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THE ANT GENUS STRUMIGENYS FRED. SMITH IN THE ETHIOPIAN AND MALAGASY REGIONS

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No. 1. — *The Ant Genus Strumigenys Fred. Smith in the Ethiopian and Malagasy Regions*

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This is a part of my revision of the dacetine ant genus *Strumigenys* Fred. Smith, planned to include the entire *Strumigenys* world fauna. For information concerning the characters and relationships of *Strumigenys,* the reader should consult my recent general references on tribe Dacetini (Brown, 1948, 1953). The 1953 reference also contains a detailed discussion of the standard measurements most useful in dacetine studies and the indices derived from these measurements. To recapitulate briefly: TL or "total length" is the sum of the exposed lengths of the head with mandibles, alitrunk, petiole, postpetiole and gaster. HL is the maximum measurable length of the head proper, seen in perfect dorsal full-face view, including all of occipital lobes and clypeus. ML is the exposed length of the closed mandibles from dorsal view (same position from which HL is measured). WL, or Weber's length of alitrunk, is the diagonal distance from base of cervix to metapleural angles, as seen from the side. CI is the cephalic index, or HL/maximum width of head$\times$100. MI, mandibulo-cephalic index, is HL/ML$\times$100. Error of measurement for the head and mandibles should not normally exceed $\pm$0.01 mm.; errors of indices as calculated from raw measurement units should not exceed $\pm$1.

The cooperation of numerous individuals in the entire dacetine project is cited in detail in my 1953 reference, but I should like to acknowledge here the most valuable loans of material and other aid rendered by the following: Dr. George Arnold, of Bulawayo; Prof. Francis Bernard, of the Université d'Alger; Dr. Ch. Ferrière, of the Museum d'Histoire Naturelle, Geneva; Prof. Guido Grandi, of the University of Bologna; Prof. Ed. Handschin, of the Naturhistorisches Museum of Basel; Dr. Harlow B. Mills, of the Illinois Natural History Survey; Dr. E. S. Ross, of the California Academy of Sciences; Dr. George Salt, of Cambridge University; and Dr. Neal A. Weber, of Swarthmore College, Pennsylvania.

Aside from a handful of obscure species in *Microdaceton* Santschi, *Smithistruma* Brown, *Miccostruma* Brown, *Codiomyrmex* Wheeler, and perhaps one or two other small genera at present

known from North Africa, the Ethiopian-Malagasy dacetines fall into two distinct, relatively common, and presumably dominant genera: *Strumigenys* and *Serrastruma* Brown. *Serrastruma* underwent drastic preliminary revision in a recent paper (Brown, 1952), and it now appears that the number of species may have to be reduced still further by synonymy, since only four to six of those names appear to represent distinct entities. These few *Serrastruma* species are all very much alike, and all are exceptionally variable in a tribe which is otherwise outstanding in the constancy of species characteristics. *Serrastruma* appears to be a relatively recently evolved group of Ethiopian origin; its ancestors are probably to be looked for in *Smithistruma* species like those of the *alberti* group. *Serrastruma* is easily the commonest, and apparently the dominating African dacetine genus, and it seems likely (on the assumption that it competes for the same food as other dacetines, namely collembola and a few other small cryptobiotic arthropods) that its presence is the chief cause of the scarcity of other dacetine groups below the Sahara.

The other genus fairly well developed in Africa is *Strumigenys,* which survives as fourteen known, valid species in the Ethiopian Region, plus one in Madagascar. Two of the Ethiopian species have become established as tramps outside Africa-Madagascar (*rogeri* and *scotti*), and these will be discussed below. All of the African *Strumigenys* species clearly belong to one ancestral stock, of which the most generalized known species is *S. grandidieri* of Madagascar, although the close interrelationship of these species is masked by extensive morphological radiation and might not therefore be guessed at without one's having the complete series of forms in intergrading array. Undoubtedly, other species from these regions remain undescribed and uncollected, but in spite of the incompleteness of the record, it seems clear that the Afro-Madagascan *Strumigenys* fauna is a very limited one compared to the two other distinct faunas of the genus. The New World and Indo-Australian faunas share, roughly equally, at least 100 described and undescribed species that I have been able to verify to date, leaving out those that are clearly synonyms.

The reason for the paucity of the African *Strumigenys* fauna

is not entirely clear, especially in the absence of detailed ecological data, but it seems probable that competition between *Strumigenys* and *Serrastruma* is at least partly responsible. In the other tropical dacetine faunas, *Strumigenys* is usually clearly the dominant genus, though *Smithistruma* is abundant in some of these regions and competes for much the same food (chiefly or entirely collembola of entomobryoid and isotomoid affinities). *Strumigenys* and *Smithistruma* differ, however, in the basic form of the mandibles, and to a certain extent also in details of predatory behavior (Wilson, 1954; Brown, 1954; unpublished data of both authors), so that competition between the two groups is probably only partial. On the basis of evidence I have given elsewhere (especially in the 1953 reference), it seems very likely that the long-mandibulate life-form (*Strumigenys*) is ancestral to the short-mandibulate, or smithistrumiform type. The long-mandibulate type is better fitted for foraging in the open, while the short-mandibulate forms are more suited to cryptic hunting; the former tends to concentrate more toward the tropics, while the latter is predominant, in the Northern Hemisphere, at least, in the warm temperate belts.

In Africa, however, the chief short-mandibulate genus is *Serrastruma,* which exists successfully through most of the continent from South Africa to the Sahara, avoiding only extreme montane and desert habitats. The *Serrastruma* mandibles, a modified and somewhat elongate version of those of *Smithistruma,* may be a very efficient prey-catching instrument, but there is probably more than this behind the success of *Serrastruma.* Probably ecological tolerances and fertility are involved strongly here, as suggested by the extreme morphological variability of the species and the rather larger-than-average nest populations, of which accurate estimates are just beginning to come in.

As mentioned already, the Afro-Madagascan *Strumigenys* so far described all belong to a single group (the *rogeri* group, here so named) representing a common stock. This group, excepting the two probably historically-migrant tramp species, is restricted to Africa and Madagascar, and its relationships with groups of other faunas are not particularly close. With the single exception of *S. rufobrunea,* a widespread and very variable species, the African *Strumigenys* show the narrow ranges of intraspecific

variation usually expected of members of the genus, and ecological specialization, so far as known, follows morphological variation. *Strumigenys* in Africa, as elsewhere, seems to tend to fill the available niches by speciating to specialized types, which then stabilize and become relatively constant and therefore are easily separable one from another. *Serrastruma,* on the other hand, fills many or all of the same niches by producing only a few, but very plastic species.

It is interesting to note that the three truly widespread tramp dacetines [*Strumigenys rogeri* Emery, *Trichoscapa membranifera* Emery and *Quadristruma emmae* (Emery)] are all either certainly or very likely of African origin. In fact, *Quadristruma emmae,* though not yet recorded from Africa proper, is now seen, through the discovery of the intergradient *Strumigenys tetraphanes* (*q.v. infra*), to be a direct offshoot of the *S. rogeri* group and hardly separable from that group except by the detail of the loss of the two smallest antennal segments. In a similar way, *Trichoscapa membranifera* seems close to certain old African stocks of short-mandibulate genera (*Smithistruma, Codiomyrmex loveridgei* Brown, *Miccostruma*), and this species is actually known from various humanly-disturbed areas in Egypt and elsewhere in North Africa. *S. rogeri* is widespread in the West Indies, the Pacific, and in the hothouses of the British Isles, and it has long been thought to be a native Neotropical ant, but I can now show that it is African as its morphological relatives are; the West African *S. sulfurea* proves to be its synonym.

The findings in the Dacetini are in agreement, as concerns tramping ability, with the patterns of colonization now emerging for the ants in general. It would seem, despite certain outstanding exceptions to the contrary, and taking into account the chaotic state of the taxonomy of ants, that the worldwide "tramp habitats" in the tropics and subtropics are occupied mainly by species and genera of African origin. The degree to which this is true will only be surely revealed after much difficult basic taxonomic labor, involving the synonymy of many species and varieties described originally on a purely geographical basis. The origins will be made known chiefly by analyzing group relationships, and then searching for the particular species concerned in its presumed native area, for it is frequently true that in its native

range, an ant elsewhere common as a tramp will be diffusely distributed, or even rare. At present writing, this appears to be the case with all the dacetines mentioned above.

