SYSTEMATICS AND PHYLOGENY OF CENTRIONCIDAE, A NEW AFROMONTANE FAMILY OF DIPTERA (SCHIZOPHORA)

by

H. R. FEIJEN
c/o Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands

With 221 text-figures and 6 tables

Contents

Abstract

Arguments are put forward for the erection of a new family of Diptera, named Centrioncidae. *Centrioncus prodiopsis*, its only previously described representative, was originally placed in the Sepsidae and later transferred to the Diopsidae. This species is now redescribed and five more *Centrioncus* are added. For 15 new Centrioncidae species occurring south of the Zambesi the genus *Teloglabrus* is created. A key to the species is given. Centrioncidae only occur in Afromontane forests and all species have very limited, allopatric distributions. They are now known to occur in Ivory Coast, Sudan, Kenya, Tanzania, Uganda, Zaïre, Malaŵi, Zimbabwe, Mozambique, Swaziland and South Africa. A review of the *Centrioncus* literature is given. The morphology, especially of female and male postabdomen, is discussed. A sister-group relationship between Centrioncidae and the neotropical Syringogastridae is postulated. Together these two families might form the sister-group of the Diopsidae. Intrafamiliar phylogenetic relationships of Centrioncidae are also indicated. Parasitism by *Rhizomyces* spp. (Laboulbeniales) is briefly discussed.

1. INTRODUCTION

During studies on Diopsidae doubts were cast on the placing of the monotypic *Centrioncus* in this family of stalk-eyed flies. Subsequent studies of *Centrioncus* specimens in the collections of the Natal Museum, the British Museum (Natural History), the Naturhistoriska Riksmuseet (Stockholm) and the Koninklijke Museum voor Midden-Afrika (Tervuren) revealed that, contrary to the opinion of former authors (Shillito, 1950; Van Bruggen, 1961; Steyskal, 1970), they do not all belong to *C. prodiopsis*, but several species could be recognized. In this monograph arguments are put forward for the erection of the family Centrioncidae as a new family of Diptera (Schizophora; Muscoidea sensu Griffiths, 1972), consisting of *Centrioncus* and one new genus, with a total of twenty-one species, twenty of which are described as new species. The phylogenetic relationships between the Centrioncidae and the other families (Diopsidae and Syringogastridae) belonging to the prefamily Diopsioinea (Griffiths, 1972) are discussed. The phylogenetic relationships within the family Centrioncidae were also analysed, this was relatively easy because of the extreme geographical isolation of all species known. Centrioncidae occur in the rain forest of the archipelago-like Afromontane region (see White, 1978). As a common name for the Centrioncidae the name of Afromontane forest flies is therefore proposed. Centrioncidae were known to occur along the axis Sudan – Cape Province (Shillito, 1950; Van Bruggen, 1961), but their known range of distribution can now be extended to Ivory Coast, Zaïre and Malaŵi, including six of the seven regional mountain systems of the Afromontane archipelago. It seems likely that in various of these mountain systems a number of Centrioncidae species still await collection and description.

2. REVIEW OF THE LITERATURE

The genus *Centrioncus* was set up by Speiser (1910) as a monotypical genus belonging to the Sepsidae. Its only species *C. prodiopsis* originated from the Kilimandjaro. Speiser considered it an interesting intermediate between Sepsidae and Diopsidae and stated that it could be described as a small *Diopsis* with the head of a *Sepsis*, if the lack of a metathoracic spine was not considered.

In his paper on Sepsidae Frey (1925) did not consider *Centrioncus*, but only stated that this genus was characterized by its two setigerous scutellar spines. However, he did not reject it from the Sepsidae as was stated by Shillito (1950).

Duda (1925) briefly discussed the systematic position of *Centrioncus*. Although he did not examine any specimens, he considered it likely that *Centrioncus* was more closely related to the Diopsidae than to the Sepsidae. As an alternative he mentioned the possibility of *Centrioncus* belonging to the Chloropidae. Duda considered Speiser's description insufficient, but his own diagnosis contains several errors. He mentioned the presence of vibrissae (probably an extrapolation of Speiser's "Kopf einer Sepsis"), which are definitely absent. Furthermore he mentioned the presence of four setigerous scutellar spines instead of two. He stated that the abdomen is not longer than the thorax, which is not true, and that the first two terga are fused and together as long as the rest of the abdomen, which is correct, but where he got that information is not clear.

After examination of various *Centrioncus* specimens and correspondence with Hennig about the type of *C. prodiopsis*, Shillito (1950) transferred the genus from the Sepsidae to the Diopsidae. An inclusion in the Chloropidae was rejected because of the difference in wing venation. As additional arguments for the closer relation of *Centrioncus* to the Diopsidae he mentioned the absence of vibrissae and spiracular bristles. Against the inclusion of *Centrioncus* in the Diopsidae he raised three objections, none of which, he stated, seemed to carry sufficient weight to justify the erection of a new family. The first objection was that "The pleurotergal spine characterizing the Diopsidae is replaced by a dome-like swelling." This statement is not correct as both *Centrioncus* and Diopsidae have a metapleural callus, but the latter in addition have a spine on this callus; the absence of this spine in *Centrioncus* may be seen as a valid argument against its inclusion in the Diopsidae. Shillito's other objections were the "very much reduced prothorax" in *Centrioncus* and the absence of eyestalks. To allow for the absence of eyestalks and metathoracic spines in *Centrioncus* Shillito recast the definition of the Diopsidae. A comparision between *Centrioncus* and other diopsid genera was made (extended and revised in Shillito, 1971) and attention was drawn to the "very logical sequence" developing in his Diopsidae s.l. The comparison contained errors and doubtful generalisations (to be reported on in later papers on Diopsidae), while the necessity of a logical sequence may be doubted. The scutellar spine of *Centrioncus* was defined as "short with long bristle", which is a confusing way of presenting relative data. The spine may be short compared with the spine of some diopsid taxa and the bristle may be long compared with the one in some diopsid taxa, but the bristle is actually about as long as the spine (as also stated by Speiser). The two pairs of head bristles of *Centrioncus* he presumed homologous with the two pairs in "other diopsids", which is likely to be only correct for the OVB. Even if both pairs of bristles had been homologous, the absence of other head bristles would have been a case of convergence (see below). In his description of *Centrioncus* Shillito omitted the clearly pubescent arista mentioned by Speiser, nor did he show this interesting character in his figures. Additional characters mentioned were the presence of an alula and the fusion of the first two terga. In the description of *Centrioncus prodiopsis* the existence of much minor variation in colour was noted, which is not surprising as material was studied from Sudan, Uganda, Zimbabwe and South Africa, now referred to different taxa. Shillito's translation of Speiser's description is commented upon under *Centrioncus prodiopsis* (chapter 9.4). The apparent confinement of *Centrioncus* to the mountains of Africa led Shillito to the unsubstantiated claim that it could well be considered "a primitive member of the relict-fauna of this continent".

Smithers (1958) gave some information on habitat and behaviour of *C. prodiopsis* (now described as *Teloglabrus vumbensis* sp. nov.) from Zimbabwe. Important was his comment on the effect of various storage methods on the coloration in *Centrioncus* specimens (see chapter 3).

In a partial revision of Southern African Diopsidae Van Bruggen (1961) followed Shillito's inclusion of *Centrioncus* in the Diopsidae. About 80 *Centrioncus* from many localities in South Africa, Zimbabwe and Mozambique were examined. Variations in size and colour pattern were noted. Referring to Smithers' paper the variation in colour was blamed on differences in the state of preservation. No subspecies were distinguished, though the isolation and corresponding degree of endemism of the localities of origin were noted (eight species are now recognised within his material). An important innovation was the illustration and discussion of male genitalia of *Centrioncus*. The illustrations of the genitalia are too much schematized, but together with illustrations of wing and habitus serve to recognize *Teloglabrus stuckenbergi* sp. nov., one of the most aberrant centrioncids. It seems likely that only the genitalia of this species were examined as otherwise the striking differences with other species should have been noted. Giving no reasons or details the hypopygium was described as "rather primitive", showing many structures apparently lost in other Diopsidae. The internal male genitalia were described as agreeing with those in other diopsids, except for the much smaller phallapodeme and "slightly" different genital ring. *C. prodiopsis* was regarded as the most mysterious diopsid, which could be a highly primitive form, but quite as well a highly specialized species.

In a study on the phylogenetic relations in Schizophora Hennig (1958) fully agreed with the inclusion of *Centrioncus* in the Diopsidae, giving a list of seven apomorphous characters of the groundplan of Diopsidae s.l., proving it to represent a monophyletic group. Four of these seven characters refer to absence of head bristles. The absence of an OC can be rejected as a synapomorphy for *Centrioncus* and the Diopsidae s.s. as it can now be included in the groundplan of the Diopsidae (Feijen, 1981). As it is now also known that the reduction of most head bristles in Diopdisae s.s. took place after the development of eyestalks, the other three "synapomorphous" characters concerning head bristles can be referred to convergence, except perhaps for the absence of postvertical bristles. The homology of the remaining head bristles in *Centrioncus* and Diopsidae s.s. should also be doubted. Hennig had doubts about their identification and regularly proposed alternative identifications (Hennig, 1941, 1958 and 1965), so it is remarkable that he included in his "eindrucksvolle" list two synapomorphies based on doubtful identifications. The other apomorphous characters of the Diopsidae s.l. were the presence of scutellar spines, the absence of a discal crossvein and the presence of spines (i.e. tubercles) on the incrassate anterior femur. Scutellar spines are found in several widely separated families (e.g. also in Stratiomyidae) and their presence in *Centrioncus* and Diopsidae s.s. might rest on homoplasy. The scutellar spines in *Centrioncus* are better developed than in *Sphyracephala*, which amongst the Diopsidae s.s. has the more plesiomorphous spines (considered secondary by Hennig). A discal crossvein is completely absent in Diopsidae s.s., but in Centrioncidae its remnants and former place can clearly be seen. Incrassate anterior femurs with tubercles are indeed an important common character of *Centrioncus* and Diopsidae s.s., but this might rest on synapomorphy at the level of a higher category or, alternatively, also on homoplasy (see chapter 7). As plesiomorphous characters of *Centrioncus* (as compared to other Diopsidae s.l.) Hennig mentioned the absence of eyestalks and the continuation of the anal vein to the posterior edge of the wing. The Diopsidae s.l. together with Megamerinidae, Nothybidae, Psilidae, Tanypezidae and Strongylophthalmyiidae were included in a tentative superfamily Nothyboidea. Hennig could not give a single apomorphous character for the groundplan of the Nothyboidea, but based his assumption on apomorphous characters held in common by various combinations of its families. As "indirecte Beweis" he mentioned the absence of relations between subgroups of Nothyboidea and other groups of Schizophora. Within the Nothyboidea a closer relationship was recognised between Diopsidae s.l., Megamerinidae and Nothybidae, based on the absence of OC, PV and perhaps also OVB as synapomorphies. This base for a relationship can now be rejected (see above).

In a later paper Hennig (1965) was still more convinced of the monophyly of his Nothyboidea, although he still could not produce a groundplan. The Diopsidae he now subdivided into the sister-groups Centroncinae and Diopsinae. The Diopsinae he subdivided into Sphyracephalini and Diopsini. Hennig regarded these subdivisions as only relative in nature and thought it possible that Centrioncinae and Diopsinae had to be regarded as families or tribes. For an absolute allocation of category in the Acalyptratae Hennig thought it best to consider subfamilies the narrowest monophyletic groups originating from before the Baltic Amber (Eocene). From the presence of the diopsine *Prosphyracephala succini* (Loew) in Baltic Amber. Hennig concluded that the sister-group relationship between Centrioncinae and Diopsinae originated from before this period. As *P. succini* itself could not have given origin to the Diopsinae (due to the absence of a posterior NP). Hennig postulated the presence of one or more coeval species from which the recent Diopsinae originate. Whether in the Eocene only one ancestor species for all recent Diopsinae existed. or the already separated ancestor species of Sphyracephalini and Diopsini were present. could not be told. but "Da wir aber nur mit den uns bekannten Tatsachen rechnen können. müssen wir es als durchaus wahrscheinlich ansehen. dass es zur Bernsteinzeit nur eine Art gegeben hat. von der alle rezenten Diopsinae abstammen. und die der uns aus dem Bernstein bekannten *Prosphyracephala succini* sehr ähnlich gewesen sein muss." Drawing this conclusion from a geologically isolated species belonging to a geographically rather acentric group of Diopsidae. not regarding possible and unknown developments in Gondwana land. is already dubious. but from the presence of a number of plesiomorphous characters in the Diopsini genus *Diopsina* (Feijen. 1981). which are not present in *Prosphyracephala*. it can now safely be assumed that both Sphyracephalini and Diopsini originate from before the Eocene and consequently should be given subfamily rank. Hennig's Diopsinae should then be elevated to family level. even if Diopsidae s.s. and Centrioncidae would be sister-groups. which in this paper is rejected.

A phylogenetic system is presented by Hennig in which characters of Centrioncinae. *Prosphyracephala*, *Sphyracephala*, *Pseudodiopsis* and all other diopsine genera taken together as "Diopsis-gruppe". are compared. In his system Hennig characterized the Centrioncinae by six plesiomorphous characters and did not mention any apomorphous character. The plesiomorphous characters were: absence of eyestalks. continuation of fifth and sixth veins to posterior edge of wing. presence of SA. dome-shaped pleurotergite (i.e. absence of metapleural spine) and more distal position of anterior crossvein. On eyestalks Hennig remarked that *Centrioncus* did not yet ("noch nicht") possess them. The fifth vein also reaches the margin in *Diopsis* and as such cannot be used to distinguish the subfamilies. The SA also occurs in various *Diopsina* (Hennig doubted this). although in *Centrioncus* this bristle stands on a small ridge and as such perhaps might not be homologous to the SA in *Diopsina*.

In a note on the postabdomen and variation in *Centrioncus prodiopsis* Steyskal (1970) considered specimens from locations as far apart as Kenya and South Africa. Although he noted an extreme variation in colour, he concluded that "apparently" only the one species was represented. In the description of the postabdomen Steyskal referred to Van Bruggen (1961) as having already illustrated the male epandrium, including cerci and surstyli. However, Van Bruggen definitely did not illustrate the membranous cerci, but Steyskal probably identified the inner telomeres as such. Steyskal discussed and illustrated the postabdomen of a female from Wilderness, South Africa (a typical representatve of *Teloglabrus* gen. nov.) and the inner copulatory apparatus of a male from Chania Falls, Kenya (now described as *Centrioncus decoronotus* sp. nov.). Until I myself could examine the genitalia illustrated by Steyskal, I could not understand his description of the inner copulatory apparatus. The epiphallus he described as consisting of two structures; however, one of the two was a section cut from the interparameral sclerite. The aedeagus was described as "very small and short", but the distal two-thirds were in fact lacking from the preparation. The hypandrium and phallosome were described as "quite plesiomorphic among the Acalyptratae" (a paraphyletic group), without giving any motivation.

In a paper on the genera of Diopsidae Shillito (1971) divided the Diopsidae in Centrioncinae, Sphyracephalinae nov. and Diopsinae sensu restrictu, which he considered "more or less equal in status". Although the chapter in which he proposed this new division was called "Phylogeny in Diopsidae", no phylogenetic base was given. In fact his modification of Hennig's system was based on the Centrioncinae and Sphyracephalinae sharing some symplesiomorphies (absence of facial sulcus, presence of alula and sixth vein) and as such can be rejected. However, the regrouping of the stalk-eyed diopsid genera was a definite improvement on Hennig's classification.

In a catalogue of the Diopsidae Steyskal (1972) followed Hennig's division in two subfamilies, though arranging the stalk-eyed genera in a way similar to Shillito's.

In a phylogenetic classification of the Schizophora, especially based on the structure of the male postabdomen, Griffiths (1972) rejected Hennig's tentative superfamily Nothyboidea as heterogenous. In a revised sense of Nothyboidea he only included Nothybidae, Psilidae, Teratomyzidae and Periscelidae. Megamerinidae, Tanypezidae (including Strongylophthalmyiidae) and Diopsidae were respectively included in the prefamilies Sciomyzoinea, Tanypezoinea and Diopsioinea of Muscoidea sensu Griffiths. In the prefamily Diopsioinea were included Diopsidae s.l. and Syringogastridae, a neotropical genus formerly classified with the Megamerinidae, given family status by Do Prado (1969). Although Griffiths also studied *Sphyracephala brevicornis* (Say) and *Diopsis* sp., he obviously concentrated on *Centrioncus* and on the basis of synapomorphies between *Centrioncus* and Syringogastridae postulated a sister-group relationship between Diopsidae s.l. and Syringogastridae.

Griffiths characterized the Diopsioinea as a monophyletic group by the following eight groundplan conditions, apomorphous with respect to the groundplan of the Muscoidea.

(1) Postvertical bristles absent.

As reduction of most head bristles in the Diopsidae s.s. took place after the development of eyestalks, this condition might also rest on homoplasy.

(2) Only one fronto-orbital and one vertical bristle (OVB) present.

Even if the remaining head bristles in the Centrioncidae and most Diopsidae were homologous, this condition would not rest on synapomorphy, as reduction in head bristles in the Diopsidae s.s. took place after the development of eyestalks (see above). In the Syringogastridae only an OVB occurs and no FOB. In the Centrioncidae one FOB and an OVB occur and in the Diopsidae s.s. an OVB and an IVB occur, with in *Diopsina* a complement of small orbital and frontal bristles.

(3) Only one postalar bristle present.

This PA is in this paper considered an IA, but even so the presence of only one bristle might be considered a synapomorphous condition if not the additional presence of a large complement of thoracic bristles (1 SA, 1 IA, 1 or 2 DC, 1 or 2 Acr, 1 or 2 Di) in *Diopsina* indicates the possibility of homoplasy in reduction of the number of IA (or PA).

(4) Terga 1 and 2 forming a syntergum, which is the largest abdominal sclerite; basal segments (especially the 2nd segment) elongate, but distal segments becoming short and wide, so as to give the abdomen a petiolate appearance.

In the Syringogastridae the first three terga are fused, with the sutures still visible (Do Prado, 1969). In *Centrioncus* only the first two terga are fused with no suture visible. In the Diopsidae s.s. the first two terga are fused (with no suture visible) in for instance *Diasemopsis*, *Cladodiopsis* and *Sphyracephala*, while in *Diopsis* and *Diopsina* the first three terga are fused. However, in *Diopsis* even between terga 2 and 3 a suture is hardly visible, while in *Diopsina* between terga 1 and 2 and between terga 2 and 3 sutures are clearly visible. From this it can be concluded that the initial fusion between terga 1 and 2 might be a synapomorphous condition, but that the disappearance of the suture might rest on parallelism, while the more apomorphous inclusion of tergum 3 also occurred independently in various groups. In the Syringogastridae terga 2 and 3 are of equal length, with tergum 1 somewhat smaller and narrower. In *Centrioncus, Diopsis, Diasemopsis, Cladodiopsis* and *Sphyracephala* tergum 1 is small, tergum 2 wide and elongate, tergum 3 still slightly wider, but shorter than the second, with the subsequent segments gradually becoming narrower and shorter. However, in *Diopsina* terga 1 and 2 are rather small and of equal length, while terga 3 and 4 are largest and widest, giving the typical clavate form of a *Diopsina* abdomen. Certainly no synapomorphous condition can be found in this respect, except for the petiolate appearance (i.e. narrower 1st segment).

(5) Sternum 7 (♂) forming complete ventral band of sclerotization, fused with inverted sternum 8 on right side (as well as on left side as normally in Muscoidea).

This condition is shown by *Centrioncus* and Syringogastridae, but certainly not by Diopsidae s.s., as also acknowledged by Griffiths, who described the condition in other diopsids with "sclerotization of the 7th and 8th segments much reduced, and the ventral band incomplete". As Griffiths accepted a sister-group relationship between *Centrioncus* and all other recent diopsids and considered the condition shown by *Centrioncus* to accord well with that described for the Syringogastridae, he thought it probable that the apomorphous presence of the ventral band could be ascribed to the groundplan of Diopsioinea. Although not explicitly stated by Griffiths, this implies considering the condition in the Diopsidae s.l. to be secondary. In the Diopsidae s.s. sternum 8 is rather normally sized in the Diopsinae and very reduced in the Sphyracephalinae, as compared with a strongly expanded sternum 8 in *Centrioncus*. In the Diopsinae there is a short band-like extension on the lefthand side of sternum 8. This extension is probably homologous with sternum 7 and a normal synapomorphous groundplan condition in Muscoidea. I see no reason why this condition should have been reached secondarily, via a complete ventral band, the less so as the ventral band in *Centrioncus* was accompanied by various other apomorphous conditions (great enlargement of sternum 8, strongly deflexed postabdomen) not present in the Diopsidae s.s. Also the condition in the Sphyracephalinae, with its strongly reduced sternum 8, is still more different (i.e. apomorphous in an opposite direction) from the situation in *Centrioncus* than the condition in the Diopsinae, though the Sphyracephalinae (i.e. Sphyracephalini) were by Hennig considered the more plesiomorphous group.

(6) Vestiges of sterna 7 and 8 (♂) lost.

This condition is found in Syringogastridae, *Centrioncus* and Diopsidae s.l. and could be considered a synapomorphous condition.

(7) 7th left spiracle (♂) lying within sternum 7.

Griffiths added that this condition is found in the Syringogastridae and

Centrioncus, but not in *Sphyracephala* and *Diopsis*, where the 7th spiracle lies in membrane. Griffiths indicated the condition in the Diopsinae as possibly secondary, consequent upon reduction of the sclerotization of the 7th and 8th segments. However, I see no need to consider the normal position in membrane of both 7th spiracles of male Diopsidae s.s. secondary (see also under condition 5). It is remarkable that Griffiths did not consider the position of the 7th right spiracle for his groundplan. He stated for *Centrioncus* "7th left spiracle within 7th sternum, 7th right spiracle within ventral band of sclerotization" and for the Syringogastridae "7th spiracles lying within ventral band of sclerotization formed by 7th sternum."

(8) Aedeagus rather short, with a complex distal section which bears lobes or processes.

This rather vaguely defined condition is only found in *Centrioncus* and the Syringogastridae. In these two groups the aedeagus is of about the same size as the complex of hypandrium and phallapodeme. In the Diopsidae the aedeagus is several times smaller than this complex. In the Centrioncidae the aedeagus is a single solid structure with indeed a complex distal section, but in the Diopsidae the aedeagus is an open, complex and delicate structure of various sclerites and stylets coming together on a basal ring, which ventrally links to the phallapodeme. As far as the aedeagus is concerned any claim to synapomorphy between the Diopsidae s.s. on the one hand and *Centrioncus* and the Syringogastridae on the other hand can be rejected.

The Diopsidae s.l. were characterized by Griffiths as a monophyletic group by the following groundplan conditions, apomorphous with respect to the groundplan of the Diopsioinea:

(1) Discal crossvein absent.

This apomorphous condition was also mentioned by Hennig (see above).

(2) Ocellar bristle lost.

Griffiths remarked that weak OC are retained in some species of the Syringogastridae but apparently never in the Diopsidae. However, in *Diopsina draconigena* Feijen, 1981, weak OC are also retained. In Centrioncidae OC are never present.

(3) Scutellum with pair of setigerous scutellar spines.

(4) Front femora thickened and armed with double series of ventral tubercles.

Both these characters were also mentioned by Hennig (see above). Griffiths remarked that in the Syringogastridae the hind femora are thickened and the front femora slender. However, it also has to be stressed that in the Syringogastridae tubercles occur on the front femora and hind femora (Do Prado, 1969), a condition also found in the Centrioncidae but not in the Diopsidae s.s. (tubercles only on front femora).

(5) Phallapodeme free anteriorly only, becoming fused with body wall posteriorly where it bears paired ventral processes, which are contiguous or fused laterally with the hypandrium.

In this respect the situation in the Centrioncidae and the Diopsidae s.s. cannot be compared. In centrioncids there is a very small phallapodeme, which with its posterior two-thirds is fused to the hypandrium via lateral extensions. In the Diopsidae the phallapodeme is well developed, free along its length and with a ventral process or pair of ventral processes connected to the hypandrium.

(6) Lower outer corner of cerci (♂) linked ventrally to telomeres.

This condition is only found in some groups of the Diopsidae s.s., especially in groups of *Diopsis* and certainly not in the Centrioncidae and as such can be rejected as a synapomorphous condition of the Diopsidae s.l. In centrioncids the membranous cerci are linked to a mesal process of the inner telomeres and are certainly not directly linked to the outer telomeres (the telomeres no doubt meant by Griffiths). Griffiths probably confused the inner telomeres with the cerci, as was done by Steyskal (1970).

In the Catalogue of African Diptera Cogan & Shillito (1980) included the Diopsidae in the Tanypezoidea, together with Tanypezidae (including Strongylophthalmyiidae) and Psilidae. The Diopsidae were divided into three subfamilies as proprosed by Shillito (1971).

3. Materials and methods

In total 279 Centrioncidae were studied from Ivory Coast (1), Sudan (1), Kenya (7), Tanzania (2), Uganda (3), Malaŵi (72), Mozambique (4), Zimbabwe (13) and South Africa (176). One specimen belongs to the Koninklijke Museum voor Midden-Afrika, two to the Naturhistoriska Riksmuseet, eleven to the British Museum (Nat. Hist.), 53 form an almost representative selection of the centrioncids in the Natal Museum and the remaining 212 belong to my own collection. It seems likely that other collections still contain specimens of these rather inconspicuous flies, which have not been recognized as centrioncids (or formerly as diopsids).

As mentioned by Smithers (1958) centrioncids are easily caught. They are found on small shrubs and plants (about 30 to 50 cm above ground) in dark places in Afromontane forests. They can be collected by random sweeping, but hunting by eye gives better results. They can also be caught in a malaise trap. To obtain a good estimate of quantative characters at least 20 females and 20 males should be collected at one collecting place. For this study such numbers were only available for *Centrioncus jacobae* sp. nov. and *Teloglabrus sanorum* sp. nov. These two species were also especially used for studies on morphology and intraspecific variation.

A special problem with the Centrioncidae is their tendency to discolour after death. Smithers (1958) noted that preservation in alcohol (70%) tended to increase the colour contrasts, whilst pinned specimens became considerably darker. In my own experience specimens kept dry after collecting and pinned within a couple of hours do not discolour. However, specimens kept in humid conditions (e.g. a closed vial) and pinned after one or two days, quickly become greasy and darker, which is especially troublesome in species with a black and brown colour pattern on the thorax. No doubt, this explains the occurrence of a "dark form" and a "light form" in species like *Centrioncus decoronotus* sp. nov. and *Teloglabrus vumbensis* sp. nov. In extreme cases of the "dark form", colour patterns (esp. on the thorax) completely disappear and are replaced by a greasy, uniform dark colour. Also specimens kept for a day in a relaxing box become very greasy. The grease can be removed with an ether bath, but the original colours cannot be restored. In Diopsidae s.s. this problem does not exist, though brownish diopsids may blacken when kept in a closed vial during a prolonged period.

Measurements were taken with a stereomicroscope equipped with a drawing mirror. The body was measured along the body axis from head (not including antennae) to positional tip of abdomen, the wing from the wing base to the tip in a straight line, the head on the widest section and the scutellar spine on the inside, from the scutellum to the tip. Means and ranges are given for females and males separately, while for the larger samples (*C. jacobae* and *T. sanorum*) the S.E. is also indicated. The angle between scutellum and body axis was measured with the fly in an exact lateral position, small inclinations giving great distortions. The image of the fly was projected via a drawing mirror and lines were drawn through the length of the scutellum and from the dorsal side of the humeral callus to the dorsal connection point between thorax and abdomen. For the measurement of the angle between the scutellar spines the fly was placed with scutellum and scutellar spines in an exact horizontal position. The image was then projected via a drawing mirror and lines were drawn through both spines. For the measurements of the angles the procedures were repeated several times and several flies were measured until a reasonably consistent result was obtained. For the calculation of the length/width ratios of female cerci and interparameral sclerite, the width was measured halfway the length and the length halfway the width.

The two rows of spinous bristles and the two rows of tubercles on the front femur were counted and averaged separately for the inner and outer rows. The tubercles on the hind femur occur usually only in one row and only the mean number per femur is given. As for these characters no significant differences were found between females and males, the means were calculated per species. All specimens of each species were examined, except for *C. jacobae* and *T. sanorum* for which 20 females and 20 males were counted.

The means of qualitative characters of the postabdomen (no. of tubercles and no. of stout spinous bristles per outer telomere, no. of hairs per inner telomere, no. of hairs of female sternum 8 and tergum 10) are based on rather low numbers (see tables 1 and 2), as the number of specimens available for dissection was rather limited for most species.

For the preparation of slides of postabdominal structures, the postabdomens were boiled in KOH 10% for 5 to 10 minutes, rinsed in water and dissected in Hoyer's medium. The female postabdomens were mounted in Hoyer's medium on normal slides, which gave just enough pressure to keep the structures well extended. In the dissection of the male postabdomen the hypopygium was first separated from the preceding segment, then the ejaculatory apodeme with associated structures was removed and the connections between hypandrium and periandrium and interparameral sclerite were cut. The seminal ducts are very thin and easily disconnected and lost, which does not form a problem as they have no taxonomic value in Centrioncidae. For the separation of the hypandrium from the periandrial fold and the interparameral sclerite some experience is needed, as the hypandrium is easily damaged (the hypandrium could therefore not be illustrated for some species dissected earlier). After isolation of the hypandrium and the aedeagus, the aedeagus was swung out from its theca through an arc of 180°, so as to bring it in one plane with the hypandrium and both structures can be studied and illustrated together (see fig. 93). The male genitalia were mounted in cavity slides, which prevents distortions and facilitates manipulation with a hair to obtain the correct drawing positions. The slides were made permanent by ringing them three times with Shellac ringing solution (see Benjamin, 1971).

For each species were illustrated: dorsal view of sterna 7 and 8 (♀) showing the underlying posterior edge of tergum 7; spermathecae; dorsal view of tergum 10 (♀) with cerci (one half showing hair configuration, one half showing underlying structures); ventral view of subanal plate; inner view of outer telomere (with base and apices as much as possible in one plane to prevent distortions); dorsal view of inner telomere with interparameral structures, periandrial fold and connections to outer telomere, periandrium and cercus, also showing the overlying position of the periandrium; dorsal view of periandrium; dorsal view of ♂ cercus; lateral view of ejaculatory apodeme and sac; dorsal view of hypandrium with aedeagus swung out over 180°, also showing the overlying epiphallus and underlying hypandrial claspers. The various sections illustrated are for *T. sanorum* shown in their proper positions (figs. 24 and 25).

The terminology used for postabdominal structures is that used and proposed by Griffiths (1972) with some minor modifications. For the chaetotaxy the following terminology has been used: spines (e.g. scutellar spines); spinous bristles, divided into the strong immovable bristles of the front femur and the much smaller stout bristles of the median arm of the outer telomere; tubercles, the blunt tubercles of the front femur and the smaller tubercles of the outer arm of outer telomere; bristles, like the head and thoracic bistles; bristle-like hairs (at micro-level), strong, rather inflexible hairs, like the larger hairs of the outer telomere, the central hairs of the inner telomere of *Centrioncus* and the terminal hairs of the hypandrial clasper; hairs, at macro-level the long central hairs of tergum 10 (♀), the long and short hairs of the cerci, the various slender, short or long, hairs of the telomeres, the slender hairs of the hypandrial clasper and the short strong hairs near the base of the clasper; microtrichia, tiny hairs covering the wing and many sclerites ("pollinosity"); pubescence, dense groups of short, typical hairs, like on the first metatarsus.

