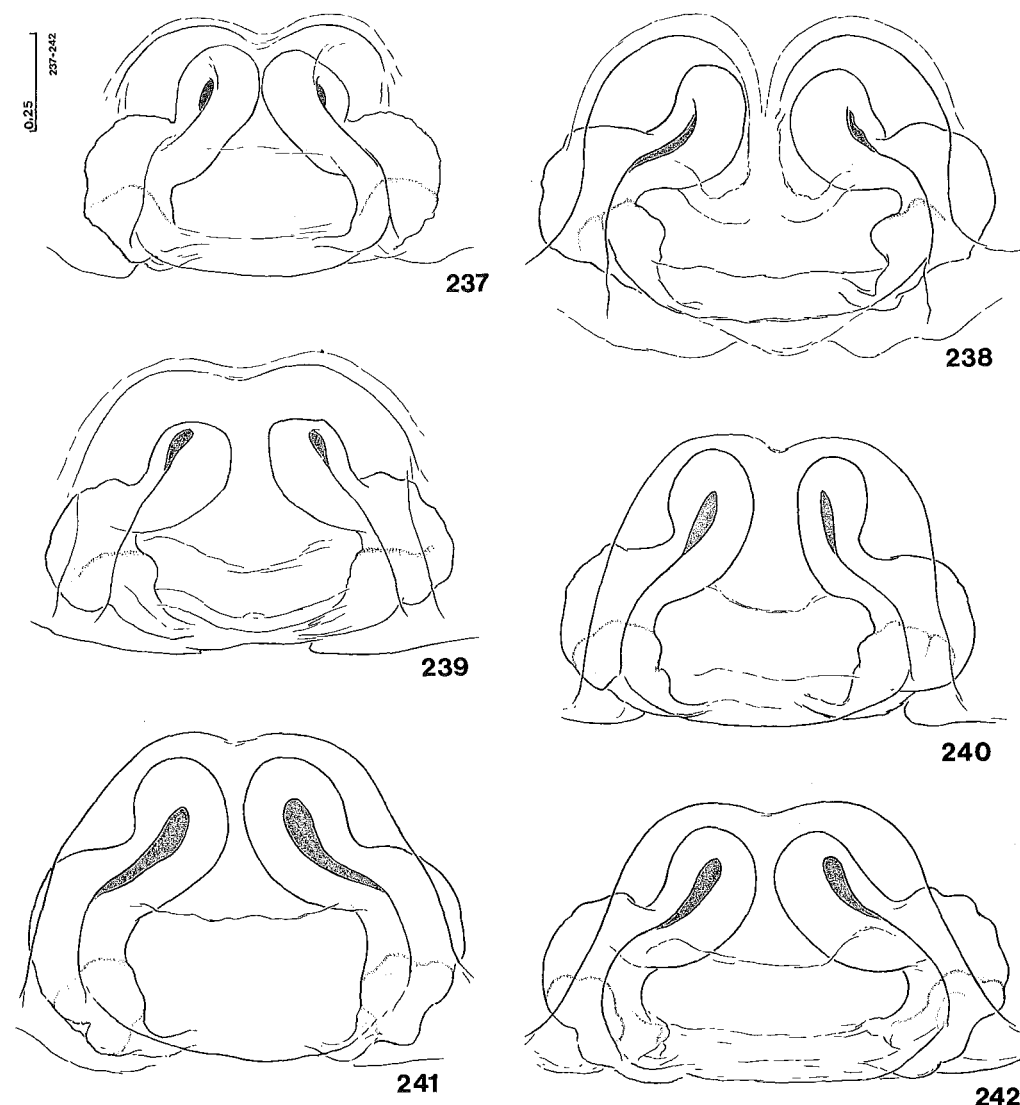


Fig. 237–242: Intraspecific variation of vulvae in *Stegodyphus lineatus*, ventral view. — 237) Spain; 238) Algeria, Biskra [note median ridge]; 239) Egypt, Damiette; 240–241) Syria; 242) USSR, Golodnaja.

white zone between them. The black stripes may be bordered laterally by white zones, but the stripes may also extend more or less to the lateral and ventral sides of the opisthosoma; however, as they are interspersed by numerous spots of white hairs, the general appearance is less dark, so that the two dorsal longitudinal black stripes remain prominent. Occasional specimens show the stripes interspersed with white hairs; they may be so numerous that the stripes are separated into single diffuse dark spots (*molitor* habitus). Ventral side marmorated, dark, with two broad paramedian and one median light longitudinal zones, the latter narrowing towards spinnerets.

It should be mentioned that the prosomal and most of the opisthosomal coloration is caused by hair coverage. Very large females, in particular, may have lost the major part of their opisthosomal hairs; so the dark stripes may have been lost. But there are also isolated specimens of this kind with two greyish longitudinal zones induced by cuticular pigmentation.

Considerable variation occurs in natural populations. It does not seem to be correlated with geographical distribution and ranges from practically white *molitor* specimens (see KULLMANN & al. 1975 Fig. 24) to nearly black specimens.

Discussion. See *S. nathistmus*.

Biology. For details see MILLOT & BOURGIN (1942). – We have found *lineatus* in Spain (Porto Calpe) in a dry habitat between shrubs and high stalks of Umbelliferae; they had their retreats at a height of 20–100 cm (Pl. 3 Fig. G). In September, animals were inadult. Various collectors refer to localities with thorny shrubs (Turkey) or to *Acacia* trees (Siwa); one female has been found in Tunisia in a heap of stones close to a field.

Measurements. ♂ (extreme data taken from other specimens in ()): Total L 10.7 (7.7, 11), prosoma L 5.8 (3.9), W ant 3.7, max W 4.0; diam AME 0.30, PME 0.35; W AME 0.78, PME 0.95, ALE 2.9, PLE 1.9. – ♀ (same remark): Total L 14.0 (10.6, 22), prosoma L 6.0 (5.1, 8.1), W ant 3.5 (5.0), max W 3.9 (5.7); diam AME 0.28 (0.30), PME 0.30 (0.35); W AME 0.73 (0.88), PME 0.88 (1.10), ALE 3.0 (3.7), PLE 2.5 (2.6).

Localities and materials. Spain: Casteldefels SSW Barcelona (1♀ subad. SMF 9543; Exc. Zool. Inst. Frankfurt leg. 8.X.1953). – SE Alcañiz (1♀ pre-epig. SMF 9541; Exc. Zool. Inst. Frankfurt leg. 14.IX.1953). – Pozuelo, Ciudad Real (1♂ 1♀ juv. MNHN AR942; DE LA FUENTE leg. 1913). – Porto Calpe, Pta d'Ifach (3♂ 9♀ 16♀ subad.; M. & O. KRAUS leg. 16.IX.1986). – Cartagena (1♀ 3♀ pre-epig. SMF RII/5142). – Granada (2♂ 2♀ juv. BMNH). – 10 km E Marbella (2♀ SMF 12923; FRANZ leg. 5.–20.VIII.1962). – Marbella (1♂ 1♀ UBDZ 1007 Fr. 85; leg. 19.IV.1976).

Italy: Sicily (1♂ 2♀ HEC 507/102. – 1♂ MCZ. – 5♂ 6♀ juv. MNHN AR944. – 2♀ 1♀ juv. NMW; MANN leg. – 1♂ 15♀ NMW 1858 II, 21; MANN leg. – 8♂ 22♀ 31♀ juv. NMW 1833/4 I. 43, 44; GROHMANN leg.).

Greece: Kifisa (1♀ MCZ; CASSIN leg. VII.1974). – Siros, Rodhos (2♂ 2♀ 4♀ pre-epig. BMNH 19.9.18. 5821–28; ERBER leg.). – Kreta: Akrotiri (1♀ SMF RII/893; leg. V.1926). – Kreta: Chalepa (2♀ SMF RII/3535).

Turkey: Malatia (8♀ MNHN AR945). – Smyrna [= Izmir] (1♂ 2♀ pre-epig. 14♀ juv. ZMB 24733–34; BAUER leg. 19.III.–9.IV.1916).

Israel: Jericho (1♂ 2♀ juv. MCZ). – Negev Desert, Sede Boquer, Zin Wadi (1♀ ROTH & ROTH leg. II.–III.1987). – Palestine & Syria (9♂ 5♀ 11 juv. HEC 512).

Jordan: Ou Ritama, Shishan (1♀ BMNH 1965.7.14.3; leg. Jordan Exped. 1965 MOUNTFORT/HOSKING). – Wadi Hasa, 30 km S Kerak (2♀; HORAK leg. 18.VI.1983). – 5 km N Tafila (4♀ 1♀ juv.; HORAK leg. 15.VI.1983).