The stages of tramping through the agency of human commerce appear to be fairly obvious. The critical step involves the chance transplantation of a continental propagule to a favorable offshore island with a limited native fauna. If such an island is not already "saturated" with competing tramps, the chances greatly favor the establishment of a very dense population there within a relatively short time. With the pressures of normal continental extraspecific competition, predation and parasitism removed or greatly lessened at the new insular habitat, a dense population is virtually inevitable. From an insular colony, small in area by geographic restriction, but dense in structure, and exposed to intensive contacts with commercial transportation, the probability that new propagules will be transported to new colonial sites is enormously increased over what it originally was in the continental distribution. It seems likely that this is the usual pattern of dispersal of potent tramp species among the smaller insects and certain other invertebrates (the notorious and well-studied giant snail, *Achatina fulica*, for instance; Bequaert, 1950). The study of this problem in the ants is a fascinating one, but very difficult due to the present very great proportion of unrecognized synonyms among the tramp species. From the fragmentary information we have at present, the tramp ants of the tropics and subtropics seem, as has already been mentioned, to be predominantly African in origin. Perhaps, as seems very likely in the better-known but restricted case of the dacetines, this apparent predominance of African forms reflects a relatively potent evolutionary situation centering in the Dark Continent. In the case of the dacetines, Africa certainly would appear to have been the chief center of major-group evolution, at least during the more recent geologic past, as well as the present.

The largest and most generalized member of the *rogeri* group is *S. grandidieri* Forel, from Madagascar. This species shows many similarities in general habitus (as well as in details like the median longitudinal cephalic sulcus, the antennal scrobe posteriorly limited near the compound eye, the preocular notch,

the size, and general head shape) to generalized members of the Indo-Australian fauna (*chyzeri* group) and to American species like *S. mandibularis* Fr. Smith and *S. precava* Brown. The closest relationships of *S. grandidieri* are, however, clearly with the African members of the genus. The generalized *rogeri* group characters include well developed preocular notches combined with rather large eyes, fairly long mandibles with the usual pair of apical teeth forming a fork, and two additional preapical teeth, and a rather strikingly depressed posterior part of the mesonotum.

Important tendencies of specialization within the group include, in different lines, reduction of eye size and loss of the preocular notch, reduction of body size, shortening of mandibles and antennae, and reduction even to loss of the more distal of the two preapical teeth. The reduction of the distal preapical tooth is unique among dacetines in that it takes place asymmetrically, with the tooth on the left mandible diminishing more strongly than that on the right. The tooth on the left may even disappear entirely, while that on the right persists in a more or less reduced state in all but one species (*irrorata*). All stages in the reduction of the distal preapical teeth are found among *rogeri* group species, and each stage furnishes a useful species-constant character.

The eye-notch character and the dentitional asymmetry have received scant attention from most authors, especially Santschi, and in consequence these features are frequently not even mentioned in past descriptions. The published figures of African *Strumigenys*, as well as the mensural citations, are also largely untrustworthy. In the matter to follow, I have not tried to correct by specific mention all of the numerous published errors of detail. Instead, there are emphasized below the essential characters, and especially the measurements, of all species studied at first hand. Special attention has been given to the construction of the key. Type material of all species treated has been directly examined unless otherwise specifically mentioned.

The species included here that were described prior to 1922 have been catalogued (under *Strumigenys s. str.*) in the following references: Emery, 1922, Genera Insectorum, Fasc. 174, pp.

320, 322; Wheeler, 1922, Bull. Amer. Mus. Nat. Hist., 45: 917-918, 1034.

In these lists are included *Strumigenys reticulata* Stitz and *S. ludovici* Forel, both of which have since been transferred to *Serrastruma* (Brown, 1952). *S. reticulata* is a synonym of *Serrastruma lujae* (Forel), while *ludovici* is perhaps a prior name for *Serrastruma alluaudi* (Santschi).

Key to the Species of *Strumigenys* of the Ethiopian and Malagasy Regions, Based on the Worker Caste

Notes on the use of the key. Since most of the species are still known only from scanty material, this key should be taken only as a preliminary guide. Larger series may well reveal that the allowances I have made for potential infraspecific variation, while generous, may in some cases be transgressed. It should also be emphasized that the mere fact that a given specimen does not readily run out in the couplets below is no assurance that the would-be identifier has discovered an undescribed species. It is regrettable that past authors have described in error certain "new" forms solely on the basis that they would not run out in the existing keys. On the other hand, it does seem likely that additional species of *Strumigenys* beyond those here treated occur in Africa.

The identifier using this key must be prepared to measure the dimensions of the head and exposed mandibles to a satisfactory degree of precision. The tolerances of error for these measurements are about ± 0.01 mm. A good-quality manipulator set in a mechanical stage, under magnification of not less than 60 diameters, is recommended for these measurements. It is also advisable to consult a full discussion of dacetine measuring techniques (Brown, 1953).

It goes almost without saying that specimens must be clean and undamaged. Dirt or adhesive lodged in the preocular notches or mandibles can cause serious error, especially at couplets 1, 3 and 10. Furthermore, at couplets 3 and 10 in cases where any doubt occurs, the mandibles should be opened in order to see the dentition properly in at least a portion of any nest series.

At couplet 1, the eye-notches should not be confused with the

antennal scrobes; the latter are broad, usually elongate sulci running for some distance along the sides of the head in such a position as to readily receive the retracted antennae, while the preocular notches run more or less vertically, perpendicular to the long axis of the head, immediately in front of the compound eyes. Specimens should not be mounted flat on the surface of cards; card mounts obscure the details of periocular structure and mandibular dentition, and hence have been the greatest single source of confusion visiting this genus to date. Point mounts, utilizing fine pennant-shaped pieces of card, are by far preferable.

At couplets 3 and 10, the possibility must be considered that rare atavistic specimens may preserve the minute vestige of a left preapical tooth close to the base of the dorsal apical tooth where this (distal) preapical tooth is normally absent in a given species. I have seen one specimen possibly belonging to this category (Bernard ms. new species, couplet 4 and p. 16). Such specimens can usually be detected if a part of a normal series, but uniques will always be difficult, and must be checked by means of dimensions and proportions and other characters given in the descriptions.

1. Ventrolateral border of the head receding sharply at the anterior margin of the eye to form a distinct preocular notch or groove; eye oriented more or less anteriorly and usually more or less detached and narrowly rounded in front.....2
   Ventrolateral border of head not or at most extremely feebly impressed at the anterior margin of the eye; eye oriented entirely laterally, the facets forming a flat or gently convex disc, or the eye reduced to a very few minute facets.....7

2. Larger, length of head proper over 1.0 mm.; each mandible with two short, oblique, truncate preapical teeth (Madagascar). *grandidieri* Forel
   Smaller, length of head proper under 1.0 mm.; preapical teeth acute...3

3. Left mandible with a single preapical tooth, the distal preapical tooth normally completely lacking (see note above on use of key).....4
   Left mandible with two preapical teeth, the distal tooth smaller than the proximal, but still quite distinct and acute.....5

4. Larger, length of head proper $>$ 0.70 mm.; CI $>$ 72, MI $<$ 54; upper angles of propodeal lamellae low and more or less rounded (Kenya).... ..... *londianensis* (Patrizi)

Smaller, length of head proper < 0.60 mm.; CI < 72, MI > 54; upper angles of propodeal lamellae normally dentiform and acute (Congo N. Angola).....new species, Bernard ms.