4. Abreviations used in text and figures

	Thorax		Wing
HC	Humeral callus	A	Alula
HP	Hypopleuron	AC	Anal cell
IsS	Intrascutal suture	ACr	Anterior crossvein
MPC	Metapleural callus	AxC	Axillary cell
MsP	Mesopleuron	1BC	First basal cell
MtP	Metapleuron	2BC	Second basal cell
PN	Pronotum	CC	Costal cell
PrP	Propleuron	DC	Discal cell
PSl	Postscutellum	DCr	Discal crossvein (remnants)
PSt	Prescutum	HCr	Humeral crossvein
PtP	Pteropleuron	MC	Marginal cell
S	Scutum	1PC	First posterior cell
ScSp	Scutellar spine	2PC	Second posterior cell
Sl	Scutellum	3PC	Third posterior cell
SP	Sternopleuron	PCr	Posterior crossvein
		ScC	Subcostal cell

SmC	Submarginal cell
V2	(etc) Second longitudinal vein

Abdomen

AAe	Apex of aedeagus
AIA	Apophysis of IOT
AIC	Articulation IT/C
AIP	Articulation IT/P
AOP	Articulation OT/P
AHI	Articulation H/IS
AHP	Articulation H/PF
BAe	Base of aedeagus
C	Cercus
CII	Connection IT/IS
COI	Connection OT/IT
E	Epiphallus
EA	Ejaculatory apodeme
ED	Ejaculatory duct
ES	Ejaculatory sac
H	Hypandrium
HA	Hypandrial arm
HCl	Hypandrial clasper
IOT	Inner arm of OT
IPP	Inner posterior corner of P
IS	Interparameral sclerite
IT	Inner telomere
MOT	Median arm of OT
OOT	Outer arm of OT
OPP	Outer posterior corner of P
OT	Outer telomere
P	Periandrium
PF	Periandrial fold
PG	Postgonite
PhA	Phallapodeme
PhP	Phallophore
PSc	Periandrial sclerite
SaP	Subanal plate
SD	Seminal duct
1Sp	(etc) 1st spiracle
SpT	Spermatheca
St1	(etc) Sternum 1
ST	Syntergum
T3	(etc) Tergum 3

Bristles

Acr	Acrostichal bristle
Ap	Apical bristle of ScSp
Dc	Dorsocentral bristle
Di	Discal bristle
FOB	Fronto-orbital bristle
IA	Intra-alar bristle
IVB	Inner vertical bristle
NP	Notopleural bristle
OC	Ocellar bristle
OVB	Outer vertical bristle
PA	Postalar bristle
PS	Presutural bristle
PV	Postvertical bristle
SA	Supra-alar bristle

Nomenclature

Diopsidae s.l.	including *Centrioncus*
Diopsidae s.s.	not including *Centrioncus*
Centrioncus	(in chapter 2) Centrioncidae

5. Morphology and intrafamiliar variation

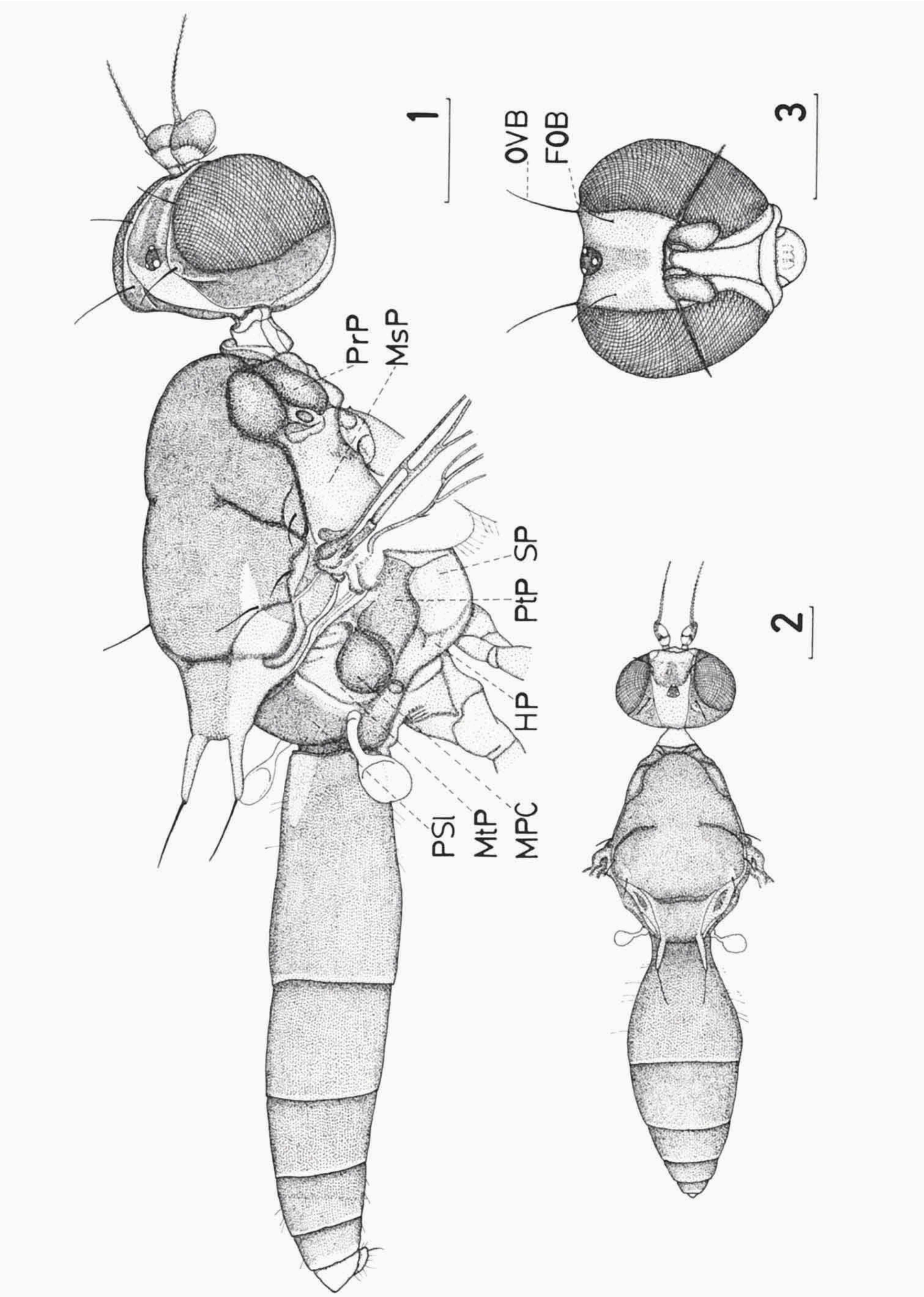
Measurements.

Little interspecific variation in length of body occurs in the Centrioncidae, most species measuring between 4.9 and 5.6 mm. A clear exception forms *Teloglabrus stuckenbergi*, which is much longer (6.3 mm in ♀, 6.5 mm in ♂), while *T. prolongatus* is somewhat smaller. Females on the average are about 7% larger than males. The range in the larger samples was about 1.1 mm and the coefficient of variation about 5%. In most species the head is from 1.10 to 1.25 mm wide, the head in *T. stuckenbergi* again being wider. The head in females on the average is about 4% wider than in males. The range in the larger samples was about 0.2 mm (V = 0.04). The length of the wing in most species lies between 4.4 and 5.0 mm, the length in *T. stuckenbergi* being 6.0 mm. The wing in females on the average is about 7% longer than in males. The range in the larger samples was about 0.9 mm (V = 0.05). The length of the scutellar spine in most species lies between 0.27 and 0.32 mm. In the large *T. stuckenbergi* the spines are close to 0.40 mm, but in the smaller *T. milleri* and *T. pelecyformis* they are absolutely as large (around 0.40 mm), but relatively larger. In females the scutellar spine is on the average about 7% longer than in males. The range in the larger samples was about 0.08 mm (V = 0.07).

Head (figs. 1-4).

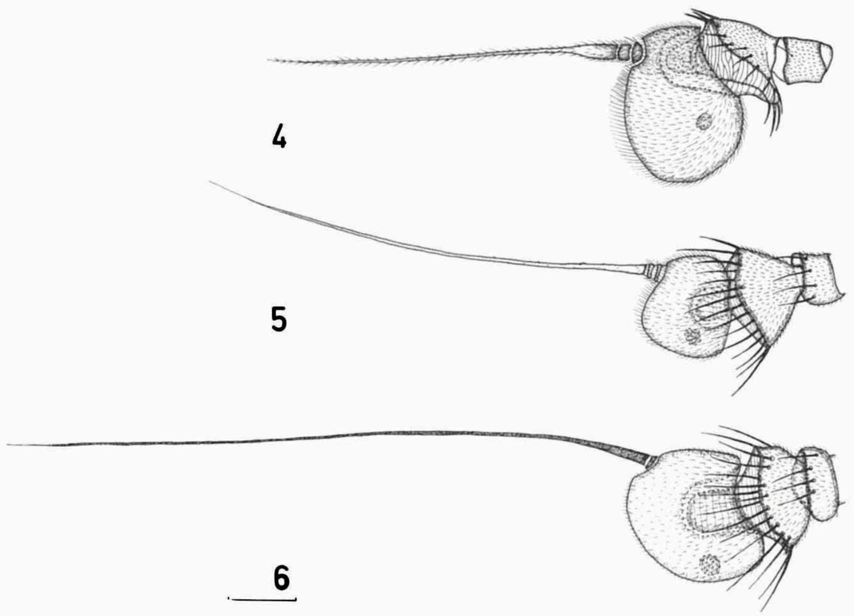
The head is rather rounded, slightly wider than high and somewhat wider than long. The ocellar triangle is slightly elevated, dark brown to black, and carries three ocelli. The frons is moderately depressed mesally in most species, strongly depressed in *T. milleri*, *T. pelecyformis* and *T. prolongatus*, slightly depressed in *C. angusticercus*, *C. prodiopsis*, *C. jacobae*, *T. stuckenbergi*, *T. duplospinosus* and *T. australis* and flat in *C. decellei*. In most species the frons is dark brown, except for the pale brown anterior quarter. In *T. stuckenbergi*, *T. sanorum*, *T. duplospinosus* and *T. curvipes* there is also a pale mesal line, while in *C. angusticercus* and *C. aberrans* the pale anterior section is rather reduced. In *C. decoronotus*, *C. prodiopsis* and *C. jacobae* the pale sections include the anterior quarter, mesal line and eye margins. In *C. decellei* the frons is uniformly pollinose, in *T. sabiensis* it is thinly pollinose, while in *C. angusticercus*, *C. decoronotus*, *C. prodiopsis*, *C. aberrans*, *C. jacobae*, *T. entabenensis*, *T. stuckenbergi* and *T. australis* the frons is pollinose with two shiny spots on either side of the ocellar tubercle. In the other species the frons is glossy with a thinly pollinose anterior section and sometimes a pollinose mesal line and eye margins.

Gena, face, buccae, prelabrum and mouthparts are pale yellowish brown,



Figs. 1–3. *Teloglabrus sanorum* ♀. 1. Dorsolateral view. 2. Dorsal view. 3. Anterior view of head. Scales 0.5 mm.

only in *C. aberrans* they are more brownish. In *Teloglabrus* the maxillary palpi have the same pale yellowish brown colour as the mouthparts, but in *Centrioncus* and *T. entabenensis* they are dark brown to blackish (in *C. decoronotus* the mouthparts are also darker). Face, buccae, prelabrum and mouthparts are covered with a thin pollinosity, but the genae are covered with a dense, silvery white pollinosity. In *T. stuckenbergi* only the outer half of the genae (near the eye margins) is covered with a dense pollinosity. The mouthparts are of the lapping type with an apically widening proboscis with a rounded labellum. The prelabrum is well-developed, sticking out anteriorly.



Figs. 4–6. Lateral view of antenna. 4. *Teloglabrus sanorum*. 5. *Sphyracephala beccarii*. 6. *Diopsis phlogodes*. Scale 0.1 mm.

The antenna is brown, pollinose, three-segmented with a three-articled dorsally implanted arista (fig. 4). The scapus is short and straight, the pedicellus triangular and apically projecting into the funiculus (for terminology see Hennig, 1976). On the apical edge of the pedicellus stands a row of about 16 short hairs, the outer hairs being stronger. In *C. decellei* and *C. angusticercus* this row counts only about twelve hairs. The funiculus is ventrally extended into an almost circular shape. In *Centrioncus* the dorsal section of the funiculus, around the base of the arista, is dark brown to blackish, in *Teloglabrus* this dark section is extended laterally to the dorsal quarter of the segment. In *T.*

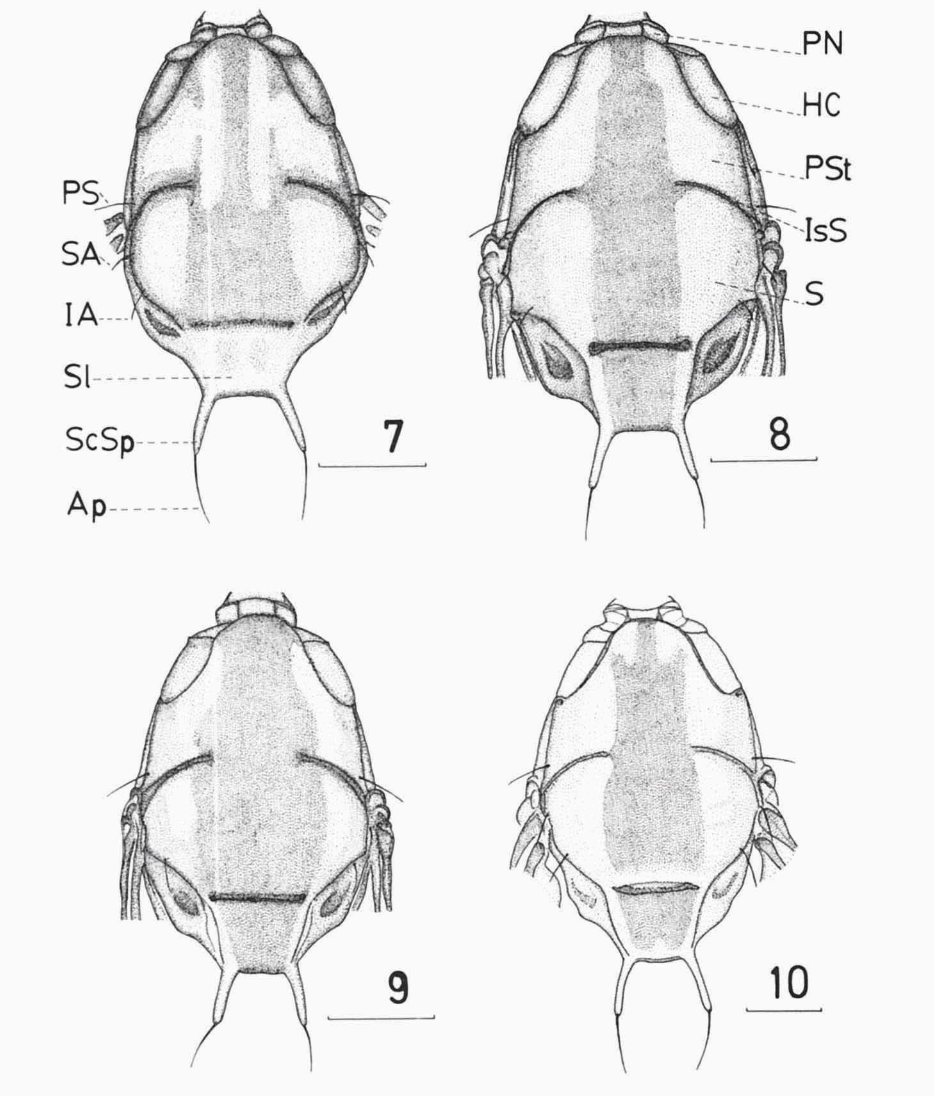
milleri and *T. pelecyformis* the blackish section includes almost the dorsal half of the lateral side. The arista counts two small basal articles and a prolonged third element with a bulbous base. The arista is covered with small hairs giving it a distinct plumose aspect. The first two articles and the base of the bulbous section of the third element are dark, the remainder of the arista being white.

In *C. aberrans* the posterior side of the head is blackish, except for the ventral edge. In *C. decellei, C. angusticercus, C. decoronotus* and *C. prodiopsis* the dorsal two-thirds of the posterior side are blackish brown and the ventral third is brown, as in *C. jacobae*, but in this latter species the tubercles of the OVB and the central region behind the ocellar tubercle are pale brown. In *Teloglabrus* the central region behind the ocellar tubercle is always pale brown, while the posterior side of the head is further blackish brown with a brown ventral half in *T. stuckenbergi, T. milleri* and *T. pelecyformis*, a brown ventral third in *T. prolongatus*, a brown ventral edge in *T. trituberculatus* and *T. vumbensis*, and only some brown below the cervix in all other species. The posterior side of the head is, except for around the cervix, densely pollinose in *C. decellei* and *C. angusticercus*, while in *C. decoronotus, C. prodiopsis, C. aberrans, C. jacobae* and *T. entabenensis* densely pollinose spots occur behind the ocellar tubercle and laterally. In all other *Teloglabrus* there is only a densely pollinose spot behind the ocellar tubercle, the rest of the posterior side being thinly pollinose. The eyes have always a dark redbrown colour.

Only two pairs of head bristles occur in Centrioncidae; an outer vertical bristle, raised on a tiny tubercle, and a fronto-orbital bristle. The OVB is stronger and about twice as long as the FOB. No hairs occur on the head, except for some tiny white hairs on the face and a number of small white hairs on the proboscis.

Thorax (figs. 1, 2 and 7-10).

The thorax (not including the scutellar spines) is about 1½ times as long as wide. The pronotum is rather short, always glossy, in colour varying from yellowish brown to blackish (usually with darker sutures) and shows small interspecific structural differences (compare figs. 7-10), which have not been described. The humeral calli are well delimited. The intrascutal sutures of the mesonotum each run for about one third of the notal width. The mesonotum is covered with fine pollinosity, being more glossy in its sutures, especially around the humeral calli. The humeral callus can be less pollinose, especially posteriorly. The colour of the mesonotum varies from yellowish to blackish brown and the colour pattern is a useful differential character at the species level. In *C. decoronotus, T. trituberculatus, T. vumbensis* and *T. stuckenbergi* a



Figs. 7—10. Dorsal view of thorax. 7. *C. decoronotus*. 8. *T. trituberculatus*. 9. *T. vumbensis*. 10. *T. stuckenbergi*. Scales 0.5 mm.

dark, broad mesal band occurs, while in *C. prodiopsis* and *C. jacobae* the humeral calli are distinctly different in colour. Small colour differences also occur along the lateral sides, especially posteriorly, in *T. sanorum* there is for instance a distinct pale coloured wedge around the IA. The lateral and inferior sides of the scutellum are usually paler, while dorsally dark spots may occur. The scutellar spines are in general pale brown.

The propleuron has a distinct callus next to the humeral callus, the anterior spiracle lying in between these calli (fig. 1). The metapleuron has a large callus just above the posterior spiracle. The pleural sclerites and postscutellum often show specifically typical patterns of brown and blackish brown. The propleuron is thinly pollinose with a glossy anterior side of the callus. The mesopleuron is more densely pollinose, especially posteriorly, but the ventral edge is shiny. On the lateral side of the sternopleuron there is a characteristic densely pollinose spot above the base of the second coxa, the anterior tip of the sternopleuron is also densely pollinose. The rest of the sternopleuron is glossy in most species but thinly pollinose in *T. stuckenbergi, T. milleri, T. duplospinosus, T. pelecyformis, T. prolongatus, T. curvipes, T. londti, T. tsitsikamensis* and *T. australis.* The pteropleuron, hypopleuron, metapleuron and postscutellum are all thinly pollinose.

The scutellum is rather flat dorsally. The angle under which the scutellum is sticking out from the body axis lies for most of the species between 25° and 35°. This angle is definitely larger in *C. decellei* (45°) and *T. stuckenbergi* (40°), somewhat larger in *C. angusticercus* and *C. prodiopsis* (38°) and somewhat smaller in *C. decoronotus* (22°). The scutellar spines are somewhat shorter (15%) than the scutellum and almost straight, slightly curving inward distally. In most species they are diverging at an angle of in between 25° and 35°, but in *C. decellei, C. prodiopsis* and *C. aberrans* they are diverging at an angle of 40°. The apical bristle of the scutellar spine is in most species equal in length to the spine or slightly larger (5%). In *C. decoronotus, T. trituberculatus, T. entabenensis, T. duplospinosus* and *T. prolongatus* this bristle is distinctly longer (25%) than the spine and in *T. tsitsikamensis* and *T. australis* shorter (15%).

The scutum has three pairs of bristles; a prescutal bristle (called notopleural bristle by Hennig, 1965), a supra-alar bristle and an infra-alar bristle (called postalar bristle by Speiser, 1910, and Griffiths, 1972). The IA is best developed followed by the PS. The SA is rather small and standing on a small ridge.

Wing (figs. 11-22)

The wing is for about 25% of its length sticking out over the tip of the abdomen. An alula is present. All longitudinal veins, including the 5th and the 6th, reach the wing margin. Both costa and subcosta are unbroken. The anal vein is closed. The remnants of the discal crossvein, separating the 2nd basal cell from the discal cell, are still visible as small protuberances on the 5th and 4th vein, connected by a band of microtrichia slightly denser and differently di-

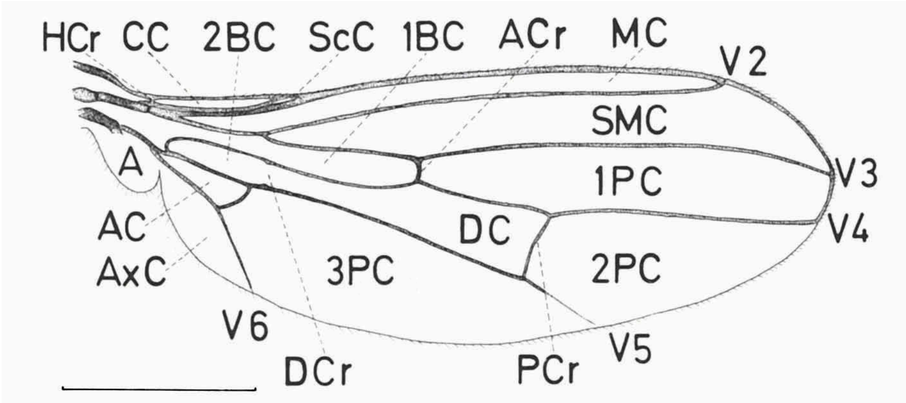
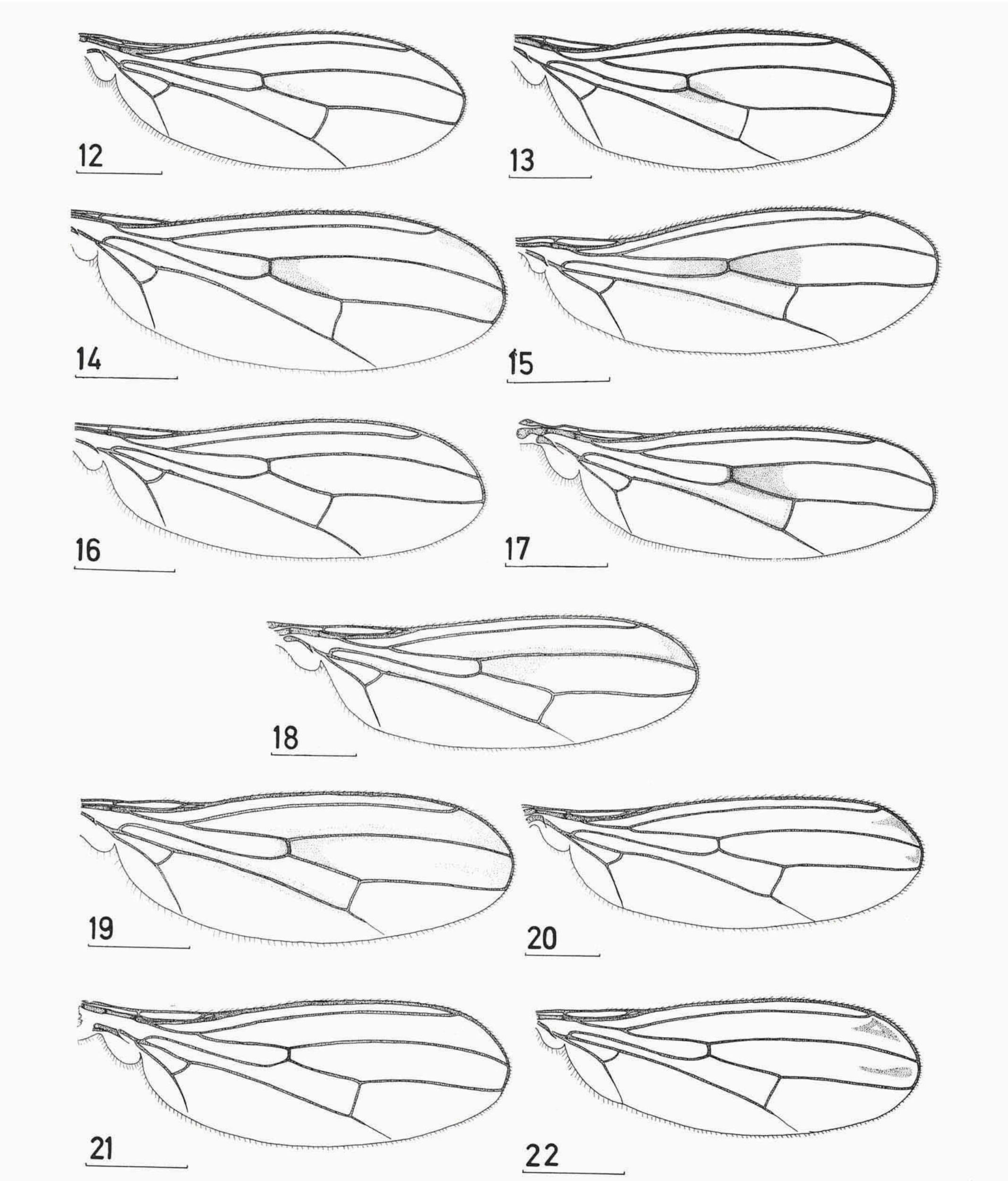


Fig. 11. Wing of *T. sanorum*. Scale 1 mm.

rected from the surrounding microtrichia. The remains are in some species quite distinct (*C. decellei, C. angusticercus*), in most species just visible (*C. jacobae* and *Teloglabrus* and in some species hardly visible (*C. decoronotus, C. prodiopsis* and *C. aberrans*). The subcostal cell is absent in *Centrioncus*. In *Teloglabrus* the subcostal cell is visible to just visible in most species, in some species (e.g. *T. stuckenbergi*) it is quite distinct, while it is not visible in *T. sabiensis* and some specimens of *T. sanorum* and *T. trituberculatus*. In *Centrioncus* the free distal section of the 5th vein becomes gradually narrower towards the end, in *Teloglabrus* this section becomes abruptly narrower and thinner at one third of its length from the posterior crossvein.

The wing is covered with microtrichia except for some generically or specifically typical, glabrous places in costal cell, 1st basal cell and 2nd basal cell. In *Centrioncus* (only posteriorly in *decoronotus* and *prodiopsis*), *T. trituberculatus* and *T. vumbensis* the costal cell is glabrous, while it is covered with microtrichia in all other *Teloglabrus*. In all *Centrioncus* (except for *decellei*) and in *T. duplospinosus, T. tsitsikamensis* and *T. australis* the second basal cell is fully covered with microtrichia. In the other species there is a tiny to small to large (*T. trituberculatus* and *T. vumbensis*) bald spot in the basal tip of the second basal cell. In all species there is a bald section in the 1st basal cell, anteriorly of the basal section of the 2nd basal cell. This bald section is round to oblong and for some species (e.g. *T. pelecyformis*) quite characteristic in shape. In *T. trituberculatus* and *T. vumbensis* this bald section is very large, continuing to the junction of the 2nd and 3rd vein, while the basal section of the first basal cell is also bald, leaving, only a narrow band of microtrichia posteriorly of the humeral crossvein.

The wing is transparant. In a number of species wingmarkings occur, which are usually vague and difficult to see. In all *Centrioncus, T. trituberculatus* and



Figs. 12–22. Wing. 12. *C. decellei.* 13. *C. angusticercus.* 14. *C. decoronotus.* 15. *C. prodiopsis.* 16. *C. aberrans.* 17. *C. jacobae.* 18. *T. trituberculatus.* 19. *T. vumbensis.* 20. *T. stuckenbergi.* 21. *T. milleri.* 22. *T. australis.* Scales 1 mm.

T. vumbensis a specifically characteristic central wingspot occurs, located mainly in the basal section of the 1st posterior cell. The central wingspot is most distinct in *C. jacobae.* In *C. angusticercus* and *C. prodiopsis* additional infuscation occurs along the 5th vein, in *C. jacobae* along the 5th vein and posterior crossvein and in *T. trituberculatus* and *T. vumbensis* along the 3rd and 5th vein. Characteristic, apical or subapical spots occur in the submarginal and 1st posterior cell of *C. decoronotus, T. trituberculatus, T. vumbensis, T. stuckenbergi, T. milleri* and *T. australis.* In some of the *Teloglabrus* with no central wingspot there is some slight infuscation around the anterior crossvein. The halteres are whitish in all species.

Legs (fig. 23).

The front coxae are about four times as long as the mid and hind coxae. The front femora are distinctly incrassate, the ratio length/width being about 2.8. The other femora are slender and straight, while the hind femora are marginally wider in the centre. The front tibiae are slightly curved, the other tibiae are straight. The front metatarsi are rather short, shorter than the other four tarsal segments together. The mid and hind metatarsi are quite long and about 1½ times as long as the other tarsal segments together.

On the distal two-thirds of the ventral side of the front femora are two rows of tubercles with on each side a row of spinous bristles. The outside row of tubercles counts on the average about 1–2½ tubercles more than the inside row (1.5–1.6 in the species of which large samples were examined). The inside row of spinous bristles counts on the average about one bristle more than the outside row. The numbers of tubercles and bristles form for a number of species a useful secondary differential character (see table 1). However, the means should be based on larger samples than available for most species in this paper. In the large *T. sanorum* sample (20 ♀ & 20 ♂) the average number of bristles per femur was 7.3 (range 6–9, V = 0.08) and the average number of tubercles 32.6 (range 26–38, V = 0.08). No significant differences in number of bristles and tubercles were found between females and males, in *T. sanorum* females counted on the average 7.23 bristles and 32.80 tubercles against 7.28 bristles and 32.43 tubercles in males. In table 1, where the species are arranged in geographical order from north to south, a clear tendency can be noted for a decrease in number of bristles and tubercles going from north to south. In *Centrioncus* most species have in between 8.3 and 10.0 bristles, while *prodiopsis* forms an exception with only 7.3 tubercles. In *Teloglabrus* most species count in between 6.6 and 7.8 bristles, exceptions being formed by its two northernmost species (*trituberculatus* 8.9 and *vumbensis* 8.3) and by *londti* (8.0) from the south. The number of tubercles is highest in *C. decellei,*

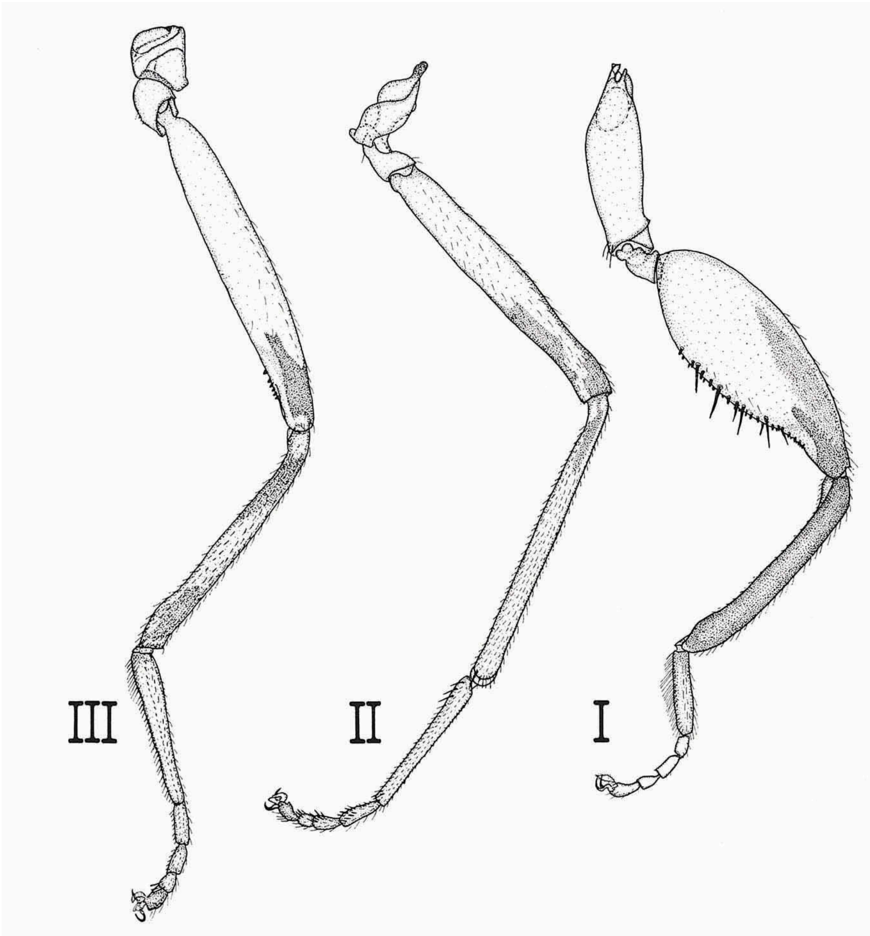


Fig. 23. Lateral view of legs of *T. sanorum*. Scale 0.5 mm.

C. angusticercus, C. decoronotus, T. trituberculatus and *T. vumbensis* (33.9–38.0), in *T. tsitsikamensis* only 27.3 tubercles occur and in the remaining species 30.0 to 33.3 tubercles. It is tempting to search for a positive regression between temperature and number of bristles and tubercles. In *Centrioncus*, for instance, a negative regression can be found between altitude and number of bristles, explaining the low score for *prodiopsis* and the high score for *decellei*. However, for the tubercles on the hind femur such relations cannot be found at all.

On the distal fifth of the ventral side of the hind femora a number of small tubercles occurs, a character which went unnoticed up till now. These tubercles usually stand in one row on the inner side of the femur but in a number

TABLE 1. Some quantitative characters of femora and ♀ postabdomen

		Femora				♀ postabdomen		
		Femur 1	Femur 1	Femur 1		St.8	T.10	Cercus
	n	no. of bristles	no. of tubercles	no. of tubercles	n	no. of hairs	no. of hairs	ratio length /width
C. decellei	2	10.0	38.0	3.5	1	8	6	4.1
C. angusticercus	1	9	36	6.5	1	8	6	5.4
C. decoronotus	14	8.3	34.8	4.9	1	14	7	3.8
C. prodiopsis	4	7.3	30.0	3.0	1	13	6	4.0
C. aberrans	6	9.2	32.0	6.5	1	8	4	5.1
C. jacobae	22	8.7	32.3	5.6	3	10.0	4.0	3.2
T. trituberculatus	8	8.9	34.9	6.0	1	6	3	4.0
T. vumbensis	26	8.3	33.9	6.7	2	9.0	5.5	2.8
T. entabenensis	4	7.5	33.3	10.0	1	5	6	3.6
T. stuckenbergi	8	6.9	33.0	2.6	1	8	7	4.5
T. sabiensis	4	7.3	32.7	6.3	0	-	-	-
T. lebombensis	4	7.8	33.0	6.0	1	9	5	3.3
T. milleri	6	7.0	30.3	3.3	1	10	6	3.0
T. sanorum	80	7.3	32.6	6.0	6	10.3	6.0	3.9
T. duplospinosus	8	7.1	31.3	2.9	0	-	-	-
T. pelecyformis	16	7.3	32.4	4.4	1	8	7	3.2
T. prolongatus	8	6.7	30.3	2.5	1	7	4	4.5
T. curvipes	8	6.9	32.4	3.4	1	10	6	3.5
T. londti	4	8.0	32.3	3.8	1	10	6	3.5
T. tsitsikamensis	4	7.0	27.3	3.8	1	7	6	3.4
T. australis	8	6.6	30.4	4.5	1	8	6	3.0

of species specimens occur with one or two tubercles in a "row" on the outer side. This occasional occurrence of a second row might be an indication for the relict character of this row, just as the rather high intraspecific variation in number of tubercles on the hind femur might be an indication for their relict character. In the large *T. sanorum* sample the average number of tubercles was 6.0 (range 3–9, V = 0.19). No significant differences in number of tubercles were found between females and males, in *T. sanorum* the females counted on average 5.90 tubercles and the males 6.05. No clear geographic or species-group tendency seems to occur for the number of these tubercles (see table 1). The lower numbers occurred in *T. prolongatus* (2.5), *T. stuckenbergi* (2.6), *T. duplospinosus* (2.9) and *C. prodiopsis* (3.0) and the highest number in *T. entabenensis* (10.0). All other species counted in between 3.3 and 6.7 tubercles. In the species description a bristle formula is given, e.g. 4.0, 4.9, 17.9, 16.8, 6.0, which represents, respectively, mean of F1 bristles of outer row, mean of F1 bristles of inner row, mean of F1 tubercles of outer row, mean of

F1 tubercles of inner row and mean of tubercles per F3.