Syria: (2♂ 20♀ 16 subad. MNHN AR941. – 1♀ NMW 1882 I. 491).

Irak: Mesopotamia (1♀ MNHN AR932).

Iran: Sabzawaran [= Jiroft] (1♀ SMF 36662). – Bushire [= Bandar e Bushehr] (6♀ BMNH 82.109).

U.S.S.R.: Golodnaja Step (14♀ ZMB 24735).

Mauritania: Atar (28♀ 1♂ juv. MNHN; DEKEYSER & VILLIERS leg. III.1951. – 5♀ MNHN; VILLIERS leg. III.1949). – Hamdoun près Atar 6♀ juv. + pre-epig. MNHN; VILLIERS leg. III.1949). – Chinguetti, dans Touffe de Sboth (1♀ juv. MNHN; DEKEYSER & VILLIERS leg. 3.–6.III.1951).

Morocco: Agadir (1♀ pre-epig. SMF 31545; SCHMIDT leg. XII.1980). – Taouz (1♀ MNHN; VIAL leg. 29.III.1969).

Algeria: (2♂ 13♀ 16 juv. MNHN. – 2♀ HEC 510; Lord WALSINGHAM leg. 1903). – Algier (3♀ BMNH 1890.7.1.8446–8. – Constantine (2♀ BMNH 1894.7.20.4–5; EATON leg. 1894). – Beni-Abbès (1♀ MNHN; BERLAND leg. 1950). – Biskra (1♀ 6 juv. BMNH 10.10.29.11–15. – 1♂ MCZ. – 1♀ MNHN; CHOPARD leg. – 1♀ 2♀ pre-epig. 1♂ juv. ZMB 24746; KATHARINER leg. III.1899). – Biskra, Böne (1♀ pre-epig. ZMB 24748; SPATZ leg.). – “Biskra-Quargla-Nefzana” (4♂ 11♀ 25 juv. + pre-epig. [SIMON det.: *deserticola*] MNHN AR940).

Tunisia: (5♂ 27♀ 6♀ pre-epig. SMF 36660; KAHMANN leg. 1959). – Tunis (2♀ 2♂ juv. BMNH; DORCA leg. – 2♀ NMW. – 1♂ 3♀ 2♀ juv. ZMB 24745; KATHARINER leg. X.1899). – Kairouan (5♂ 14♀ 35 juv. MNHN AR786. – 2♀ 1♀ juv. MNHN AR943). – Douz (2♂ 2♀ MRAC 133.671; VELARD leg.). – Djerba (3♀ ZMB 24747; BILGENER leg.). – Djerba, NE Houmt-Souk in flachen Lagen von *Mesembryanthemum* (1♂ SMF; KAHMANN leg. 14.IV.1959). – Near Houmt-Souk [Steinhaufen am Rande eines Feldes, in Röhren] (1♀ SMF 36661; KAHMANN leg. 15.IV.1959).

Lybia: Tripolis (1♀ ZMB 24750. – 1♀ ZMB 24749; BROWSKI leg. 27.IV.1899. – 1♀ 1♀ pre-epig. ZMB 24751; QUEDENFELD leg.). – Benghazi Distr. (1♀ BMNH; PERSSON leg. 1984).

Niger: Desert de Air (1♀ pre-epig. MNHN; CORTIER leg.).

Tchad: Massif du Tibesti (42♀ 12♂♀ juv. MRAC 132.956; 132.974; BRANDILY leg. VII.–X.1965).

Egypt: Siwa Depression (2♀ subad. BMNH 1936.2.12.499–500; OMER-COOPER leg. 22.III.1935). – Alexandria (1♂ 1♀ juv. ZMB 560. – 1♀ ZMB 538). – Damiette [= Dumyât] (4♀ Syntypes of *lituratus* ZMB 1518 [pinned specimens]; EHRENBURG leg. – 3♀ ZMB 498). – Sinai (1♀ subad. HEC). – Great S. Arabian Desert: Daugha (1♀ BMNH 1931.6.2.28), Bil Ashush (1♀ BMNH 1931.6.2.29), Uruq Dhahiyah (1♀ BMNH 1931.6.2.30; leg. 26.XII.1930–10.1.1931). – Wadi Sikait (1♂ 3♀ 1♀ juv. BMNH 0.5.25.15–18; MACALISTER leg.).

Sudan: Khartoum (1♀ pre-epig. MRAC 120.761; CLOUDSLEY-THOMPSON leg. 1960–61).

South Yemen: Aden (1♀ NMW).

Stegodyphus tentoriicola PURCELL, 1904

(Fig. 206, 209–210, 243–245, 249–250, 254–255; Map 4)

1904 *Stegodyphus tentoriicola* PURCELL, Trans South Afr. philos. Soc., 15(3): 135 Pl. 10 Fig. 6 (D♂♀) – vid.!

1958 *Stegodyphus tentoricola*, – BONNET, Bibl. aran., (4): 4149 (C).

S. tentoricola BONNET, 1958, is an unjustified emendation of the original spelling.

Since 1910, the species has never been mentioned again in the primary zoological literature.

Total length of males varies between 8.1 and 10.5, that of females between 11.0 and 16.5

Leg I of males not modified; tibiae cylindrical, without fringes of long hairs, but tibiae, metatarsi and basal region of tarsi ventrally with sparse long and also shorter hairs directly inserting near the basis of sclerotized blunt and cone-shaped protuberances.

Male pedipalps see Fig. 243–245. Terminal lamella (with embolus) opposed to a long sclerotized hook-like apophysis with parallel borders. There is a very deep cuneiform

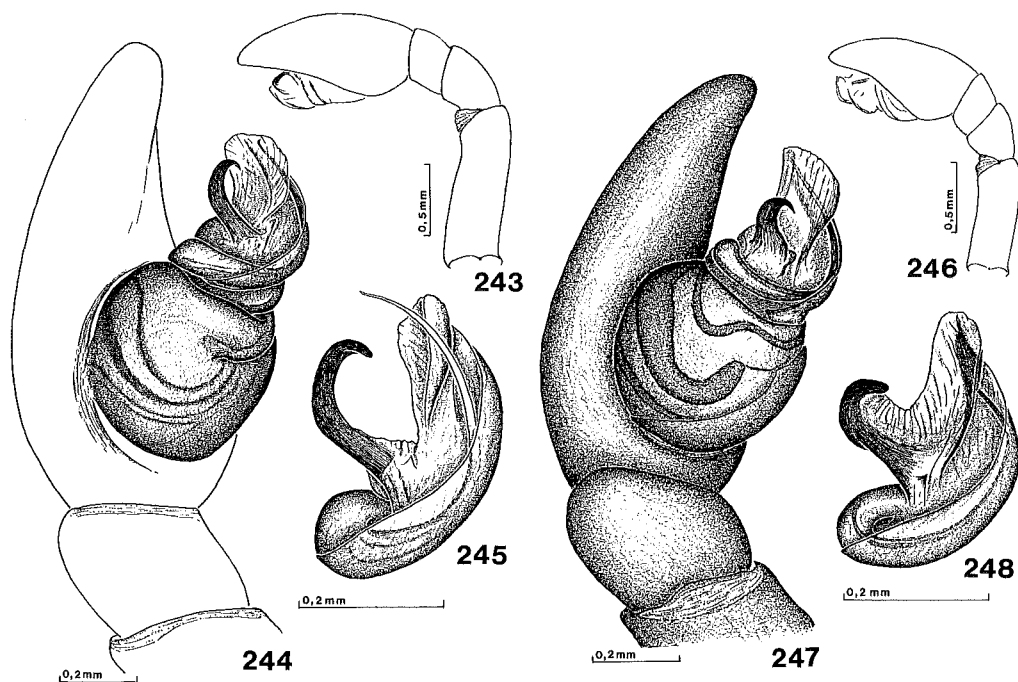


Fig. 243–245: *Stegodyphus tentoriicola*. – 243) Proportions of male palp; 244–245) male palp and diagnostic details of terminal lamella.

Fig. 246–248: *Stegodyphus dumicola*. – 246) Proportions of male palp; 247–248) male palp and diagnostic features of terminal lamella.

gap between terminal lamella and terminal hook. Pedipalpal femur longer than in *dumicola* (see Fig. 243; 246).

Female genitalia see Fig. 249–250, 254–255. Shape of epigynum depends from orientation (vertical position!). Median element (posterior view) together with its sclerotized lateral frames relatively broad (compared with *dumicola*). – Vulva frequently has a nodiform curved receptacular element in front of the multilocular complex (X in Fig. 250); although present in most specimens, this structure may be occasionally absent.