5. Larger, length of head proper > 0.65 mm.; MI < 42; compound eyes exceptionally large and prominent (Transvaal).....*pretoriae* Arnold
Smaller, length of head proper < 0.65 mm.; MI 42 or more; compound eyes smaller to moderate in size and prominence.....6

6. MI 43-49; mandibular shafts distinctly arcuate (W. Africa to Natal and Angola).....*rufobrunea* Santschi
MI 51 or more; mandibular shafts nearly straight (W. Africa; widespread in tropics of both hemispheres, especially in the Pacific and W. Indies; also British greenhouses).....*rogeri* Emery

7. Normally exposed portions of the antennal scapes very broad, less than three times as long as their greatest width; CI about 90 or slightly more (Uganda).....*tetraphanes* new species
Normally exposed portions of antennal scapes more than three times as long as wide; CI well under 90, and usually less than 85.....8

8. Greatest diameter of compound eye distinctly greater than greatest width of antennal scape.....9
Compound eye very small, its greatest diameter less than, or at least not greater than, greatest width of antennal scape.....10

9. Head narrower, CI < 73; mandibles longer, MI > 45 (Seychelles Is.; São Tomé I.).....*scotti* Forel
Head broader, CI > 73; mandibles shorter, MI < 40 (Natal).....
.....*marleyi* Arnold

10. Left mandible with only a single preapical tooth, the distal preapical tooth normally completely lacking.....11
Both mandibles each with two preapical teeth, though in some cases, the distal preapical tooth on one or both sides may be reduced to a minute denticle.....12

11. Right mandible with two preapical teeth, the distal tooth small and normally covered by the dorsal apical tooth of the left mandible at full closure; CI between 70 and 80 (Uganda to Angola)..*dextra* new species
Right mandible with only one preapical tooth, the distal preapical teeth of both mandibles lacking; CI > 80 (Zululand).....*irrorata* Santschi

12. Combined length of head and mandibles when closed > 0.85 mm.; CI < 75; MI 50 or slightly more (Natal).....*havilandi* Forel
Combined length of head and closed mandibles < 0.85 mm.; CI > 75; MI usually under 50.....13

13. Combined length of head and mandibles 0.70 mm. or less; CI *ca.* 81; MI *ca.* 37-38; most hairs on dorsum of head nearly or quite obicular, appearing like round, shining, convex scales or studs (British E. Africa) ..... *stygia* Santschi
Combined length of head and closed mandibles more than 0.70 mm., usually 0.75 mm. or slightly more; CI 77-80±; MI usually > 38; hairs on dorsum of head more or less broadened apically, but not orbicular. 14
14. MI > 43; each humerus with a flagellate hair; HL 0.53 mm. or less. (E. and S. Africa) ..... *tragaordhi* Santschi
MI < 43, usually 41 or less; humeri without flagellate hairs; HL usually greater than 0.53 mm. (E. and S. Africa) ..... *arnoldi* Forel

SYSTEMATIC TREATMENT BY SPECIES

STRUMIGENYS GRANDIDIERI Forel

Strumigenys Grandidieri Forel, 1892, Ann. Soc. Ent. Belg., **36:** 517, worker. Type locality: Andrangoloaka Forest, Madagascar. Syntypes: Mus. Hist. Nat., Geneva; Mus. Comp. Zool. Harvard University.

Worker. Descriptive notes are based on two very similar syntypes in the Museum of Comparative Zoology, one of which was measured: TL 5.02, HL 1.33, ML 0.69, WL 1.30 mm.; CI 76, MI 52. Because of its size, this species could hardly be confused with any other African-Malagasy *Strumigenys.*

Head massive, deeply and broadly excised behind, with a distinct, narrow median dorsal sulcus running from clypeus to posterior excision. Antennal scrobes ending, or at least becoming extremely indistinct, at about the level of the eyes. Eyes large, but not so large relatively as in *pretoriae,* convex, prospicient; preocular notch broad and deep, involving the dorsolateral cephalic border.

Mandibles broad, robust, slightly depressed, inserted close together and slightly diverging at full closure. Apical fork of two stout acute subequal teeth, without intercalary tooth or denticle. Each mandible with two short, truncate preapical teeth, directed obliquely anteriorly, subequal in size and scarcely longer than broad, very close to the apex and to each other.

Alitrunk slender, pronotum convex, its anterior margin narrowly rounded and sharply marginate, without humeral angles. Mesonotum reasonably distinct, although the promesonotal suture is obsolescent; posterior mesonotum forming a long slope down

to the strong metanotal groove, from which the nearly plane, platform-like propodeal dorsum rises slightly but rather abruptly; dorsum and declivity of propodeum meeting at approximately a right angle. Propodeal teeth long, spiniform, strongly elevated and divergent; lateral borders of declivity without infradental lamellae, but with three or four fine vertical rugules on each side.

Petiolar node shorter than its slender peduncle, about as broad as long seen from above and narrowly rounded above as seen in lateral view profile; petiolar appendages reduced to insignificant vestiges. Postpetiole transversely elliptical, strongly convex, half again as broad as the petiolar node and less than half as broad as the gaster, with only strongly reduced ventral appendages. Gaster with 9-13 widely spaced, distinct basal costulae extending about 1/5 the length of the basal segment. Gaster otherwise and most of mandibles smooth and shining. Remainder of body, including pleura and both nodes, densely punctulate, opaque. Fine superimposed rugulation on dorsum of head and alitrunk, most distinct on anterior pronotal margin.

Ground pilosity sparse, short, very narrowly spatulate and subappressed on head; available specimens may be partially rubbed. Row of 4 (or 6) longer, suberect, apically very feebly spatulate hairs bordering occipital excision; another pair on vertex. Scape hairs fine, curved apicad; clypeal border hairs narrowly spatulate, curved mesad. A pair of long, erect, very weakly clavate hairs on postpetiole, and a few on posterior half of gaster. Color light ferruginous (possibly somewhat faded); mandibles and head lighter and more yellowish; vertex transversely, nodes and gaster slightly darker than the rest.

Female and male unknown to me.

As already mentioned in my introductory remarks, *S. grandidieri* appears to be the most generalized and most primitive member of the *rogeri* group. Furthermore, it has a "primitive look" backed by size, head structure, form of alitrunk and propodeal armament having much in common with presumed primitive forms of other faunal groups. The species remains known only from the Madagascan type collection, and is the only species of the genus so far recorded from Madagascar proper.

STRUMIGENYS LONDIANENSIS (Patrizi)

Proscopomyrmex londianensis Patrizi, 1946, Boll. Ist. Ent. Univ. Bologna, **15:** 295, figs. 1, 2, worker. Type locality: Londiani, Kenya (by tautonymy). Additional orig. loc.: Mau Forest, Kenya. Holotype and paratypes: Ist. Ent. Univ. Bologna; paratypes in Brit. Mus. (Nat. Hist.).

Strumigenys (Proscopomyrmex) londianensis, Arnold, 1948, Occas. Pap. Nat. Mus. S. Rhodesia, **2** (14): 227.

Proscopomyrmex? londianensis, Brown, 1948, Trans. Amer. Ent. Soc., **74:** 128.

Strumigenys londianensis, Brown, 1949, Mushi, **20:** 15.

Worker. Notes based on a single paratype from Londiani, by courtesy of Prof. Grandi. TL 4.2, HL 0.88, ML 0.45, WL 0.88 mm.; CI 75, MI 51. Patrizi gave a short description and large, detailed figures in dorsal and lateral views. In addition to marked contradictions involving dimensions and proportions between the description and figures, and between these and the paratype before me, I note the following:

1. In the paratype, the mandibles are shorter and heavier than as figured, not so strongly arcuate, and the teeth shorter and thicker and set more nearly at a right angle to the shafts. On the right mandible, a short distal preapical tooth is present, but is small and partly covered by the dorsal apical tooth of the left mandible at full closure. The left mandible lacks a distal preapical tooth, but the proximal preapical tooth is well developed on both mandibles.

2. In the paratype, the compound eyes are rounded anteriorly as seen from above, and are not pointed; from lateral view, the eyes appear roughly circular. In front of the eyes is a well-marked vertical groove, extending even into the dorsolateral cephalic borders above and well across the postbuccal surface below. Greatest diameter of eye (*ca.* 0.07 mm.) greater than maximum width of scape (*ca.* 0.05 mm.).

3. In the paratype, the posterior descending mesonotal slope is gently and evenly concave, not interrupted by a suture-like impression as shown in Patrizi's figure 2.

4. In the same figure, the propodeal lamella is much too abruptly terminated ventrally, as is clear even without reference to a specimen. In the paratype, the dorsal angle of the lamella

is lower and more blunt than as shown in the figure, and the excision between upper and lower angles is concavely rounded, not subangular.

5. In the paratype, numerous short, spaced basal costulae meet the anterior border of the first gastric segment. Also, the petiole of the paratype bears feeble vestiges of posterolateral spongiform appendages left out in the figure, and there are small, inconspicuous, reclinate-spatulate hairs on the dorsum of the head of the paratype. The postpetiolar disc is smooth and shining, but dirty.