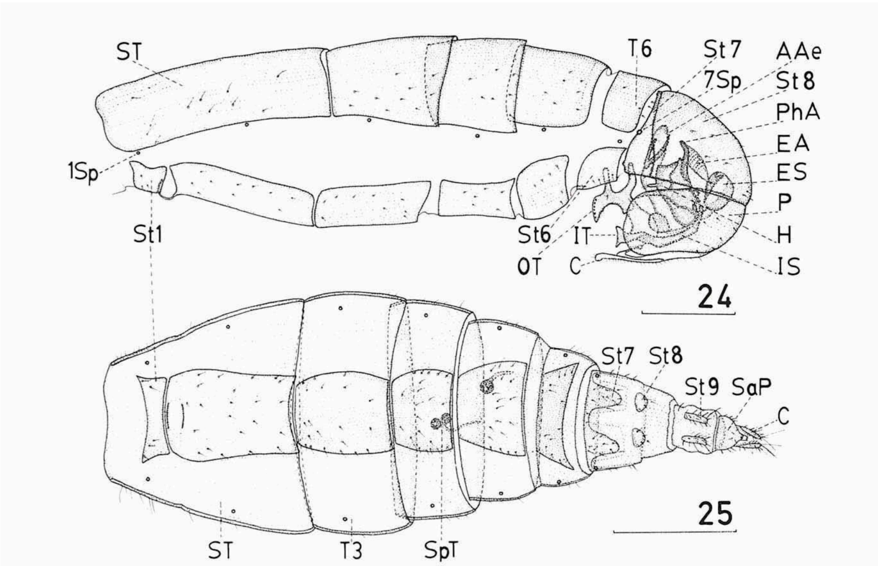
No interspecific variation seems to exist in occurrence and distribution of hairs on the legs. Most segments have some sparse white hairs, while on the femora some additional black hairs occur. The tibiae and tarsi count rows of small black hairs, but in the whitish tarsal segments the hairs are white. A somewhat stronger short hair occurs at the end of tibia 2, while somewhat stronger hairs also occur at the base of metatarsus 2 and the apices of the tarsal segments of the mid leg. Yellowish white pubescence occurs underneath the front and hind metatarsi and in small distal spots on the inner side of front and hind tibiae. No apical spurs are found on any segment.

The front coxae and trochanters are yellowish white in most species, in *C. aberrans* and *T. lebombensis* they are somewhat darker and in *T. stuckenbergi* more yellowish. The front femora are pale yellowish brown in most species, and more yellowish in *T. stuckenbergi*. The front tibiae are dark brown. The distal four tarsal segments of the fore leg are yellowish white in most species and slightly darker in *C. angusticercus, C. aberrans* and *T. duplospinosus*. The front metatarsus is brown in most *Centrioncus* and has a darker base or is overall slightly darker than the other tarsal segments in most *Teloglabrus* and in *C. prodiopsis*. In *C. jacobae, T. trituberculatus, T. stuckenbergi* and *T. milleri* the front metatarsus has the same yellowish white colour as the remaining tarsal segments. On the inner side of the front femora occurs a typical dark brown spot or stripe distally. In *C. decellei, C. angusticercus* and *C. aberrans* are distal spots on, respectively, the distal half, third and quarter. In *C. decoronotus* and *C. prodiopsis* occurs a vague brown stripe on the distal half and in *C. jacobae* a broad brown stripe on the distal two-thirds. In *Teloglabrus* occurs a stripe on the distal two-thirds, except for in *T. entabenensis, T. sabiensis* and *T. lebombensis* where it runs for the distal half and in *T. stuckenbergi* where it runs for the distal three-quarters.

The mid and hind legs are pale brown, except for in *T. stuckenbergi* in which they are pale yellow. Speiser (1910) described the mid and hind coxae of *C. prodiopsis* as black, which was an error. The mid femora have a darker distal section in *C. decellei, C. decoronotus, C. aberrans, T. trituberculatus* and *T. vumbensis*, while the other species also have a brown stripe on the distal section of the inner side. *T. stuckenbergi* has an additional brown stripe on the distal section of the outer side. The mid tibiae are uniformly pale brown in *Centrioncus* (except for *prodiopsis*), but have a darker base in most *Teloglabrus*. The hind femora have a dark distal section in *Centrioncus* (somewhat stripe-like in *decellei*), *T. trituberculatus* and *T. vumbensis*. In the other *Teloglabrus* dark brown distal stripes occur on the inner and outer sides of the hind femora, except for in *T. lebombensis* and *T. milleri* which have a dark apex and only a distal stripe on the inner side. The hind tibiae have a darker proximal and distal third in most species. In *C. aberrans* the hind tibiae are uniformly pale brown, in *C. jacobae* only the proximal third is darker and in *T. stuckenbergi* there are continuous brown stripes on inner and outer side. The pulvilli are whitish and the claws black.

Preabdomen (figs. 1, 2, 24, 25).

The preabdomen (segment 1—5) consists dorsally of syntergum (terga 1 + 2), tergum 3, tergum 4 and tergum 5. No suture is visible in the syntergum. The syntergum takes up about 35% of the length of the abdomen, tergum 3 about 15%, tergum 4 about 15% and tergum 5 about 13%. Sternum 1 is rather short and takes up about 5% of the length of the abdomen, it is connected to sternum 2 by a mesal bridge. Sternum 2 takes up 20% of the abdominal length, sternum 3 16%, sternum 4 11% and sternum 5 7%. Sternum 5 is somewhat broader than the more anterior abdominal sterna. Griffiths (1972) illustrates a sternum 5, which, in relation to tergum 5 and sternum 6, is much smaller than sternum 5 of *T. sanorum* (fig. 24). The origin of the centrioncid illustrated by Griffiths is not given and eventual use of the size of sternum 5 as a differential character remains to be examined. The distal half of the syntergum is about twice as broad as its base, giving the characteristic petiolate appearance of the abdomen. The subsequent segments gradually diminish in



Figs. 24—25. *T. sanorum*. 24. Lateral view of ♂ abdomen. 25. Ventral view of ♀ abdomen. Scales 0.5 mm.

width again. All five preabdominal pairs of spiracles are lying in membrane.

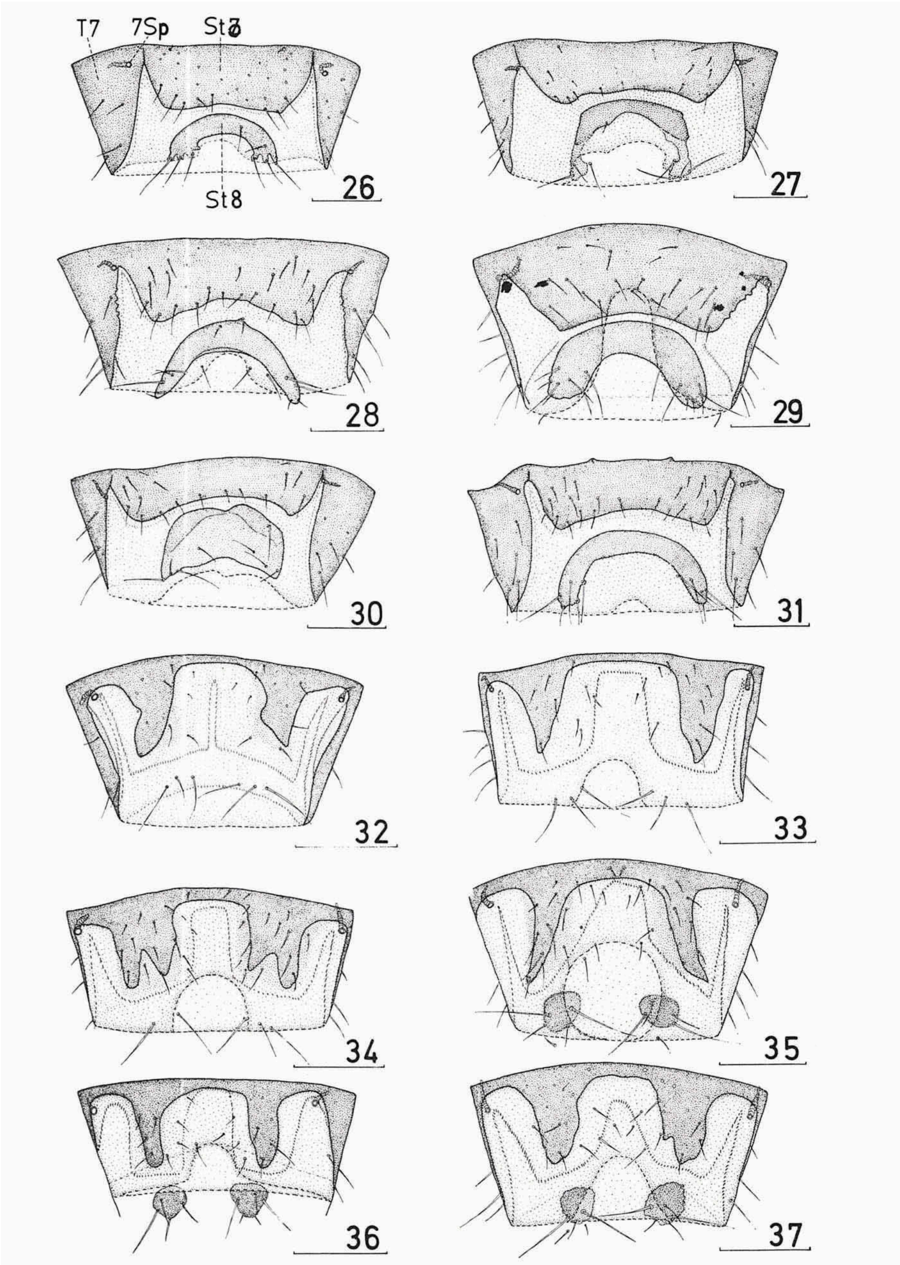
The preabdomen is sparsely covered with whitish hairs, especially laterally on the syntergum. The terga are covered with thin pollinosity, the first two sterna are glossy and the other sterna pollinose.

The dorsal side of the preabdomen varies in colour from brown to dark brown to blackish brown, the ventral side is pale brown with darker sterna, except for in *T. stuckenbergi* in which it is yellowish. In some species the posterior edges of the terga are slightly paler, in *C. jacobae* and *T. entabenensis* especially the posterior edge of the syntergum is paler. In *T. trituberculatus* and *T. vumbensis* there is a pale yellowish band, which almost forms two spots on the posterior edge of the syntergum. In *T. stuckenbergi* the basal and distal sections of the syntergum have laterally pale yellowish spots.

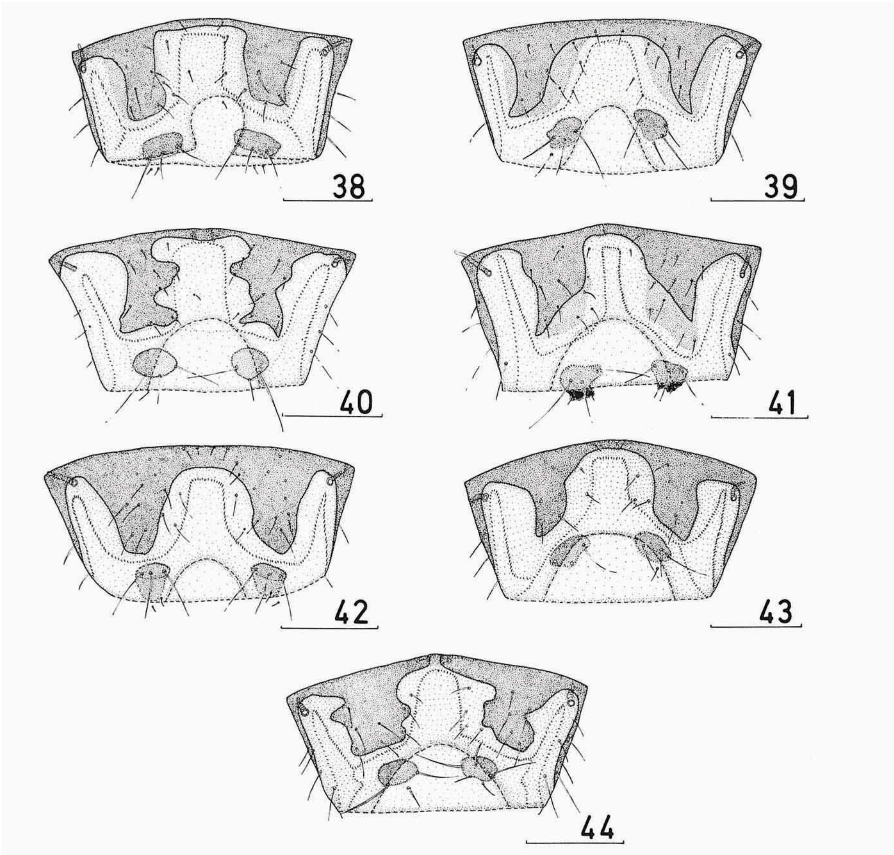
Female postabdomen (figs. 25–65).

Segments 6 and 7 have the same colour as the preabdomen, while the remaining segments have a whitish colour. The postabdomen is covered with a fine pollinosity.

Tergum 6 is a rectangular sclerite, while sternum 6 is trapezoïd in shape and the broadest sternum. The 6th spiracle is in membrane. Segment 7 is sclerotized basally in a complete ring. In *Centrioncus* (except for *decoronotus* and *prodiopsis*) sutures are visible in the connection between tergum and sternum (e.g. fig. 26). These sutures are absent in the more band-like connection in *Teloglabrus* (e.g. fig. 34). Tergum 7 is roughly rectangular. In *Centrioncus* it is uniformly well sclerotized, while in *Teloglabrus* it is thinly sclerotized, with stronger sclerotization latero-anteriorly. Tergum 7 usually has a typical mesal gap posteriorly (figs. 26–44). This gap is absent in *T. trituberculatus*, small to very small in *C. decellei* and *C. jacobae*, broad but not very deep in *C. angusticercus* and *C. aberrans*, large and almost circular in *T. sanorum*, very large and circular in *T. stuckenbergi*, long and bell-shaped in *C. prodiopsis*, and rather large to very large, triangular to semi-circular in the remaining species. The lateral edges of tergum 7 are curved under ventrally in *Centrioncus* (e.g. fig. 26), in *C. prodiopsis, T. trituberculatus* and *T. vumbensis* they are hardly curved under and in the remaining *Teloglabrus* not at all. In *Centrioncus* sternum 7 consists of one rectangular piece, showing some small interspecific differences in length and width (figs. 26–31). In *Teloglabrus* sternum 7 consists of two longitudinal pieces conjoined basally on the meson. The form of these pieces varies from rather irregular, to posteriorly acute, obtuse, or bifurcated (figs. 32–44). In *Centrioncus* the 7th spiracle lies in the tergum. In *decellei* and *jacobae* they lie well into the tergum, in *angusticercus* and *decoronotus* just in the tergum and in *prodiopsis* and *aberrans* half in/half out of the tergum. In *Teloglabrus* the 7th spiracle is in membrane.



Figs. 26–37. Ventral view of ♀ sterna 7 and 8, showing 7th spiracles. 26. *C. decellei*. 27. *C. angusticercus*. 28. *C. decoronotus*. 29. *C. prodiopsis*. 30. *C. aberrans*. 31. *C. jacobae*. 32. *T. trituberculatus*. 33. *T. vumbensis*. 34. *T. entabenensis*. 35. *T. stuckenbergi*. 36. *T. lebombensis*. 37. *T. milleri*. Scales 0.2 mm.

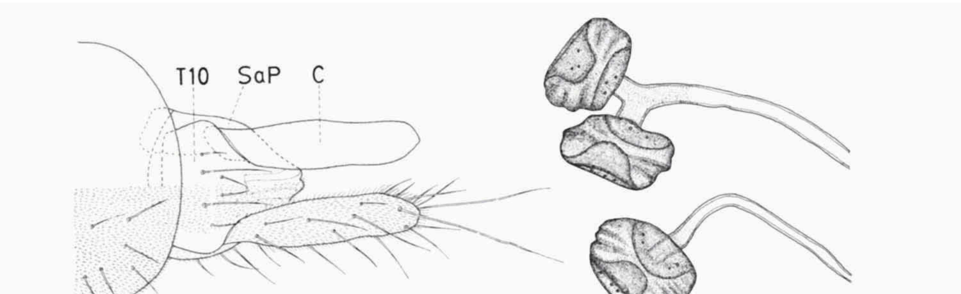


Figs. 38–44. Ventral view of ♀ sterna 7 and 8, showing 7th spiracles. 38. *T. sanorum*. 39. *T. pelecyformis*. 40. *T. prolongatus*. 41. *T. curvipes*. 42. *T. londti*. 43. *T. tsitsikamensis*. 44. *T. australis*. Scales 0.2 mm.

Tergum 8 is absent in all Centrioncidae. Sternum 8 is rather anteriorly located, more or less under the posterior section of tergum 7. In *C. aberrans* (fig. 30) sternum 8 forms a single, roughly rectangular, sclerite, in other *Centrioncus* (figs. 26–29 and 31) it forms a single, more or less U-shaped sclerite. In *Centrioncus* about 8 to 14 (see table 1) hairs are present on sternum 8, especially in the posterior corners (tips of the U). In *Teloglabrus* sternum 8 is represented by two small, round or rectangular, weakly sclerotized sclerites (e.g. fig. 36), which from the distribution of the hairs can be presumed to be homologous to the posterior corners (tips of the U) of the sclerite in *Centrioncus*. In *T. trituberculatus*, *T. vumbensis* and *T. entabenensis* (figs. 32–34) these two sclerites are not visible, their former place only indicated by their characteristic hairs. In *Teloglabrus* about 5—10 (see table 1) hairs are present on the two sclerites forming sternum 8, the lowest numbers (5—6) being reached in the species where these two sclerites are no longer visible. Tergum 9 and sternum 9 are formed by two narrow longitudinal sclerites (fig. 25). In *C. decoronotus, C. prodiopsis* and *T. lebombensis* these sclerites are somewhat broader, in *T. stuckenbergi* they are anteriorly broader and in *T. tsitsikamensis* and *T. australis* the tergites are broader than the sternites.

Tergum 10 varies in shape from more or less onion-shaped to pentagonal (e.g. fig. 45). Basally the sclerite can be somewhat narrower. The lateral sides can be smoothly curved or more angular. Apically there is a somewhat ill-defined mesal extension in between the cerci. Tergum 10 is only centrally covered with microtrichia, the lateral edges being glabrous. In *T. trituberculatus* (fig. 161) the tergum appears to be completely covered by microtrichia, while in *C. decellei* (fig. 136) and *T. lebombensis* (fig. 184) the glabrous lateral edges are broader than in the other species. Centrally, the tergum carries usually about three pairs of hairs (table 1), one pair being stronger than the others. In *C. aberrans, C. jacobae* and *T. prolongatus* only two pairs are present and in *T. trituberculatus* only three hairs.

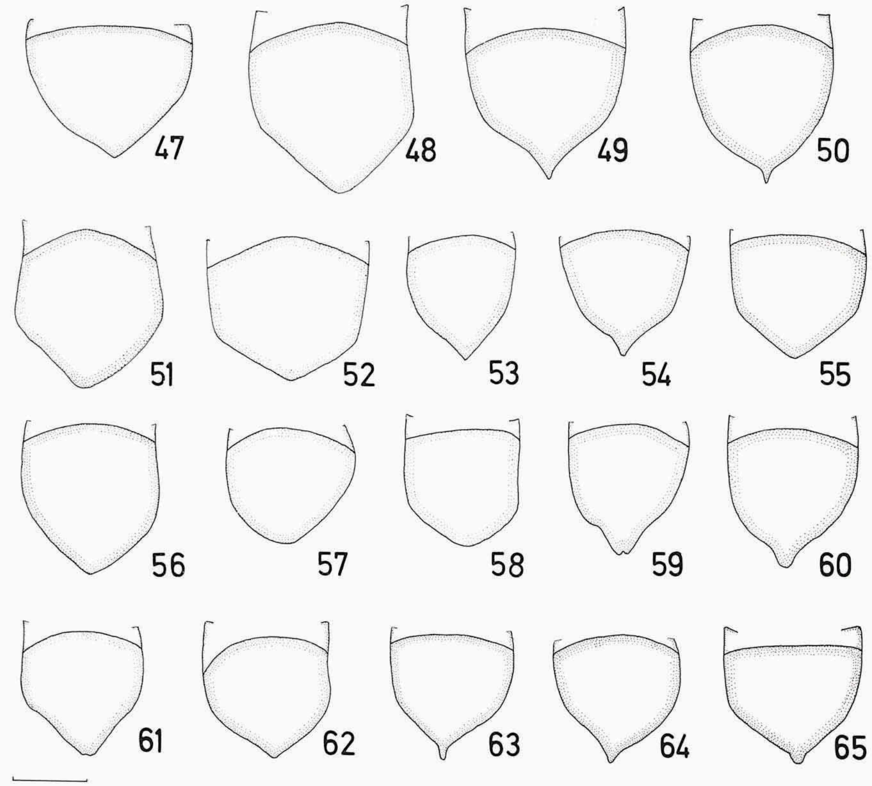
The cerci are rather long, covered with microtrichia and provided with a number of hairs and about four long hairs. The length/width ratio varies from 2.8 to 5.4 (see table 1). In *T. vumbensis, T. milleri* and *T. australis* the cerci are rather broad (ratio $<$ 3.0), in most species not so narrow (3.0 $<$ ratio $<$ 4.0), in *C. decellei, T. stuckenbergi* and *T. prolongatus* narrow (4.0 $<$ ratio 5.0) and in *C. aberrans* and *C. angusticercus* very narrow (ratio $>$ 5.0).



Figs. 45—46. *T. sanorum* ♀. 45. Dorsal view of tip of abdomen, showing tergum 10 and cerci. 46. Spermathecae. Scales 0.1 mm.

The subanal plate is covered with microtrichia and has a number of long hairs along the posterior edge. Its basic form is pentagonal, but quite some intergeneric and interspecific variations occurs in size, form of apex and angularity of the lateral sides (see figs. 47–64). In *Centrioncus* the subanal plate is much larger than in *Teloglabrus*. *T. trituberculatus* has a very small subanal plate. The apex varies from very obtuse (*T. milleri*) to obtuse to acute to acuminate. In *T. sanorum* the tip of the apex is split.

The spermathecae are three (2 + 1), dark brown and on long ducts. They vary in shape from round and smooth to somewhat angular or flattened and



Figs. 47–65. Ventral view of subanal plates. 47. *C. decellei*. 48. *C. angusticercus*. 49. *C. decoronotus*. 50. *C. prodiopsis*. 51. *C. aberrans*. 52. *C. jacobae*. 53. *T. trituberculatus*. 54. *T. vumbensis*. 55. *T. entabenensis*. 56. *T. stuckenbergi*. 57. *T. lebombensis*. 58. *T. milleri*. 59. *T. sanorum*. 60. *T. pelecyformis*. 61. *T. prolongatus*. 62. *T. curvipes*. 63. *T. londti*. 64. *T. tsitsikamensis*. 65. *T. australis*. All drawn to the same scale; scale 0.1 mm.

wrinkled. In how far this variation is real and in how far it depended on the preparation technique is not clear. The variation shown is anyway not so specific as in for instance the Diopsidae. On top of the spermatheca a dimple occurs which varies in size and shape, while the base is also often invaginated. Some tiny tubercles occur dispersed over the spermathecae, except for perhaps in *T. stuckenbergi*, which has a typically textured spermathecal wall. In most species the spermathecal ducts are hyaline for most of their length, except for the darker proximal ends near the spermathecae. In *C. decellei, T. trituberculatus* and *T. vumbensis* the ducts are entirely or almost entirely hyaline. The junction in the paired spermathecae is Y-shaped, except for in *C. aberrans* where it is T-shaped (fig. 154).

Egg (fig. 66).

In females of some species (*C. decellei, C. angusticercus, C. jacobae, T. entabenensis, T. pelecyformis* and *T. australis*) developing and/or developed eggs were encountered during dissection. The egg is elongate, striated and tapering towards the ends. The length is about three times the width, in *T. pelecyformis* the length was 0.9 mm and the width 0.3 mm. The microstructure of the shell (fig. 66) and the general shape of the egg are quite similar to those found in Diopsidae (see Descamps, 1957, and Feijen & Schulten, 1981).

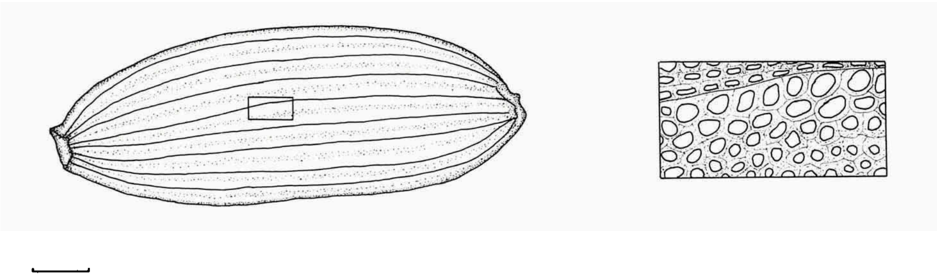
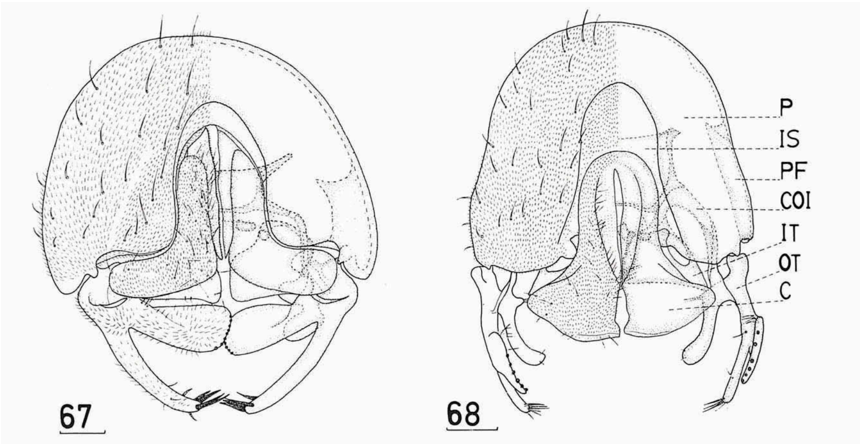


Fig. 66. Egg of *T. pelecyformis*, one section enlarged. Scale 0.1 mm.

Male postabdomen (figs. 24, 67–133).

Tergum 6 (fig. 24) has about half the length of tergum 5. Sternum 6 is about as long as tergum 6 and slightly asymmetrical, only touching sternum 7 on the left side. Terga 7 and 8 are absent. Sternum 7 is located on the left side, fused to sternum 8 with a distinct suture. Dorsolaterally sternum 7 is very narrow, ventrolaterally it is about four times as wide (fig. 24). Sternum 7 also forms a complete ventral band of sclerotization. The 6th spiracles are symmetrically situated in membrane. The 7th left spiracle is located laterally in the anterior edge of sternum 7, while the 7th right spiracle is located in the ventral

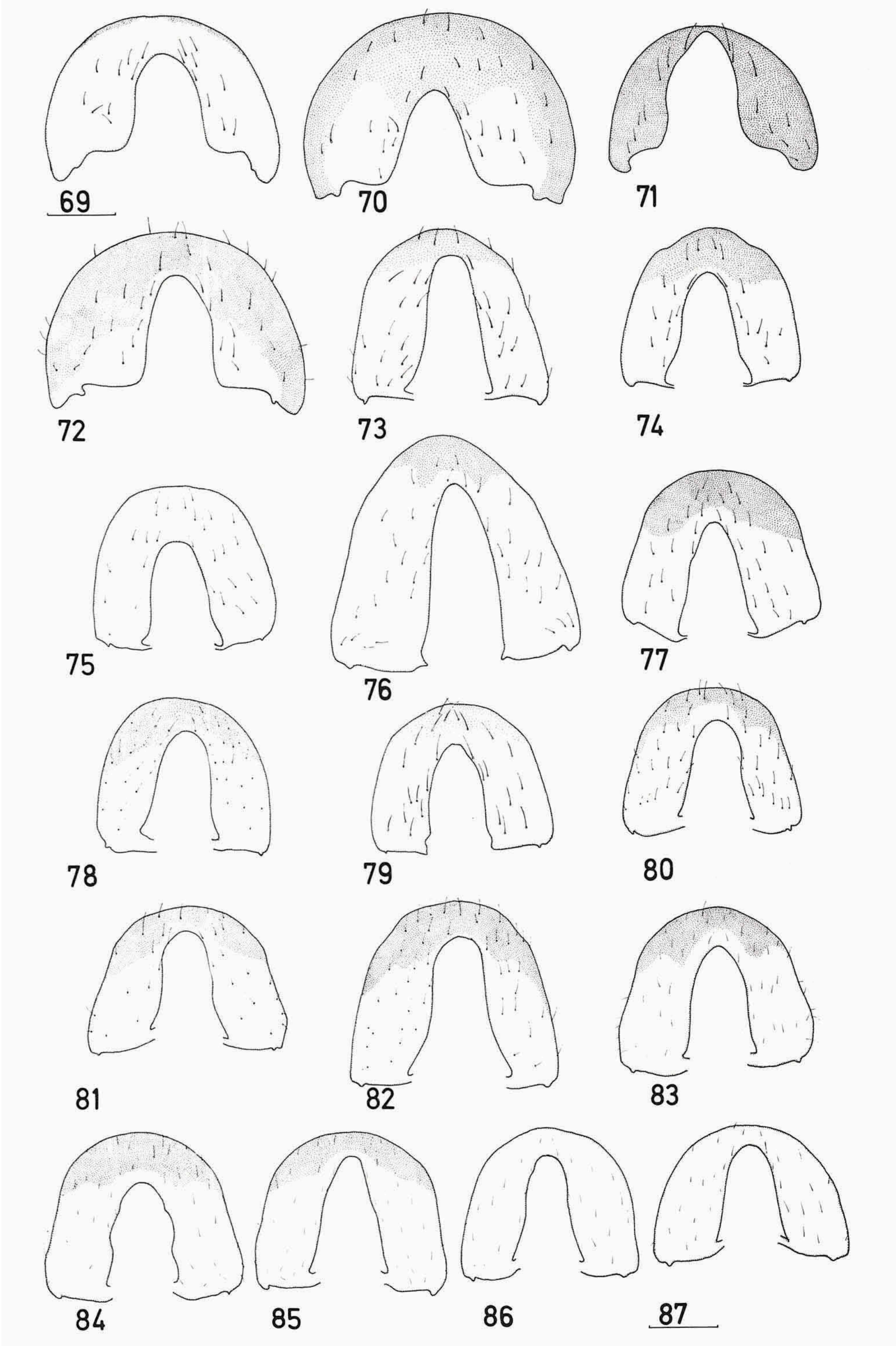


Figs. 67–68. Dorsal view of periandrium with outer telomeres and cerci, showing underlying structures on right half. 67. *T. jacobae*. 68. *T. sanorum*. Scales 0.1 mm.

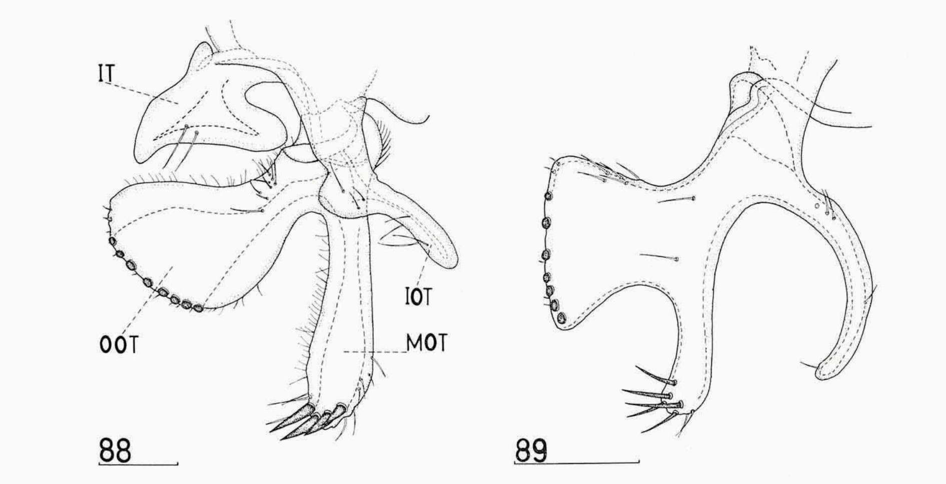
band of sclerotization. Sternum 8 is very large and in shape about a quarter of a ball (fig. 24). Segments 6, 7 and 8 have the same colour as the preceding segments of the abdomen. Sternum 8 is glossy, while the other sclerites are thinly pollinose.

The periandrium is in a strongly deflexed position, lying underneath sternum 8 to which it is equal in length. Together with sternum 8 the periandrium forms half a ball, containing the inner copulatory apparatus (fig. 24). In (morphologically) dorsal view the periandrium is broad and rounded in *Centrioncus* and more narrow and somewhat bell-shaped in *Teloglabrus* (figs. 67–87). In *T. stuckenbergi* the periandrium is more triangular in shape. The inner edge of the periandrium is somewhat typically shaped in some species (e.g. *T. curvipes*, fig. 84). The mesal gap is very small in *C. prodiopsis* (fig. 70). The periandrium is covered with microtrichia (pollinosity) and a number of short hairs. In most species it is yellowish brown with a darker basal section, but in some species it is uniform yellowish brown or brown.