Colour only moderately retained in (alcohol-preserved) material available to us; there is not much difference between males and females. Prosoma bright red-brown, also chelicerae. Sternum and all appendages yellowish brown, with pedipalpal tarsus (♀), metatarsus + tarsus I and tarsus II darker. Prosoma covered by white plumose hairs; they form a narrow clypeal 'barb' and cover the major part of the chelicerae (less dense in distal fourth); white plumose hairs also present on pedipalps, legs (densest on femora) and on sternum. All legs annulated: a subbasal and a very broad terminal dark ring on femora and also on tibiae, in distal half of patellae and in distal two-thirds of metatarsi III + IV. Ventral membranes of articulations between femora and patellae usually dark pigmented [not so in *dumicola*!].

Opisthosoma greyish white, with paired dark spots, corresponding to insertions of dorsoventral musculature (Fig. 206). Single specimens show traces of two longitudinal greyish bands. Lateral sides of opisthosoma diffusely bordered by grey pigment and adjacent greyish spots extending to the ventral side. Ventral side dark, somewhat marmorated, with two paramedian light zones extending from the region of the lungs posteriorly. Spinnerets encircled by a light, unpigmented zone. Opisthosoma densely covered with white plumose hairs.

Discussion. See key to species. – Additional remarks: see *S. dumicola*.

Biology. According to PURCELL (1904), this species is *not* gregarious. LE ROY found a single female (with large egg sac) in a nest, with its snare web in grass tops.

Localities and materials. R. South Africa: Kalahari Gemsbok Nat. Park, Twee Rivieren (1♂ 1♀ TM 8950, 8949; VAN SON leg. II. 1958). – Hanover (2♂ 8♀ 1♂ + 6♀ juv. Syntypes SAM 2322/11836; SCHREINER leg. XII. 1901–I. 1902). – Herschel, Chas. Hall, 4–5000 ft. (1♀ NM 1746; leg. 1933). – Zwartkops, Krugersdorp Distr. (1♀ NCP 87/203; LE ROY leg. 19. IV. 1983). – Makapan (1♂ 4♀ MNHN AR 824).

Stegodyphus dumicola POCK, 1898

(Pl. 2 Fig. C–G; Fig. 31, 195–198, 211, 246–248, 251–253, 256–259, 263; Map 5)

1898 *Stegodyphus dumicola* Pocock, Ann. Mag. natur. hist., (7) 2: 201 Taf. 8 Fig. 7 (D♂♀) – vid.!

1908 *Stegodyphus deserticola* PURCELL, Denkschr. med.-naturwiss. Ges. Jena, 13: 217 Pl. 11 Fig. 5 (D♂♀) – vid.!

1920 *Stegodyphus deserticola*, – TUCKER, Ann. South Afr. Mus., 17(5): 452 (N) – vid.!

The type materials clearly demonstrate the synonymy. In his description of *deserticola* PURCELL mentioned seven males. As it was not possible to trace male specimens in the ZMB collections, this group of the syntypes has apparently been lost. But we have found three males "ex typis" in the collection of the SAM.

Total length of males varies between 5.4 and 7.3, that of females between 7.9 and 13.3.

Prosoma only slightly elevated in males (Fig. 263), even less so in females. Surface of prosoma of male covered with numerous tubercles, each of them bearing a hair at its anterior base (much more prominent than in females and in the sister species *tentoriicola*).

Leg I of males not modified, tibiae cylindrical (Fig. 211), without fringes; tibia, metatarsus and basal region of tarsus without blunt cone-shaped protuberances (as described in *tentoriicola*).

Male pedipalps see Fig. 246–248. Terminal lamella (with embolus) opposed to a sclerotized claw-shaped apophysis which is distinctly shorter than in *tentoriicola*. Both terminal elements of bulb are connected by a partially sclerotized membrane, forming a U-shaped low incision. Pedipalpal femur shorter than in *tentoriicola* (Fig. 246; 243).

Female genitalia see Fig. 195–198, 251–253, 256–259. Shape of epigynum depends on orientation (vertical position). Median plate (posterior view) together with its sclerotized lateral frames narrower (compared with *tentoriicola*; see discussion below). – Vulva in most cases without the nodiform element in front of the multilocular

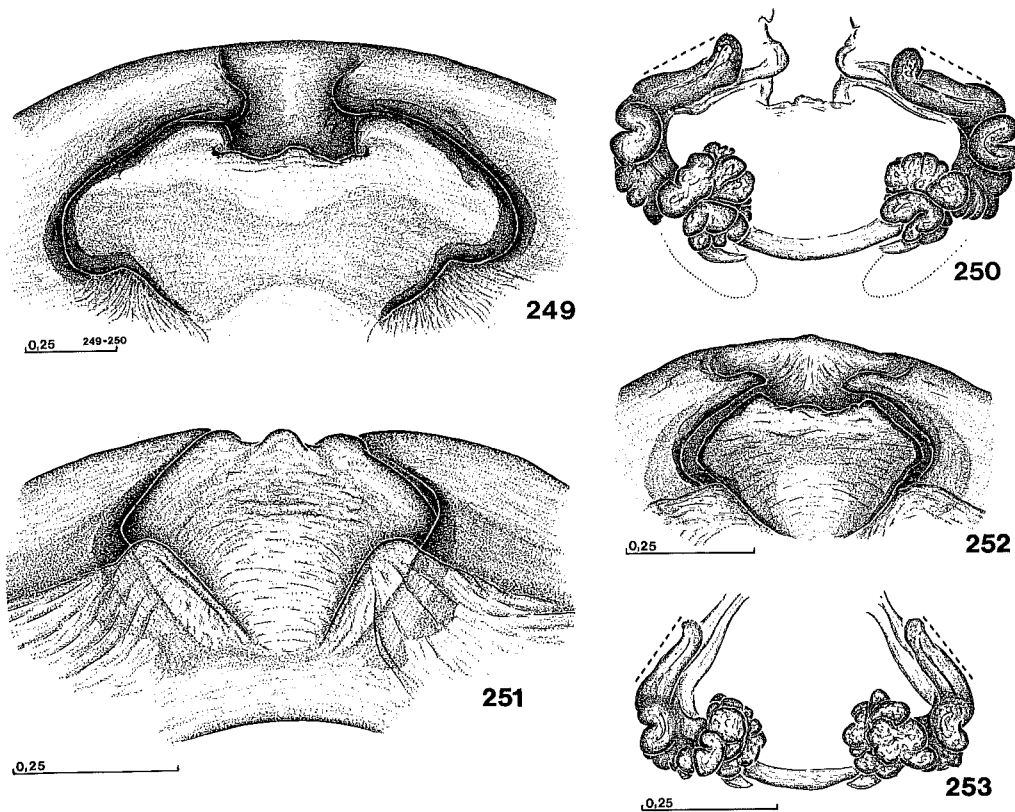


Fig. 249–250: *Stegodyphus tentoriicola*. – 249) Epigynum in its vertical position, posterior view; 250) vulva, same position.

Fig. 251–253: *Stegodyphus dumicola*. – 251–252) Epigynum in its vertical position, posterior view; 253) vulva, same position.

complex; see discussion. – Occasionally, the epigynum shows two extensible membranous elements in its posterior part (Fig. 257–259); for further discussion see p. 165.

The bright coloration of living specimens is illustrated in Pl. 2 Fig. C–G. There is not much sexual dimorphism. It is expressly noted that brownish, greyish and also blackish individuals may occur in the same colony; there are also specimens showing a predominantly blackish prosoma (also legs), but with a brownish opisthosoma. All metatarsi are almost black, with a broader white ring close to the base and a narrower such ring at the end; the last one very striking and characteristic in males.