This species is closely related to *S. rufobrunea* and *Strumigenys* new species of Bernard ms., but is larger than either of these and differs in numerous details, especially the very different propodeal lamellae. It is a forest species still known only from the two original Kenyan collections.

STRUMIGENYS PRETORIAE Arnold

Strumigenys (*Proscopomyrmex*) *pretoriae* Arnold, 1949, Occas. Pap. Nat. Mus. S. Rhodesia, **2** (15): 267, fig. 8, worker. Type locality: Pretoria, Transvaal. Holotype: Nat. Mus. S. Rhodesia, Bulawayo; paratype in Agric. Res. Inst., Univ. Pretoria.

Worker. Notes based on the single paratype worker, sent through the courtesy of Prof. J. C. Faure for my study. TL 2.8, HL 0.73, ML 0.29, WL 0.70 mm.; CI 73, MI 39. Mandibles stout, gently arcuate, with dentition as in Figure 1a. Eyes exceptionally large and convex, narrowly rounded anteriorly and separated here from the head by a deep, narrow preocular notch as shown in Figure 1b. Posterior mesonotum depressed below level of propodeal dorsum; propodeal lamella with a short but acute, elevated tooth above, convex below (Figure 1c). Petiole with a long, narrow peduncle having a spongiform border beneath; node broader than long, with moderate posterior spongiform fringe. Postpetiolar node transverse, smooth and shining at least in the middle. Basigastric costulae distinct, fanning from bilateral sources and extending almost to the midlength of the basal segment. Head and promesonotum with moderately abundant small, reclinate spoon-shaped hairs; gastric dorsum with sparse erect remiform hairs in transverse rows. Color light ferruginous.

The very large eyes mark this form at once among the Old World *Strumigenys,* and rival those of the Amazonian *S. tococae* Wheeler. E. K. Hartwig collected the types while "beating for thrips," so it is possible that, like *S. tococae,* the eye development may be correlated with strongly epigaeic foraging habits, or perhaps even a subarboreal mode of life. Such a correlation holds well for a number of neotropical dacetine ants.

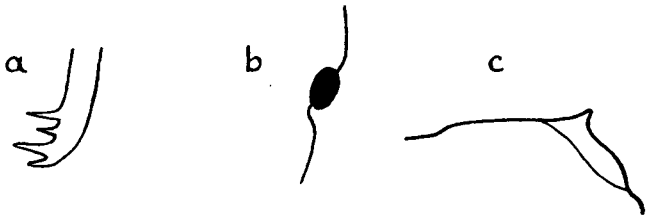

Figure 1. *Strumigenys pretoriae* Arnold, paratype worker; *a.* apex of mandible; *b,* eye and periocular region, dorsal view; *c,* outline of propodeum, lateral view; all to same scale.

STRUMIGENYS new species, Bernard ms.

Worker. Notes based on two workers collected at different localities in the Belgian Congo by N. A. Weber (see below). This distinctive little species is widespread in the Congo drainage system and is apparently common in the southern part of this region, as shown by several small series loaned by Prof. Bernard from the Machado Angolan collections. Prof. Bernard has indicated a desire to describe this species from his more abundant material in his forthcoming work on the Angola ant fauna.

TL 1.9-2.0, HL 0.52, ML 0.29-0.31, WL 0.44-0.45 mm.; CI 69-70, MI 57-60. This very slender species has long, narrow, gently arcuate mandibles and small compound eyes with deep, narrow preocular notches, marking its close relationship to *rogeri, rufobrunea* and *londianensis.* The apical teeth are long and slender, longer than in *rogeri* and *rufobrunea,* and the proximal preapical teeth of both mandibles are also quite well developed. In the case of the distal preapical tooth, however, only that of the right mandible is normally present, and even this is difficult to see at full closure because it is then covered by the dorsal apical tooth of the left mandible. In one of the

specimens I have seen, the left mandible bears an extremely minute projection at the proximal side of the base of the dorsal apical tooth, and this projection may be an artifact, a structural defect, or the vestige of a distal preapical tooth. I do not think it wise to mount this specimen for examination by transmitted light until further material is available, as this is one of only two taken by Dr. Weber and deposited in American museums. In any case, the projection is so very small as to be insignificant, and it was not present in any of the remaining samples I have examined.

Localities for material examined: BELGIAN CONGO: 10 miles E. Stanleyville, 1 worker (Weber, No. 2225). Beni to Irumu, Ituri Forest, 1 worker (Weber, No. 2129B). ANGOLA: Collections by A. de Barros Machado, all from vegetable debris of the soil in gallery forest of various river tributaries of the Congo system; Nos. 54-5, 1130-29, 1195-24, forest of Luachimo R., near Dundo; No. 408-1, forest of R. Sanga, branch of R. Luachimo, near Dundo; No. 403-2, forest of R. Tchimana, branch of R. Tchikapa; No. 1430-20, left bank of R. Kasai, NE corner of Angola.

This form is most like *S. londianensis,* from which it differs very markedly in size, form of propodeal lamellae, and other features.

STRUMIGENYS RUFOBRUNEA Santschi

Strumigenys rufobrunea Santschi, 1914, Boll Lab. Zool. Portici, **8:** 373, worker, female. Type locality: Conakry, French Guinea, by present selection. Additional orig. loc.: Olokomeji, Nigeria. Lectotype, by present selection, the female from Conakry in Naturhist. Mus., Basel; other original syntypes deposited with lectotype.

Strumigenys (*Proscopomyrmex*) *faurei* Arnold, 1948, Occas. Pap. Nat. Mus. S. Rhodesia, **2** (14): 226, figs. 12, 12a, worker, female. Type locality (orig. designation): Sordwana, Zululand. Other orig. locs.: Richards Bay and St. Lucia Lake, Zululand. Holotype and paratypes: Nat. Mus. S. Rhodesia, Bulawayo. Paratypes: Agric. Res. Inst., Univ. Pretoria; Mus. Comp. Zool. Harvard Univ., etc. NEW SYNONYMY.

Strumigenys petiolata Bernard, 1953 (1952), Mém. Inst. Fr. Afr. Noire, **19** (1): 254, fig. 14 H, I, J, worker. Type locality: Mt. Nimba, French Guinea, 700 M, in termitary in forest. Holotype: Mus. Hist. Nat. Paris. NEW SYNONYMY.

S. rufobrunea is a common and highly variable species ranging widely in tropical Africa. When Santschi first described the species, he overlooked the important eye notches, thus misleading Arnold, who described the same form more accurately under the name *faurei.* The recent description and figures of *S. petiolata* Bernard are in several respects incomplete and self-contradictory, and also fail to show eye notches. I believe this omission is due to the deplorably poor method of card-mounting practiced on ant specimens in many European museums; many of the choice samples sent me from the Old World have been rendered worthless by semi-immersion in adhesive that is virtually impossible to remove in any solvent without damage to pilosity and other important details. One is frequently astonished at the gross inaccuracy of what are supposed to be scientific descriptions, but this astonishment is both explained and magnified anew when the slovenly preparations upon which these descriptions are so coolly based become available for re-examination. It must also be admitted that some American preparations on the more desirable point mounts are so poorly done as to be equally worthless. In my opinion, no descriptive myrmecological work, however pretentious, can be trusted if the material upon which it is based is improperly prepared.

To return to *S. petiolata*: Bernard considered this form closely related to *S. reticulata* Stitz (actually a synonym of *Serrastruma lujae*), to *S. hindenburgi* Forel (an Argentinian species as dissimilar from *petiolata* as its geographical remoteness suggests), and to *S. grandidieri.* Nothing is said about the really closely related forms like *londianensis, rogeri,* and the senior synonyms *rufobrunea* and *faurei.* Though I have not seen the *petiolata* type, and in spite of the confused circumstances surrounding its description, I believe that it is only a fairly large specimen of *rufobrunea* well within the variation outlined below. I have been able to compare directly the type of *S. rufobrunea,* workers and females of the type series of *S. faurei,* and a large amount of other material from diverse localities, and the notes below summarize the specific characters of the two female castes. Special emphasis is placed on variation within the species.