The system of telomeres, interparameral structures, cerci and their respective connections is rather complicated in Centrioncidae. The periandrium bears a pair of outer telomeres articulating with its outer posterior corners (figs. 67, 68). The outer telomeres are generally deeply bifurcated, consisting of three lobes, named outer (morphologically dorsal) arm, median arm and inner (morphologically ventral) arm (figs. 88, 89). These lobes are in various ways equipped with tubercles, spinous bristles, (bristle-like) hairs and microtrichia. The inner arm is linked to the common base of the outer and median arms. In *C. decoronotus, C. prodiopsis* and *C. jacobae* the inner arm is quite detached



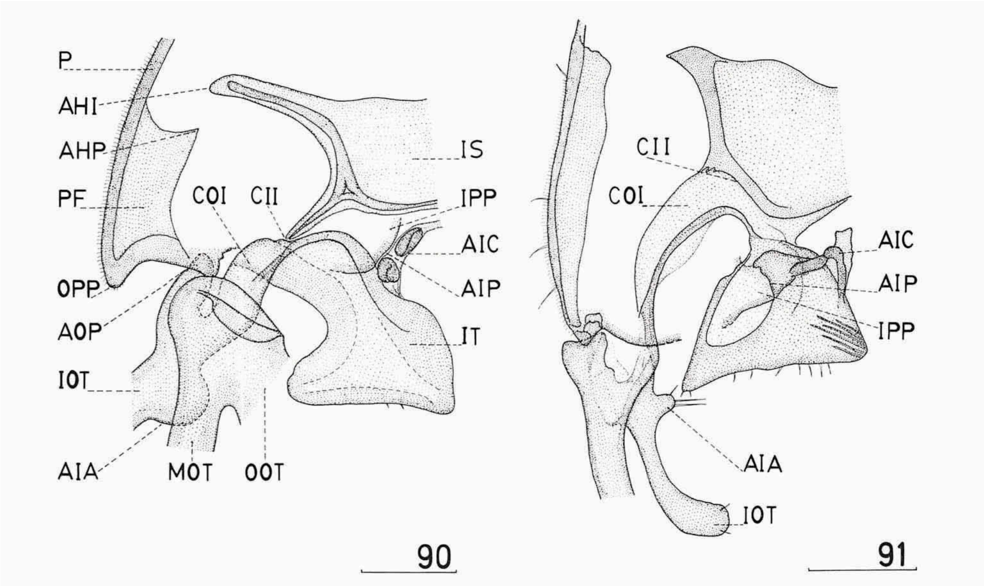
Figs. 69–87. Dorsal view of periandrium. 69. *C. decoronotus*. 70. *C. prodiopsis*. 71. *C. aberrans*. 72. *C. jacobae*. 73. *C. trituberculatus*. 74. *T. vumbensis*. 75. *T. entabenensis*. 76. *T. stuckenbergi*. 77. *T. sabiensis*. 78. *T. lebombensis*. 79. *T. milleri*. 80. *T. sanorum*. 81. *T. duplospinosus*. 82. *T. pelecyformis*. 83. *T. prolongatus*. 84. *T. curvipes*. 85. *T. londti*. 86. *T. tsitsikamensis*. 87. *T. australis*. All drawn to the same scale; scale 0.2 mm.



Figs. 88–89. Inner view of outer telomere. 88. *C. jacobae* (also showing inner telomere). 89. *T. sanorum*. Scales 0.1 mm.

from the common base of the outer and median arms (fig. 88) and also in other species often sutures are present between the inner arm and the rest of the outer telomere. Seen also some other structural differences between inner arm and the other two arms (absence of microtrichia on inner arm in those species with a pollinose outer telomere, absence of spinous bristles or tubercles on inner arm), it seems likely that only the outer and median arms and their common base are homologous with the telomere (surstylus) of other dipterous families, while the inner arm is a formation of interparameral origine, fused with the telomere.

Via a curved structure (COI, figs. 90, 91) the outer telomere (especially its inner arm) is connected to a more mesal, clasper-like structure, called the inner telomere. The pair of inner telomeres is located under the cerci, probably of interparameral origine, well sclerotized and rather varied in structure and hairiness. Functionally they seem to replace the cerci, which are membranous in centrioncids. The connection between inner and outer telomere and the inner telomere itself are linked to a large, central, plate-like structure; the interparameral sclerite (figs. 90, 91). This thinly sclerotized, more or less rectangular, sclerite has laterally and posteriorly rod-like thickenings, which might be homologous to the processus longi as found in for instance various groups of diopsids. Hennig (1976) named the interparameral sclerite a "ventrale Epandrialsklerit" and considered it to be almost certainly homologous with a 10th sternum. Interesting are Hennig's observations about a possible secondary division of the "ventrale Epandrialsklerit" into a glabrous anterior section and

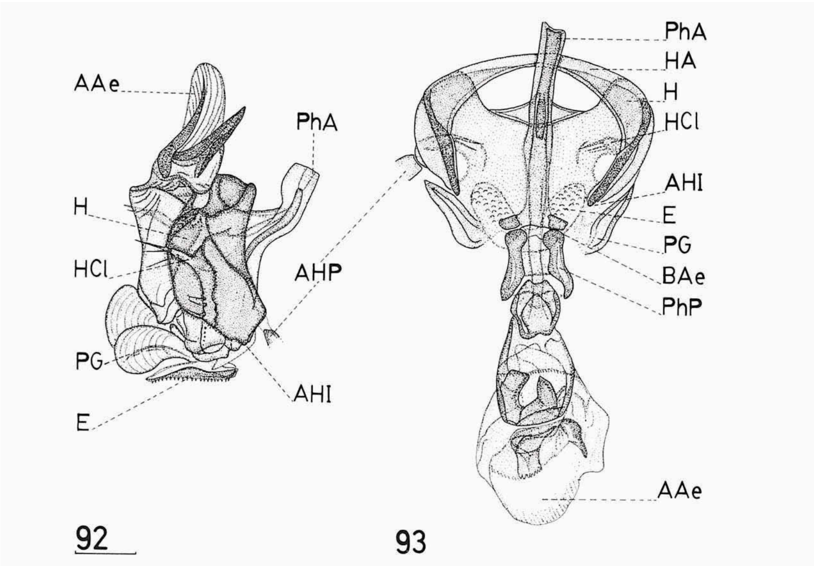


Figs. 90–91. Dorsal view of periandrial fold, interparameral sclerite, inner telomere and base of outer telomere, showing the various connections between periandrium, outer telomere, inner telomere, interparameral sclerite and cercus. 90. *C. jacobae*. 91. *T. sanorum*. Scale 0.1 mm.

a, more or less separated, hairy posterior section, as in *Platypezina connexa* Boh. (Platypezidae) and *Atelestus pulicarius* Fall. (Empididae). While not entering the discussion on the origin of the "interparameral sclerite", I think it possible that its hairy posterior section, as found in these species, is homologous to what are now called "inner telomeres" in Centrioncidae. The inner posterior corner of the periandrium articulates with, or is with a mesad extension connected to, a rather variable, heavily sclerotized system of sclerites in the basal section of the inner telomere. This same basal system is via a variable, more or less sclerotized, structure linked to the overlying cercus (figs. 90, 91).

The cercus is simple in structure, covered with microtrichia and a number of hairs. It is membranous in nature and shows up transparent in slides, reason for which it has probably been confused with the underlying sclerotized inner telomere. It has no clasper function and instead probably serves to cover the gap between the deflexed hypopygium and sternum 6 in resting position (see fig. 24). Its colour in dried specimens is whitish.

The interparameral sclerite serves as a theca for the inner copulatory apparatus. The anterior tips of the interparameral sclerite are linked to the posterior tips of the hypandrial arms (compare figs. 91 and 93). Slightly more ante-



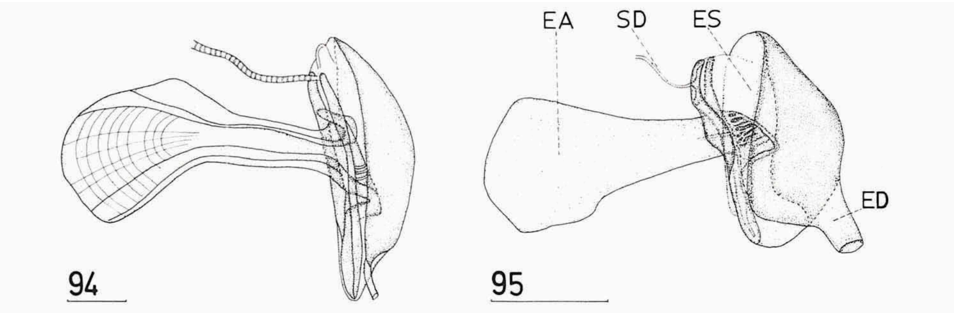
Figs. 92—93. *T. sanorum*, phallapodeme, hypandrium and aedeagus. 92. Lateral view with aedeagus in rest position. 93. Dorsal view with aedeagus in extended position. Scale 0.1 mm.

riorly the hypandrium is connected to the periandrial fold (or periandrial sclerite in *C. aberrans* and *T. trituberculatus*). The periandrial fold is an inward directed extension of the lateral edge of the periandrium, from the outer posterior corner to about halfway the anterior edge (figs. 90, 91). The periandrial fold is somewhat plate-shaped, but in two species the inner section is detached to form a separate "periandrial sclerite", only posteriorly connected to the periandrium (figs. 151 and 159).

The phallapodeme (figs. 92, 93) is slender, very small and for two-thirds of its length fused to the hypandrium via lateral extensions. The hypandrial arms are fused anteriorly under the phallapodeme and posteriorly the arms link up with the anterior ends of the interparameral sclerite. About halfway the hypandrial arms and lateroventrally the hypandrium links up with the periandrial fold or sclerite. The ventral side of the combination of phallapodeme and hypandrium is hollow and serves as a theca for the aedeagus in rest position (fig. 92). Lateroventrally there usually is a pair of small claspers provided with some terminal bristle-like hairs and some subterminal hairs, while there are also some short strong hairs near their bases. Although these clapsers are similar in structure to what are called pregonites in various families (e.g. Tachinidae s.l., see Griffiths 1972), I prefer to use the more neutral term "hypandrial clasper" as the homology of these structures is in doubt. The claspers are lacking in *C. aberrans*, a set of bristle-like hairs taking their place. Posteriorly the hypandrium carries a pair of large lateral lobes (fig. 93), which are likely to be postgonites.

In its rest position (fig. 93) the aedeagus points in a positionally dorsal (morphologically anterior) direction, resting on the interparameral sclerite and in the genital pouch (theca) provided by hypandrium, phallapodeme and hypandrial claspers. Additional support is still given by the apophysis of the inner arm of the outer telomere. From its rest position the aedeagus can swing through a wide arc into the copulatory position. The aedeagus is a rather slender, apically broadening, solid structure, about 1½ times as long as the phallapodeme. Basally there is a distinct phallophore, which is a more or less cylindrical structure, laterally heavily sclerotized (fig. 92). The phallophore bears an epiphallus, which is usually V-shaped, denticulated and with a small stem connected to the phallophore (fig. 147). The epiphallus fills the space between the base of the aedeagus and the interparameral sclerite. The aedeagus contains subapically a number of complicated, variable, heavily sclerotized sclerites. The tip of the aedeagus can be bifurcated, smooth, serrated or filamentous.

An ejaculatory apodeme and sac are present. The apodeme is usually much broader anteriorly. The sac has a well sclerotized ovoid cap (figs. 94, 95). The seminal and ejaculatory ducts are very narrow and smooth with only a fine spiralled reinforcement visible in the seminal duct. The ejaculatory duct links up with the posterior section of the phallapodeme and enters the aedeagus via the phallophore (fig. 187).



Figs. 94–95. Lateral view of ejaculatory apodeme and sac. 94. *C. jacobae*. 95. *T. sanorum*. Scales 0.1 mm (note the difference in size).

Many characters of the male postabdomen show interspecific variation and are under the most important differential characters. The position of the outer telomere is dorsolateral to dorsal in *Centrioncus*, the outer and median arms touching on the meson in *C. jacobae* (fig. 67). In *Teloglabrus* the outer telomere has a lateral position (fig. 68), even lateroventral in *T. entabenensis*. The outer telomere is deeply bifurcated in all species, except for *C. aberrans* (fig. 150). The common base of the outer and median arms varies strongly in length and width, extremes being the very short and broad base in *C. jacobae* (fig. 88), the long and slender base in *C. decoronotus* (fig. 140), the bulbous base in *C. prodiopsis* (fig. 145), the short base in *T. londti* (fig. 208), the long and broad base in *T. australis* (fig. 217) and the very long and slender base in *T. stuckenbergi* (fig. 173). The outer side of the outer and median arms is in various, specifically typical, ways covered with microtrichia in *Centrioncus* (fig. 67). In *Teloglabrus* (fig. 68) the outer telomere is glabrous, hence its name. The form of the arms is typical for each species. The outer arm is constricted at its base in most species, in *C. aberrans* (fig. 150), however, it is tapering towards the apex. The form of the outer arm varies from rounded to ovoïd to trapezoïd to rectangular to straight and slender. In *T. milleri* (fig. 185) it has a dorsal outgrowth, almost becoming a fourth arm. At the apex the

TABLE 2. Some quantitative characters of ♂ genitalia

	n*	OOT no. of tubercles	MOT no. of bristles	Inner telomere no. of long hairs	Inner telomere no. of small hairs	Inner telomere % covered with micro-trichia	IS ratio width/length
C. decoronotus	4	6.0	4.0	2.5	2	0	2.0
C. prodiopsis	2	17.0	0	3	5	0	2.5
C. aberrans	2	4.5	6.0	1	6	0	2.5
C. jacobae	12	7.6	4.0	2	10	0	2.5
T. trituberculatus	2	3.5	7.0	0	25	5	1.3
T. vumbensis	6	4.7	10.0	0	21	50	1.2
T. entabenensis	2	6.5	3.0	0	22	50	1.1
T. stuckenbergi	2	13.0	4.0	0	35	70	1.0
T. sabiensis	2	5.5	7.0	0	32	100	1.3
T. lebombensis	2	5.0	3.5	0	25	75	1.4
T. milleri	2	5.0	11.0	0	19	0	1.1
T. sanorum	24	6.9	4.4	0	18	75	1.7
T. duplospinosus	2	6.0	5.5**	0	23	75	1.8
T. pelecyformis	4	6.0	4.8	0	20	25	1.0
T. prolongatus	2	8.0	6.0	0	24	60	1.0
T. curvipes	2	6.0	5.5	0	25	50	1.4
T. londti	2	8.5	5.0	0	21	10	1.2
T. tsitsikamensis	2	5.5	4.5	0	12	60	1.5
T. australis	2	6.0	6	0	18	40	1.7

* for OOT and MOT ** 3.5 + 2.0

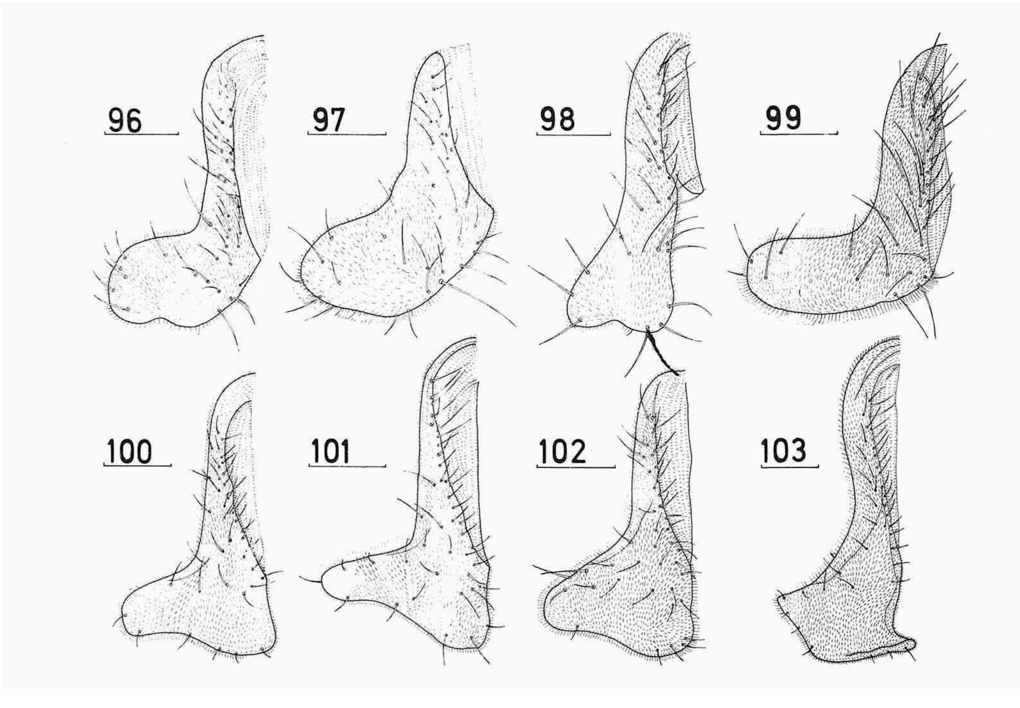
outer telomere has a row of tubercles, some tiny hairs and sometimes some small "underdeveloped" tubercles. The number of tubercles varies from 3.5 in *T. trituberculatus* to 17.0 in *C. prodiopsis* and is a useful differential character (see table 2), though there is some intraspecific variation. In the larger samples of *C. jacobae* and *T. sanorum* the means were resp. 7.6 (range 7–9, V = 0.10) and 6.9 (range 5–8, V = 0.13). Furthermore the outer arm carries a number of hairs varying in number from 1–13. In *T. stuckenbergi* there are also about ten short stout bristle-like hairs.

The median arm varies in shape from long and club-shaped to very broad to straight and slender to very short to short and strongly curved. In *C. duplospinosus* there is an additional central protuberance (fig. 190). Apically there is a number of stout, spinous bristles (except for in *C. prodiopsis*), with some additional (bristle-like) hairs. The number of fat bristles varies from 3.0 in *T. entabenensis* to 11.0 in *T. milleri* and is also a useful differential character (see table 2), though there is some intraspecific variation. In the larger samples of *C. jacobae* and *T. sanorum* the means are resp. 4.0 (range 3–5, V = 0.15) and 4.4 (range 4–6, V = 0.13). In *T. entabenensis* and *T. stuckenbergi* the stout, spinous bristles are smaller than in other species and in *T. milleri* they are particularly large. In *T. duplospinosus* they are divided in two groups, hence its name. The hairs vary in number from 1–13.

The inner arm is in *C. decoronotus, C. prodiopsis* and *C. jacobae* quite detached from the common base of the other two arms, in *C. aberrans* and *Teloglabrus* the inner arm is linked straight to the base of the others, with or without sutures and constrictions. In *T. sabiensis* there is a typical fold-like process in the axil between the inner arm and the base of the other arms (fig. 178). The gap between the inner arm and the other arms varies in size but is particularly large in *T. tsitsikamensis*. The inner arm varies from very broad to slender and from straight to curved. In *C. decoronotus* it carries two typical apophyses, in *C. aberrans* and *C. prodiopsis* one large one, in *C. jacobae* one broad one and in *Teloglabrus* one small one. The number of hairs varies from three to seven. In *C. aberrans* the inner arm has a typical dentated area.

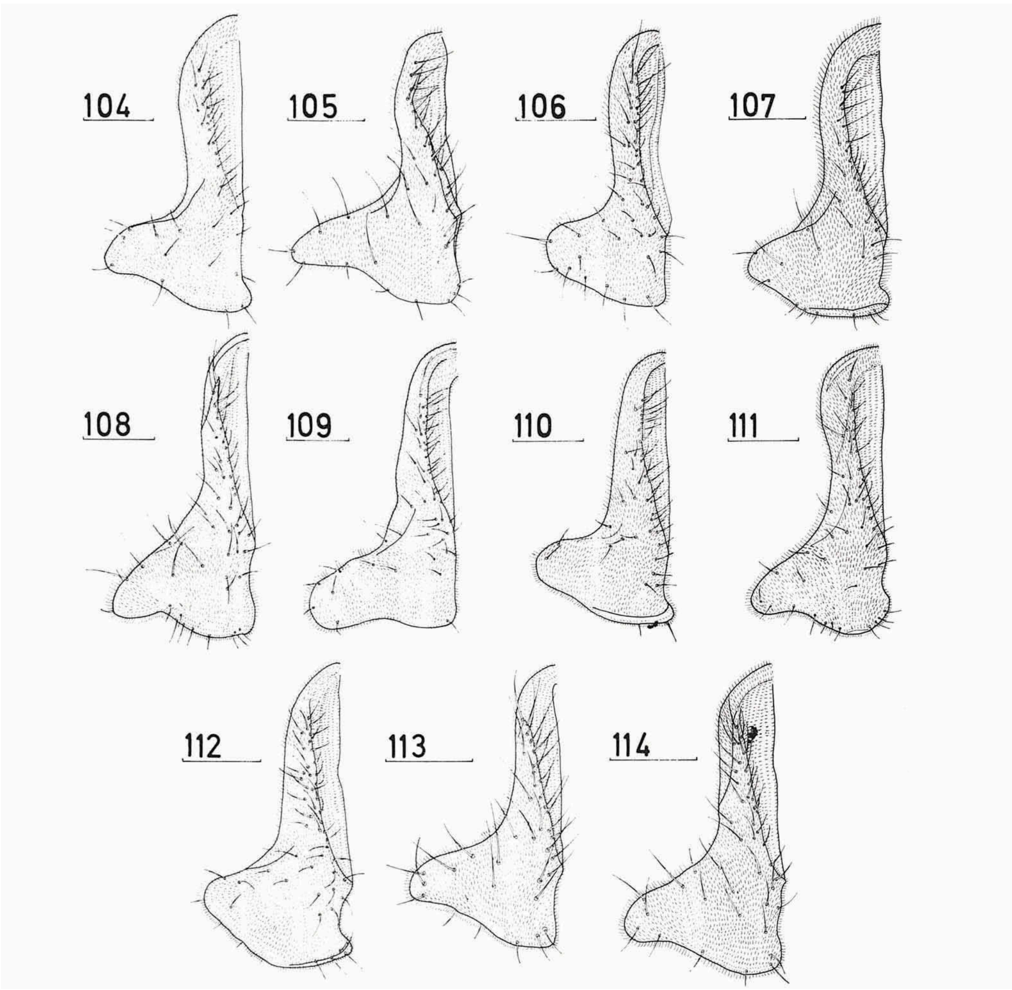
The connective band between outer and inner telomere is short in *Centrioncus*, broad and short in *T. vumbensis* and *T. milleri* and long in all other *Teloglabrus*. The inner telomere has a typical shape for each species and varies in form from rectangular to triangular to trapezoïd to oblong to ovoïd, while the form of the apical corners is often typical too. The base of the inner telomere varies from somewhat to very constricted. In *Centrioncus* there are one to three long, strong bristle-like hairs centrally on the inner side of the inner telomere and a few (two to eight) short hairs near the base and/or near the apical edge (see table 2). In *Teloglabrus* there are no long, bristle-like hairs, but a larger number of short hairs, usually divided in a series along the apical edge, a central group and a group in the mesal basal section. The number of these hairs varies from 18 to 25 for most species, with only 12 in *T. tsitsikamensis* and as much as 35 in *T. stuckenbergi*. In *Centrioncus* the inner telomere is glabrous, no microtrichia being present. In *Teloglabrus* microtrichia are always present on the inner side, except for in *T. milleri* in which the inner telomere has a typical marmorated structure. The amount of microtrichia varies from just some basal microtrichia in *T. trituberculatus* to a fully covered inner telomere in *T. sabiensis* (see table 2). In the other *Teloglabrus* the area of the inner telomere covered with microtrichia is often specific. In *Centrioncus, T. vumbensis, T. entabenensis* and *T. milleri* no ridges occur in the mesal apical corner of the inner telomere. In all other *Teloglabrus* ridges occur in that place, varying in direction (diagonal or longitudinal), number and strength.

In *Centrioncus* the inner posterior corner of the periandrium is articulating with the mesally directed, basal sclerites of the inner telomere. In *Teloglabrus*



Figs. 96–103. Dorsal view of ♂ cercus. 96. *C. decoronotus*. 97. *C. prodiopsis*. 98. *C. aberrans*. 99. *C. jacobae*. 100. *T. trituberculatus*. 101. *T. vumbensis*. 102. *T. entabenensis*. 103. *T. stuckenbergi*. Scales 0.1 mm.

the inner posterior corner of the periandrium is usually via a mesad extension linked to the centrally located basal sclerites of the inner telomere. Only in *T. stuckenbergi* and *T. milleri* there is no mesad extension, so the inner posterior corner links directly to the basal sclerites. The inner telomere is in *Centrioncus* linked to the cercus via one or two solid, simple mesad directed sclerites, the sclerites of both sides being connected via a membranous band (fig. 90). In *T.*



Figs. 104–114. Dorsal view of ♂ cercus. 104. *T. sabiensis*. 105. *T. lebombensis*. 106. *T. milleri*. 107. *T. sanorum*. 108. *T. duplospinosus*. 109. *T. pelecyformis*. 110. *T. prolongatus*. 111. *T. curvipes*. 112. *T. londti*. 113. *T. tsitsikamensis*. 114. *T. australis*. Scales 0.1 mm.

milleri (fig. 186) the inner telomere is connected to the cercus via a slender, mesad directed, basal sclerite in a way similar to that in *Centrioncus*. In all other *Teloglabrus* the rather complicated centro-basal structure is connected to the cercus via a bent, partly sclerotized, structure, first anteriorly directed, then running out posteriorly to the cercus (fig. 91). The structure is varying in size and shape.

In *C. decoronotus*, *C. prodiopsis* and *C. jacobae* (figs. 96, 97 and 99) the cerci have distally a broad lateral extension. In *C. aberrans* (fig. 98) the cerci are very slender, only slightly widening distally and carrying rather large hairs. In *Teloglabrus* (figs. 100—114) the cerci are more or less boot-shaped, especially varying in shape and size of the nose.

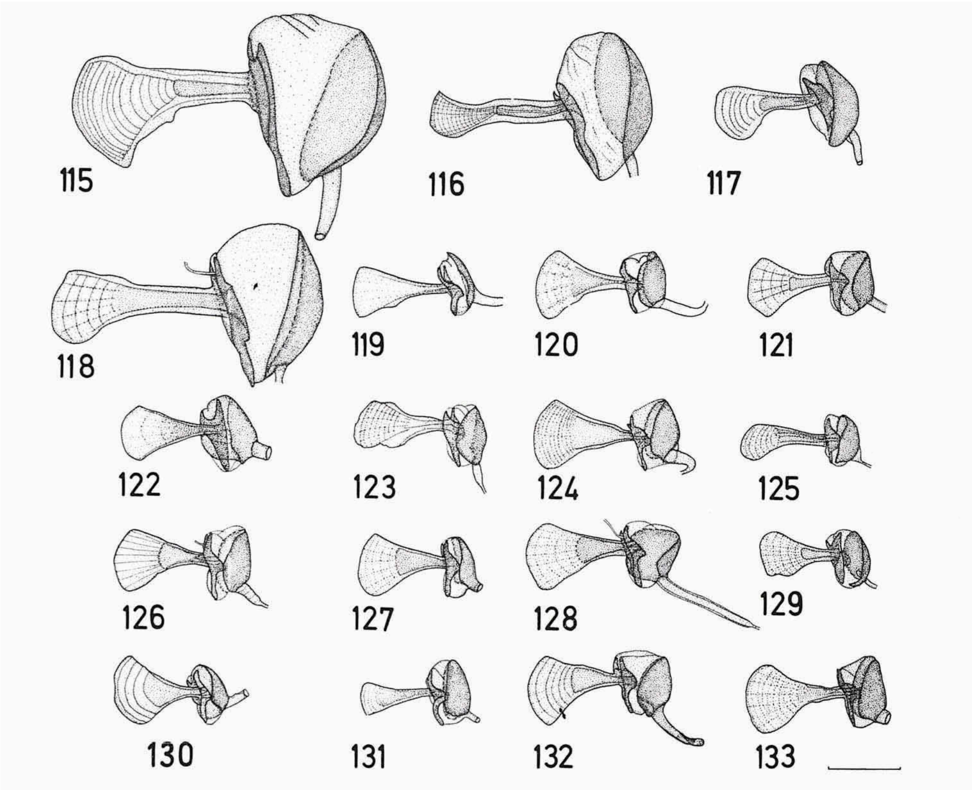
In *Centrioncus* the interparameral sclerite is very short, the ratio width/length varying from 2.0 to 2.5 (see table 2). In *Teloglabrus* the width/length ratio varies from 1.0 to 1.8. In *Centrioncus* (fig. 90) the interparameral sclerite has large lateral extensions anteriorly, while in *Teloglabrus* (fig. 91) these extensions are very small or lacking.

The periandrial fold is broad and short in *C. decoronotus* and *C. jacobae* (fig. 90) and rather broad and short in *C. prodiopsis* (fig. 146), while it is long and narrow in *Teloglabrus* (fig. 91). In *C. aberrans* (fig. 151) and *T. trituberculatus* (fig. 159) the inner section of the fold has become detached to form a periandrial sclerite, linking the outer posterior corner of the periandrium to the hypandrium.

The hypandrial clasper is absent in *C. aberrans* (fig. 152), rather short in *C. jacobae* and *T. sabiensis* and longer in all other species. In *C. aberrans* there are five strong bristle-like hairs, instead of a clasper. In *C. decoronotus*, *C. prodiopsis* and *C. jacobae* there are three strong, terminal bristle-like hairs on the clasper and no thinner subterminal hairs, whereas in *Teloglabrus* the number of fat terminal bristle-like hairs varies from one to two and the number of thinner subterminal hairs from zero to three. In the larger sample of *T. sanorum* the average number of terminal bristle-like hairs was 1.1 (range 1—2, $V = 0.29$) and of subterminal hairs 2.3 (range 2—3, $V = 0.21$).

The phallapodeme is in most species anteriorly just extending beyond the hypandrium, in *C. prodiopsis*, *C. aberrans*, *T. londti* and *T. tsitsikamensis* it is extending well beyond the hypandrium and in *T. milleri* it is distinctly shorter than the hypandrium.

The epiphallus is more or less V-shaped (fig. 93) in most species, but in *T. trituberculatus*, *T. vumbensis*, *T. entabenensis* and *T. stuckenbergi* it is broad, rather short and somewhat curved. The epiphallus is well denticulated in *Centrioncus*, *T. stuckenbergi* and *T. milleri*, being more sparsely denticulated in the other species.



Figs. 115—133. Lateral view of ejaculatory apodeme and sac. 115. *C. decoronotus*. 116. *C. prodiopsis*. 117. *C. aberrans*. 118. *C. jacobae*. 119. *T. trituberculatus*. 120. *T. vumbensis*. 121. *T. entabenensis*. 122. *T. stuckenbergi*. 123. *T. sabiensis*. 124. *T. lebombensis*. 125. *T. milleri*, 126. *T. sanorum*. 127. *T. duplospinosus*. 128. *T. pelecyformis*. 129. *T. prolongatus*. 130. *T. curvipes*. 131. *T. londti*. 132. *T. tsitsikamensis*. 133. *T. australis*. All drawn to the same scale; scale 0.2 mm.

The aedeagus is, especially apically, broader in *Centrioncus* than in *Teloglabrus*. In *C. aberrans* (fig. 152) the aedeagus has a very narrow central section. *T. trituberculatus* (fig. 160) has a particulary slender aedeagus amongst *Teloglabrus*. The phallophore is very short in *C. aberrans*, short in *T. prolongatus*, *T. londti*, *T. tsitsikamensis* and *T. australis*, rather short in *T. vumbensis* and long in all other species. The lateral, apical sections of the phallophore are acute in *Centrioncus* and more blunt to rounded in *Teloglabrus*. The subapical sclerites of the aedeagus show quite some variation. In *Centrioncus* they are especially large and some are U-shaped, in *Teloglabrus* they are variously shaped, especially the most apical one being rather specific. The tip of the aedeagus is smooth in *C. decoronotus*, *C. prodiopsis* and *C. jacobae* and rather filamentous in *C. aberrans*. In *Teloglabrus* the apex is smooth in *trituberculatus, entabenensis, duplospinosus, pelecyformis, curvipes* and *australis* and partly or completely, and superficially or deeply, serrated in the other species.

The ejaculatory apodeme in *Centrioncus* (except for *prodiopsis*) is rather straight dorsally and is ventrally much broader apically (figs. 115, 117 and 118), while it is somewhat curved in *C. prodiopsis* (fig. 116). In *Teloglabrus* the apodeme is more or less fan-shaped (figs. 119–133). In *Teloglabrus* there is some variation in size and degree of anterior broadening, but in *Centrioncus* txe difference in size is very marked. In *C. decoronotus* and *C. jacobae* the ejaculatory apodeme & sac is twice as long as in *C. aberrans* and *Teloglabrus*, reaching the gigantic size of 0.8 mm, i.e. one/seventh of the body length. The ejaculatory apodeme & sac is also very large in *C. prodiopsis*, but not as large as in *C. decoronotus* and *C. jacobae*. In *Centrioncus* the proximal section of the ejaculatory duct stands at right angles to the ejaculatory apodeme, while in *Teloglabrus* it is usually more or less in line with the apodeme.