Specimens preserved in alcohol show subdued coloration (compared with the bright colour pattern of living spiders): Dorsal side of prosoma uniformly red-brown, triangular anterior eye field darker. Sternum and legs light brown, but all tarsi darker, red-brown. Sternum with lateral dark zones, coxae and subsequent segments of legs annulated with dark zones. – Opisthosoma light yellowish grey, with two paramedian lon-

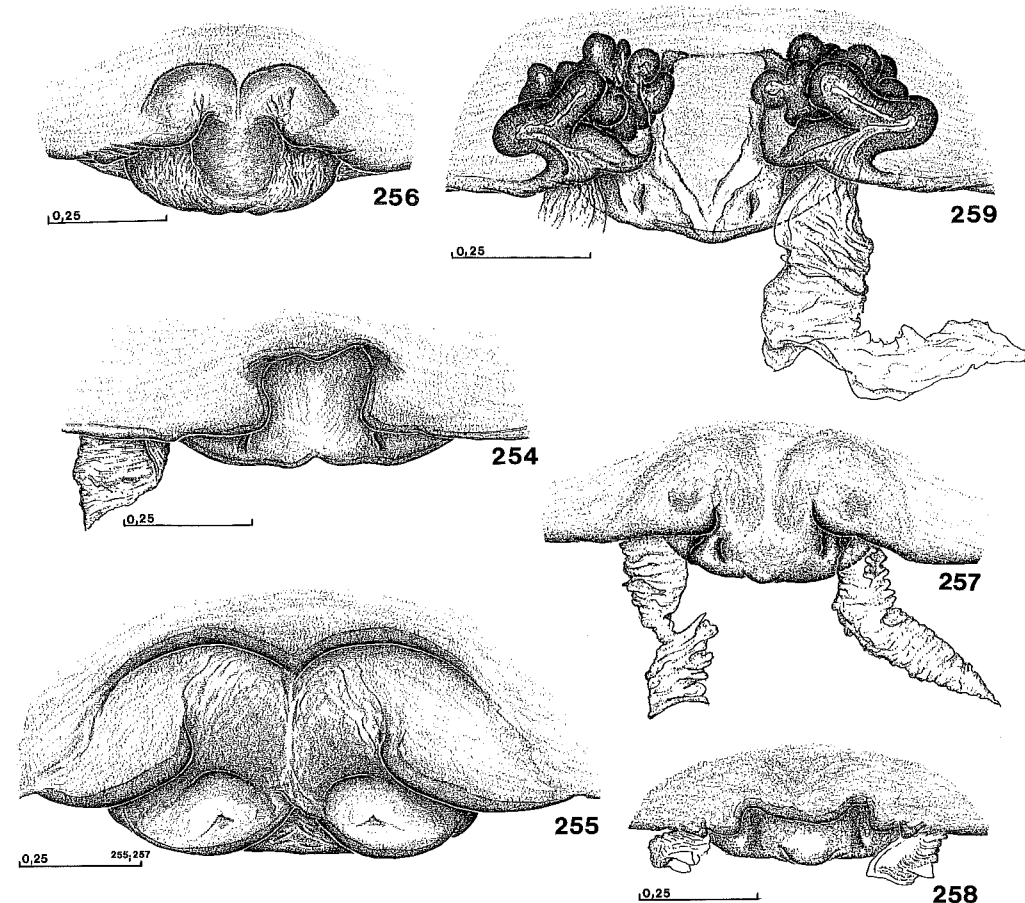


Fig. 254–255: *Stegodyphus tentoriicola*, anterior part of epigynum as visible on ventral side of opisthosoma. – 254) Small specimen, showing a strictly vertical position; 255) very large specimen, showing an oblique position.

Fig. 256–259: *Stegodyphus dumicola*. – 256–258) Anterior part of epigynum as visible on ventral side of opisthosoma, different stages showing strictly vertical (258) or oblique positions (256–257); 259) epigynum and vulva, ventral view. – [Fig. 257, 259: syntype of *deserticola*].

gitudinal zones; lateral regions light, with scattered dark spots; ventral side also dark, but with light lung regions and adjacent somewhat narrower light longitudinal zones; epigastric furrow light, also two narrow paramedian and one brief median longitudinal stripe dividing a broad ventral black area. – Whole spider covered with white plumose hairs. – Even in very old alcohol materials, the prosoma never has the uniformly bright red brown appearance present in *tentoriicola*; the same is true of the more or less uniformly greyish white dorsal side of the opisthosoma in this species.

Discussion. *S. tentoriicola* and *dumicola* are regarded as sister species. They are different in size: Fig. 264 and Tab. 7 demonstrate that males are clearly distinguishable but there is some overlap in females.

Coloration seems to be different (see alternative characters mentioned in key to species); but our redescription of *tentoriicola* is based on specimens preserved in alcohol and the coloration of living individuals remains unknown. – With regard to alcohol materials, the dark pigmentation of the membranes of articulation especially between femora and patellae seems to be a fairly reliable character: this is usually present in *tentoriicola* and lacking in *dumicola*.

Males may be distinguished by the difference in a lamellar structure of the terminal apparatus of the bulb. We have never seen even one doubtful specimen.

Females may cause difficulties. Differences in the shape of the epigynal plate (posterior view, Fig. 251–252) intergrade. The same is true with regard to vulval structures: the nodiform element *X* (Fig. 253) is present in most specimens of *tentoriicola*, but it may be more or less vestigial on one or both sides, especially in small specimens. In *dumicola*, the nodiform element is normally absent, but we have seen spiders showing it closely to the complex multilocular receptacula, and less pronounced as in “typical” *tentoriicola* (Fig. 197–198). The position of the ‘anterior’ parts of the vulva tends to be different (see converging lines added to Fig. 250 and 253).

Biology. For details see SEIBT & WICKLER (1988) and WICKLER & SEIBT (1988). In SWA/Namibia we found nests almost in thorny bushes and trees, between Tsumeb and Grootfontein syntopic with *S. bicolor* (see p. 217).

Measurements (variation see Fig. 264; Tab. 5). – ♂: Total L 5.7, prosoma L 2.9, W ant 1.7, max W 2.2; diam AME 0.19, PME 0.22; W AME 0.46, PME 0.55; ALE 1.56, PLE 1.08. – ♀: Total L 12.0, pros. L 5.6, W ant 3.1, max W 3.8; diam AME 0.24; PME 0.29; W AME 0.67, PME 0.81, ALE 2.8, PLE 2.0.

Localities and materials. Angola: Moçamedes, Caculovar Riv. (2♂ 11♀ BMNH 06.5.28.3–12, part; ANSORGE leg. 5.II.1906). – Humpata 1♂ 9♀; DE BARROS MACHADO leg. 23.–29.III.1977). – Lubang, Humpata (1♂ 6♀, DE BARROS MACHADO leg. 28.III.1977).

Namibia: Etosha Pan (one whole nest with 28♂ 60♀ 90♀ pre-epig. NM; LAMORAL & DAY leg. 3.–6.III.1969). – Etosha Park (1 nest; KRAUS & KRAUS leg. 26.VII.1988, numerous nests observed). – Etosha Park near Namutoni (6♂ 61♀ numerous juv.; SEIBT & WICKLER leg. III.1983). – Etosha Park, S Andoni (35♀ NM; GRIFFIN leg. 19.V.1986). – Sandhup (1♀ 12♀ pre-epig. SMA B 5908; leg. III.1923). – Otjikoto, 20 km W Tsumeb (2 juv. ZMH; MICHAELSEN leg. 16.VI.1911). – Otavi Highlands, Ghaub Farm (1♀ 1♀ pre-epig. NM 11498; LAMORAL leg. 8.–10.III.1969). – Damaraland, Sandamap Farm (2♀ 1♀ juv. MN 12624; LAMORAL & DAY leg. 13.II.1969). – Between Groote Spitzkoppe and Usakos (1 nest; KRAUS & KRAUS leg. 22.VII.1988, numerous nests observed). – Karibib (2♀ ZMH; MICHAELSEN leg. 23.–26.IV.1911). – Usakos (3♀ pre-epig. ZMH; MICHAELSEN leg. 22.IV.–22.VI.1911). – Okahandja (1♀ SMF 11058; GAERDES leg. V.1955). – Quickborn, Okahandja (1♀ TM 13409; BRADFIELD leg. 17.VII.1923). – Region from Outjo to Etosha Park; from Namutoni to Tsumeb, Grootfontein, Otavi, Otjivarongo, Waterberg, Okahandja, Gross Barmen [= Otjikango] (numerous nests; KRAUS & KRAUS observed, VII./VIII.1988). – Windhoek (5♀ ZMH; MICHAELSEN leg. 24.IV.–8.V.1911. – 3♀ SMF RII/6759). – Gobabis (1♀ SMF RII/8182). – Gurumana (1♀ 1♀ pre-epig. SAM B 2157; TUCKER leg. 7.–8.I.1916; 1♂ 4♀ 20♀ pre-epig. 4 juv. SAM B 2152; TUCKER leg. 18.I.1916). – Hakos Mts, Portsmut Farm (one whole nest with 16♂ 50♀ 29♀ pre-epig. NM; LAMORAL & DAY leg. 7.XII.1969. – 1♀ NM 12569; LAMORAL leg. 7.II.1969). – Lüderitz (1♀ SMF RII/5941).