Worker. Measurements are based on 25 workers from at least 11 separate colonies from 8 localities listed below, excepting

the Angola samples. HL 0.50-0.62, ML 0.22-0.30 mm.; CI 75-81, MI 43-49. Examples from single collections: Khor Aba, Anglo-Egyptian Sudan (Weber, 1470), HL 0.62, ML 0.30 mm.; CI 81, MI 48, one worker. Gross Batanga, Cameroon (Schwab), HL 0.60, ML 0.30 mm.; CI 80, MI 49, one worker. *S. faurei* type series, St. Lucia Lake and Richards Bay, Zululand, HL 0.52-0.56, ML 0.25-0.26 mm.; CI 75-79, MI 45-48, 12 workers. Ituri Forest, Belgian Congo (Weber, 2124, 2129A), HL 0.50-0.51, ML 0.22-0.24 mm.; CI 76, MI 43-47, 4 workers. Haut Mbomu, French Equatorial Africa (Weber, 2187, 2192), HL 0.50, ML 0.24 mm.; CI 76-77, MI 48, two workers. Same locality (Weber, 2188), HL 0.60, ML 0.28 mm.; CI 76, MI 47, one worker. Fort Portal, Uganda (Weber, 2095), HL 0.55, ML 0.25 mm.; CI 76, MI 45, one worker. Although none was measured from the six series collected by Machado in the Congo and Angola (see below), the workers here show a similar range of variation so far as can be determined by simple inspection.

The larger workers often have broader heads and deeper, narrower, more distinct eye notches, but exceptions occur both ways. Larger workers also frequently have the pronotum evenly punctulate, while smaller ones usually have feeble longitudinal rugulation predominating on the pronotum; all intergrades occur. The postpetiolar disc varies from smooth and shining in most series to finely longitudinally striate in the *faurei* types and certain Angolan samples; here again, intergrades are found. The proximal and distal preapical teeth are present on both mandibles, the distal being considerably smaller than the proximal. The shafts of the mandibles are gently but very distinctly arcuate, clearly more strongly so than in *rogeri*. Color varies from light to deep ferruginous, and certain Angolan samples are nearly black.

Female. Lectotype, HL 0.52, ML 0.23 mm.; CI 73, MI 44. A single dealate specimen from Kawanda Experiment Station, near Kampala, Uganda (soil sample under elephant grass, *Pennisetum purpureum* (G. Salt), HL 0.60, ML 0.28 mm.; CI 78, MI 47. Two dealates from *faurei* type series, allonidal, HL 0.57-0.58, ML 0.27-0.28 mm.; CI 80-81, MI 46-47. Total ranges for the above 4 females; HL 0.52-0.60, ML 0.23-0.28 mm.; CI 78-81, MI 44-47. Variation in these and a few Angolan females parallels that of the workers.

Male unknown.

In addition to the localities cited above, six series have arrived after the main work on this species was completed, sent by Prof. Bernard from the collections of Machado, all taken in vegetable detritus in gallery forest in the southern Congo drainage area: BELGIAN CONGO, between Tchikapa and Luluabourg, 100 km. east of Tchikapa. Gallery forests of the rivers Luachimo, Tchimana and Sanga, mostly near Dundo, ANGOLA; Machado Nos. 180-19, 403-2, 408-1, 1195-24, 1210-12, 1248-29.

From the available ecological data, it would seem that *S. rufobrunea* can occupy a great range of habitats, but it appears most often to be found in rainforest or gallery forest, or tree-shaded parts of the savannah. It is the commonest member of the genus in Africa, if collection frequency is any guide. This species could be confused only with *S. rogeri*, but *rogeri* has longer, straighter mandibles and differs in other ways also.

STRUMIGENYS ROGERI Emery

Pyramica gundlachi Roger, 1862, Berlin. ent. Zeitschr., **6:** 253, fig. 18a, female, *nec* worker. Type locality: Cuba. Types in Zool. Mus. Univ., Berlin.

Strumigenys rogeri Emery, 1890, Bull. Soc. Ent. Ital., **22:** 68, pl. 7, fig. 6, worker. Type locality: St. Thomas, West Indies. Holotype: Mus. Civ. Stor. Nat., Genoa. Forel, 1893, Trans. Ent. Soc. Lond., p. 378, worker, female, St. Vincent, W.I., biology. Wheeler, 1908, Bull. Amer. Mus. Nat. Hist., **24:** 145, pl. 12, fig. 13, worker, Puerto Rico. 1913, Bull. Mus. Comp. Zool., **54:** 496. Wheeler and Mann, 1914, Bull. Amer. Mus. Nat. Hist., **33:** 40, Haiti. Menozzi and Russo, 1930, Boll. Lab. Zool. Portici, **24:** 163, Moca, Dominican Republic. Santschi, 1931, Rev. Ent., Rio de Janeiro, **1:** 275, Pinar del Rio, Cuba. M. R. Smith, 1936, Jour. Agr. Univ. Puerto Rico, **20:** 856, fig. 12, Puerto Rico, ecology. Donisthorpe, 1915, British Ants, p. 341 (1927, 2nd ed., p. 393), synonymy and refs., summary records from greenhouses in British Isles. Brown, 1948, Trans. Amer. Ent. Soc., **74:** 113, Fiji, Hawaii. Other locality records from West Indies occur in the literature, but are repetitious and will not be cited here.

Strumigenys incisa Godfrey, 1907, Notes R. Bot. Garden Edinburgh, **17:** 102, fig., worker. Type locality: Hothouse, R. Bot. Garden, Edinburgh. Types: locality unknown. Synonymy *teste* Donisthorpe, 1915, *loc. cit.*

Strumigenys sulfurea Santschi, 1915, Ann. Soc. Ent. France, **84:** 261, worker. Type locality: Samkita, Gabon. Syntypes: Naturh. Mus., Basel. NEW SYNONYMY.

Worker. One syntype had an HL of 0.57 mm.; CI 72, MI 53. Ten workers from various West Indian and Hawaiian localities: HL 0.58-0.62 mm., ML 0.30-0.34 mm.; CI 70-74, MI 55. Except for the very slightly smaller size, the syntype agrees very well with abundant material available to me from the West Indies and various Pacific islands. The extra-African material, as would be expected of a tramp species stemming from a single female, or at least from a restricted-locality stock, is unusually uniform. There can be little doubt of the origin of *S. rogeri* in Africa. It has no close relatives in the New World endemic fauna, and it is clearly very close to *S. rufobrunea, S. londianensis* and other African species, previous accounts to the contrary nothwithstanding.

S. rogeri is so well known, and so frequently described and figured in the literature, that no new description is required here. To emphasize a few points: the eyes are small, but the preocular notches are distinct, deep and narrow. Mandibles robust, very nearly straight, lying very close together when closed, the preapical teeth two on each mandible, stout and moderate in length, close to apex, the distal tooth much the shorter of the two. Body and head slender; ground pilosity arranged as in related species, inconspicuous. A pair of slender, erect remiform hairs on vertex, a transverse row of four on occiput, one on each side of the mesonotum, and several on the nodes and gastric dorsum; humeral angles each with a contorted flagellate hair. Mesonotum sharply depressed posteriorly, the low portion forming a continuous convexity with the propodeal dorsum. Propodeal lamellae distinct, with short, acute teeth above. Postpetiole more or less smooth and shining. Gastric dorsum with 5 or 6 coarse but not long costulae on each side at base. Color uniform light or yellowish ferruginous.

The female of *S. rogeri* differs from its worker in the usual ways, and the compound eyes are unusually large. It can be distinguished from the *S. rufobrunea* female by means of its slightly narrower head and longer, straighter mandibles, which are a little more than half as long as the head proper. In addition to specimens from most of the localities cited in the synonymy, I have seen material from Micronesia (H. S. Dybas), Jamaica (H. B. Mills), Trinidad (N. A. Weber).

I am fortunate also in having important notes on the biology of *S. rogeri* made by E. O. Wilson during his stay in Cuba in the summer of 1953; these have been turned over to me in their entirety, and I have abstracted them for use here so that the habits of at least one member of the group should be illuminated along with the routine revisionary data. It should be borne in mind that the following notes were made in a habitat other than the native one for the species, and that the majority of feeding notes of this kind necessarily come from observations made in artificial circumstances.