6. Some ecological aspects

6.1. Distribution and habitat

Of the seven regional mountain systems of the Afromontane archipelago (White, 1978) six are now known to contain Centrioncidae; only for the Ethiopian system the Centrioncidae are not known. In the West African system only *C. decellei* from Ivory Coast is known. Three species occur in the Imatongs-Usambara system, *C. angusticercus* at the northern limit of the system in Southern Sudan, *C. decoronotus* in Kenya and *C. prodiopsis* in Tanzania. In the Uluguru-Mulanje system only *C. jacobae* from Southern Malawi is known. This latter species is rather closely related to *C. decoronotus* and *C. prodiopsis* from the Imatongs-Usambara system and at least as far as the Centrioncidae are concerned the Imatongs-Usambara and Uluguru-Mulanje systems cannot be considered very strongly separate systems. In the Kivu-Ruwenzori system at least two species occur, *C. aberrans* from Uganda and an as yet undescribed *Centrioncus* from Zaïre. *C. aberrans* from the Kivu-Ruwenzori system is quite different from the *Centrioncus* from the other three systems where *Centrioncus* occur (see chapter 8).

The Centrioncidae from the two southern regional mountain systems are referred to *Teloglabrus*. In the Chimanimani system *T. trituberculatus* from Mozambique and *T. vumbensis* from Zimbabwe occur, these two species form a monophyletic group, quite distinct from the other *Teloglabrus*. In the Drakensberg system thirteen species (*entabenensis, stuckenbergi, sabiensis, lebombensis, milleri, sanorum, duplospinosus, pelecyformis, prolongatus, curvipes, londti, tsitsikamensis* and *australis*) are now known from South Africa, while a probably undescribed species was sighted but not collected in Mbabane, Swaziland. However, these Drakensberg system species do not form a monophyletic group. *T. milleri* is for instance the sister-group of all other *Teloglabrus*, including the Chimanimani system species (see chapter 8).

All the Centrioncidae seem to have very limited allopatric ranges of distribution. Most species were only collected at one single place (forest). Only *C. decoronotus*, *C. jacobae*, *T. vumbensis* and *T. sanorum* were collected at more places, but even so their ranges of distribution were rather limited. For most Centrioncidae no accurate data on their habitat were available, but as a rule the Centrioncidae only seem to occur in montane forests, where they can be found on small shrubs and plants in the darker and more humid places (see also the habitat descriptions for *C. jacobae* and *T. sanorum* under, respectively, chapters 9.4 and 9.5). In *Centrioncus* only *decellei* seems to occur at a rather low altitude, all the other species occurring well above 1000 m (*angusticercus* above 1000 m, *decoronotus* between 1200 and 2350 m, *prodiopsis* between 1300 and 3500 m, *aberrans* at 1500 m and *jacobae* between 1300 and 1400 m). In *Teloglabrus* the two species of the *trituberculatus* group occur at altitudes of around to somewhat above 1000 m, while the altitudes at which the South African *Teloglabrus* were found are rather variable: *entabenensis* at 1500 m, *stuckenbergi* at 1800 m, *sabiensis* at around 950 m, *lebombensis* at 730 m, *milleri* at 1130 m, *sanorum* between 1400 and 1550 m, *duplospinosus* at 1700 m, *pelecyformis* at 1000 m, *prolongatus* at 950 m, *curvipes* at 2000 m, *londti* at 850 m, *tsitsikamensis* at 100 m and *australis* at 200 m. Although the latter two species occur in low altitude forests, these forests are considered to belong to the Afromontane region (Chapman & White, 1970). *T. stuckenbergi* seems to be the only centrioncid not occurring in, but above the rain forest. Its aberrant yellowish colour and large size might be related to this difference in habitat.

6.2. Reproduction

Gravid females were encountered in six species: *C. decellei*, *C. angusticercus*, *C. jacobae*, *T. entabenensis*, *T. pelecyformis* and *T. australis*. In several females more than 20 developing and developed eggs were found and a fecundity of between 25 and 50 eggs, as in the Diopsidae, seems likely. The gravid female of *C. decellei* was collected in March, at the start of the second rainy season in Ivory Coast. The gravid female of *C. angusticercus* was collected in

March, one month before the start of the rainy season in Southern Sudan. The gravid females of *C. jacobae* were collected in December and January, the first months of the rainy season in Malaŵi, while the females collected in other months did not have eggs. The gravid female of *T. entabenensis* was collected in January, in the first half of the rainy season and the gravid female of *T. pelecyformis* was collected in September, a month before the start of the rainy season. The gravid female of *T. australis* was collected in October, no distinct rainy season occurring in the Knysna forest. The teneral specimens studied were collected in July (*C. decoronotus*), January (*C. prodiopsis* and *T. vumbensis*), February (*T. sanorum*) and December (*T. sabiensis*), so with the exception of *C. decoronotus* all in the first half of the rainy season. The rate of parasitism by Laboulbeniales of *C. jacobae* was 0% in February and increased up to the beginning of January to over 60%. Data on other species also indicate that Laboulbeniales were most common at the end of the dry season and at the beginning of the rainy season. All these data indicate that the Centrioncidae start laying eggs at the end of the dry season, continuing to do so into the beginning of the rainy season. A change of generation takes place before the first half of the rainy season has come to an end. The geographic isolation of Centrioncidae species is probably enhanced by the fact that reproduction starts in the dry season, before the advent of the rainy season. No, or almost no, dispersal of gravid females will take place in the humid conditions of the rainy season. (In for instance the Diopsidae many species confined to rain forest in the dry season, leave the forest in the rainy season when reproduction starts.)

6.3. Fungal parasites

In the Diopsioinea no Laboulbeniales have yet been recorded for the Syringogastridae and up till now for *Centrioncus*. For the Diopsidae 15 Laboulbeniales have so far been described (Thaxter, 1896, 1900, 1901, 1918 and 1931). These species were divided over the genera *Laboulbenia* Robin (1), *Stigmatomyces* Karsten (5) and *Rhizomyces* Thaxter (9). The single *Laboulbenia* species had *Diopsis* as host, while the *Stigmatomyces* species and *Rhizomyces* species were found on *Diopsis* and *Diasemopsis*. *Laboulbenia* spp. are now known to occur only on *Diopsis* with a brownish abdomen (Feijen, 1978 and unpublished data). *Stigmatomyces* spp. occur on *Diopsis, Diasemopsis, Diopsina* and *Sphyracephala*, while *Rhizomyces* spp. are found on *Diopsis* and *Diasemopsis*. *Laboulbenia* is a very large and varied genus with species occurring on many Coleoptera families, on Isoptera, Hymenoptera, Diptera and Mesostigmata (Thaxter, 1908). Amongst Diptera *Laboulbenia* seems to be limited to the

Diopsidae. *Stigmatomyces* mainly occurs on dipterous families and further on a few Coleoptera families, while *Rhizomyces* is only known from the Diopsidae (Thaxter, 1931).

As *Rhizomyces* has now also been found on a number of the Centrioncidae, this genus will be discussed in some more detail. Thaxter (1931) considered the name of this genus a misnomer to some extent since only five of its nine species resemble the type of the genus in penetrating the thinner integument on the inferior side of the abdomen by means of a rhizoidal apparatus. These five species (*ctenophorus, gibbosus, circinalis, cornutus* and *cucullatus*) only occurred on species of *Diopsis*. The other four species (*crispatus, confusus, gracilis* and *kamerunus*) are only known to occur on species of *Diasemopsis* and develop a typical blackened foot, like that of the vast majority of Laboulbeniales. Thaxter linked this character to the occurrence on harder and thicker parts of the host's integument. Amongst the many Diopsidae examined I indeed found the representatives of the *ctenophorus* group only on *Diopsis*, while representatives of the *crispatus* group were only found on *Diasemopsis* (of both groups a number of species remain to be described). One species found on *Diasemopsis* had instead of the typical, wedge-shaped blackened foot, a typical ball-shaped transparent foot, so this species might still form a third group. Whether the explanation of Thaxter for the difference in basal structure of the *ctenophorus* group and of the *crispatus* group (i.e. the species with a rhizoidal apparatus penetrating the thinner integuments and the ones with a simple wedge-shaped foot attacking the thicker integuments) is that simple, remains to be seen. Interesting is anyway that the species of the *ctenophorus* group only occur on the abdomen of *Diopsis*, especially on the ventral side of the 1st and 2nd segment, in between syntergum and tergum 3 and on the tip of the postabdomen, all of which can be considered "easily penetrable" places. The species of the *crispatus* group occurring on *Diasemopsis* are much less location specific and can be found on the eyestalks, scutum, scutellar spines, legs, wings, ventral side of 1st and 2nd abdominal segment and in between terga 3 and 4. In the first four locations the integument can certainly be considered harder and thicker, but in the case of the wings this is dubious, while the last two locations are identical or comparable with the locations of the *ctenophorus* group.

The *Rhizomyces* spp. found on the Centrioncidae all belonged to the *crispatus* group. An interesting question is why the representatives of a well-defined group as the *crispatus* group of *Rhizomyces* should have a distribution limited to the Centrioncidae and *Diasemopsis*. Various *Diasemopsis*, like *aethiopica* (Rondani) and *sylvatica* Eggers, occur during at least part of the year in the same habitat as the Centrioncidae, but this is also true for some *Diopsis* species like *fumipennis* Westw., *absens* Brunetti and especially *phlogodes* Hendel, which are parasitized by *Rhizomyces* of the *ctenophorus* group. The exact placing of *Diasemopsis* in Diopsidae, with its actual subdivision in two subfamilies, anyway still has to be considered (see also chapter 7) and the occurrence of the *crispatus* group is just one more indication for its special position. Interesting will also be to know which Laboulbeniales occur on Asian diopsids. Laboulbeniales from these flies have not yet been examined, but their presence can already be confirmed.

In Centrioncidae *Rhizomyces* were encountered in *C. decellei, C. prodiopsis, C. jacobae, T. trituberculatus, T. vumbensis, T. sanorum. T. duplospinosus, T. pelecyformis. T. curvipes* and *T. australis*, which indicates that they can probably be found on all the Centrioncidae. As already mentioned before (chapter 6.2) the rate of parasitism increased up to the first period of the rainy season, followed by a sharp decline, indicating a change of generation of the host. The number of parasitized flies examined (34) is too low to draw firm conclusions, but it seems anyway likely that more males are parasitized than females (see chapter 8.4 under *C. jacobae*). In females fungi were only found on the wings, while in males they were found on the wings and/or the ventral side of the 1st and 2nd abdominal segment and once on a leg. The *Rhizomyces* encountered on the wings were twice as common on the right wing as on the left wing, a type of specificity that is also quite common in other Laboulbeniales.

How many *Rhizomyces* species were found on Centrioncidae cannot yet be said, but it seems more than likely that at least the species parasitizing *Centrioncus* and *Teloglabrus* are not conspecific. The fungi from *Centrioncus* are over twice the length of those from *Teloglabrus*, with a much longer stalk-cell and appendage. The appendage in *Rhizomyces* from *Centrioncus* has an axis with about 14 cells, while those from *Teloglabrus* have about eight cells. The average numbers of antheridia per branch are also higher in the fungi from *Centrioncus* (especially those from *C. jacobae*). The *Rhizomyces* spp. found do not seem to be conspecific with any of the four described species of the *crispatus* group, but they are certainly more related to *Rhizomyces gracilis* than to the other three species.

7. Phylogenetic relationships within the Diopsioinea

In table 3 an enumeration of character states in Syringogastridae, Centrioncidae and Diopsidae is given. The morphological analysis of the characters considered is based on Do Prado's (1969) and Griffiths' (1972) studies on the

Syringogastridae, the morphological studies on the Centrioncidae presented in this paper, and my (largerly unpublished) studies on the Diopsidae. The phylogenetic evaluation of the character states is primarily based on Hennig's (1958, 1965) and Griffiths' work.

TABLE 3. Distribution of some character states among the families of Diopsioinea. Synapomorphous and autapomorphous conditions are underlined, 0 indicates a plesiomorphous condition, (0) a condition secondarily lost in one or more subgroups and (1) an apomorphous condition 1 an apomorphous condition only present in one or more subgroups

Character	Plesiomorphous state – 0	Apomorphous state – 1	Syringo-gastridae	Centrion-cidae	Diop-sidae
Head					
1 Eyestalks	absent	present	0	0	1
2 IVB	present	lost	1	1	0 (1)
3 FOB	several	one or more	1	1	0 (1)
4 PV	present	lost	1	1	1
5 OC	present	lost	0(1)	1	0(1)
6 Arista	plumose	glabrous	0	0	1
7 Arista	tripartite	bipartite	?	0	0 (1)
8 Funiculus	straight	ventrally extended	1	1	0
Thorax					
9 Scutellar spines	absent	present	0	1	1
10 Metapleural spines	absent	present	0	0	1
Wing					
11 Alula	present	lost	1	0	0 (1)
12 V5 reaching margin	yes	no	1	0	0 (1)
13 V6 reaching margin	yes	no	1	0	1
14 DCr	complete	reduced	0 (1)	1	1
–a	relicts	absent	–	0	1
Legs					
15 Femur 1	slender	incrassate	0	1	1 (0)
16 Femur 3	slender	incrassate	1	0	0
17 Tubercles on F1	absent	present	1	1	1
18 Tubercles on F3	absent	present	1	1	0
19 Subapical bristle tibia 2	absent	present	1	0	0
Preabdomen					
20 Syntergum T1 + T2	absent	present	1	1	1
21 Syntergum incl. T3	no	yes	1	0	0 (1)
22 Suture syntergum	present	lost	0	1	0 (1)
23 1 Sp in tergum	no	yes	1	0	0

TABLE 3 (continued)

Female postabdomen					
24 6 Sp in tergum	no	yes	1	0	0
25 7 Sp in tergum	no	yes	1	1 (0)	0 (1)
26 Segment 7 with basal ring	no	yes	0	1	0
27 Sternum 8	present	absent	?	0 (1)	1
28 T9 and St9	undivided	divided	?	1	0 (1)
29 Spermathecae	3	2	0 (1) ?	0	0 (1)
Male postabdomen					
30 Tergum 6 reduced	no	yes	0	1	1
31 Sternum 6 divided	no	yes	1	0	0 (1)
32 6 Sp in tergum	no	yes	1	0	0
33 Vestiges T7 and T8	present	lost	1	1	1
34 St7 with complete ventral band	no	yes	1	1	0
35 7Sp in sclerite	no	yes	1	1	0
36 St8 enlarged	no	yes	0	1	0
37 OT three-lobed	no	yes	0	1	0
38 OT with tubercles and spinous bristles	no	yes	0	1	0
39 Inner telomere	absent	present	1	1	0
40 Cerci membranous	no	yes	0	1	0
41 Phallapodeme reduced	no	yes	1	1	0
42 Phallapodeme free from hypandrium	yes	no	0	1	1
–a PhA and hypandrium linked via process	no	yes	0	–	1
–b 2/3 of PhA fused with hypandrium	no	yes	0	1	–
43 Aedeagus	long	short	1	1	1
44 Hypandrial claspers	present	secondarily lost	0	0 (1)	1
45 Postgonites well developed	yes	no	0	0	1

The following observations have to be made regarding the character states considered in table 3.

Characters 2–5. In *Diopsina* the fullest complement of head bristles occurs, OVB, IVB, OC and various FOB being present. This proves that reduction of head bristles, except for perhaps PV, took place after the development of eyestalks (see also chapter 2). In the other Diopsidae only an OVB and an IVB are present, the latter often being reduced and sometimes absent. In the Syringogastridae only an OVB occurs and in some of its species a weak OC, while in the Centrioncidae only an OVB and an FOB are present. The absence of PV appears a synapomorphous condition of the three families, but the possibility of parallelism should not be excluded.

Characters 6–8. The arista is clearly plumose in the Syringogastridae and the Centrioncidae and glabrous in the Diopsidae, remnants of former pubescence still being visible in the Sphyracephalinae (figs. 4–6). The arista is tripartite in the Centrioncidae and all Sphyracephalinae and bipartite in all Diopsinae. However, in the form of the antennal segments and the distribution of chaetae, the Sphyracephalinae and the Diopsinae are very similar (figs. 5, 6), while the funiculi have a very similar aspect in the Syringogastridae and the Centrioncidae.

Characters 9, 10. Given the number of synapomorphies in the Syringogastridae and the Centrioncidae, not shared by the Diopsidae, it seems likely that the development of scutellar spines in the Diopsidae and the Centrioncidae rests on homoplasy. It should also be noted that in various diopsids (*Sphyracephala* and some *Diasemopsis*) the scutellar spines are very small and underdeveloped, which might represent a more plesiomorphous condition (considered a secondary state by Hennig, 1958). The metapleural spines of the Diopsidae should not be homologized with the metapleural callus of the Centrioncidae (see chapter 2). The form of the metapleuron in the Syringogastridae has not been described.

Characters 11–13. An alula is present in the Centrioncidae and the Sphyracephalinae. The 5th vein does not reach the margin in the Sphyracephalinae, but reaches the margin in many *Diopsis*. The 6th vein is absent in the Diopsinae and does not reach the margin in the Sphyracephalinae.

Characters 15–18. In the Diopsidae and the Centrioncidae there are double rows of tubercles on the front femur and in the Syringogastridae a single row is present. In the Syringogastridae there is a double row of tubercles on the hind femur, while in the Centrioncidae a single row is present with occasionally remnants of a second row. In the Syringogastridae the hind femora are incrassate and in the Centrioncidae and the Diopsidae the front femora. I consider the latter characters less important than the presence or absence of tubercles, seen also the fact that in various groups of the Diopsidae secondarily slender front femora occur. An interesting alternative hypothesis can be found in a combination of characters present in the Baltic Amber species *Palaeotanypeza spinosa* Meunier. Hennig (1965) placed this species in the Megamerinidae, which at that time still included the genus *Syringogaster*, and indicated the possibility of it being the stem species of all recent Megamerinidae. In *P. spinosa* hind and front femora are both incrassate and both carry double rows of tubercles. Its presence in Baltic Amber excludes the possibility of it being a representative of the stem group of Diopsioinea, but the possibility of it being a representative of the sister-group of Diopsioinea cannot be ruled out. In that case the presence of slender front femora in the Syringogastridae and slender hind femora in the Centrioncidae and Diopsidae and the absence of tubercles on the hind femora of the Diopsidae could be considered secondary conditions.

Characters 20—22. In the Centrioncidae and various genera of the Diopsidae the suture in the syntergum is no longer visible, while in the Syringogastridae and some genera of the Diopsidae tergum 3 is also included in the syntergum. In both cases these identical character states probably rest on parallelism (see also chapter 2).

Character 25. The 7th spiracle lies in tergum in the Syringogastridae and *Centrioncus* and in membrane in *Teloglabrus* and the Diopsidae. The condition in *Teloglabrus* is thought to be secondary, consequent upon reduction of tergum 7 and sternum 7, which show a more plesiomorphous state in *Centrioncus.*

Character 27. Sternum 8 is present as a large single sclerite in *Centrioncus* and as two small sclerites in *Teloglabrus*, being completely absent in some species of the latter genus, in all the Diopsidae and probably also in the Syringogastridae.

Character 28. Tergum 9 and sternum 9 are each divided into two longitudinal sclerites in all Centrioncidae, but in the groundplan of the Diopsidae these sclerites are undivided though they are divided in some *Diasemopsis* and some *Sphyracephala* and semi-divided in still other genera.

Character 29. Do Prado (1969) found only one pair of spermathecae in his various *Syringogaster* species, while Hennig (1958) claimed three spermathecae for *Syringogaster brunnea* (though only illustrating the pair). In the Centrioncidae there are always three spermathecae. In the Diopsidae there are usually three spermathecae, but in a *Cladodiopsis* species a small fourth spermatheca developed on the stem with paired spermathecae and in *Diasemopsis* there are always two single spermathecae. Interesting is that in the Syringogastridae reduction from three to two spermathecae took place through loss of the single spermatheca, leaving the paired spermathecae, and in the Diopsidae through loss of one of the paired spermathecae, leaving two single spermathecae.

Character 30. In the Syringogastridae tergum 6 is about as long as tergum 5, while in the other two families it is about half as long as tergum 5, which must represent a parallel development.

Character 31. Sternum 6 forms two small sclerites in the Syringogastridae (as sternum 5), but is a single sclerite in the Centrioncidae and most Diopsidae, except for *Sphyracephala* in which also two small sclerites are present.

Characters 34—36. In the Syringogastridae sternum 7 forms a complete ventral band of sclerotization, fused with narrow sternum 8 (sometimes with fusion line indicated by visible suture on left side), with the 7th spiracles lying within the ventral band (Griffiths, 1972) or laterally within the "tergito" (Do Prado, 1969). In the Centrioncidae sternum 7 forms a complete ventral band of sclerotization, with expanded area on left side where its fusion with the large sternum 8 is indicated by a visible suture, while the 7th left spiracle is within sternum 7 and the 7th right spiracle within the ventral band. In the Sphyracephalinae sternum 8 forms a very reduced dorsal sclerite, while in the Diopsidae sternum 8 is a rather "normal" sized dorsal sclerite with a short band-like extension on the left side, probably homologous with sternum 7. The 7th spiracles are symmetrically in membrane. This condition in the Diopsidae represents a normal synapomorphous groundplan condition in Muscoidea (see also chapter 2).

Characters 37, 38. These characters represent autapomorphous conditions for the Centrioncidae. It is interesting to note the similarities for these characters between the Centrioncidae and the Phaeomyinae (Sciomyzidae) (see Rivosecchi, 1980).

Characters 39, 40. The situation in the Syringogastridae was by Do Prado (1969) described as "Internamente e lateralmente, unindo-se ao nono tergito, há um par de pinças fálicas, que se articulam com os forcipes; mais internamente há trés peças quitinosas articuladas que formam um « V » inverto, ligadas por uma membrana, e também articuladas com a base do pênis; consideramos essas peças como um segundo par de pinças fálicas." This situation is fully comparable with the conditions found in the Centrioncidae (see chapter 5). Do Prado's "pinças fálicas" are named inner telomeres in this paper and the other structures described by him represent the interparameral sclerite ("membrana") with laterally rod-like thickenings. Griffiths (1972) did not refer to inner telomeres (also not in the case of the Centrioncidae) and mentioned the absence of interparameral sclerites. Inner telomeres and a plate-shaped interparameral sclerite are absent in the Diopsidae, where only a more or less rod-like (broader in the Sphyracephalinae) processus longi may be found. In the Centrioncidae the cerci have lost their clasper function and turned membranous, their clasper function taken over by the underlying inner telomeres. However, in the Syringogastridae the cerci remained sclerotized.

Characters 41, 42. In the Syringogastridae the phallapodeme is free from the hypandrium, more or less rod-like and rather small. In the Centrioncidae the phallapodeme is very small, about as long as the aedeagus, more or less rod-like and posteriorly for two-thirds of its length fused to the hypandrium via lateral extensions. In the Diopsidae the phallapodeme is large, several times longer than the aedeagus, of various, generically typical, shapes and at about halfway its length linked to the hypandrium via a ventral process or pair of ventral processes.

Character 43. In the Syringogastridae the aedeagus is relatively short and according to Do Prado's (1969) illustrations a solid structure, differentiated in the distal third. This condition is quite similar to the one described for the Centrioncidae, though the aedeagus in the Centrioncidae is still smaller. The structure in the Diopsidae is very different, but the aedeagus in this family is also small, which might represent a synapomorphous condition of the Diopsioinea. In the Diopsidae the aedeagus is an open, delicate structure, basally there is an open ring to which dorsally the main sclerites and stylets are attached and ventrally some secondary stylets. The basal ring is only ventrally connected to the hypandrium. Whether the condition in the Syringogastridae and the Centrioncidae represents the more plesiomorphous condition in Diopsioinea or whether it has evolved in a different direction from that in the Diopsidae is difficult to say. The condition in the Diopsidae should anyway be considered highly apomorphous amongst Muscoidea.

Character 44. Hypandrial claspers ("pregonites") with bristle-like terminal hairs are according to Do Prado's (1969) figure 14 present in the Syringogastridae, though Griffiths' (1972) figure 80 does not show them. In the Centrioncidae claspers with bristle-like terminal hairs are present in all species except for *C. aberrans* in which they must secondarily have been lost. In the Diopsidae these claspers, which serve to hold the aedeagus in its resting position are not present. Instead, the aedeagus in resting position locks into a posterior structure of the hypandrium, from which it is rather difficult to disentangle during preparation of the slides.

Character 45. Both in the Centrioncidae and the Syringogastridae large postgonites are present. In the Diopsidae it is difficult to indicate which structures are homologous with postgonites, but it is possible that in these flies they are involved in the posterior locking device of the hypandrium.

A number of the characters and their respective states listed in table 3 were used to construct the phylogenetic tree of Diopsioinea presented in fig. 134. The sister-group relation between the Syringogastridae and the Diopsidae s.l., proposed by Griffiths (1972) is now reduced to a sister-group relation between the Syringogastridae and the Centrioncidae, while the Diopsidae s.s. might be considered a sister-group of the Syringogastridae and the Centrioncidae. Seen the list of synapomorphous conditions (2, 8, 18, 25, 34, 35 and 39) I do not doubt the monophyly of the group consisting of the Syringogastridae and the

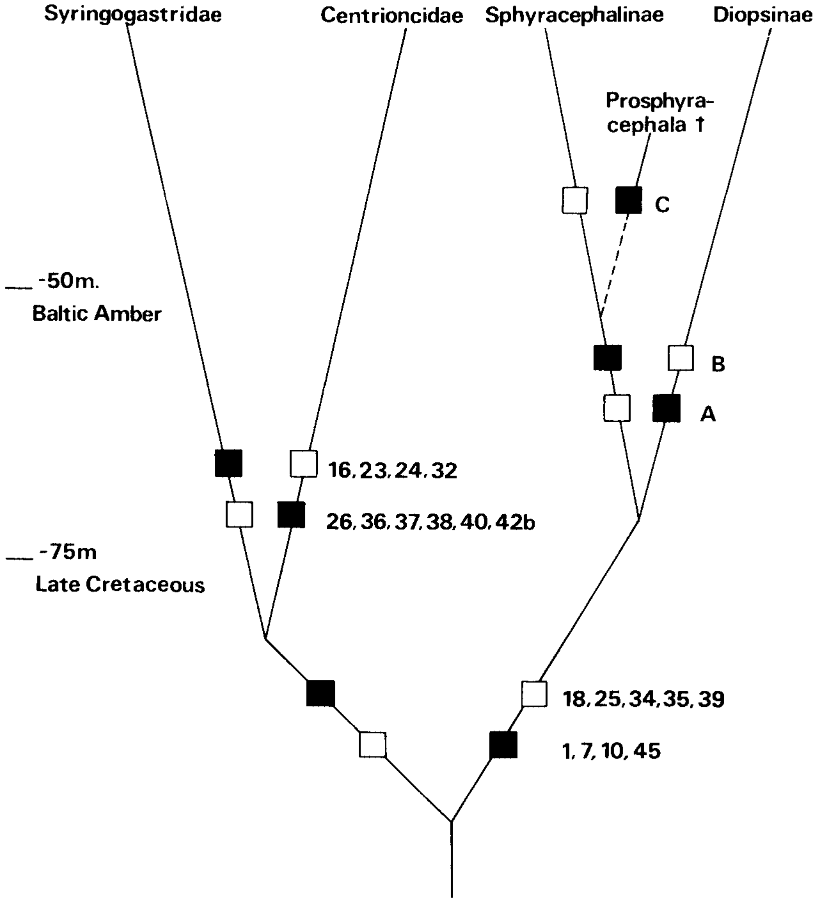


Fig. 134. Phylogenetic relationships within the Diopsioinea. Numbers refer to character states mentioned in table 3. The division of the Diopsidae in two subfamilies has a provisional character. Apomorphous conditions are: A) bipartite arista, absence of alula and 6th vein, B) absence of tip of 5th vein and reduced sternum 8 (♂), C) loss of NP. *Prosphyracephala* is not necessarily the sister-group of all other Sphyracephalinae, its place has only been indicated for dating purposes. The times of divisions shown represent minimal ages.

Centrioncidae. Whether the prefamily Diopsioinea is a truly monophyletic group and consequently the Diopsidae s.s. a sister-group of the Syringogastridae and the Centrioncidae leaves still room for some doubts. Various of the synapomorphous conditions of Diopsioinea (17, 20 and 33) are good indications for the monophyly of Diopsioinea and the occurrence of a number of important parallel developments in its families should also be noted. Just as well I think it possible that closer studies (especially of genitalia) of subgroups of related prefamilies (Micropezoinea, Sciomyzoinea) and the increase of studies of Amber material might still yield surprises.

As has been shown above (chapter 2) the existence of *Prosphyracephala succini* in Baltic Amber (late Eocene, early Oligocene) indicates the coeval existence of other Sphyracephalinae and Diopsinae. A further Sphyracephaline, *Prosphyracephala rubiensis* Lewis, 1971, has been described from a compression fossil from North American Oligocene, though Lewis' reasons for including it in *Prosphyracephala* (structural similarity, contemporaneity) are not valid, so it could just as well be included in *Sphyracephala*. The division of the Diopsidae into Sphyracephalinae and Diopsinae therefore dates back to at least (early) Eocene and an eventual division of Diopsioinea into the stemgroup of the Syringogastridae and the Centrioncidae and the stemgroup of the Diopsidae must date back still earlier. Given the Neotropical distribution of the Syringogastridae and the Afrotropical distribution of the Centrioncidae and given the presumed minimal age of the Diopsidae it seems likely that the division into Syringogastridae and Centrioncidae coincided with (or antedated) the separation of South America and Africa, which occurred about 75 million years ago.

The large number of autapomorphous conditions of both the Syringogastridae and the Centrioncidae and the early, presumed date (late Cretaceous) of splitting up of these sister-groups, gives no reason to contemplate joining these two families in one family. The splitting up in fig. 134 of the Diopsidae in Sphyracephalinae and Diopsinae has mainly been shown to illustrate the argumentation for the determination of age of the Diopsioinea and has a provisional character. The place of the genera *Diasemopsis* and *Diopsina* in the subgroups of the Diopsidae for instance still has to be elucidated. Furthermore *Prosphyracephala* should not be considered the sister-group of all other *Sphyracephala*, its splitting off has only been shown for the timing argument.

8. Phylogenetic relationships within the Centrioncidae

The Centrioncidae can be divided into two genera, *Centrioncus* occurring north of the Zambesi and *Teloglabrus* occurring south of the Zambesi. In table 4 an enumeration of character states in *Centrioncus* and *Teloglabrus* is given, which serves as phylogenetic base for the separation of these genera. For quite a number of characters, distinctly different in both genera (e.g. size of subanal plate, form of periandrium, shape of interparameral sclerite, shape of periandrial fold, presence of membranous band between inner telomeres), it could not be established which, if any, form represents the more apomorphous state. Seen the fact that most plesiomorphous conditions, recognized as such, occur in *Centrioncus*, it seems likely that for most of these characters the condition found in *Centrioncus* represents the more plesiomorphous state.

The following observations can be made regarding the character states mentioned in table 4.

TABLE 4. Plesiomorphous and apomorphous conditions in *Centrioncus* and *Teloglabrus*

Character	Plesiomorphous state – 0	Apomorphous state – 1	*Centrioncus*	*Teloglabrus*
1 CC covered with microchaetae	yes	no	1	0 (1)
2 Subcostal cell	present	absent	1	0 (1)
3 V5 abruptly thinner distally	no	yes	0	1
4 Sutures in basal ring segment 7 (♀)	present	lost	0 (1)	1
5 7th spiracle	in tergum	secondarily in membrane	0	1
6 St7 (♀) reduced and divided	no	yes	0	1
7 St8 (♀) reduced and divided	no	yes	0	1
8 OT glabrous	yes	no	0	1

(1) The costal cell is covered with microtrichia in most *Teloglabrus* and wholly or partially glabrous in *Centrioncus*, *T. trituberculatus* and *T. vumbensis*. The latter two species also have large glabrous sections in other cells and it is likely that the same condition for the costal cell rests on parallelism. These two species in fact share still more conditions with *Centrioncus*, which are likely to rest on parallelism, probably influenced by identical (high temperature) ecological circumstances (see below).

(2) The subcostal cell is absent in *Centrioncus, T. sabiensis* and some *T. trituberculatus* and *T. sanorum*, while in the other *Teloglabrus* it is just visible to very distinct.

(4) These sutures, indicating the place of fusion between tergum and sternum, are lost in *Teloglabrus* and in *C. decoronotus* and *C. prodiopsis*.

In *Centrioncus* the male genitalia of *decellei* and *angusticercus* are not yet described and various species (e.g. *Centrioncus* sp. from Zaïre) doubtlessly still await description. Just as well it seems already possible to postulate a sister-group relationship between *C. aberrans* (and probably the Zaïre *Centrioncus* sp.) on the one hand and all other *Centrioncus* on the other hand. In table 5 an enumeration of character states in *C. aberrans* and the other *Centrioncus* is given, which serves as base for the assumption of a sister-group relationship. As far as the other *Centrioncus* are concerned table 5 is mainly based on the three species (*decoronotus, prodiopsis* and *jacobae*) for which the male genitalia are known, but the apomorphous occurrence of a U-shaped female sternum in these three species and in *angusticercus* and *decellei* is a strong argument for the monophyletic origine of these five species. As zoogeographic argument can also be indicated the occurrence of *decellei* in the West African regional system of the Afromontane archipelago and of *angusticercus, decoronotus, prodiopsis* and *jacobae* in the weakly separated Imatongs-Usambara and Uluguru-Mulanje regional systems, while *aberrans* occurs in the Kivu-Ruwenzori regional system. The following observations can be made regarding the character states mentioned in table 5.

TABLE 5. Plesiomorphous and apomorphous conditions in *C. aberrans* and other *Centrioncus* (♂ characters for the latter species refer to *decoronotus, prodiopsis* and *jacobae* only)

Character	Plesiomorphous state – 0	Apomorphous state – 1	*C. aberrans*	Other *Centrioncus*
1 Sternum 8 (♀)	rectangular	U-shaped	0	1
2 OOT/MOT	bifurcated	broadly joined	1	0
3 Cerci (♂)	straight	lateral extension distally	0	1
4 Periandrial sclerite	absent	present	1	0
5 Hypandrial clasper	present	lost	1	0
6 Ejaculatory apodeme	normal	very large	0	1

(1) Sternum 8 has in *aberrans* the most plesiomorphous state of all Centrioncidae.

(2) The broadly joined outer and median arms of the outer telomere of *C. aberrans* clearly represent a more apomorphous state, as is shown by the position of the inner sutures.