Botswana: Maun, Kgwebe Hills (2♀ BMNH; WANLESS & SMITH leg. 30.–31.III.1976). – Kalahari, Kakia [published “Khakhea”] (3♂ 5♀ 3♀ pre-epig. SAM 150509; 64♀ 66♀ pre-epig. ZMB 24736, Syntypes of *deserticola*; SCHULTZE leg. I.1905).

Zimbabwe: Salisbury [= Harare] (8♀ BMNH 1899.5.4.58–63; MARSHALL leg. 22.IV.1899; 2♂ 2♀ subad. NM 9862; MAC KAY leg. 17.XII.1970). – Umfuli (3♀ 1♀ pre-epig. SAM 12501; PATRICK leg. II.1901). – Bulawayo (4♀ MCZ).

Mozambique: Mapai (1♂ 4♀ MRAC 137.449; RODRIGUEZ leg.). – Inhaca (11♀ MRAC 136.464; Mission Zool. MRAC-ULB leg. VII.–VIII.1969).

Swaziland: Hlane Game Sanctuary (2♀; SEIBT & WICKLER leg. 12.XI.1986). – Mpaka Stn. (15♂ 75♀; SEIBT & WICKLER leg. XI.1986, XI.1987). – Hlatikulu (4♀ NM 2578; leg. I.1939).

R. South Africa: Kruger Nat. Park (2♂ 2♀ 5♂♀ subad., SEIBT & WICKLER leg. XI.1985). – Babalala (24♂ 57♀; SEIBT & WICKLER leg. XI.1987). – Between Shingwedzi and Letaba (2♂ 2♀ 3♂♀ juv.; SEIBT & WICKLER leg. XI.1987). – Olifants (4♂ 3♀ 5♀ pre-epig.; SEIBT & WICKLER leg. 19.XI.1987). – Skukuza (2♀; SEIBT & WICKLER leg. XII.1984, XI.1986). – Pumbe Pad (14♂ 4♀ 12♂♀ subad. NM 8853; LAWRENCE leg. XI.1963). – N Transvaal, 5 km S Hoedspruit (2♂ 2♀ 4♀ subad.; SEIBT & WICKLER leg. 28.X.1986). – Nylstroom, Waterberg (4♀ 6♀ pre-epig. TM 13255; VAN DAM leg. XII.1923). – Roedeplaats Dam Nat. Res., 17 km NE Pretoria (1♀ pre-epig. NCP 84/222; VAN DEN BERG & SCHULTZ leg. 17.X.1983). – Pretoria (1♀ TM 13663; HEWITT leg. 1909). – Pretoria, Gezina (3♂ 12♀ 8♀ pre-epig. TM 13549; ROBERTS leg. I.1915). – Univ. of Pretoria, Exp. Farm, beneath succulents (1♀ NCP 88/421; DE VILLIERS leg. 15.III.1987). – Kings Kloof, Pongola, on *Aloe* (1♀ NCP 81/229; DIPPENAR leg. 12.VII.1967). – Modderfontein, Transvaal (1♀ 4♀ pre-epig. NCP 87/726, 799; FILMER leg. X.1986, 24.I.1987). – Barberton (6♀ SAM 4179; CREGVE leg. XII.1897). – Lydenburg (7♀ ZM 13278–84; KRANTZ leg. 1897; 1♂ 1♀ NCP 87/213; FILMER leg. 28.XII.1984). – Kroonstad (2♀ SAM 5812; WATERMEYER leg. III.1899). – “Hamm. Kraal, Makapan, Kimberley, Blomfontein & Vryburg” (8♂ 60♀ 4♀ subad. MNHN AR 827). – Mafeking N Vryburg (2♀ SAM 14705; TOIT leg. 1909). – Saltoan, Wonderboom (1♀ TM 13631; METHUEN leg. IV.1911). – Northern Cape, Dibeng (one whole nest with 20♂ 9♀ 90♀ pre-epig. NM; LAMORAL leg. 31.I.1979). – Natal, between Maputa and Pongola, pont on way to Nduma (one whole nest with 125♀ NM; LAMORAL leg. 19.I.1968). – Mseleni (1♀ 14♀ juv. NM; TOPPIN leg. 1946). – Hluhluwe, Ubizane Ranch (3♂ 3♀; SEIBT & WICKLER leg. 18.–24.XI.1986). – Ladysmith, Klip Riv. (4♀ MRAC 166.519; SHAW-COPELAND leg. XI.1980). – Spienkop Dam 30 km SW Ladysmith (1♂ 3♂ juv., 1♀ 7♀ pre-epig. 2 juv. NM; GRISWOLD & GRISWOLD leg. 9.–10.XII.1985). – Middeldrift, Tugela Riv. (1♂ 2♀ pre-epig. NM 3299; LAWRENCE leg. X.1940). – Estcourt (1♂ 1♀ Syntypes BMNH 1897.2.30.33–4; MARSHALL leg. – 1♀ NM 9476). – Mhlopheni Nat. Res., 10 km SE Mudon (1♀ NM; CROESER leg. 8.IV.1983). – Grahamstown (6♀ BMNH 1899.7.24.57–63). – Gretna Farm, 6 km SW Grahamstown (1♀ NM; CROESER & HAWKES leg. 29.XII.1981). – Goodwins Kloof, Grahamstown (1♂ 1♀ NCP 83/389; COBBY leg. I.1980). – Cape Prov., Somerset East (3♂ 2♀ 8♀ subad. NM 8812; WOLMMARANT leg. IV.1963). – Pearston (1♂ 2♀ NM 9474; LAWRENCE leg. III.1965). – Table Mountain (1♀ BMNH 01.3.11.9; HULL leg.). – Cape Town (7♀ MNHN AR 826). – Cape Town, Deep. Riv. (9♀ HEC 520; leg. VI.1891). – Cedarberg Tourist Camp Kromrivier, 72 km SSE Clanwilliam (1♂ 8♀ 1♀ pre-epig. NM; GRISWOLD & GRISWOLD leg. 1.–7.XI.1985).

III. Relationship of permanently social species

As demonstrated in the preceding section (C.II.), each of the three species groups includes its own gregarious form: *Stegodyphus mimosarum* belongs to the *africanus* group, *S. dumicola* to the *mirandus* group, and *S. sarasinorum* to the *dufourii* group. Thus, the permanently social species are not directly related. Their sister species should be expected to be non-social representatives of the relevant species groups.

S. dumicola: There is no doubt that *S. tentoriicola* is the sister species of *dumicola*. The two species are extremely similar. They both occur in southern Africa. All other representatives of the *mirandus* group differ considerably in various characters and thus cannot be compared with *dumicola*.

S. sarasinorum: Obviously, *S. pacificus* is the sister species of *sarasinorum*. The main reason for this assumption is that both species occur in India; no other representatives of the species group are known from the Indian subcontinent. It seems highly improbable that one of the African representatives of the *dufouri* group could be the sister species of *sarasinorum*.

S. mimosarum: It seems more difficult to state which of the exclusively African representatives of the *africanus* group could be the sister species of *mimosarum*. – We suppose that *mimosarum* and *africanus* have originated from a common ancestor, as the two species are remarkably similar in their coloration (Pl. 1 Fig. A, D); various measurements and ratios taken from *mimosarum* material are closest to equivalent data of *africanus* specimens (see Tab. 5: Diam and W PME : AME); *africanus* and *mimosarum* are widespread species and have similar distributions (Map. 1, 3). – For the following reasons, the remaining species of the group are eliminated: (i) *sabulosus* is an extremely dark species, close to black; (ii) *tingelin* has extremely short legs I and a yellow longitudinal band on the dorsal side of the opisthosoma, connected posteriorly with a yellow spot; (iii) in *lineifrons* and *hildebrandti*, two ratios of PME : AME are different (diameters and width); (iv) *simplicifrons* is a potential synonym of *mimosarum*.

The question as to whether the three permanently social forms are really species has not yet been raised. Is there any possibility that they might represent merely ecophenotypes? Phenons of this kind may have originated several times under similar ecological conditions; that is to say, they could reflect the adaptive potential of a species and not form monophyletic units. SEIBT & WICKLER (1988) report that *S. dumicola* and *mimosarum* both inhabit African dry thornbush country.