Wilson took his observation colony at San Vicente, Pinar del Rio, Cuba, from a small nest under a rotten limb lying on well shaded ground. The galleries extended into the wood itself. Transferred to a small plaster observation nest, the workers readily captured numbers of entomobryoid collembolans proffered; campodeids up to four times the length of the ants were also always accepted and, like the entomobryoids, were fed to the larvae. Also observed to be chewed by the larvae after capture were a small psocopteran, a small ichneumonid wasp, and a small, injured embiopteran that had previously been ignored by a colony of *Smithistruma nigrescens* Wheeler. A symphylan and a pseudoscorpion, one each, were accepted and eaten by the larvae, but only after lengthy contact with the ants. Other specimens of these last two groups seem to have been refused by the larvae after capture on some occasions. A small polydesmid millipede was also captured, but soon rejected by larvae and workers. Consistently avoided or ignored when offered in the intimate confines of the observation nest were mites, nasute and other termites, small isopods, poduroid collembolans, adult staphylinid and sylvanid beetles of small size, a small campodeiform beetle larva, and dead mosquitoes, though the beetles mentioned disappeared from the nest and may possibly have been eaten. *Drosophila* adults were caught by the adults, but later discarded.

Entomobryoid collembolans seemed to be the usual and preferred prey fed to the larvae, although campodeids were never refused. In feeding habits, therefore, *S. rogeri* follows the generic habit of collembolan predation but, like some other widespread dacetine species, it will also accept a variety of other

small arthropods, particularly campodeids, when available. In hunting, or when disturbed, the workers and females open the mandibles to slightly more than 180°.

In view of the fact that collembolan predation is now known to furnish the basic food supply for widely differing *Strumigenys* species in all three of the major faunas of the world, it seems reasonable to assume that it is general for the genus and also that it is a primitive habit for the genus in the phylogenetic sense. The cases in which the exclusive diet of entomobryoids, isotomoids and symphypleonans is exceeded, show an erratic choice of additional prey, and it does not seem possible at the moment to predict for a given species just what additional kinds of arthropods may be taken over and above the collembolan groups named. This circumstance suggests that widened prey preferences may be secondarily acquired. Relatively common and successful species seem to accept a wider variety of non-collembolan prey than do the ants which are rarer and ecologically more restricted. The rejection of poduroids as prey seems, however, to be nearly or quite universal among *Strumigenys* and the other dacetine genera so far studied. The generality of collembolan predation can probably be extended to all the African-Malagasy species of *Strumigenys*.

STRUMIGENYS SCOTTI Forel

Strumigenys scotti Forel, 1912, Trans. Linn. Soc. Lond., Zool., (2) **15:** 159, worker. Type locality: Mare aus Cochons, *ca.* 1000 ft., Silhouette, Seychelles Is. Syntypes: Mus. Hist. Nat., Geneva.

Worker. One syntype examined through the courtesy of Dr. Ch. Ferrière: TL 2.6, HL 0.67, ML 0.31, WL 0.66 mm.; CI 66, MI 47; scape L 0.40 mm. Twelve workers selected from two large nest series from Makambrera, *ca.* 1300 M., São Tomé Island (B. Malkin): HL 0.59-0.63, ML 0.30-0.32 mm.; CI 68-71, MI 49-51.

The differences in size and proportions between the two samples available are not excessive when one considers that the first is limited to a single example; furthermore, the localities, one on an island in the Gulf of Guinea and the other in the Indian Ocean, are probably secondary ones populated within recent times from the African mainland. As in the case of

S. rogeri, such insular populations are at once more limited in their variability and denser in their structure than the hypothetical parent continental stock, the latter remaining uncollected to the present day. Though I was not able to compare directly the syntype of *S. scotti* with the São Tomé sample because the latter arrived after the type had been returned to Switzerland, my extensive notes on the type reveal no significant differences of the sort that usually distinguish species in this group. In this case offshore colonization may well have proceeded from two different segments of the mainland population.

S. scotti is a medium-sized species without preocular notches. It is similar to *S. havilandi* in general size and appearance, but differs in a number of details, the most readily apparent being the much larger eyes in *scotti*, especially as compared to the more slender antennal scapes (see key). The mandibles are incurved at their bases and have well developed distal and proximal preapical teeth, though the distals are shorter than the proximals. Posterior mesonotum depressed, continuous with plane or feebly convex propodeal dorsum except for a feebly marked metanotal groove. Propodeal teeth sharp, strongly elevated, with narrow, concave lamellae beneath.

Petiole with a rather long peduncle having a narrow ventral spongiform strip; posterior appendages of node nearly obsolete. Postpetiole transverse-elliptical, convex above, smooth and shining, its ventral spongiform appendages moderate in bulk. Basigastric costulae short, indistinct, grouped bilaterally. Ground pilosity of head composed of inconspicuous narrow spatulate reclinate hairs, generally distributed except for the occipital 2/5, where they are much reduced and partly replaced by 6 slender, erect, blunt or subclavate specialized hairs, of which there are also a pair on the mesonotum, a smaller pair on the posterior mesonotum, and groups becoming more numerous on the nodes and gaster. Humeri each with a long, finely flagelliform hair.

A female from one of the Makambrera colonies: HL 0.61, ML 0.31, forewing L 2.3 mm.; CI 72, MI 50. Eyes very large.

STRUMIGENYS MARLEYI Arnold

Strumigenys havilandi race *marleyi* Arnold, 1914, Proc. Rhodesia Sci. Assoc., **13**: 31, pl., fig. 10, worker. Type locality: Durban, Natal. Syntypes:

Nat. Mus. S. Rhodesia, Bulawayo. 1917, Ann. S. Afr. Mus., **14:** 378, worker.

Strumigenys marleyi Arnold, 1926, Ann. S. Afr. Mus., **23:** 286, worker.

Worker. Two syntypes, TL 2.4-2.5, HL 0.62, ML 0.22, WL 0.60 mm.; CI 76-77, MI 35-36. Related to *S. scotti*, but mandibles much shorter and more broadened at the base, recalling, in less extreme version, certain species of the *Labidogenys* complex of the Indo-Australian Region (*S. biroi* Emery, *S. emdeni* Forel); the trend is surely a convergent one. Distal preapical teeth much smaller than the proximals, the right slightly larger than the left. Apical fork with ventral tooth slightly shorter than dorsal and bearing on its ventral basal surface a small acute adventitious tooth and a minute intermediate denticle. Arnold's figure is highly diagrammatic, and shows a small median clypeal protuberance corresponding to the approximate position of the projecting labral lobes. Eyes weakly convex, with 6-7 facets in the greatest diameter, the diameter being distinctly greater than the maximum width of the scape.

Head and promesonotum covered with small inverted-spoon-shaped hairs, generally distributed dorsally, but no specialized erect hairs. Sparse, short, posteriorly inclined remiform hairs arranged symmetrically on nodes and gastric dorsum.

S. marleyi is known only from the type collection, made by Arnold in a nest of *Pheidole punctulata* Mayr. This *Strumigenys* is similar to *S. scotti* in overall size and form, and in the size of the eyes; on the other side, it seems related by tendencies in the development of mandibles and pilosity to the smaller form, *S. arnoldi.*

STRUMIGENYS HAVILANDI Forel

Strumigenys havilandi Forel, 1905, Mitt. naturh. Mus., Hamburg, **22:** 13, nota, worker. Type locality: "Natal, 5300 feet." Syntypes: Mus. Hist. Nat., Geneva; Natal Mus., Durban; Mus. Comp. Zool. Harvard Univ. Santschi, 1913, Bull. Soc. Ent. France, p. 257, worker, in key. Arnold, 1917, Ann. S. Afr. Mus., **14:** 377, worker

Worker. Two syntypes, TL 2.5-2.8, HL 0.62-0.65, ML 0.33-0.34, WL 0.67-0.70 mm.; CI 71-73, MI 52-53. Mandibles very feebly arcuate, their shafts noticeably tapered apicad; both preapical

teeth of each mandible very slender, long and acute, only a little shorter than dorsal apical tooth. Compound eye minute, scarcely half as wide as the maximum width of the robust antennal scape. Alitrunk in profile very shallowly concave in the posterior mesonotal region, its outline almost straight. Hairs shorter, broader at apices, more numerous and more generally distributed on posterior cephalic dorsum than in *S. scotti.* In addition to the usual sparse erect spatulate hairs, the gastric dorsum bears sparsely distributed short, linear-spatulate appressed hairs. I have not seen the sexual forms of this species, or records other than the original one.