(4) A periandrial sclerite also occurs in *T. trituberculatus*, which clearly represents an independent development.

(5) Hypandrial claspers occur in the Syringogastridae and all Centrioncidae except for *C. aberrans* in which they are thought to be secondarily lost.

(6) The ejaculatory apodeme is very large in *C. prodiopsis* and extremely large in *C. decoronotus* and *C. jacobae*.

As far as *C. decoronotus, C. prodiopsis* and *C. jacobae* are concerned a closer relationship between *decoronotus* and *prodiopsis* can be assumed, which geographically was also to be expected. This closer relationship can be based on the synapomorphous absence of sutures in the ♀ 7th segment and for the rest on phenetic arguments like similarities in form of epiphallus, long common base of OOT and MOT, form of mesad sclerite of IT, form of subanal plate, high number of hairs on (♀) sternum 8 (13 or 14 against 10 in *jacobae*), length of stripe on femur 1, distribution of microtrichia in costal cell and number of hairs on (♀) tergum 10 (6 or 7 against 4 in *jacobae*).

From the comparison between *Centrioncus* and *Teloglabrus* (see table 4) the conclusion can be drawn that relatively more plesiomorphous and more fundamental plesiomorphous conditions occur in *Centrioncus*. Furthermore the specific differences in *Centrioncus* are larger than in *Teloglabrus*, which might partially be correlated to the greater geographic isolation of *Centrioncus* species. However, especially the relatively small differences between species belonging to the *sanorum* complex indicate that speciation in *Teloglabrus* is of a more recent date than in *Centrioncus*. Interesting further is the occurrence of some typical *Centrioncus* characters, likely to represent more plesiomorphous conditions, in a few *Teloglabrus*, especially in *milleri* and to a lesser degree in *stuckenbergi*. Based on these data it is postulated that the centre of origin of the Centrioncidae lies within the actual range of distribution of *Centrioncus* (perhaps even in the Kivu-Ruwenzori regional system, where *aberrans* occurs) and that the splitting off of *Teloglabrus* finds its origin in a southward migration crossing the Zambesi. The analysis of relationships within *Teloglabrus* presented below is based on this postulation and in its turn supports this postulation.

Within *Teloglabrus* four groups can presently be distinguished: the single species "groups" of *milleri* and *stuckenbergi*, the *trituberculatus* group consisting of *trituberculatus* and *vumbensis* and the *sanorum* complex consisting of *entabenensis, lebombensis, sanorum, duplospinosus, pelecyformis, prolongatus, curvipes, londti, tsitsikamensis* and *australis*, with *sabiensis* standing just slightly apart from this complex.

T. stuckenbergi and especially *T. milleri* show various conditions which further only occur in *Centrioncus*, and are likely to represent plesiomorphous conditions (table 6, character states 1–4). *T. milleri* might be considered the sister-group of all other *Teloglabrus* on the basis of character states 3–6 mentioned in table 6, while its glabrous inner telomere might still form an additional plesiomorphous character. In *T. stuckenbergi* a mesad extension of the inner posterior corner is also absent and the epiphallus is also well denticulated, but this appears to rest on symplesiomorphy, as no synapomorphous condition of *milleri* and *stuckenbergi* could be found.

TABLE 6. Plesiomorphous and apomorphous conditions in *T. milleri, T. stuckenbergi* and other *Teloglabrus*

	Character	Plesiomorphous state – 0	Apomorphous state – 1	*T. milleri*	*T. stuckenbergi*	Other *Teloglabrus*
1	Mesad extension IPP	absent	present	0	0	1
2	Denticulation epiphallus reduced	no	yes	0	0	1
3	Articulation IT/C	mesad sclerite	bent structure	0	1	1
4	Ejaculatory apodeme	club-shaped	fan-shaped	0	1	1
5	Fourth arm outer telomere	absent	present	1	0	0
6	Inner telomere marmorated	no	yes	1	0	0

An interesting case is also formed by the *trituberculatus* group, which are the only *Teloglabrus* occurring in the Chimanimani regional mountain system and not in the Drakensberg system. The *trituberculatus* group is considered a monophyletic group based on the following synapomorphous conditions: straight outer arm of outer telomere, glabrous costal cell and large glabrous section in first basal cell. Like *T. milleri* and *T. stuckenbergi* the *trituberculatus* group also shares a number of character states with *Centrioncus*, e.g. high number of bristles and tubercles on front femur (see table 1), glabrous costal cell and central wingspot. These conditions concern, however, rather superficial characters and are thought to represent parallel developments induced by similarities in environmental conditions (*Centrioncus* and the *trituberculatus* group occur in the tropics, while the other *Teloglabrus* have South African

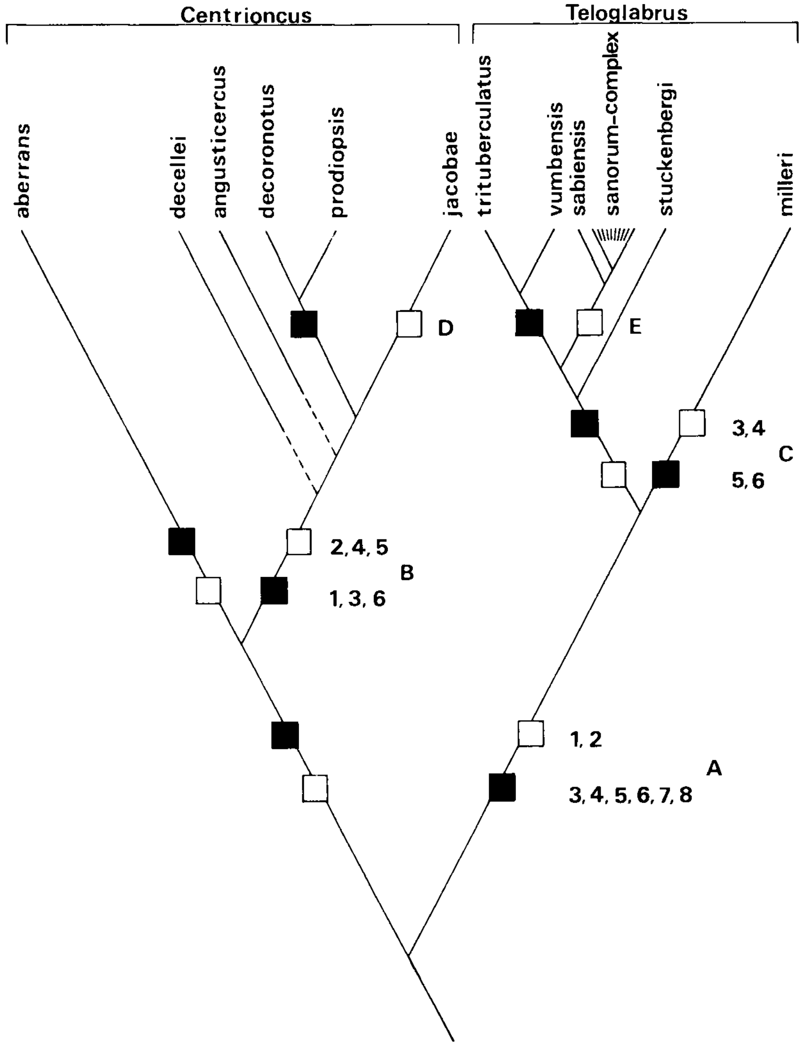


Fig. 135. Relationships within the Centrioncidae. A) see table 4, B) see table 5, C) see table 6, D) apomorphous condition is loss of suture in ♀ 7th segment, E) apomorphous conditions form the straight outer telomere and the glabrous wingspots.

distributions). The remaining *Teloglabrus* mainly belong to what is named the *sanorum* complex characterized by a more or less ax-shaped combination of outer and median arms of outer telomere. *T. sabiensis* was on typological grounds (form of inner telomere and fold in outer telomere) considered slightly outside of the *sanorum* complex.

A cladogram (fig. 135) is presented showing the relationships between and within the genera of the Centrioncidae. Where possible the phylogenetic arguments for the divisions are indicated, where this was not possible the divisions are based on phenetic arguments.

9. Systematics

9.1. Prefamily Diopsioinea

This prefamily of the Muscoidea sensu Griffiths, 1972, consists of the families Syringogastridae, Centrioncidae fam. nov. and Diopsidae s.s., of which the former two are sister-groups. The Syringogastridae (eight species) are confined to the Neotropical region and the Centrioncidae (21 species) to the Aethiopian region, while the Diopsidae (ca. 155 species) have principally an Old World distribution centre with one recent and one fossil species known for North America.

The groundplan of Diopsioinea presented by Griffiths (1972) has been discussed above (see chapter 2). This groundplan should now be reduced to the following groundplan conditions apomorphous with respect to the groundplan of Muscoidea.

(1) 1st and 2nd abdominal terga fused, forming syntergum: abdomen with petiolate appearance.
(2) Front femora armed with ventral tubercles.
(3) Vestiges of sterna 7 and 8 (♂) lost.
(4) Aedeagus rather short.
(5) Postvertical bristles absent.

9.2. Centrioncidae fam. nov. (type-genus *Centrioncus* Speiser, 1920)

Small (4–7 mm), slender flies; rounded head, eyes not stalked, pedicellus without cleft, rounded funiculus with tripartite pubescent arista, one pair of OVB and one pair of FOB, no other head bristles present; three pairs of scutal bristles, distinct pair of scutellar spines with apical bristles; costa unbroken, alula present, 5th and 6th vein reaching the margin, relicts of discal crossvein visible, wings transparent with or without vague spots; incrassate front femora with double series of ventral tubercles and of spinous bristles, slender hind femora with small tubercles; syntergum consisting of terga 1 and 2, abdominal spiracles 1–6 in membrane, 7th spiracles (♀) in tergum or not, left 7th spiracle (♂) in laterally located sternum 7 and right 7th spiracle in ventral band of sclerotization; segment 7 (♀) sclerotized basally in a complete ring, tergum and sternum 9 (♀) each consisting of two sclerites, three (2 + 1) spermathecae; elongate, striated eggs; tergum 6 (♂) half as long as tergum 5, sternum 7 (♂) located on left side and with complete ventral band of sclerotization, sternum 8 (♂) very large; articulate three-lobed outer telomeres with tubercles and spinous bristles, clasper-like "inner telomeres", large interparameral sclerite, membranous ♂ cerci; small phallapodeme with posterior two-thirds fused to hypandrium; hypandrial clasper usually present, postgonites and epiphallus present; aedeagus a short solid structure, ejaculatory apodeme present.

The Centrioncidae are characterized as a monophyletic group by the following groundplan conditions which are apomorphous with respect to the groundplan of the Diopsioinea. Conditions 8, 14, 15, 16 and 18 repesent autapomorphous conditions, while conditions 2, 3, 6, 10, 12, 13 and 17 are synapomorphous conditions of the Syringogastridae and the Centrioncidae. Conditions 4, 11 and perhaps 5 represent parallel developments in the Diopsidae and the Centrioncidae.

(1) Ocellar bristles lost.
(2) Inner vertical bristles lost.
(3) Funiculus ventrally extended into a circular shape.
(4) Scutellum with pair of setigerous spines.
(5) Front femora thickened and armed with double series of ventral tubercles.
(6) Hind femora armed with ventral tubercles.
(7) Suture of syntergum lost.
(8) Segment 7 (♀) sclerotized basally in a complete ring.
(9) Tergum 9 and sternum 9 (♀) each consisting of two oblong sclerites.
(10) 7th spiracle (♀) in tergum (*Centrioncus*) or secondarily in membrane (*Teloglabrus*).
(11) Tergum 6 (♂) reduced to about half the length of tergum 5.
(12) Sternum 7 (♂) forming complete ventral band of sclerotization, fused with inverted sternum 8 on right side (as well as on left side as normally in Muscoidea).
(13) 7th left spiracle (♂) lying within sternum 7 and 7th right spiracle within ventral band of sclerotization.
(14) Sternum 8 (♂) very large and in the shape of a quarter ball.
(15) Three-lobed outer telomere, armed with tubercles and spinous bristles.
(16) Cerci (♂) membranous.

(17) Inner telomeres (of interparameral origin) present.
(18) Phallapodeme reduced and posteriorly for two-thirds of its length via lateral extensions fused to the hypandrium.

9.3. Key to the genera and species

Given the strict geographic isolation of all Centrioncidae known, a conventional key might seem superfluous, but for confirmation of identifications and as an aid for future descriptions it might still prove useful. The key is based on external characters, ♂ genitalia, ♀ postabdomen and distribution and also reflects the phylogenetic relationships known.

(* means only ♀ known, ** only ♂ known)

1. Maxillary palpi dark, central wingspot, outer telomere pollinose, sterna 7 and 8 (♀) both undivided, north of Zambesi . . . . . . *Centrioncus* . . . 2
— Maxillary palpi usually yellow, usually no central wingspot, outer telomere glabrous, sterna 7 and 8 (♀) both longitudinally divided, south of Zambesi . . . . *Teloglabrus* . . . 7
2. Sternum 8 (♀) U-shaped, outer telomere bifurcated, ejaculatory apodeme very large, ♂ cerci laterally extended distally 3
— Sternum 8 (♀) rectangular, outer and median arms of outer telomere broadly joined, ejaculatory apodeme normaly sized, ♂ cerci straight, dark species, Ruwenzori, Uganda . . . . *aberrans*
3. Femur 1 dark distally, head densely pollinose posteriorly 4
— Femur 1 with dark stripe distally, posterior side of head only densely pollinose behind ocellar tubercle and laterally 5
4. Frons flat and uniformly pollinose, distal half of femur 1 dark, 7th spiracle (♀) well into tergum, ♀ cerci narrow (l/w = 4.1), Ivory Coast . . . . *decellei**
— Frons slightly depressed and with two shiny spots, distal third of femur dark, 7th spiracle (♀) just in tergum, ♀ cerci very narrow (l/w = 5.4), Southern Sudan . . . . *angusticercus**
5. Vague central wingspot, femur 1 with stripe on distal half, subanal plate acuminate, 7th spiracle (♀) just in tergum, outer and median arms of outer telomere with long common base 6
— Distinct central wingspot, femur 1 with stripe on distal two-thirds, subanal plate apically obtuse, 7th spiracle (♀) well into tergum, outer and median arms of outer telomere with a very short common base, Southern Malaŵi . . . . *jacobae*
6. Scutum with blackish band, two apical wingspots, tergum 7 (♀) with

semi-circular mesal gap, outer arm rounded and with six tubercles, Rift Valley, Kenya . . . . *decoronotus*

— Scutum dark with brown humeral calli, no apical wingspots, tergum 7 (♀) with narrow mesal gap, outer arm trapezoid and with 17 tubercles, Kilimandjaro, Tanzania . . . . *prodiopsis*

7. Inner telomere at least partially pollinose and connected to cercus via long bent structure 8

— Inner telomere glabrous with marmorated structure and connected to cercus via short mesad sclerite, two vague apical wingspots, subanal plate apically obtuse, outer telomere with fourth arm, inner arm with eleven spinous bristles, Nkandla, South Africa . . . . *milleri*

8. Brown to blackish brown, mean body length 4.5—5.6 mm, bell-shaped periandrium 9

— Yellowish, mean body length 6.3—6.5 mm, triangular periandrium, scutum with blackish band, two apical wingspots, subanal plate apically obtuse, outer arm of outer telomere ovoid with 13 tubercles, Mariepskop, South Africa . . . . *stuckenbergi*

9. Costal cell glabrous, 1st basal cell with large glabrous section, central wingspot, sternum 8 (♀) absent, outer arm of outer telomere straight . . 10

— Costal cell pollinose, 1st basal cell with small glabrous spot, no central wingspot, sternum 8 (♀) usually present, combination of outer arm and inner arm of outer telomere ax-shaped 11

10. Mesal band broad (one-third scutal width), tip of submarginal cell infuscated, ♀ cerci narrow (l/w = 4.0), outer arm of outer telomere slender (l/w = 4.0), inner telomere only pollinose at basal margin, Gorongosa Mt., Mozambique . . . . *trituberculatus*

— Mesal band very broad (half of scutal width), tips of marginal, submarginal and 1st posterior cell infuscated, ♀ cerci broad (l/w = 2.8), outer arm of outer telomere rectangular (l/w = 2.1), basal half of inner telomere pollinose, Eastern Zimbabwe . . . . *vumbensis*

11. Frons partially glossy, axil between inner arm of outer telomere and base of other arms smooth, inner telomere more or less rectangular to trapezoid and partially pollinose . . . . (*sanorum* complex) . . . 12

— Frons uniformly pollinose, fold between inner arm of outer telomere and base of other arms, inner telomore ovoid and uniformly pollinose, Sabie, South Africa . . . . *sabiensis***

12. Maxillary palpi yellow, femur 3 with usually less than seven tubercles, sternum 8 (♀) present, median arm of outer telomere usually with more than three spinous bristles, inner telomere with ridges 13

— Maxillary palpi dark, femur 3 with ten tubercles, sternum 8 (♀) absent, median arm of outer telomere with three spinous bristles, inner telomere without ridges, Zoutpansberg, South Africa . . . . *entabenensis*

13. Inner telomere for 75% pollinose, only distal quarter glabrous 14

— Inner telomere for 60% or less pollinose, more sections than only distal quarter glabrous 16

14. Femur 1 with stripe on distal two-thirds, tubercles and spinous bristles of outer telomere together about 11.5, interparameral sclerite short (w/1 1.7) 15

— Femur 1 with stripe on distal half, tubercles and spinous bristles of outer telomere together about 8.5, interparameral sclerite not so short (w/1 = 1.4), subanal plate apically obtuse, aedeagal apex partly serrated, Lebombo, South Africa . . . . *lebombensis*

15. Scutum with pale wedge around IA, femur 3 with about six tubercles, median arm of outer telomere slightly curved and with about 4.4 spinous bristles; tergum 7 (♀) with large circular mesal gap, subanal plate acuminate and split, Drakensberg, South Africa . . . . *sanorum*

— No pale wedge around IA, femur 3 with about three tubercles, median arm of outer telomere apically strongly curved and with 3.5 spinous bristles apically and 2,0 on preapical protuberance, Lions Bush, South Africa . . . . *duplospinosus***

16. Subanal plate apically obtuse, median arm of outer telomere curved to strongly curved 17

— Subanal plate apically acuminate, median arm of outer telomere straight to almost straight 18

17. Scutellum uniformly blackish, tergum 10 with four hairs, ♀ cerci narrow (1/w = 4.5), outer arm of outer telomere broad and with eight tubercles, inner arm curved, interparameral sclerite as long as broad, inner telomere with apical process, Deepdale, South Africa . . . . *prolongatus*

— Scutellum with two dark spots, tergum 10 with six hairs, ♀ cerci not so narrow (1/w = 3.5), outer arm of outer telomere slender and with six tubercles, inner arm strongly curved, interparameral sclerite rather short (1/w = 1.4), Ingeli, South Africa . . . . *curvipes*

18. Inner telomere only centrally pollinose (10—25% covered), interparameral sclerite long (w/1 from 1.0 to 1.2) 19

— Inner telomere at least basally and centrally pollinose (40—60% covered), interparameral sclerite rather short (w/1 from 1.5—1.7) 20

19. Scutellar spines long (0.39 mm), tergum 7 (♀) with triangular gap, outer arm of outer telomere with about six tubercles, inner telomere with centrally a square pollinose area (25% covered), aedeagal apex smooth, Pietermaritzburg, South Africa . . . . *pelecyformis*

— Scutellar spines normal sized (0.32 mm), tergum 7 (♀) with semi-circular gap, outer arm of outer telomere with about 8.5 tubercles, inner telomere with centrally a small round pollinose area (10% covered) aedeagal apex serrated, Grahamstown, South Africa .... *londti*

20. Frons glossy, scutum uniformly dark brown, no wingspots, femur 1 with about 27 tubercles, inner arm of outer telomere short with 4.5 short spinous bristles, inner telomere with twelve hairs, Tsitsikama, South Africa . ... *tsitsikamensis*

— Frons with two glossy spots, scutum with narrow dark mesal band, two subapical wingspots, femur 1 with about 30 tubercles, inner arm of outer telomere very short with six long spinous bristles, inner telomere with 18 hairs, Knysna, South Africa .... *australis*

9.4. **Centrioncus** Speiser, 1910

Centrioncus Speiser, 1910: 190.
Centrioncus; Shillito, 1950: 109 (in part).
nec *Centrioncus*; Smithers, 1958; 25.
nec *Centrioncus*; van Bruggen, 1961: 422.
Centrioncus; Steyskal, 1970: 325 (in part).
Type-species: *Centrioncus prodiopsis* Speiser, 1910.

Centrioncidae with dark maxillary palps, dark section of funiculus limited to around base of arista, central region behind ocellar tubercle usually dark, posterior side of head also laterally densely pollinose; costal cell partly or wholly glabrous, subcostal cell absent, distal section of 5th vein gradually thinner, central wingspot; usually more than eight spinous bristles per front femur, no distal stripes on hind femur; sutures in basal ring of segment 7 (♀) usually visible, tergum 7 (♀) well sclerotized and with lateral edges curved under, sternum 7 (♀) one rectangular piece, 7th spiracles (♀) in tergum, sternum 8 (♀) one single U-shaped or rectangular piece, subanal plate large; periandrium broad and rounded, inner arm of outer telomere usually quite detached from common base of outer and median arms, outer telomere in dorsal to dorsolateral position, outer and median arms covered with microtrichia, connection between outer and inner telomeres short, inner telomere glabrous, without ridges and with one to three long bristle-like hairs and two to eight short hairs, inner posterior corner of periandrium without mesad extension for articulation with inner telomeres, articulation between inner telomere and cercus via one or two small mesad sclerites, the sclerites of both sides linked via a membranous connection; ♂ cerci with distally a broad lateral extension or slender; interparameral sclerite anteriorly with large lateral extensions, ratio width/length varying from 2.0–2.5; periandrial fold broad and short or periandrial sclerite present; hypandrial clasper with three terminal bristle-like hairs or absent; epiphallus well denticulated, lateral sides of phallophore distally acute, aedeagus rather broad, distal aedeagal sclerites large and U-shaped; ejaculatory apodeme ventrally much broader apically or somewhat curved, ejaculatory apodeme & sac very large or normal sized, proximal section of ejaculatory duct at right angles to ejaculatory apodeme. *Centrioncus* apparently only occurs north of the river Zambesi.

Centrioncus are characterized as a monophyletic group by the following groundplan conditions, which are apomorphous with respect to the groundplan of the Centrioncidae:

(1) Costal cell partly or wholly glabrous.

(2) Subcostal cell absent.

Centrioncus decellei sp. nov.
(figs. 12, 26, 47, 136, 137)

Type material: ♀ holotype from Amanikro, 50 km NW of Abengourou, Ivory Coast, ix.1961, J. Decelle. The type is in the Koninklijk Museum voor Midden-Afrika, Tervuren, Belgium. Permanent slides were made of postabdomen, wing and fungi.

Measurements: length of body 5.0 mm, width of head 1.18 mm, length of wing 4.9 mm, length of scutellar spine 0.30 mm.

Head: frons flat, central section not sunken, pollinose, dark brown, except for pale anterior quarter; pedicel with only twelve small apical hairs; posterior side of head blackish brown for dorsal two-thirds and pale brown for ventral third, densely pollinose except for around cervix.

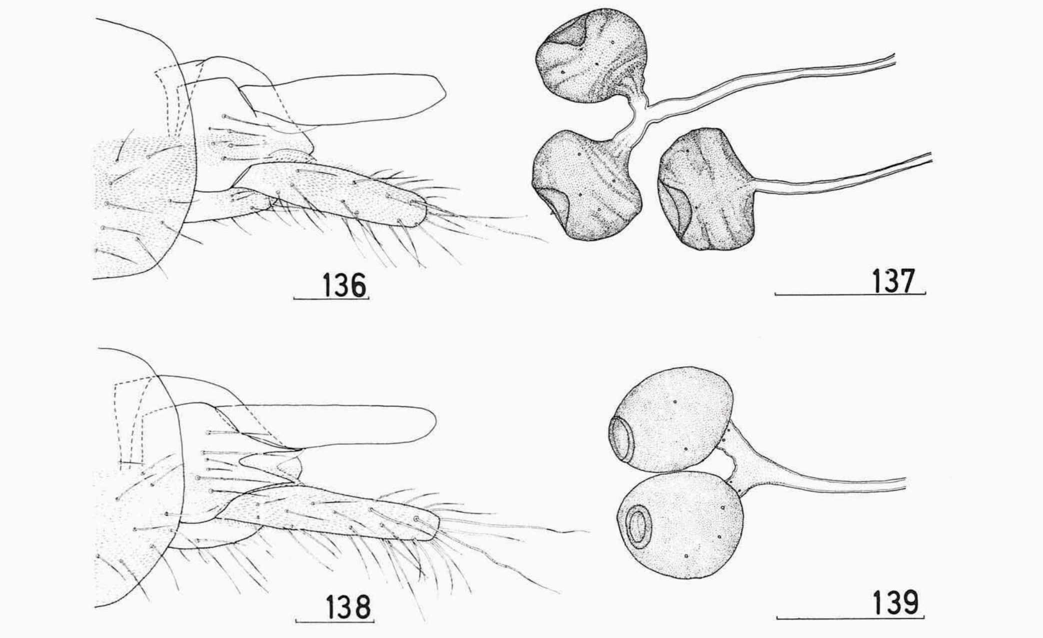
Thorax: pronotum black, mesonotum blackish brown, humeral callus slightly less dark, edges of mesonotum (especially posterior of IA) and dorsolateral edges and lateral sides of scutellum chestnut brown, scutellar spines yellowish brown; propleuron blackish brown, paler ventrally, mesopleuron chestnut brown anteriorly and posteriorly, but dark in the centre, lateral side of sternopleuron blackish with brown spot anteriorly, other pleura and postscutellum blackish; scutellum sticking up at an angle of 45° from body axis, spines diverging at an angle of 40°, apical bristles of scutellar spines broken off.

Wing: no microtrichia in most of costal cell, proximal tip of second basal cell and part of first basal cell immediately anterior of this tip; relicts of discal crossvein quite distinct; very vague central spot around anterior crossvein, mainly in proximal section of first posterior cell (fig. 12).

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale brown with on distal half of inner side a darker brown somewhat stripe-like spot, tibia 1 and metatarsus 1 dark brown, rest of tarsus 1 yellowish white; second and third leg pale brown, distal part of femur 2 and distal and proximal third of tibia 3 darker, distal quarter of femur 3 with a somewhat stripe-like darker spot on outer side; bristle formula 4.5, 5.5, 19.5, 18.5, 3.5.

Preabdomen: dorsally blackish brown, apical edges of terga less dark, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with small mesal gap at posterior edge (fig. 26), strongly curved under ventrally, sutures visible in connection between tergum and sternum, sternum 7 rectangular and rather narrow, 7th spiracle well into tergum; sternum 8 broadly U-shaped with eight hairs, sternum and tergum 9 each consisting of two narrow sclerites; tergum 10 somewhat pentagonal with three pairs of hairs and only central section covered with microtrichia (fig. 136); cerci narrow (length/width = 4.1), subanal plate (fig. 47) rather large, somewhat pentagonal and apically obtuse; spermathecae (fig. 137) not very rounded, somewhat wrinkled, with a dimple and some dispersed tiny tubercles, ducts entirely hyaline. The abdomen contained fullgrown eggs.



Figs. 136–137. *C. decellei* ♀. 136. Dorsal view of tip of abdomen. 137. Spermathecae. Figs. 138–139. *C. angusticercus* ♀. 138. Dorsal view of tip of abdomen. 139. Spermathecae. Scales 0.1 mm.

Habitat: no specific data are available on the collection place but maps show it as a dense forest area of rather low altitude.

Fungi: seven specimens of *Rhizomyces* sp. occurred on the right wing.

A diagnosis of this species cannot be complete without knowledge of the male genitalia, but for the moment it can be characterized by the flat, uniformly pollinose frons, densely pollinose posterior side of head, upturned scutellum, weak central wingspot, bristle formula (esp. the high numbers of bristles and tubercles of femur 1), brown spot on distal half of femur 1, small mesal gap of tergum 7, form of sterna 7 and 8, place of 7th spiracle well into tergum, narrow cerci, form of subanal plate and hyaline spermathecal ducts. It is to be hoped that the male of this—so far known—geographically isolated species (occurring over 4000 km from the nearest other centrioncid) will soon become known.

Centrioncus angusticercus sp. nov.
(figs. 13, 27, 48, 138, 139)

Centrioncus prodiopsis; Shillito, 1950: 113 (in part).

Type material: ♀ holotype from Nagichot, Sudan, iii.1946, D.J. Lewis. The type is in the British Museum (N.H.), London (BM 1947-208). A permanent slide was made of the postabdomen.

Measurement: length of body 5.7 mm, width of head 1.26 mm, length of wing 5.0 mm, length of scutellar spine 0.28 mm.

Head: frons flat but slightly depressed mesally, dark brown except for anterior edge, pollinose, with shiny spots on either side of ocellar tubercle; apical edge of pedicel darker and with about twelve small black hairs; posterior side of head blackish brown for dorsal two-thirds and brown for ventral third, densely pollinose, except for around cervix.

Thorax: pronotum dark chestnut brown, mesonotum uniformly blackish brown, lateral sides of scutellum and scutellar spines pale brown; propleuron brown, region around anterior spiracle black, mesopleuron brown anteriorly, posterior two-thirds blackish brown except for pale brown posterior edge, other pleura and postscutellum blackish brown; scutellum sticking up at an angle of 38° from body axis, spines diverging at an angle of 25°, apical bristles slightly longer than spines.

Wing: no microtrichia in most of costal cell and in small spot in first basal cell above proximal tip of second basal cell; relicts of discal crossvein quite distinct; vague central spot around junction of anterior crossvein and fourth vein (fig. 13), very vague infuscation along fifth vein between anal cell and posterior crossvein.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale brown with distal third on inner side dark brown and small dark spot apically on outer side, tibia 1 and metatarsus 1 dark brown, rest of tarsus 1 pale brown; second and third leg pale brown, femur 2 with subapical dark stripe on inner side, distal quarter of femur 3 and proximal and distal third of tibia 3 darker; bristle formula 4, 5, 18, 18, 6.5.

Preabdomen: dorsally blackish brown, apical edges of terga less dark, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with broad, rather large, mesal gap posteriorly (fig. 27), curved under ventrally, sutures visible in connection between tergum and sternum, sternum 7 rectangular and rather short, 7th spiracle in tergum, but just on the edge; sternum 8 very roughly U-shaped with eight hairs, anterior edge parallel to posterior edge of sternum 7, anterior section well sclerotized, but arms of the U connecting to posterior hairs of sclerite weakly sclerotized, sternum and tergum 9 each consisting of two narrow sclerites; tergum 10 somewhat onion-shaped (fig. 138), with three pairs of hairs and lateral edges, not covered with microtrichia; cerci very narrow (length/width = 5.4), subanal plate very large, somewhat pentagonal and apically obtuse (fig. 48); spermathecae (fig. 139–single one lost during preparation) round, smooth, with a ridge around the small dimple and some dispersed tiny tubercles, ducts hyaline except for small proximal section. The abdomen contained fullgrown eggs.

Habitat: the collecting place is in a montane area above 1000 m.

Until the male has become known this species can be characterized by the shiny spot on either side of ocellar tubercle, densely pollinose posterior side of the head, vague central wingspot and infuscation around fifth vein, brown spot on distal third of femur 1, bristle formula (esp. the high number of tubercles of femur 1), broad and shallow gap of tergum 7, form of sterna 7 and 8, place of 7th spiracle on edge of terga, very narrow cerci, very large subanal plate and rounded spermathecae with a ridge around the dimple.

Centrioncus decoronotus sp. nov.
(figs. 7, 14, 28, 49, 69, 96, 115, 140–144)

Centrioncus prodiopsis; Steyskal, 1970: 325 (in part; figs. 3 and 4, but not figs. 1 and 2).

Type material: ♂ holotype, 1 ♂ and 1 ♀ paratype from Naivasha, Kenya, vii.1937, H. J. A. Turner; 2 ♂ paratypes from Thomson's Falls and Chania Falls, Aberdare range, Kenya, x.1934, F. W. Edwards (BM, 1935–203), 1 ♀ paratype (teneral) from Thomson's Falls, vii.1974, D. Hollis and 1 ♀ paratype from Ngong, Kenya, ix.1940, G. van Someren. All type material is in the British Museum (N.H.). The specimen from Chania Falls was identified and illustrated as *C. prodiopsis* by Steyskal (1970). Permanent slides were made of ♂ genitalia and ♀ postabdomen.

Measurements: Length of body of ♀ 5.3 mm (range 5.0–5.7) and of ♂ 5.2 mm (5.1–5.3), width of head of ♀ 1.23 mm (1.20–1.26) and of ♂ 1.17 mm (1.14–1.20), length of wing of ♀ 5.0 mm (4.8–5.2) and of ♂ 4.7 mm (4.5–5.0), length of scutellar spine of ♀ 0.36 mm (0.34–0.38) and of ♂ 0.31 (0.28–0.32).

Head: frons mesally depressed, dark brown, but eye margins, meson and anterior third pale brown, thinly pollinose with shiny spots on either side of ocellar tubercle; mouth parts darker than face and prelabrum; posterior side of head black for dorsal two-thirds and brown for ventral third, thinly pollinose but densely pollinose behind the ocellar tubercle and laterally.