We cannot definitely exclude this possibility, but there are two main reasons why we believe that the permanently social forms represent biospecies:

a) They have their own morphological characters. We have never seen any transitional specimen of doubtful identity.

b) Social behaviour in *S. mimosarum*, *dumicola*, and *sarasinorum* is unique and complex; it seems to be more than the mere continuation of juvenile behaviour patterns in neotenic, sexually mature instars: obviously, there has been independent evolution peculiar to each species with regard to biological properties (SEIBT & WICKLER 1988). The sex ratio in *dumicola* and *mimosarum* ($\sigma^7 : \text{f}$) is close to 0.1. We have observed in *dumicola* that egg-laying females are helped by other females during the course of cocoon production and transportation (M. KRAUS 1988); according to BRADDOO (1976: 395), *sarasinorum* is much less advanced, as gravid females produce their cocoons without any help and would even be disturbed (!) by other members of the colony.

D. Biology

I. General results

As already explained, most previous authors have been interested in the biology of the gregarious spiders of *Stegodyphus*. It is now almost certain that there are no more than three social living species: *mimosarum* in Africa south of the Sahara, *sarasinorum* in India, and *dumicola* in southern Africa. With regard to the African species, the reader is referred to the simultaneously published papers by SEIBT & WICKLER (1988) and WICKLER & SEIBT (1988). On the basis of their own precise field and laboratory studies, these authors give many new qualitative and, especially, quantitative data; in order to present a new platform, observations recorded by previous authors are included and critically discussed. A review has been published by BUSKIRK (1981), and D'ANDREA (1987) has compiled all available data from the literature.

The majority of the 14 'solitary' *Stegodyphus* species can have a colonial but not a social life style – at least in late inadult and adult stages. Only one of these species, *lineatus*, has been studied in any detail (MILLOT & BOURGIN 1942 [laboratory observations]); supplementary data have been published by KULLMANN et al. (1971, 1972). We have observed the same species in Spain (Porto Calpe) and then in the laboratory (see below). But practically nothing is known about any of the other solitary species. For this reason, we have included various highly fragmentary data at the end of the taxonomic descriptions of *africanus*, *hildebrandti*, *sabulosus*, *sarasinorum*, *dufouri*, *manicatus*, *nathistmus*, and *lineatus*. It seems highly desirable to clear up details of the colonial occurrence of *manicatus*; this species could be close to social living (see p. 220).

Remarks on *S. lineatus*. – According to MILLOT & BOURGIN (1942), spiderlings remain gregarious after their first moult outside the egg-sac ["Sociabilité et commensalisme persistant donc, chez les *Stegodyphus* solitaires, longtemps après la sortie du logis natal"]. According to KULLMANN et al. (1972), early instars are completely dependent on maternal feeding by regurgitation. Spiderlings having reached the third stage outside the cocoon feed together with their mother on prey she has captured. Juveniles of the following (4th) stage have been found to be independent of maternal care, but they continue to live gregariously forming groups varying in size from several to many individuals; MILLOT & BOURGIN (: 311) had observed a minimum of 3 and a maximum of 30 spiders. Observations published by KULLMANN et al. (1971: 185) indicate that gregarism may continue even in stage 5; succeeding instars are solitary.

At Porto Calpe (E Spain), the spiders have been found to be immature in September. In a shrub covering approximately 1 m² we counted 22 solitary tubes, each with its own net. Even extremely close neighbours had strictly separate nets, there was not a single connecting thread between adjacent webs. We have collected these already solitary (but still immature) spiders, together with their individual retreats fixed between parts of dry plants; in the laboratory, they were placed approximately the original distance apart: most spiders gave up their already acquired hermitages and formed groups of 6 to 9 individuals with new, common retreats. This indicates an unexpected

degree of flexibility. Later instars returned again to solitary living. Adult males have occasionally been observed in the tubes of females, with the female close to the entrance and the male behind.

In the laboratory, neighbouring adult females show a special behaviour: one of the spiders may execute rhythmic vibrations of its web. This has only been observed in situations when both females had left their retreat. We are inclined to interpret this as territorial behaviour, as the non-vibrating spider reacts by returning into her retreat.

Flexibility also occurs with regard to the instar which acquires sexual maturity. Males have been reported to reach maturity after 7, 8 or 9 moultings [= moultings outside the egg-sac]. Accordingly, KULLMANN et al. (1972: 106, Fig. 23) have been able to distinguish three size classes in males. – Females mature with the 9th moulting or later (KULLMANN et al. 1972: 102) and may continue to moult (see p. 161).

Some of the syntopic immature specimens we had collected in September 1986 became mature in February 1987 (males and females). But even in July 1987 various immature spiders had remained; one female did not reach sexual maturity until February 1988 and died 5 weeks later. As all specimens were kept under the same conditions and food was offered in abundance, we interpret these differences as cases of delayed maturation (see SEIBT & WICKLER 1988: 294).

II. Origin of social living

KULLMANN et al. (1971: 187) have expressed the view that periodically social forms may be regarded as “phylogenetic precursors” of permanently social species. BURGESS (1978: 74) argued as follows: “In close-spaced, communal web genera ..., the first step in evolutionary development may have been neoteny; the retentions of behaviors of the juveniles, who remain close together in the web, tolerantly building and feeding (seen in many species).” Both authors were apparently on the right track:

1. Morphological evidence

As compared with non permanently social species, sociality is correlated with various differences in size and proportions.

a) The body size of adults is considerably smaller in all permanently social species than in their corresponding non-social sister species (i.e. sibling species); see Fig. 260–263, 264, 265–266.

b) At least in two of three permanently social species, males and females show juvenile character expressions in the profile of the prosoma (Fig. 261, 263): in *mimosarum* and *dumicola*, the so-called “pars cephalica” is less elevated and thus similar in shape to that of juveniles of their non-social sister species (*africanus*, *tentoriicola*). *S. sarasinorum* is different, as adult males have the “pars cephalica” elevated to a similar degree

Tab.7: As compared with their solitary sister species, social *Stegodyphus* species have relatively shorter legs I [ratio L leg I : L prosoma], in general, the relative length of their legs I, II and III is lower [leg IV = 100].

social			solitary		
<i>mimosarum</i>			<i>africanus</i>		
♂	2.5	116:84:62:100	♂	2.6 .. 2.8	118:87:72:100
♀	2.1	102:84:68:100	♀	2.2 .. 2.4	113:93:70:100 118:88:73:100
<i>sarasinorum</i>			<i>pacificus</i>		
♂	2.1	130:92:72:100	♂	3.6	138:93:70:100 148:97:71:100
♀	2.3	118:88:70:100	♀	2.4 .. 2.7	134:92:72:100 134:94:74:100
<i>dumicola</i>			<i>tentoriicola</i>		
♂	3.0 .. 3.5	123:92:67:100 126:88:70:100	♂	3.5 .. 3.8	120:88:68:100 126:90:70:100
♀	2.5	114:88:75:100	♀	2.4 .. 2.6	118:87:70:100 124:91:77:100

to their much larger non-social sister species, *pacificus* (Fig. 116–117); but it should be noted that the elevation in *pacificus* is rather extreme.

c) In *S. dumicola* the male pedipalpal femur and also the whole appendage are shorter than in its non-social sister species *tentoriicola* (Fig. 243–246). This has been observed to an even more pronounced degree in *sarasinorum* (compared with its sibling species *pacificus*) (Fig. 119–120), but not in *mimosarum* versus *africanus*. – This feature is regarded as another juvenile character expression and is present in two of the three permanently social species.

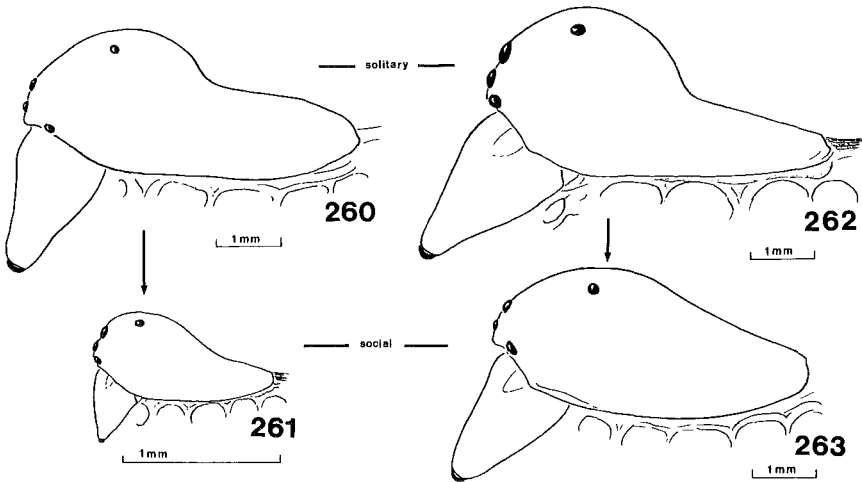


Fig. 260–263: Juvenile character expression in permanently social *Stegodyphus* species: Elevation of “pars cephalica” is prominent in non-social species and nearly lacking in social representatives. – 260) *S. africanus*; 261) *S. mimosarum*; 262) *S. tentoriicola*; 263) *S. dumicola*. – Arrows are directed towards social sister species.