STRUMIGENYS ARNOLDI Forel

Strumigenys Arnoldi Forel, 1913, Ann. Soc. Ent. Belg., **57:** 114, worker. Type locality: Bulawayo, S. Rhodesia. Syntypes: Nat. Mus. S. Rhodesia, Bulawayo; Mus. Hist. Nat., Geneva?

Strumigenys arnoldi Arnold, 1917, Ann. S. Afr. Mus., **14:** 376, pl. 8, figs. 117, 117 a-d, worker.

I have not seen type material, but have examined a specimen from Pretoria (J. C. Faure), determined by Dr. Arnold, the original collector, and thus presumed authentic. Also available are 3 workers and a dealate female, preserved rather poorly, from Eldoret, Kenya (S. Patrizi). These two samples are closely similar despite the geographical separation. Worker: TL 2.1-2.2, HL 0.54-0.55, ML 0.21-0.22, WL 0.54-0.55 mm.; CI 77-78, MI 38-41. Female: HL 0.60, ML 0.24 mm.; CI 76, MI 39.

S. arnoldi is similar to *S. tragaordhi,* but differs in having a longer, slightly narrower head proper, while its mandibles are both relatively and absolutely shorter. The spoon-shaped pilosity of the anterior cephalic dorsum is broader and more conspicuous, and extends more abundantly to the promesonotum. In these samples of *arnoldi,* the only specialized erect hairs of the alitrunk are one clavate pair astride the mesonotum; no specialized humeral hairs.

Dr. Arnold took the types of this species under a stone in a nest of *Bothroponera krugeri* Forel.

STRUMIGENYS TRAGAORDHI Santschi

Strumigenys Tragaordhi Santschi, 1913, Bull. Soc. Ent. France, p. 257, worker, original diagnosis in key.

Strumigenys traegaordhi Santschi, 1914, Medd. Göteborgs Mus. Zool. Afd., **3**: 28, fig. 4, worker. Type locality: Pietermaritzburg, Natal, by present selection. Additional orig. loc.: Sweetwaters, Natal. Syntypes: Naturh. Mus., Basel.

Worker. Two lectotopic syntypes, courtesy of Prof. Ed. Handschin, HL 0.51-0.52, ML 0.23-0.25 mm.; CI 79-80, MI 45-48. This is a rather "average-looking" small *Strumigenys.* Mandibles weakly arcuate, somewhat broader than as shown in Santschi's figure and gently tapered from base toward apex, enclosing a large oval space at full closure. Distal preapical teeth of both mandibles very small, that of the right slightly larger. Ground pilosity of head composed of narrow inverted-spoon-shaped hairs distributed over the entire dorsal surface, but becoming small and inconspicuous on the extreme occiput. Vertex with a pair of slender, curved, erect, remiform hairs, and a transverse row of four of these on the posterior occiput. Exposed scape L 0.29 mm.; funiculus L 0.44 in the larger of the two syntypes.

Alitrunk slender, resembling that of *stygia,* but promesonotum slightly more convex, propodeal dorsum straight in profile. A flagellate hair on each humeral angle; mesonotum straddled by two pairs of erect remiform hairs, and the usual sparse remiform pilosity on nodes and gaster. Postpetiolar disc smooth and shining. Color light ferruginous, head very slightly darker.

Various authors have recorded this species from widely separated East African localities, but the determinations remain unconfirmed.

STRUMIGENYS DEXTRA new species

Holotype worker. TL 1.6, HL 0.41, ML 0.17, WL 0.40 mm.; CI 76, MI 42. In general size and appearance resembling *S. arnoldi* and *S. tragaordhi,* but a little smaller even than the latter. Eyes very small, almost but not quite as wide as the maximum width of the antennal scape, feebly convex and laterospicient, without a preocular notch or groove. Mandibles gently arcuate, gradually and weakly tapered from base toward apex; dorsal apical tooth decidedly longer than ventral apical and proximal preapical; all of these teeth well developed, slender and acute. Distal preapical tooth present on the right mandible only, small, concealed at full closure by the dorsal apical tooth

of the engaged left mandible; no trace of distal preapical tooth on left mandible. Scape (L 0.63 mm.) gently curved at base, feebly and gradually incrassate at midlength; funiculus (L 0.90 mm.; apical segment L. 0.61 mm.) with greatly reduced, indistinct second and third segments.

Alitrunk in profile gently convex above, with a feeble impression in the region of the posterior mesonotum; metanotal groove virtually obsolete. Propodeum with small but acutely triangular teeth, continued below as feebly concave infradental lamellae. Petiole distinctly and robustly pedunculate; node with gently sloping, bicarinulate anterior face, rounded above, its spongiform appendages reduced to cariniform vestiges. Postpetiole convex, smooth and shining above, with fairly well developed ventral appendages. Gastric dorsum smooth, with a few coarse costulae extending over about the basal quarter of the first segment. Dorsum of head, mesonotum, propodeum and petiole coarsely reticulopunctate, opaque. Pronotum rather coarsely longitudinally rugulose, with broad interspaces weakly shining; posterior sides of alitrunk smooth, shining; appendages, including mandibles, finely and superficially sculptured, more or less opaque.

Ground pilosity of head reduced and inconspicuous, except for a triple row of anteriorly curved spoon-shaped hairs along each dorsolateral cephalic margin from frontal lobe to posterior limit of scrobe. A similar single row, curved apicad, on the anterior border of each scape, and a few hairs forming a clypeal fringe. Ground pilosity reduced, scanty and inconspicuous. Specialized erect hairs remiform to claviform: one pair on vertex; a curved row of 4 along occipital border; one pair straddling mesonotum; a pair on each node; about six transverse rows of 4 each on gastric dorsum, smaller toward gastric apex. Legs and gula with fine, short, flattened reclinate pilosity. Color yellowish ferruginous throughout.

Holotype taken with 6 paratype workers in a soil sample under elephant grass (*Pennisetum purpureum*) at Kawanda Experiment Station, 5 miles north of Kampala, Uganda (G. Salt, No. SS 30). In the same and adjacent samples were taken other presumably hypogaeic ant species (*Ponera coeca* Santschi, *Solenopsis?* sp., and *Strumigenys tetraphanes* new species).

Two additional workers, not paratypes, were seen from Busnia, at the Kenya-Uganda boundary (N. A. Weber, No. 2080) and a single worker from Haut Mbomu, Ubangi Shari, French Equatorial Africa (Weber, No. 2177). Combined measurements for the Kawanda and Busnia series, 9 workers, TL 1.5-1.6, HL 0.39-0.43, ML 0.17-0.18, WL 0.38-0.43 mm.; CI 71-76, MI 40-43. Internidal variation only very slight. Busnia series with slightly broader hairs on the lateral cephalic borders than in the type series. In addition, I have belatedly examined four small series from among the material collected by A. de Barros Machado in Angola, all from the vegetable detritus of the soil of gallery forests of various tributaries of the Congo system: Camissombo, 87 km. south of Dundo, 850 M. (rain forest), No. 1419-6. Luachimo Forest, near Dundo, No. 1248-29. R. Sanga, Dundo, No. 408-1. Left bank R. Kasai, NE corner of Angola, No. 1430-20.

This little species, related to *arnoldi* and the other small forms without eye notches, can be distinguished readily by means of the asymmetrical mandibular dentition, the lateralized development of the cephalic ground pilosity, and the proportions and relatively coarse sculpture. It is widely distributed and apparently rather common in central Africa.

STRUMIGENYS STYGIA Santschi

Strumigenys stygia Santschi, 1913, Bull. Soc. Ent. France, p. 257, worker, original diagnosis in key. 1914, Voy. Alluaud et Jeannel Afr. Or., Hym., **2**: 113, fig. 20, worker. Type locality: Cave A at Shimoni, coastal British E. Africa. Syntypes: Naturh. Mus., Basel.

Worker. Two syntypes, courtesy of Prof. Handschin, HL 0.49-0.50, ML 0.18-0.19 mm.; CI 81, MI 37-38. See key. Mandibles short, stout, feebly arcuate; dorsal apical and proximal preapical teeth long and slender; distal preapical teeth small, that on right larger than the one on the left. Head broad, and set with broadly suborbicular to orbicular, shining, pale whitish, stud-like hairs over its entire dorsal surface. A row of 4 stubby curved suberect hairs along the occipital margin. Promesonotum broad, depressed, with an indistinct median carinula; farther posteriad. mesonotum narrowed and dorsally weakly impressed, forming with propodeal dorsum a gentle convexity, at the summit of

which is the feebly marked metanotal groove. Each side of mesonotum with a stout clavate hair. Postpetiole superficially sculptured, subopaque to opaque.