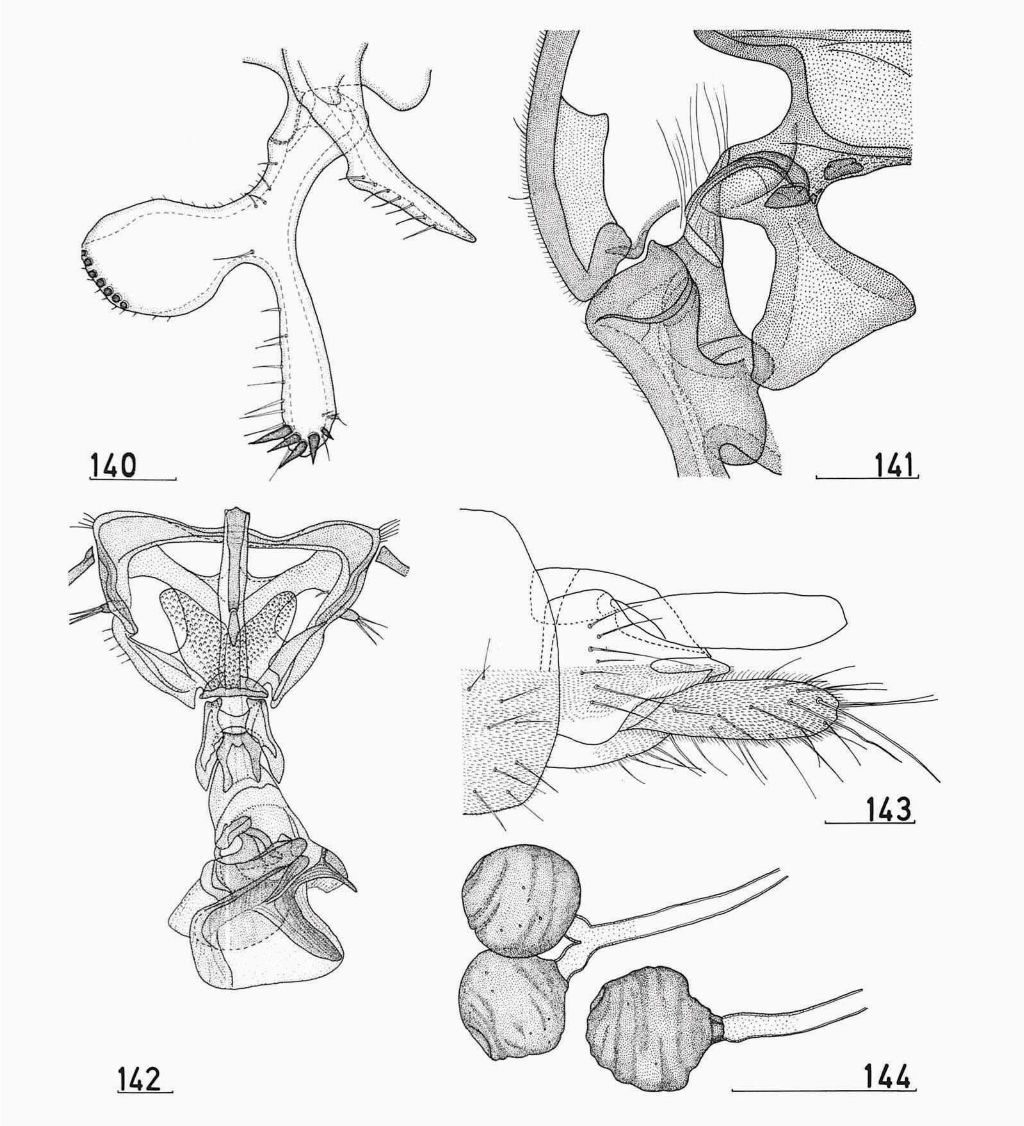
Thorax: pronotum dark brown, mesonotum with a very typical configuration of blackish brown and brown (fig. 7), humeral callus and mesal stripe blackish brown, mesal stripe abruptly becoming very broad posteriorly, lateral sides, anterior tip and area aroun d intrascutal suture dark brown, rest of mesonotum, including scutellum and scutellar spines brown, two vague darker spots on scutellum (this configuration shows some variation but is clearly visible in five of the seven specimens, the remaining two have an almost uniformly dark mesonotum, probably due to postmortal discoloration); lateral side of humeral callus brown, propleuron and region around anterior spiracle blackish brown, mesopleuron brown with central third and ventro-anterior section blackish brown, lateral side of sternopleuron blackish brown with small brown central spot, other pleura and postscutellum blackish brown except for brown subalar callus; scutellum sticking up at an angle of about 22° from body axis, straight spines diverging at an angle of about 30°, apical bristle clearly longer than scutellar spine.

Wing: no microtrichia in posterior part of costal cell and in small spot in first basal cell above proximal tip of second basal cell; relicts of discal crossvein almost absent; vague central spot around anterior crossvein (mainly in proximal part of first posterior cell), two vague apical spots in submarginal cell and first posterior cell resp. (fig. 14).

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale brown with vague brown stripe on distal half of inner side, tibia 1 dark brown, metatarsus 1 pale yellowish brown, rest of tarsus yellowish white; second and third leg pale brown with distal sixth of femora 2 and 3 and proximal and distal third of tibia 3 darker; bristle formula 4.0, 4.3, 17.8, 17.0, 4.9.

Preabdomen: dorsally dark brown, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with rather large, semi-circular, mesal gap posteriorly (fig. 28), lateral sides rather irregular and curved under ventrally, no sutures visible between tergum and sternum, sternum 7 rectangular and rather large, 7th spiracle just in tergum; sternum 8 large and U-shaped with 14 hairs, sternum and tergum 9 consisting of two not very narrow sclerites; tergum 10 (fig. 143) somewhat onion-shaped, with seven hairs, lateral edges not covered with microtrichia; cerci not so narrow (length/width = 3.6), sub-



Figs. 140—144. *C. decoronotus*. 140. Inner view of outer telomere. 141. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 142. Dorsal view of hypandrium, phallapodeme and aedeagus. 143. Dorsal view of tip of ♀ abdomen. 144. Spermathecae. Scales 0.1 mm.

anal plate (fig. 49) rather large with smoothly curved lateral sides and apically acuminate; spermathecae (fig. 144) round but rather wrinkled, with a dimple and some dispersed tiny tubercles, ducts hyaline but slightly darker at proximal end.

Male postabdomen: periandrium (fig. 69) broad and rounded, yellow but more brownish basally; outer telomere (fig. 140) in dorsolateral position and deeply bifurcated, common base of outer and median arm long and slender; outer arm rather symmetrical, rounded at outer corners and constricted at base, on average with 6.0 tubercles and one hair, median arm long and club-shaped with on average 4.0 spinous bristles and about 13 hairs, median arm and basal half of outer arm covered with microtrichia on outer side; inner arm quite detached from outer and median arm, slender but rather irregularly shaped, with two short broad apophyses (not shown in position in fig. 140, but one can be seen in fig. 141 beneath inner telomere) and about seven hairs along its length; connection between outer telomere and inner telomere (fig. 141) short, inner telomere very constricted at base, somewhat triangular, outer corners rounded, glabrous, with centrally two or three long, bristle-like hairs on inner side and two small hairs apically; basal mesad sclerite for articulation with cercus rather small, cercus (fig. 96) with broad lateral extension distally; interparameral sclerite short, ratio width/length = 2.0, anterior corners strongly extended laterally, periandrial fold broad and short; hypandrial claspers moderately long with apically three strong bristle-like hairs, one small hair near base of clasper, phallapodeme hardly extending beyond hypandrium (fig. 142), epiphallus V-shaped, well denticulated, phallophore long with apically acute lateral sides, aedeagus broad with various heavily sclerotized sclerites distally, some of these sclerites U-shaped, apex of aedeagus smooth (Steyskal's 1970 description of this aedeagus was based on the basal section only and has to be rejected, see chapter 2); ejaculatory sac and ejaculatory apodeme remarkably large (fig. 115), apodeme ventrally much broader apically.

Habitat: this species occurs in the various patches of montane forest along the Rift Valley in Kenya; it was caught from 1200 to 2350 m upward.

C. decoronotus is characterized by the shiny spot on either side of ocellar tubercle, paler eye margins of frons, typical colour pattern of mesonotum, central wingspot and two vague apical wingspots, bristle formula, brown stripe on distal half of femur 1, form of sterna 7 and 8 in ♀, place of 7th spiracle on edge of tergite (♀), apically acuminate subanal plate, rounded outer arm and long club-shaped median arm with resp. 6.0 tubercles and 4.0 spinous bristles, long and slender common base of OOT and MOT, quite detached inner arm with two apophyses, triangular, basally strongly constricted inner telomere, broad lateral extension of distal third of ♂ cercus, presence of hypandrial clasper, long phallophore, smooth aedeagal apex and gigantic ejaculatory apodeme and sac. Its closest relatives are *C. prodiopsis* and *C. jacobae*, but it stands closer to the former species.

Centrioncus prodiopsis Speiser, 1910
(figs. 15, 29, 50, 70, 97, 116, 145—149)

Centrioncus prodiopsis Speiser, 1910: 191.
nec *Centrioncus prodiopsis*; Shillito, 1950: 113.
nec *Centrioncus prodiopsis*; Smithers, 1958: 25.
nec *Centrioncus prodiopsis*; van Bruggen, 1961: 422.
nec *Centrioncus prodiopsis*; Steyskal, 1970: 325.

Type material: the original description was based on two pairs from Kibonoto, Kilimandjaro, Tanzania, one pair from i.1905—06, 1 ♀ from ix.1905—06 and 1 ♂ from x.1905—06, all collected by Sjöstedt. One syntype, lacking the abdomen, is in the Museum für Naturkunde der Humboldt Universität, Berlin, DDR, and the other three syntypes, one of which also lacks the abdomen, are in the Naturhistoriska Riksmuseet, Stockholm, Sweden. Only the two specimens with an abdomen were examined. Of these the ♂ (from x.1905—06) was selected as lectotype and the (teneral) ♀ (from i.1905—06) as paralectotype. Permanent slides were made of ♂ genitalia, ♀ postabdomen and fungi.

Speiser's description is not sufficient to characterize the species but an integral translation will be given as it contains useful comments on the coloration. It also contains one error. Shillito's (1950) description is not a redescription as stated by Smithers (1958) but an incomplete translation (including one error) of the original.

Translation of Speiser's description.

Length 4¾—5¼ mm. Head dark reddish brown, face and lower half of the back of the head reddish yellow, as is also the proboscis. Palpi almost black. Antennae bright yellowish brown, with roundish black spot at the base of the buff arista. Thorax black, humeral callus and a callus between wing-root and halteres (= metapleural callus) dark mahogany-red, lower side of prothorax near fore coxae yellow. On the pleura, above the middle coxae, a silvery tomentose spot of roundish shape. Dorsal thorax covered with a very sparse greyish pollinosity. Scutellum black-brown above, its sides and underside yellow. Legs bright buff, fore tibiae dark-brown, at least the last 4 segments of the anterior tarsi snow-white. On middle and hind femora, the apex is darkened at least by lateral brown stripes, middle and hind tibiae likewise ringed brown at base. Fore coxae pale yellow, middle and hind coxae black (Speiser confused the middle and hind coxae with the sterna).

Wings hyaline with a smoky brown central cloudiness around the anterior crossvein, most pronounced in the first posterior cell between the anterior crossvein and the vicinity of the posterior crossvein (and not in the anal cell as mentioned by Shillito, 1950). Halteres whitish yellow. Abdomen pitch to dark brown, the small last segments of ♀♀ whitish yellow.

Redescription.

Measurements: length of body 5.9 mm (♀ paralectotype) and 5.0 mm (♂ lectotype), width of head 1.20 mm (♀) and 1.06 mm (♂), length of wing 5.4 mm (♀) and 4.6 mm (♂), length of scutellar spine 0.37 mm (♀) and 0.29 mm (♂).

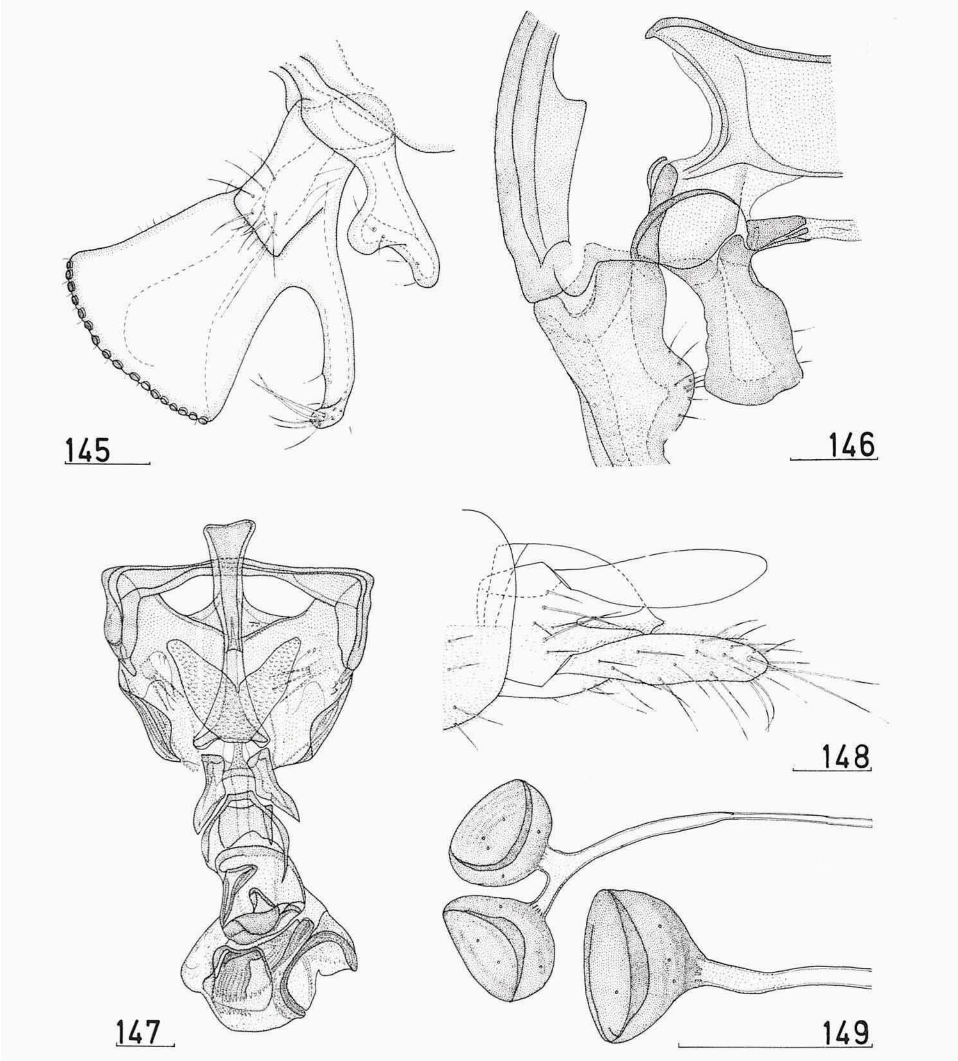
Head: frons slightly depressed mesally, dark brown, but eye margins, mesal line and anterior quarter pale brown, thinly pollinose with shiny spot on either side of ocellar tubercle. Dorsal two-thirds of posterior side of head black, ventral third brown, thinly pollinose but densely pollinose behind ocellar tubercle and laterally.

Thorax: pronotum dark brown, mesonotum blackish brown, humeral callus dark brown (the original colour probably being dark mahogany red, as stated by Speiser), scutellar spines and lateral sides of scutellum dark brown; propleuron brown, ventrally paler, other pleura and post-scutellum blackish brown, anterior edge of mesopleuron and subalar callus paler (the metapleural callus in the two syntypes studied is not aberrantly coloured from its surroundings, as stated by Speiser, but I see no reason to doubt Speiser's description); scutellum sticking up at an angle of about 38° from body axis, scutellar spines slightly curved inward distally and diverging at an angle of 40°, apical bristle slightly larger than spine.

Wing: no microtrichia in basal and posterior section of costal cell and in small spot in first basal cell above proximal tip of second basal cell; remnants of discal crossvein almost absent; rather vague, large central spot around anterior crossvein (fig. 15), occupying basal section of first posterior cell up to posterior crossvein, distal third of basal cell and anterior edge of discal cell, fifth vein broadly infuscated between anal cell and posterior crossvein.

Legs: coxa and trochanter 1 yellowish white, femur 1 pale brown, with vague brown stripe on distal half of inner side, tibia 1 dark brown, tarsus 1 yellowish white with base of metatarsus slightly darker; second and third leg pale brown (including coxae), femur 2 with preapical dark stripe on inner side, base of tibia 2 slightly darker, distal sixth of femur 3 and proximal and distal third of tibia 3 darker; bristle formula 3.5, 3.8, 15.8, 14.3, 3.0.

Preabdomen: dorsally dark brown, ventral side pale brown with slightly darker sterna.



Figs. 145–149. *C. prodiopsis*. 145. Inner view of outer telomere. 146. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 147. Dorsal view of hypandrium, phallapodeme and aedeagus. 148. Dorsal view of tip of ♀ abdomen. 149. Spermathecae. Scales 0.1 mm.

Female postabdomen: tergum 7 with long, rather narrow, bell-shaped mesal gap posteriorly (fig. 29), lateral sides hardly curved under ventrally, no sutures visible between tergum and sternum, sternum 7 very large, somewhat rectangular, but posteriorly narrower, 7th spiracle half in/half out of tergum; sternum 8 broad, U-shaped with broad arms, weakly sclerotized and with 13 hairs posteriorly, sternum and tergum 9 consisting of two not so very narrow sclerites; tergum 10 (fig. 148) rather pentagonal with angular lateral sides, three pairs of hairs, lateral sides not covered with microtrichia; cerci not so narrow (length/width = 4.0), subanal plate (fig. 50) rather large with smoothly curved lateral sides and apically acuminate; spermathecae (fig. 149) cup-shaped because of very large apical dimple, some dispersed tiny tubercles, ducts hyaline but slightly darker at proximal ends.

Male postabdomen: periandrium (fig. 70) broad and rounded with rather small mesal gap, brown, posteriorly more yellowish brown; outer telomere (fig. 145) in dorsolateral position, deeply bifurcated, common base of outer and median arm rather long and broad with a bulbous thickening on inner side, outer arm very large, rather thick, somewhat trapezoid, narrower at base, apical edge completely covered with on average 17.0 tubercles, median arm rather long, slender and curved, apically about eight bristle-like hairs, two of which very long, no spinous bristles present, outer arm and basal half of median arm covered with microtrichia on outer side; inner arm quite detached from outer and median arm, broad with one large subapical apophysis giving a Y-shaped form to the apex, about five hairs; connection between outer telomere and inner telomere (fig. 146) short and broad, inner telomere hardly constricted at base, small and narrow, somewhat rectangular, glabrous, three long bristle-like hairs centrally on inner side, one large hair in mesal basal corner and four small hairs at apical edge; basal mesad sclerite for articulation with cercus rather large and divided, cercus (fig. 97) rather short, basally very narrow, broadening apically with a broad lateral extension; interparameral sclerite short, ratio width/length = 2.5, anterior corners strongly extended laterally, periandrial fold rather broad and short; hypandrial claspers moderately long with apically three long bristle-like hairs, two short hairs near base of clasper, phallapodeme extended well beyond hypandrium, epiphallus V-shaped, well denticulated, phallophore long with apically acute lateral sides, aedeagus broad and with various heavily sclerotized sclerites subapically, one of which U-shaped, apex of aedeagus smooth; ejaculatory sac and apodeme very large, but not as large as in *C. decoronotus* and *C. jacobae*, apodeme with small curve subapically.

Habitat: this species was collected in rainforest at altitudes varying from between 1300 and 1900 m, to at 2000 m and between 2000 and 3500 m.

Fungi: the ♂ lectotype had four immature specimens of a *Rhizomyces* sp. on its left wing and 15 on its right wing.

C. prodiopsis is characterized by the paler brown eye margins of the frons, glossy spot on either side of ocellar tubercle, blackish brown mesonotum with brown humeral calli, large central wingspot, infuscated 5th vein, brown stripe on distal half of F_1, preapical stripe of F_2, low numbers of bristles and tubercles on femora, long and narrow mesal gap of tergum 7 (♀), 7th spiracle half in/half out of tergum (♀), form of sterna 7 and 8, rather large apically acuminate subanal plate, cup-shaped spermathecae, broad periandrium with small mesal gap, very large outer arm with 17.0 tubercles, curved median arm without spinous bristles, quite detached inner arm with Y-shaped apex, small and narrow inner telomere, broad lateral extension of distal third of ♂ cercus, large phallophore, smooth apex of aedeagus and somewhat curved, very large, ejaculatory apodeme. Its closest relatives are *C. jacobae* and *C. decoronotus*, but is stands somewhat closer to the latter species.

Centrioncus aberrans sp. nov.
(figs. 16, 30, 51, 71, 98, 117, 150—154)

Centrioncus prodiopsis; Shillito, 1950: 113 (in part).

Type material: ♂ holotype, 1 ♂ and 1 ♀ paratype from Kilembe, Ruwenzori Range, Uganda, xii.1934—i. 1935, F. W. Edwards (BM, 1935—203). All type material is in the British Museum (N.H.). Permanent slides were made of ♂ genitalia and ♀ postabdomen.

Measurements: length of body in ♀ 4.9 mm and in ♂ 5.2 and 5.0 mm, width of head in ♀ 1.12 mm and in ♂ 1.24 and 1.15 mm, length of wing in ♀ 4.4 mm and in ♂ 4.7 and 4.4 mm, length of scutellar spine in ♀ 0.26 mm and in ♂ 0.27 and 0.26 mm.

Head: frons mesally depressed, almost uniformly brown, pollinose except for shiny spot on either side of ocellar tubercle; face, gena, buca and mouthparts brown, palpi slightly darker; posterior side of head uniformly blackish brown except for ventral edge, thinly pollinose, except for densely pollinose spots behind ocellar tubercle and laterally.

Thorax: pronotum dark brown, mesonotum uniformly blackish brown, rather densily covered with grey pollinosity, except for more shiny humeral calli, scutellar spines brown; pleura and postscutellum uniformly blackish brown; scutellum sticking up at an angle of about 25° from body axis, spines diverging at an angle of about 40°, apical bristle slightly longer than spines.

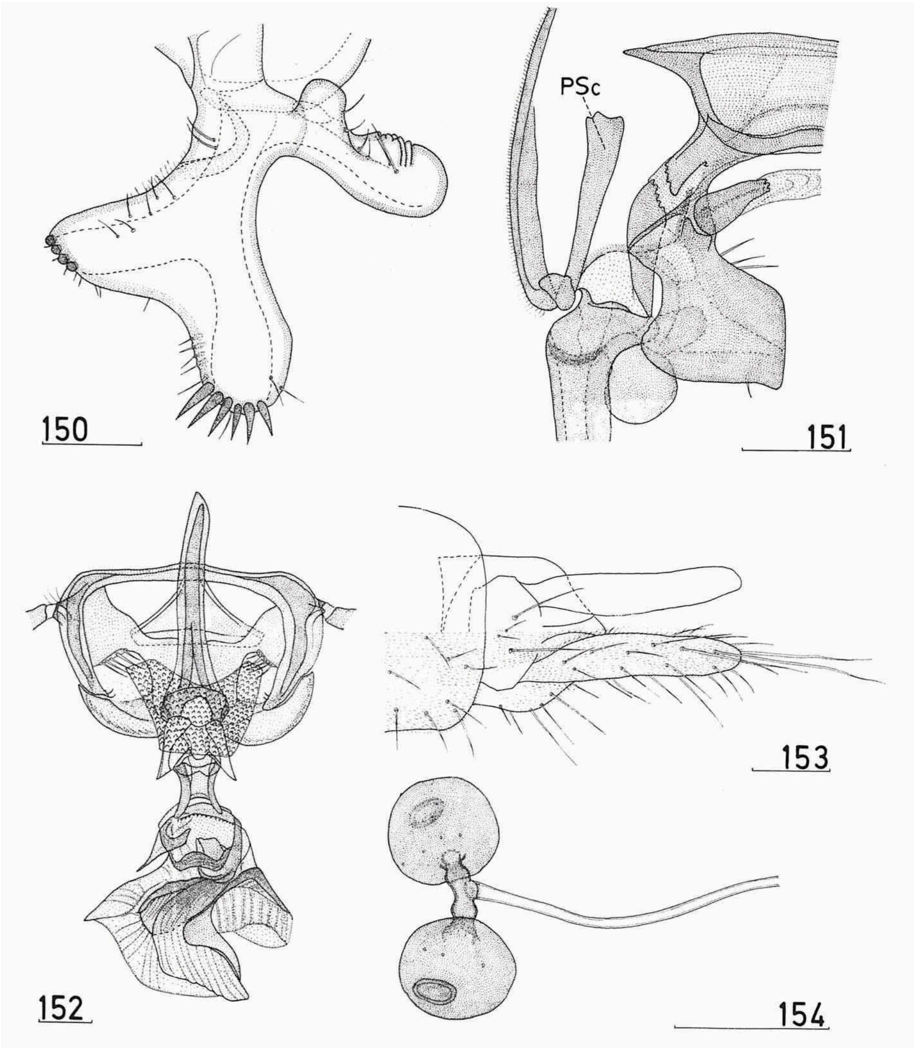
Wing: no microtrichia in most of costal cell and in tiny spot in first basal cell above proximal tip of second basal cell; remnants of discal crossvein almost absent; very vague central spot at base of first posterior cell (fig. 16), hardly crossing anterior crossvein into first basal cell.

Legs: coxa 1 and trochanter 1 very pale brown, femur 1 pale brown with distal quarter brown, hardly forming a stripe on inner side, tibia 1 and most of metatarsus 1 dark brown, other tarsal segments very pale brown; second and third leg pale brown with apical fifth of femora darker; bristle formula 4.0, 5.2, 16.8, 15.2, 6.5.

Preabdomen: dorsally dark brown, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with broad, rather large mesal gap posteriorly (fig. 30), lateral edges curved under ventrally, sutures between tergum and sternum visible, sternum 7 rectangular and rather short, 7th spiracle half in/half out of tergum; sternum 8 a somewhat curved rectangular piece, anteriorly and laterally more sclerotized and with eight hairs, sternum and tergum 9 each consisting of two not very narrow sclerites; tergum 10 (fig. 153) laterally angular, almost octagonal in shape, with two pairs of hairs, lateral edges not covered with microtrichia; cerci very narrow (length/width = 5.1), subanal plate (fig. 51) narrower basally, rather large, almost pentagonal; spermathecae (fig. 154) round and smooth with a small dimple and some dispersed tiny tubercles, junction of ducts of paired spermathecae T-shaped, ducts hyaline except for connecting part between paired spermathecae, the single spermatheca was probably lost during preparation.

Male postabdomen: periandrium (fig. 71) broad and rounded with large mesal gap, uniformly brown; outer telomere (fig. 150) in dorsolateral position, not deeply bifurcated, outer and median arms with short broad common base and rather broadly joined (probably secondarily, as shown by the inner seams), outer arm tapering apically, not constricted at base, on average with 4.5 closely joined tubercles, median arm very broad with on average 6.0 stout spinous bristles, both arms with about eight hairs and centrally covered with microtrichia on the outer side; inner arm broadly linked to base of other arms, very broad, with one large apophysis, about six hairs and a peculiar dentated area between apophysis and apex; connection between outer telomere and inner telomere (fig. 151) rather short, inner telomere constricted at base, quadrangular, glabrous, with one long bristle-like hair centrally on inner side and six small hairs in mesal basal corner; mesal sclerite for articulation between inner telomere and cercus large and mesally pointed, cercus (fig. 98) very slender, with rather detached mesal section and long hairs; interparameral sclerite short, ratio width/length = 2.5, laterad more sclerotized, anterior corners extended laterally, periandrial fold narrow, not directly connected to inner genitalia, instead the outer posterior corner of the periandrium and the hypandrium are connected by a periandrial sclerite; hypandrial clasper absent, instead a row of five bristle-like hairs (one of which very strong) has a clasper function (fig. 152), two small hairs posteriorly of bristle-like hairs, phallapodeme relatively long, extending well beyond hypandrium, epiphallus only vaguely V-shaped, well denticulated, phallophore very short, central sec-



Figs. 150–154. *C. aberrans*. 150. Inner view of outer telomere. 151. Dorsal view of periandrial fold, periandrial sclerite, interparameral sclerite and inner telomere. 152. Dorsal view of hypandrium, phallapodeme and aedeagus. 153. Dorsal view of tip of ♀ abdomen. 154. Spermathecae. Scales 0.1 mm.

tion of aedeagus reduced, distal section of aedeagus very broad, with various complicated sclerites, one of which U-shaped, around which filamentous, curtain-like structures; ejaculatory apodeme and sac (fig. 117) of normal size, apodeme ventrally broader apically.

Habitat: the species was collected in the lower part of the Ruwenzori range at an altitude of 1500 m.

C. aberrans is a rather aberrant *Centrioncus*, but a decision as to whether it is convenient to erect a separate subgenus for it, can better wait till the ♂ genitalia of *decellei* and *angusticercus* and the genitalia of *Centrioncus* sp. have become known. The more important characters on which such an eventual decision can be based are at the moment: sternum 8 (♀) one single rectangular piece, T-shaped junction of spermathecal ducts, presence of periandrial sclerites, slender ♂ cerci, absence of hypandrial claspers, very short phallophore, centrally narrow and apically very broad aedeagus and normally sized ejaculatory apodeme. At species level *C. aberrans* is further characterized by the shiny spot on either side of ocellar tubercle, almost completely blackish posterior side of head, uniformly dark colour of thorax, very vague central wing-spot, brown distal quarter of femur 1, bristle formula, broad and shallow mesal gap of tergum 7 (♀), 7th spiracle half in/half out of tergum (♀), two pairs of hairs of tergum 10, very narrow ♀ cerci, large mesal gap of periandrium, broadly joined outer and inner arms of OT, apically tapering outer arm with 4.5 tubercles, very broad median arm with 6.0 spinous bristles and large apophysis of inner arm.

Centrioncus sp.

In 1973 while visiting the Museum voor Midden-Afrika in Tervuren I cursorily inspected some *Centrioncus* from Lac Gando, North Kivu, Zaïre, noting their dark colour and small wingspot. However, these specimens could not now be traced. Because of their geographic position it seems likely that they represent an undescribed *Centrioncus*, probably related to *aberrans*.

Centrioncus jacobae sp. nov.

(figs. 17, 31, 52, 67, 72, 88, 90, 94, 99, 118, 155–157)

Type material: ♂ holotype from Mount Soche, Limbe, Malaŵi, x.1972, H. R. & J. J. Feijen, furthermore 15 ♀ and 15 ♂ paratypes from Mount Soche and Mount Ndirande near Limbe and Mount Chiradzulu between Limbe and Zomba; between 1972 and 1975 in total 33 ♀ and 39 ♂ were collected at these places in about all months of the year. All type material is in the Rijksmuseum van Natuurlijke Historie, Leiden, except for some paratypes in the Natal Museum (NM 2650) and the British Museum (N.H.). Permanent slides were made of wings, ♂ genitalia, ♀ postabdomen and fungi.

Measurements: 20 ♀ and 26 ♂ were measured; length of body in ♀ 5.61 mm ± SE 0.07 (range 5.2–6.2) and in ♂ 5.28 mm ± 0.04 (4.8–5.7), width of head in ♀ 1.19 mm ± 0.01 (1.08–1.28) and in ♂ 1.15 mm ± 0.01 (1.00–1.21), length of wing in ♀ 5.02 mm ± 0.06 (4.6–5.5) and in ♂ 4.70 mm ± 0.05 (4.4–5.1), length of scutellar spine in ♀ 0.289 mm ± 0.006

(0.25—0.33) and in ♂ 0.273 mm ± 0.004 (0.23—0.31). The fresh weight of females on the average was 4.2 mg and of males 3.4 mg.

Head: frons slightly depressed mesally, darkbrown but for paler anterior third and mesal line, thinly covered with pollinosity except for shiny spot on either side of ocellar tubercle; posterior side of head pale brown for ventral third and dark brown for dorsal two-thirds, except for pale section behind ocellar tubercle and pale tubercle of OVB, thinly pollinose, but densely pollinose behind ocellar tubercle and laterally.

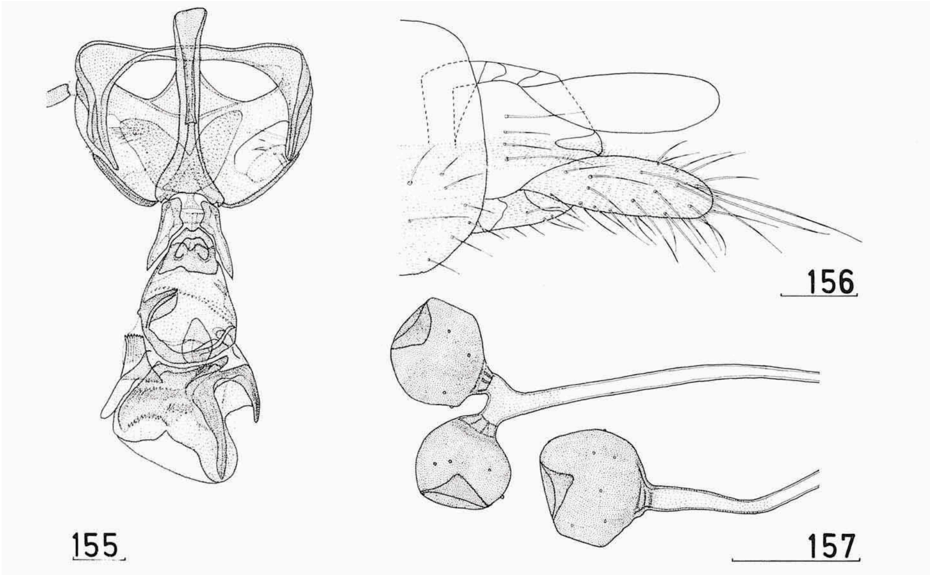
Thorax: pronotum dark brown, scutum blackish brown, but lateral sides in varying degrees less blackish and more chestnut brown, humeral callus brown, distally different from rest of mesonotum, scutellum dark brown to chestnut brown with dorsally two blackish spots; propleuron brown, area around anterior spiracle blackish, mesopleuron brown with darker central spot, sternopleuron and subalar callus brown, other pleura and postscutellum blackish brown; scutellum sticking up at an angle of about 25° from body axis, spines diverging at an angle of about 28°, apical bristle as long as spine.