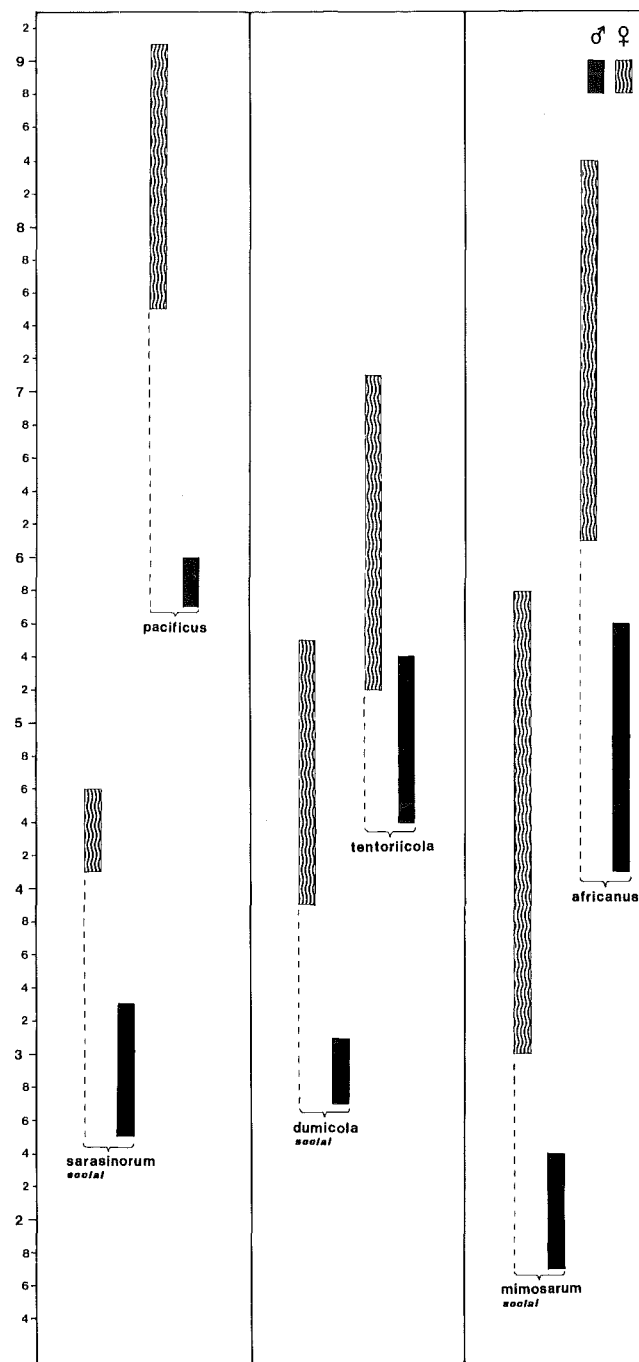


Fig. 264: Intraspecific variation of prosoma length in solitary species and in their permanently social sister species. In three different species groups, social representatives are constantly smaller [one single overlap between *dumicola* and *tentoriicola* females].

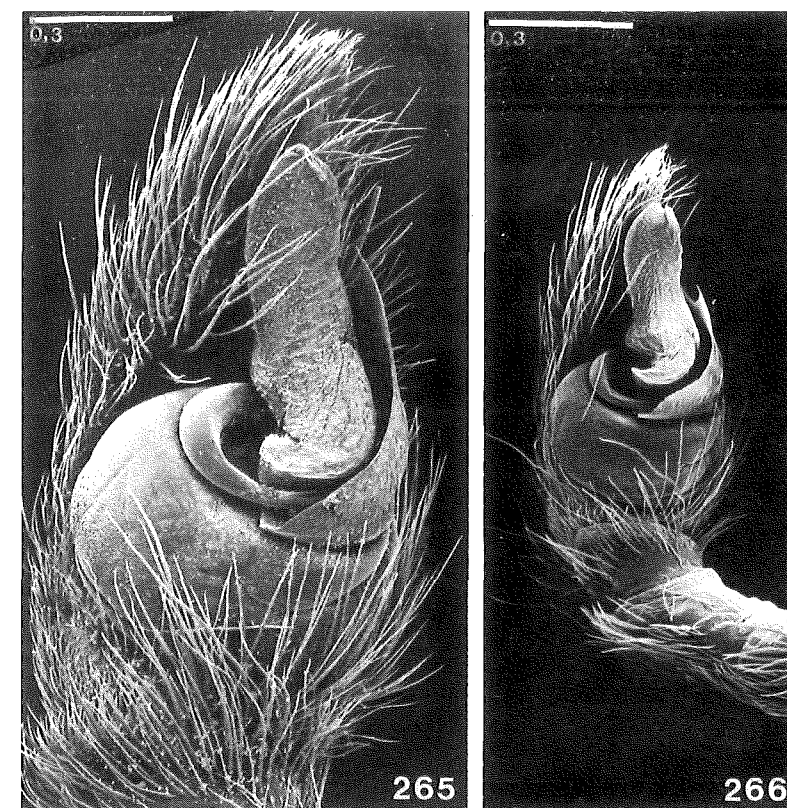


Fig. 265–266: Difference in size of terminal apparatus of male palps. – 265) *Stegodyphus africanus* (solitary); 266) *S. mimosarum* (permanently social). – Same scale.

d) All social living species have (compared with the length of the prosoma) relatively shorter legs I than their non-social siblings (Table 7; see also Table 1, 3, 5). With the exception of *dumicola* males, the same is true with regard to the ratio of the length of legs I:II:III:IV [leg IV = 100%]. These differences of social living representatives are also interpreted as juvenile features.

2. Biological evidence

There are various peculiarities in the biology of *Stegodyphus* that might have been pre-suppositions for the origin of permanent sociality.

a) Eresidae are known to occur in colonies (see, e.g. WIEHLE 1953: 73).

b) In *Eresus* and *Stegodyphus* early instars are completely dependent on maternal feeding (see p. 243). Later, the spiderlings feed together with their mother on prey she

has captured. Finally, the digestible substance of the old female is incorporated into her offspring by "gerontophagy" (SEIBT & WICKLER 1988).

c) Juvenile spiders of non-permanently social species continue to maintain gregarianism; as far as known at present, this may even happen in stage 5 (see p.243).

d) Under special circumstances, inadult spiders of non permanently social species that have already dispersed and separated may transitorily return to social habits and produce a common retreat again (see p.243).

e) In *Stegodyphus* (and presumably also in other subtaxa of Eresidae), sexual maturity may be achieved by different instars (see p.244). This flexibility explains the occurrence of relatively small and also of rather large males and females in one and the same species.