Antennal scape (exposed L 0.26 mm.) distinctly broadened at about midlength, its greatest width about 0.05 to 0.06 mm.; sharply narrowed just before apex; funiculus L 0.36 mm. Color rather uniform yellowish-ferruginous. This species is known to me only from the type series.

Strumigenys tetraphanes new species

Holotype worker. TL 2.15, HL 0.54, ML 0.19, WL 0.50 mm.; CI 91, MI 36.

Head broad, in general form like that of *Quadristruma eurycera* (Emery) (1897, Term. Füzetek, 20: pl. 14, fig. 17) of New Guinea; dorsum depressed, only feebly convex. Posterior excision rather deep; occipital lobes rounded, produced laterally at greatest breadth of head bluntly and subangularly; anterior to this, the lateral borders converging strongly; preocular laminae feebly converging, almost parallel. Eyes small, only very feebly convex and without preocular notch, situated on ventral scrobe borders at about cephalic midlength. Clypeus much broader than long, obtusely angulate behind, free border broadly rounded, but feebly emarginate and faintly impressed in the center.

Mandibles short, robust, resembling those of *Strumigenys mocsáryi* Emery (*loc. cit.*, fig. 15) in size, form and position at full closure, but not in dentition. Dorsal apical tooth about 0.13 mm. long, very slender, sharp, feebly recurved; ventral apical tooth straight, slender, more than half as long as the dorsal tooth and feebly diverging from it; no intercalary teeth or denticles. The large spiniform preapical tooth, situated a little distad of midlength of mandible, is about ¾ the length of the dorsal apical tooth and similar in shape and feeble recurvature. About midway between apical and preapical teeth is a minute but acute denticle (=distal preapical tooth), between 0.01 and 0.02 mm. long, that of the right mandible slightly larger than that of the left.

Antennal scape 0.27 mm. long, broadly expanded anteriad,

in shape like a naval cocked hat or the space enclosed by a low normal curve and its baseline. The scapal expansion is not so extreme as in *Quadristruma eurycera*, but is considerably more so than in *Q. emmae* (Emery) or any species of *Strumigenys* so far described. Maximum breadth of scape about 0.11 mm.; expanded portion feebly convex dorsally. Funiculus 0.34 mm. long, of which the apical segment occupies slightly more than 3/5; basal segment longer than broad, II, III and IV very short, broader than long; IV as long as or slightly longer than II+III.

Alitrunk distinctive in form. Pronotum and anterior mesonotum together forming an almost perfect circle as seen from above, this surface rather strongly depressed dorsally and with blunt, overhanging lateral pronotal margins; humeral angles not developed. The surface of this promesonotal disc is divided by the feeble, sulciform, semi-circular promesonotal suture; pronotum with an anteromedian and bilateral, and the mesonotum with an anterior, dorsal convex area. Behind the promesonotal disc, posterior mesonotum immediately and strongly depressed and narrowed, and as seen from above continued posteriad by propodeum to form with it an oblong, parallel-sided section slightly shorter than the promesonotal disc and less than half as broad; this section as seen from the side forming one continuous, convex dorsal outline, and without lateral margins as seen from above. Metanotal groove visible on dorsum as a darkened line. Propodeal declivity steep; teeth short, half as long as the distance between the centers of their bases and only moderately acute, continued below by feebly concave infradental lamellae which are almost as broad as the height of the teeth.

Petiolar peduncle laterally compressed and longer than its node. Node small, anteroventrally compressed, broader than long; as seen from the side high and narrowly rounded at the dorsal apex. Petiolar appendages reduced to fine vestiges, midventral strip represented only as a low, non-spongiform carina. Postpetiole forming a transverse ellipse, about twice as broad as long and nearly twice as broad as the petiolar node; strongly convex dorsally; appendages fairly well developed, but largely restricted to the venter. Gaster slightly narrower than head, somewhat depressed; anterior spongiform margin medially emarginate.

Gastric costulae coarse, radiating from bilateral origins, about 7 or 8 on each side, those nearest the middle oblique, enclosing a free narrow median triangular area; longest costulae extending nearly 1/3 the length of the long basal tergite; gastric dorsum otherwise appearing very finely and superficially reticulate (perhaps due in part to a film of secretion), but still very strongly shining. Sides of posterior alitrunk shining, but feebly roughened as on the gastric surface. Mandibular teeth shining. Remainder of body densely punctulate, opaque; postpetiole with very feeble superimposed longitudinal rugulosity.

Dorsum of head from about midlength to posterior clypeal border thickly set with conspicuous, heavy, suborbicular, subappressed, inverted-spoon-shaped hairs; a double row of the same extends posteriad along each dorsolateral cephalic border as far as the blunt lateral occipital angles, and a single row of the same, large and very conspicuous (6-7 hairs) lines the anterior border of each scape. Similar, but very much smaller and less conspicuous hairs on the clypeus and posterior half of the cephalic dorsum; contrast between the pilosity of anterior and posterior parts of head quite striking, as in certain other species of the *S. rogeri* group (e.g., *scotti*). Hairs on anterior clypeal border similar to the foregoing, intermediate in size, subappressed, 4 on each side of the middle. Alitrunk with a sparse and altogether insignificant complement of minute appressed hairs, the surface appearing nude except for a prominent pair of short, erect, strongly clavate mesonotal hairs. A pair of the same is directed posteriorly from the postpetiole, and there are about twelve (some possibly broken off) on the gastric dorsum, diminishing in size apicad. Legs and scapes with small appressed spatulate hairs. Underside of head with fine subappressed pubescence; inner borders of mandibles with a few long fine hairs.

Color ferruginous yellow, dorsal surfaces a trifle darker.

Holotype a unique worker taken in a soil sample from under elephant grass at Kawanda Experiment Station, 5 miles north of Kampala, Uganda, on Feb. 15, 1949 (G. Salt) with *Strumigenys dextra* new species (*q.v.*) and other ants. Holotype deposited in Museum of Comparative Zoology, Harvard University.

This aberrant member of the *rogeri* group is of more than

usual interest because it shows affinities to the tropicopolitan tramp species *Quadristruma emmae* (Emery), and in fact nicely links this little form to the *rogeri* group, and thus to genus *Strumigenys*. The fact that *Q. emmae* has only four segments in the antennae still separates it from *Strumigenys*, but the extreme reduction of the second and third funicular segments in *S. tetraphanes* makes this difference largely an academic one. A reappraisal of the genera of subtribe Strumigeniti may well reveal that *Quadristruma* Brown (1949) should be merged with *Strumigenys*, but whatever the eventual decision, it seems plain now that *emmae* is African, not Papuasian, in origin, and that the *rogeri* group is directly ancestral. The other *Quadristruma* species, *Q. eurycera* (Emery), may not belong to the same stock as *emmae*, and its resemblances to *emmae* and *tetraphanes* may well be convergent ones. The final generic review of the Dacetini will see this relationship altered in some manner.

S. tetraphanes is readily separated from the other members of the *rogeri* group by means of its broad head and short mandibles, and above all by means of its very broad antennal scapes.

STRUMIGENYS IRRORATA Santschi

Strumigenys irrorata Santschi, 1913, Bull. Soc. Ent. France, p. 257, worker, original diagnosis in key. 1914, Medd. Göteborgs Mus. Zool. Afd., **3**: 29, fig. 5, worker. Type locality: Lake Sibayi, Zululand. Holotype: Naturh. Mus., Basel.

I have not been able to view the unique worker type directly, but Prof. Handschin has very kindly sent me pencil sketches in answer to my inquiries. These confirm that both mandibles lack the distal preapical tooth, although both mandibles are shown as having long proximal preapical teeth. The compound eye is portrayed as small, its greatest diameter less than the greatest scape width; the drawing shows no obvious trace of a preocular notch. As measured from Santschi's figure (*loc. cit.*), which may or may not be accurate in showing proportions, the CI would be about 84 and the MI about 41. Santschi gave the length as 1.5 mm. total, which is probably too low.

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