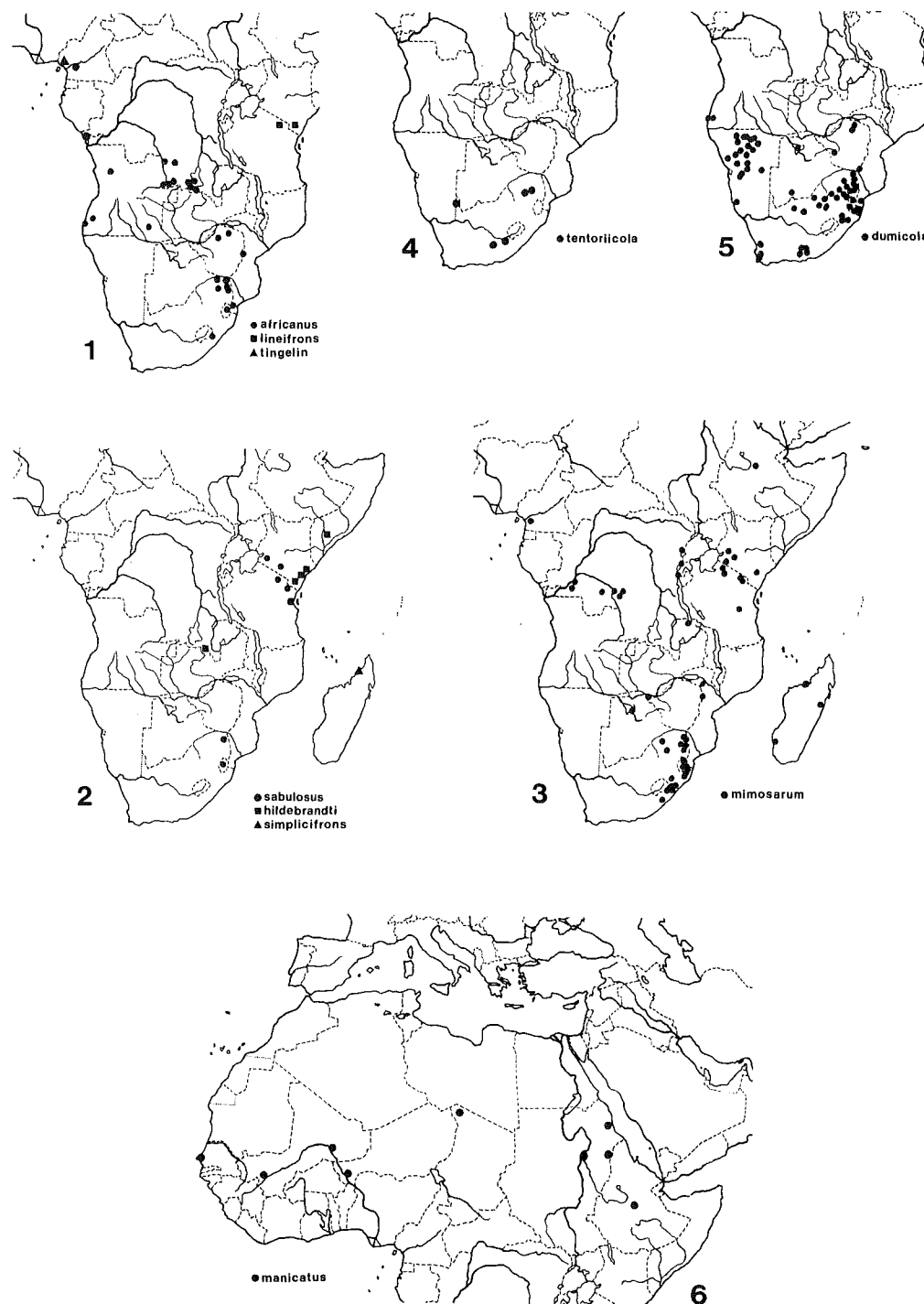
3. Conclusions

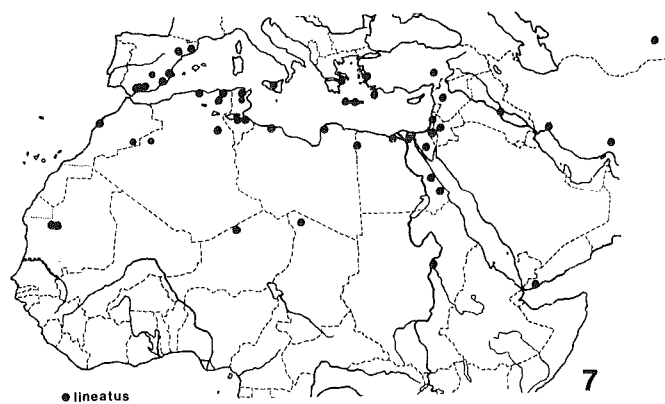
Each of the three species groups of the genus *Stegodyphus* includes one single permanently social living species. It is highly improbable that the stem species of the whole genus was social. In this case, we would have to assume that the majority of the Recent representatives (14 species) has secondarily and more or less independently returned to solitary life habits. Outgroup comparison also provides strong evidence against this possibility. It seems to be purely theoretical. We therefore conclude that permanent social living has been acquired independently by three species in three different species groups. This may explain differences in the biology of the three social species *mimosarum*, *dumicola* and *sarasinorum* (see SEIBT & WICKLER 1988).

In principle, the origin of permanently social species in *Stegodyphus* seems to be a transition from communities of juveniles to communities of adults. The hypothesis that such social species have evolved by neoteny is strongly supported by the presence of a whole series of juvenile character expressions (p.244). Various biological properties present in inadults of the species that are not permanently social can be regarded as pre-adaptations.

Thus, we conclude that the adults of the permanently social species correspond to inadult instars of their sister species: juvenile social behaviour seems to have been maintained in adults by means of neotenic development. This is an uncommon way in the evolution of animal sociality.

E. Maps





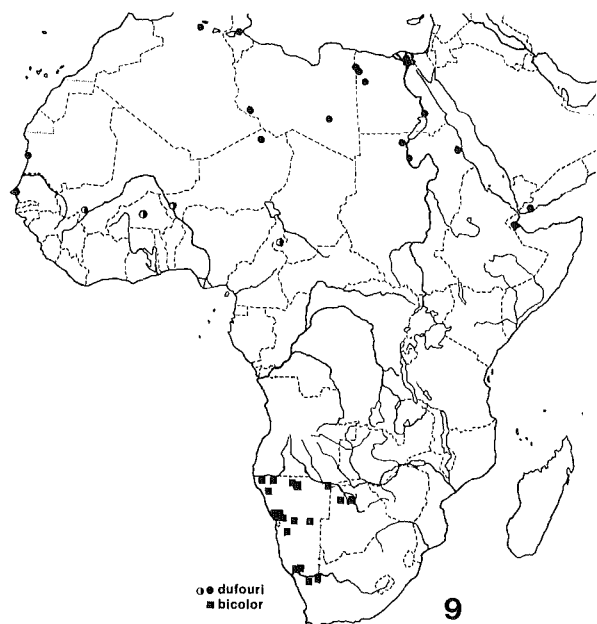
● lineatus

7



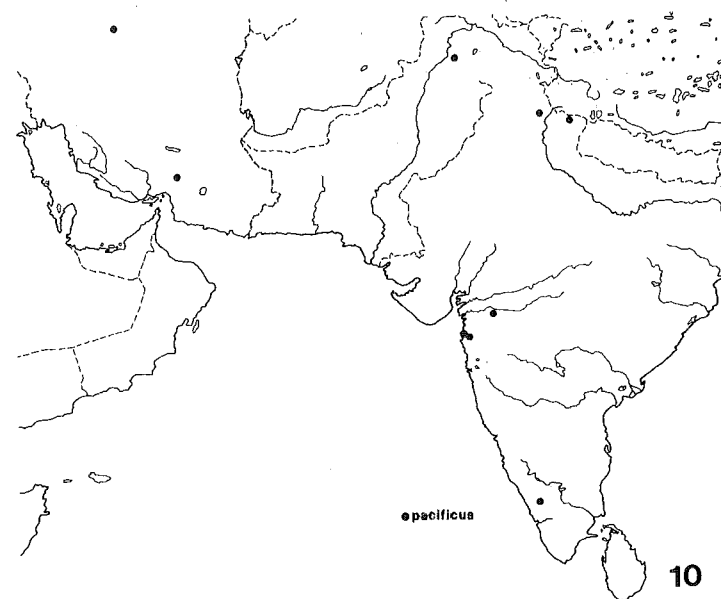
● nathistmus

8



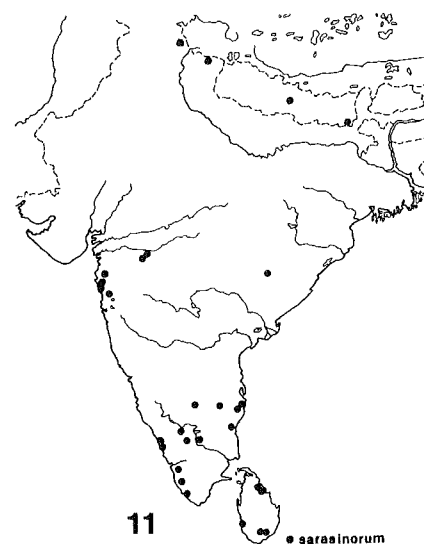
○ dufouri
■ bicolor

9



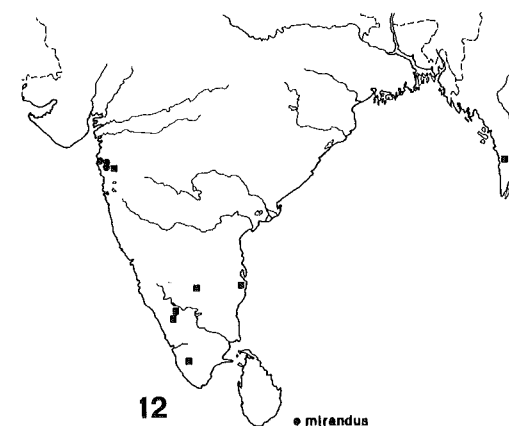
● pacificus

10



● sarasinorum

11



○ mirandus
■ tibialis

12

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