Wing: no microtrichia in costal cell and in section of first basal cell above proximal tip of second basal cell; remnants of discal crossvein just visible; distinct central spot around anterior crossvein (fig. 17), mainly in proximal quarter of first posterior cell and marginally in first basal cell and discal cell, distinct infuscation along posterior crossvein and along 5th vein between anal cell and posterior crossvein.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale brown, on inner side a broad brown stripe on distal two-thirds, tibia 1 glossy dark brown, tarsus 1 yellowish white; second and third leg pale brown, weak brown stripe on apex of femur 2, apex of femur 3 and base of tibia 3 darker brown; bristle formula 4.0, 4.7, 16.9, 15.4, 5.6.

Preabdomen: dorsally blackish brown, posterior edges (especially of syntergum) paler, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with very small mesal gap posteriorly (fig. 31), lateral edges curved under ventrally, suture between tergum and sternum visible, sternum 7 rectangular and rather short, 7th spiracle well in tergum; sternum 8 a broad U-shaped piece with ten hairs, sternum and tergum 9 each consisting of two narrow sclerites; tergum 10 (fig. 156) somewhat onion-shaped, with two pairs of hairs, lateral edges not covered with microtrichia; cerci not so narrow (length/width = 3.2), subanal plate (fig. 52) large, pentagonal, apically obtuse; spermathecae (fig. 157) round and smooth with a dimple and some dispersed tiny tubercles, spermathecal ducts hyaline except for dark proximal ends. In December and January (the beginning of the rainy season) gravid females were collected. These females had no developing eggs any more.



Figs. 155–157. *C. jacobae*. 155. Dorsal view of hypandrium, phallapodeme and aedeagus. 156. Dorsal view of tip of ♀ abdomen. 157. Spermathecae. Scales 0.1 mm.

Male postabdomen: periandrium (figs. 67 and 72) broad and rounded, brown but inner posterior corner pale brown; outer telomere (figs. 67 and 88) in dorsal position, left and right outer and median arms touching on the meson, deeply bifurcated, outer and median arms with extremely short, broad common base, outer arm asymmetrical, rounded at corners and constricted at base, on the average with 7.6 (range 7–9) tubercles, median arm long club-shaped and rather broad with on the average 4.0 (range 3–5) stout spinous bristles, both arms with about eight hairs and fully covered with microtrichia on outer side; inner arm rather detached from outer and median arm, slender but rather irregularly shaped, with one broad apophysis and about seven hairs along its length; connection between outer telomere and inner telomere short (fig. 90), inner telomere constricted at base, mesal posterior corner right-angled and lateral corner obtuse (60°), glabrous, with two long bristle-like hairs centrally on inner side, eight small hairs in mesal basal corner and two small hairs at apical edge; two mesal sclerites for articulation with cercus small but distinct, cercus (fig. 99) with a very long lateral extension distally; interparameral sclerite short, ratio length/width = 2.5, anterior corners very extended laterally, periandrial fold broad and short; hypandrial claspers short and with three long bristle-like hairs, three small hairs near its base, phallapodeme extending beyond hypandrium (fig. 155), epiphallus V-shaped and well denticulated, phallophore long with apically acute lateral sides, aedeagus broad and distally with various heavily sclerotized sclerites, one of which U-shaped, apex of aedeagus smooth; ejaculatory sac and apodeme (figs. 94 and 118) remarkably large, apodeme ventrally broader apically.

Habitat: the species was collected at an altitude of between 1300 and 1400 m in dense, shady rainforest on the slopes of various mountains around Limbe. It occurred in places with little undergrowth where it could be found in ones or twos on the leaves of small tea-like shrubs. It was never seen or collected in other types of t abitats. The species was never encountered in similar habitats in other places in Malaŵi, like Mount Mulanje, Mount Zomba, Ntchisi rainforest and the Nyika plateau. This does not mean that they do not occur there, but it seems likely, as various of these places were regularly sampled. *C. jacobae* seems to remain in the same habitat all year round, as it could be collected in any month. It does not seem to be gregarious during certain times of the year as diopsids are. Every now and then it was collected together with diopsids, especially *Diopsis phlogodes.*

Fungi: of the 33 females 5 were parasitized by on the average 8.7 Laboulbeniales and of the 39 males 13 were parasitized by on the average 11.0 fungi. All fungi belonged to the same *Rhizomyces* sp. They mainly occurred on the dorsal side of the wing, the number on the right wing being 2½ times more than on the left wing. Some males had fungi on the ventral side of the first and second abdominal segment. The rate of parasitism was 0% in February and increased up to the beginning of January, indicating a change of generation in January, so that assuming a development time of 4 to 8 weeks, reproduction started at the end of the dry season.

C. jacobae is characterized by the shiny spot on either side of ocellar tubercle, pale tubercles of OVB, pale region behind ocellar tubercle, blackish brown mesonotum, brown humeral calli, brownish scutellum with two black spots, dark central wingspot, infuscation along fifth vein and posterior crossvein, broad stripe on distal two-thirds of femur 1, bristle formula, very small mesal gap of tergum 7 (♀), form of sterna 7 and 8 in ♀, seventh spiracle well in tergum (♀), two pairs of hairs on tergum 10, large pentagonal, apically obtuse, subanal plate, very short base of outer and median arms, rounded outer arm with 7.6 tubercles, long club-shaped median arm with 4.0 spinous bristles, quite detached inner arm with one broad apophysis, large lateral extension of distal end of ♂ cerci, long phallophore, smooth aedeagal apex and gigantic ejaculatory apodeme and sac. Its closest, known relatives are *C. decoronotus* and *C. prodiopsis.*

9.5. **Teloglabrus** gen. nov.

Centrioncus: Shillito, 1950: 109 (in part).
Centrioncus: Smithers, 1958: 25.
Centrioncus: van Bruggen, 1961: 422.
Centrioncus: Steyskal, 1970: 325 (in part).
Type species: *Teleglabrus sanorum* sp. nov.

Centrioncidae with maxillary palps usually yellowish, dark section of funiculus at least including dorsal quarter of lateral side, central region behind ocellar tubercle pale brown, posterior side of head only densely pollinose behind ocellar tubercle; costal cell usually covered with microtrichia, subcostal cell usually present, free section of 5th vein abruptly becoming thinner distally, usually no central wingspot; usually less than eight spinous bristles per front femur, usually with distal stripes on hind femur; no sutures in basal ring of segment 7 (♀), tergum 7 (♀) thinly sclerotized and lateral edges not or almost not curved under, sternum 7 (♀) consisting of two longitudinal pieces conjoined on the meson, 7th spiracle (♀) in membrane, sternum 8 (♀) consisting of two small sclerites or absent, subanal plate not so large; periandrium rather narrow and bell-shaped, inner arm of outer telomere broadly joined to common base of outer and median arms, outer telomere in lateral position, outer and median arms glabrous, connection between outer and inner telomeres usually long, inner telomeres in varying degrees covered with microtrichia, usually with ridges in the mesal posterior corner and with 12—35 short hairs and no long, bristle-like hairs, inner posterior corner of periandrium usually with mesad extension connected to inner telomere, articulation between inner telomere and cercus usually via a bent slender structure, the structures of both sides not linked; ♂ cerci boot-shaped; interparameral sclerite with small or without lateral extensions, ratio width/length varying from 1.0—1.8; periandrial fold long and narrow or periandrial sclerite present; hypandrial clasper with one or two terminal bristle-like hairs; epiphallus usually sparsely denticulated, lateral sides of phallophore distally obtuse or rounded, aedeagus rather narrow, distal aedeagal sclerites not so large; ejaculatory apodeme usually fan-shaped, ejaculatory apodeme and sac normally sized, proximal section of ejaculatory duct in line with apodeme. *Teloglabrus* apparently only occurs south of the river Zambesi.

Teloglabrus are characterized as a monophyletic group by the following groundplan conditions, which are apomorphous with respect to the groundplan of the Centrioncidae.

(1) Sutures in basal ring of segment 7 (♀) lost.
(2) Sternum 7 (♀) reduced to two longitudinal pieces conjoined on the meson.

(3) Sternum 8 (♀) reduced to two small sclerites or lost.
(4) 7th spiracle (♀) secondarily in membrane.
(5) Outer and median arms of outer telomere glabrous.
(6) Free section of 5th vein abruptly becoming thinner distally.

Teloglabrus trituberculatus sp. nov.
(figs. 8, 18, 32, 53, 73, 100, 119, 158–162)

Centrioncus prodiopsis; van Bruggen, 1961: 423 (in part).

Type material: ♀ holotype, 1 ♂ and 2 ♀ paratypes from Gorongosa Mountain, Manica province, Mozambique, ix.1957, B.R. Stuckenberg. All type material is in the Natal Museum, South Africa. Permanent slides were made of ♂ genitalia and ♀ postabdomen.

Measurements: length of body in ♀ 5.5 mm (range 5.2–5.7) and in ♂ 5.5. mm, width of head in ♀ 1.27 mm (1.23–1.30) and in ♂ 1.26 mm, length of wing in ♀ 4.9 mm (4.5–5.2) and in ♂ 5.4 mm and length of scutellar spine in ♀ 0.34 mm (0.33–0.35) and in ♂ 0.32 mm.

Head: frons mesally depressed, posterior three-quarters glossy dark brown with a paler mesal stripe, anterior quarter pale brown and pollinose; posterior side wholly black or (in two paler specimens) with ventral edge yellow brown, sparsely pollinose, but densely pollinose behind ocellar tubercle.

Thorax: holotype and ♂ paratype with distinct pattern of brown and black, ♀ paratypes mainly blackish; first form with brown pronotum with blackish sutures, mesonotum brown with broad blackish mesal band continuing on scutellum (fig. 8), scutellar spines brown, humeral callus brown, lateral sides of scutum and prescutum somewhat darker brown, intrascutal suture black, pleura wholly yellowish brown in ♂ paratype, but in holotype with black anterior section on sternopleuron and posterior section of pteropleuron; dark form with brown pronotum, more blackish posteriorly, mesonotum blackish brown, lateral sides slightly browner, lateral and posterior sides of scutellum brownish, spines brown, mesopleuron and dorsoposterior section of sternopleuron brown, other pleura and postscutellum blackish brown; scutellum sticking up at an angle of about 30° from body axis, spines diverging at an angle of about 37°, apical bristle clearly longer (ca. 25%) than spine.

Wing: no microtrichia in most of costal cell, proximal section of second basal cell and most of first basal cell proximally of junction of 2nd and 3rd vein (only a band of microtrichia below humeral crossvein); subcostal cell just visible; central wingspot around anterior crossvein, in proximal quarter of first posterior cell, distal tip of first basal cell and posterior section of submarginal cell (fig. 18), part of spot in submarginal cell continuing as infuscation along

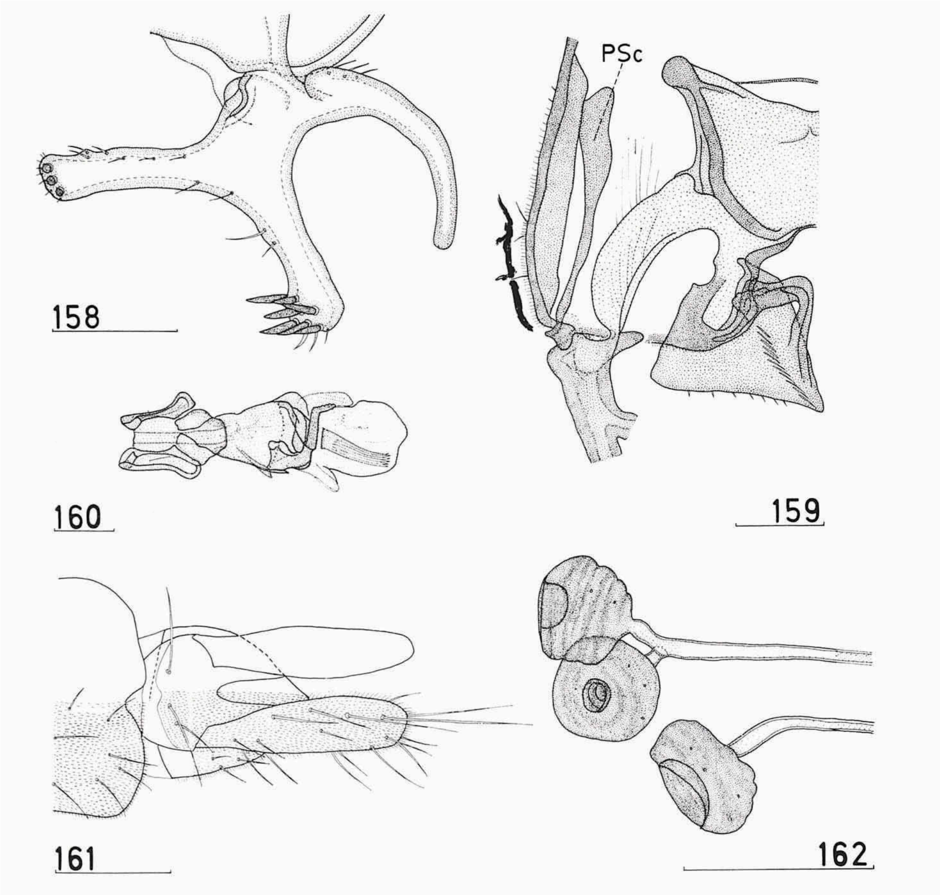
3rd vein, apex of submarginal cell infuscated, 5th vein infuscated between anal cell and posterior crossvein.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown, on inner side a brown stripe on distal two-thirds, tibia 1 dark brown, tarsus 1 yellowish white; 2nd and 3rd leg pale brown, apices of femora 2 and 3 slightly darker, base of tibia 2 darker, basal and distal part of tibia 3 darker; bristle formula 4.0, 4.9, 17.9, 16.8, 6.0.

Preabdomen: dorsally brown (blackish brown in dark form), pale band (almost forming two spots) on posterior edge of syntergum, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with straight posterior edge, lateral edges hardly curved under ventrally, the two longitudinal parts of sternum 7 slender and apically somewhat pointed (fig. 32); sternum 8 not visible, its former presence in the form of two small sclerites only indicated by twice three hairs, sternum and tergum 9 each consisting of two narrow sclerites; tergum 10 (fig. 161) somewhat onion-shaped, with three hairs, covered with microtrichia (including lateral edges); cerci not so narrow (length/width = 4.0), subanal plate (fig. 53) narrow and small, apically acute; spermathecae (fig. 162) roundish and wrinkled, with a dimple and some dispersed tiny tubercles, spermathecal ducts almost entirely hyaline except for slightly darker proximal ends.

Male postabdomen: periandrium (fig. 73) more or less bell-shaped, yellowish brown but base darker; outer telomere in lateral position, outer and median arms with short broad common base (fig. 158), outer arm straight and very slender (four times as long as broad) with 3.5 tubercles and eight small hairs, median arm slender, straight and somewhat club-shaped with 7.0 stout spinous bristles and five hairs; inner arm curved, with a small tubercle-shaped apophysis and three small hairs near its base; connection between outer and inner telomere long (fig. 159), inner telomere trapezoïd and strongly constricted at base, with about eight short hairs at apical edge, ten centrally and seven at mesal basal corner, some microtrichia basally, about ten small ridges along diagonal to inner posterior corner; inner posterior corner of periandrium with narrow mesal extension fused to central structures of inner telomere, articulation between inner telomere and cercus via long, hooked structure, partly sclerotized, partly membranous, cercus (fig. 100) boot-shaped with obtuse nose; interparameral sclerite rather long, ratio width/length = 1.3, anterior corners somewhat extended laterally, periandrial fold narrow, not directly connected with inner genitalia, instead a periandrial sclerite connects outer posterior corner of periandrium with hypandrium; hypandrial claspers moderately long with apically two short, stout, bristle-like hairs, near its base two short hairs, phallapodeme extending beyond hypandrium, epiphallus short and broad,



Figs. 158–162. *T. trituberculatus.* 158. Inner view of outer telomere. 159. Dorsal view of periandrial fold, periandrial sclerite, interparameral sclerite and inner telomere. 160. Dorsal view of aedeagus. 161. Dorsal view of tip of ♀ abdomen. 162. Spermathecae. Scales 0.1 mm.

not especially V-shaped, sparsely denticulated, phallophore long with apically rounded lateral sides, aedeagus very slender (fig. 160), not broadening apically, several sclerotized structures subapically, the most apical one long, slender and apically serrated, tip of aedeagus smooth; ejaculatory sac and apodeme (fig. 119) normally sized, apodeme fan-shaped.

Habitat: the two dark specimens were collected in gallery forest at an altitude of 840 m on the slope of Mount Gorongosa, the two brown specimens were collected in montane forest at an altitude of 1200 m.

Fungi: ♂ with about 25 immature specimens of a *Rhizomyces* sp. on ventral side of first and and second abdominal segment, ♀ paratype with 8 immature stages on left wing and 30 on right wing.

T. trituberculatus is characterized by its shiny frons, brown thorax with black mesal band on dorsum (not visible in dark form), absence of microtrichia in costal cell and basal half of first basal cell, central wingspot extending in submarginal cell along third vein, infuscated tip of submarginal cell, infuscated fifth vein, bristle formula (esp. high numbers of bristles and tubercles on front femur), pale posterior band of syntergum, absence of gap in tergum 7 (♀), absence of sternum 8 in ♀, tergum 10 with three hairs and fully covered with microtrichia, narrow and apically acute subanal plate, straight and very slender outer arm with 3.5 tubercles, straight median arm with 7.0 spinous bristles, curved inner arm, trapezoid inner telomere with only basally some microtrichia, presence of periandrial sclerite, long phallophore with apically rounded lateral sides and very slender aedeagus with smooth apex. Its closest, known relative is *T. vumbensis*.

Teloglabrus vumbensis sp. nov.
(figs. 9, 19, 33, 54, 74, 101, 120, 163—167)

Centrioncus prodiopsis; Smithers, 1958: 25.
Centrioncus prodiopsis; van Bruggen, 1960: 423 (in part).

Type material: ♂ holotype, 1 ♂ and 2 ♀ paratypes from Mount Selinda, Zimbabwe, ii.1954, N.J. Myers, 2 ♂ and 6 ♀ paratypes from North Vumba, Zimbabwe, ii—vii.1964 and 1965, D. Cookson and 1 ♂ (teneral) paratype from Vumba Mountain near Umtali, i.1955, B.R. Stuckenberg. All type material is in the Natal Museum, South Africa. Permanent slides were made of ♂ genitalia, ♀ postabdomen, wing and fungi.

Measurements: length of body in ♀ 5.6 mm (range 5.1—5.9) and in ♂ 5.2 mm (4.9—5.5), width of head in ♀ 1.25 mm (1.20—1.30) and in ♂ 1.18 mm (1.04—1.29), length of wing in ♀ 4.8 mm (4.4—5.2) and in ♂ 4.7 mm (4.3—4.8) and length of scutellar spine in ♀ 0.31 mm (0.28—0.34) and in ♂ 0.29 mm (0.26—0.33).

Head: frons mesally depressed, glossy dark brown with paler mesal stripe, anterior quarter pale brown and slightly pollinose; posterior side in most specimens almost wholly black except for some brown below the cervix, in some specimens ventral edge pale brown, sparsely pollinose but densely pollinose behind ocellar tubercle.

Thorax: holotype and 6 paratypes with brown and black configuration, other 6 paratypes more uniformly dark (or darkened); first form with brown pronotum with blackish sutures, mesonotum brown with a very broad blackish mesal band, continuing across the scutellum (fig. 9), scutellar spines brown, lateral sides of scutum and scutellum somewhat darker brown, intrascutal suture blackish, pleura mainly yellowish brown with some variable blackish sections on hypopleuron, posterior part of pteropleuron and anterior and posterior parts of sternopleuron, postscutellum dark brown; dark(-ened) form with thorax almost wholly blackish, lateral section of pronotum brown, mesopleuron, subalar callus, spot on sternopleuron, lateral sides of scutellum and scutellar spines brown; scutellum sticking up at an angle of 35° from body axis, spines diverging at an angle of about 25°, apical bristle marginally longer than spine.

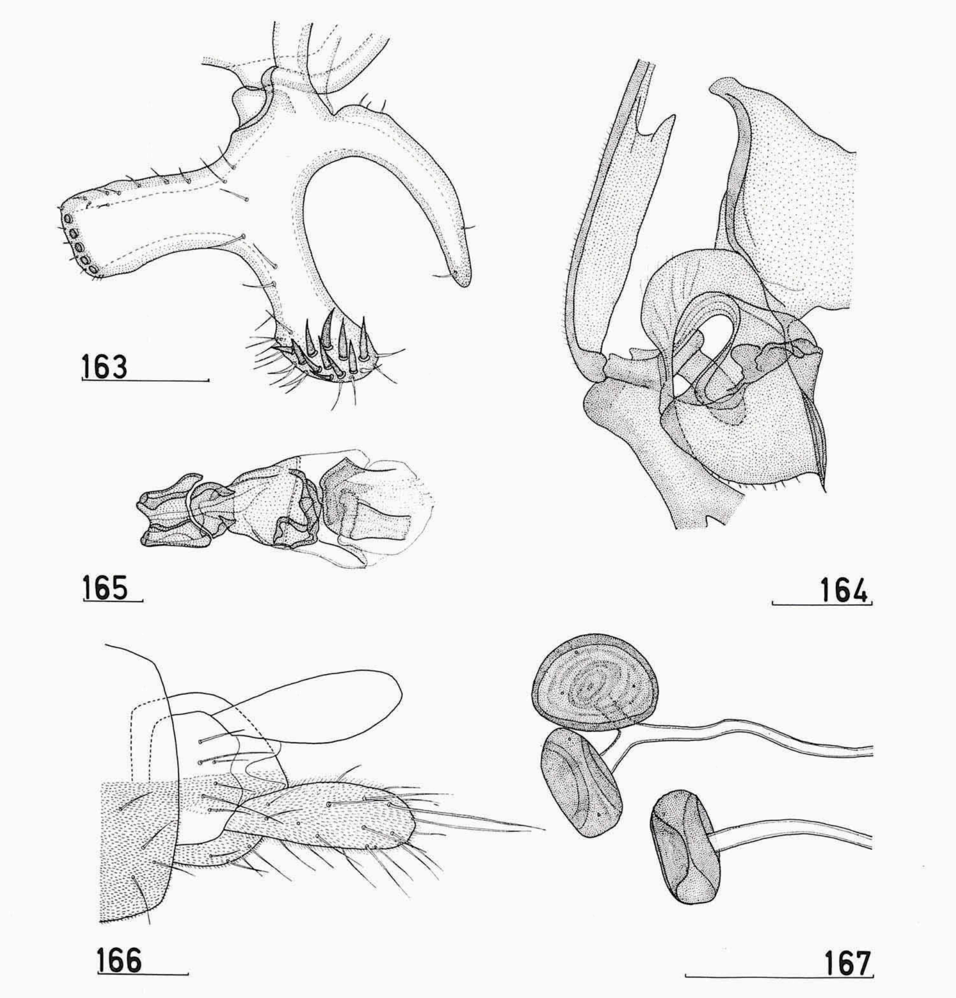
Wing: no microtrichia in most of costal cell, tiny proximal section of the second basal cell and most of first basal cell proximally of junction of second and third vein (only a band of microtrichia below the humeral crossvein); subcostal cell just visible; central wingspot around anterior crossvein, in proximal sixth of first posterior cell, distal tip of first basal cell and posterior section of submarginal cell (fig. 19), third vein infuscated from central wingspot onward, tips of marginal, submarginal and first posterior cells infuscated, in first posterior cell apical infuscation running out in a point towards disc, fifth vein infuscated between anal cell and posterior crossvein.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with brown stripe on distal two-thirds of inner side, tibia 1 dark brown, tarsus 1 yellowish white, metatarsus darker, especially in darkened form; second and third leg pale brown, apices of femora 2 and 3 darker, proximal and distal third of tibia 3 darker; bristle formula 3.8, 4.5, 17.9, 16.0, 6.7, range of tubercles on femur 3 very large (4—11).

Preabdomen: dorsally brown, pale band (almost forming two spots) on posterior edge of syntergum, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with rather large, semi-circular mesal gap posteriorly (fig. 33), lateral edges hardly curved under ventrally, the two longitudinal parts of sternum 7 slender and apically pointed; sternum 8 not visible, its former place indicated by two groups of resp. four and five hairs, sternum and tergum 9 each consisting of two narrow sclerites; tergum 10 (fig. 166) with 5 to 6 hairs, lateral sides glabrous; cerci broad (length/width = 2.8), subanal plate (fig. 54) small and apically acuminate; spermathecae (fig. 167) with flattened appearance because of large apical and basal dimples, with some dispersed tiny tubercles, spermathecal ducts completely hyaline.

Male postabdomen: periandrium (fig. 74) somewhat bell-shaped, yellowish brown with basal quarter darker; outer telomere in lateral position, outer and median arms with short broad common base (fig. 163), outer arm rectangular in shape (over twice as long as broad) with 4.7 tubercles and about eight short hairs, median arm broad, straight, somewhat club-shaped with 10.0 stout spinous bristles and 18 hairs; inner arm curved, with one small apophysis (fig.



Figs. 163–167. *T. vumbensis*. 163. Inner view of outer telomere. 164. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 165. Dorsal view of aedeagus. 166. Dorsal view of tip of ♀ abdomen. 167. Spermathecae. Scales 0.1 mm.

164) and five hairs; connection between outer and inner telomere short and broad (fig. 164), inner telomere constricted at base, apical edge rounded, about eight small, square-based hairs on inner side of apical edge, six hairs centrally and seven at the mesal basal corner, inner basal half covered with microtrichia; inner posterior corner of periandrium with narrow mesal extension fused to central structures of inner telomere, articulation between inner telomere and cercus via twisted structure on mesal edge of inner telomere, cercus (fig. 101) boot-shaped with rather acute nose; interparameral sclerite

quite long, ratio width/length = 1.2, anterior corners somewhat extended laterally, periandrial fold long and narrow; hypandrial claspers moderately long with apically one stout bristle-like hair and subapically two thinner hairs, near its base three small hairs, phallapodeme extending beyond hypandrium, epiphallus small, not very V-shaped, sparsely denticulated, phallophore rather short with apically subacute lateral sides, aedeagus slender, slightly broadening apically (fig. 165), several sclerotized structures subapically, the most apical one broad and apically tapering towards a serrated edge, aedeagal apex partly smooth and partly serrated; ejaculatory apodeme and sac normally sized (fig. 120), apodeme fan-shaped.

Habitat: the species occurs in the various montane forests of the Vumba Range and Mount Selinda at estimated altitudes of resp. 1200–1500 and 900 to 1200 m.

Fungi: a female from Selinda with about 50 specimens of a *Rhizomyces* sp. on the left wing and about 25 on the right wing. Most specimens were in the immature phase.

T. vumbensis is characterized by its shiny frons, brown thorax with very broad, black mesal band, absence of microtrichia in costal cell and basal half of first basal cell, central wingspot extending in submarginal cell along third vein, infuscated tips of marginal, submarginal and first posterior cells, infuscated fifth vein, high number of bristles and tubercles on front femur, pale posterior band of syntergum, rather large semi-circular mesal gap of tergum 7 (♀), absence of sternum 8 in ♀, tergum 10 with five to six hairs and laterally glabrous, broad ♀ cerci, small and apically acuminate subanal plate, rectangular outer arm with 4.7 tubercles, broad, club-shaped median arm with 10.0 spinous bristles, curved inner arm, inner telomere with rounded apical edge and inner basal half covered with microtrichia, short phallophore with apically subacute lateral sides and partly serrated aedeagal apex. Its closest known relative is *T. trituberculatus.*

Teloglabrus entabenensis sp. nov.
(figs. 34, 55, 75, 102, 121, 168–172)

Type material: ♂ holotype and 1 ♀ paratype from Entabeni For. Station, Zoutpansberg Range, N. Transvaal, South Africa, i.1975, B.R. Stuckenberg. All type material is in the Natal Museum, South Africa (NM 2639). Permanent slides were made of ♂ genitalia and ♀ postabdomen.

Measurements: length of body 5.4 mm (♀) and 5.0 mm (♂), width of head 1.23 mm (♀) and 1.17 mm (♂), length of wing 4.9 mm (♀) and 4.4

mm (♂), and length of scutellar spine 0.29 mm (♀) and 0.25 mm (♂).

Head: frons mesally depressed, dark brown but for pale anterior quarter, slightly pollinose except for glossy parts on either side of tubercle; maxillary palpi dark brown; posterior side mainly black but behind ocellar tubercle and below cervix brown, thinly pollinose but densely pollinose behind ocellar tubercle and laterally.

Thorax: pronotum blackish brown, mesonotum blackish brown, lateral sides more brownish, lateral and apical sides of scutellum brown, scutellar spines pale brown; propleuron brown, area around anterior spiracle dark, mesopleuron brown, sternopleuron blackish brown except for dorsoposterior brown section, other pleura and postscutellum blackish brown except for ventro-anterior brown spot on hypopleuron and posterior section of metapleuron; scutellum sticking up at an angle of about 27° from body axis, spines diverging at an angle of about 24°, apical bristle as long as spine.

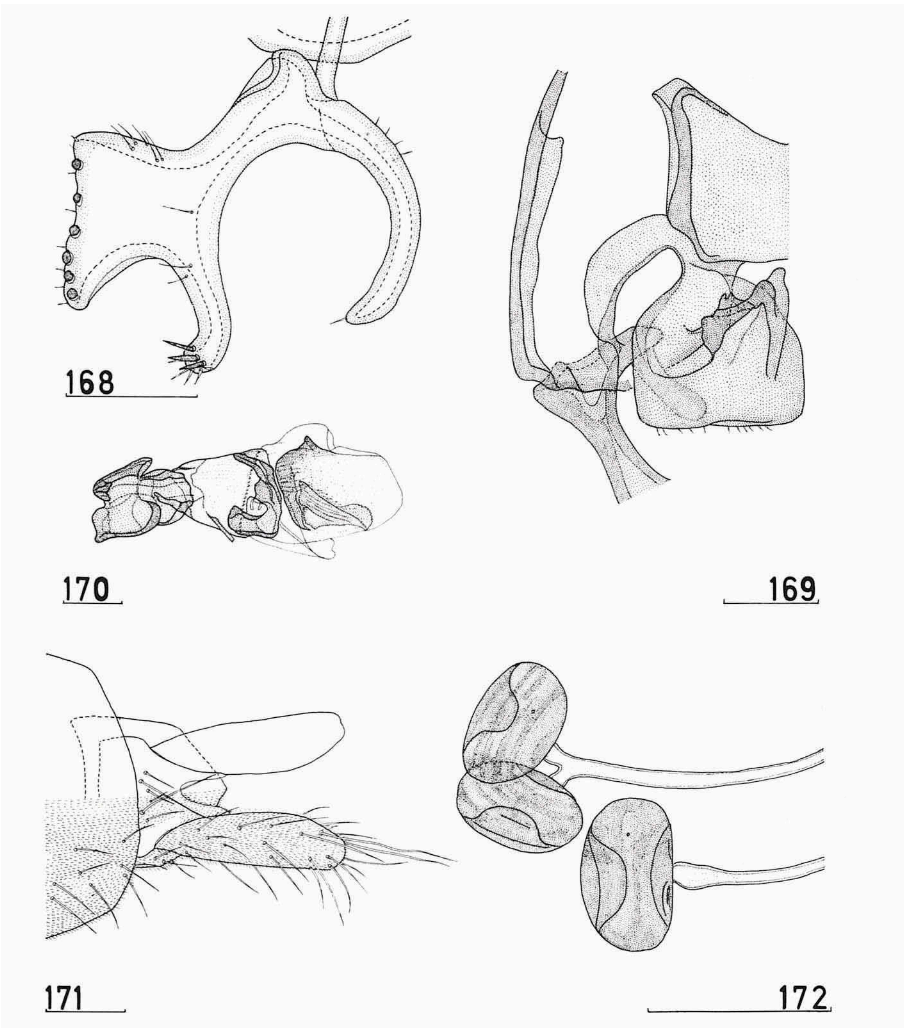
Wing: no microtrichia in basal tip of second basal cell and small section of first basal cell anterior of this tip; subcostal cell just visible; no wing markings except for vague infuscation around anterior crossvein.

Legs: coxa 1, trochanter 1 and femur 1 yellowish white, femur 1 with broad brown stripe on distal half of inner side, tibia 1 dark brown, tarsus 1 yellowish white, metatarsus darker; second and third leg pale brown, femur 2 with brown stripe on inner distal third, base of tibia 2 darker, femur 3 apically with brown stripes on inner and outer side, base and apex of tibia 3 darker; bristle formula 3.0, 4.5, 16.8, 15.5, 10.0.

Preabdomen: dorsally blackish brown, edge of syntergum pale brown laterally, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with rather large semi-circular mesal gap posteriorly (fig. 34), the two longitudinal parts of sternum 7 broad and apically furcated; sternum 8 not visible, its former place indicated by two groups of resp. two and three hairs, sternum and tergum 9 each consisting of two narrow sclerites; sternum 10 (fig. 171) with three pairs of hairs, lateral sides glabrous; cerci not so narrow (length/width = 3.6), subanal plate (fig. 55) somewhat pentagonal and apically obtuse; spermathecae (fig. 172) wrinkled with large dimple and some tiny tubercles, spermathecal ducts hyaline except for proximal section. Developing eggs were present in the abdomen.

Male postabdomen: periandrium (fig. 75) somewhat bell-shaped, uniformly pale brown; outer telomere in lateroventral position, outer and median arms with long slender common base and together ax-shaped, outer arm (fig. 168) very broad, irregularly trapezoid with 6.5 tubercles and about six hairs, median arm short, slender, somewhat curved and with three small spinous bristles and about seven hairs; inner arm curved, with one apophysis (fig. 169)



Figs. 168—172. *T. entabenensis*. 168. Inner view of outer telomere. 169. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 170. Dorsal view of aedeagus. 171. Dorsal view of tip of ♀ abdomen. 172. Spermathecae. Scales 0.1 mm.

and four hairs; connection between outer and and inner telomere long (fig. 169), inner telomere constricted at base, somewhat quadrangular, proximal corners rounded, apical corners right-angled, about ten small hairs on inner sides of apical edge, ten hairs centrally and two in the mesal basal corner, inner basal half covered with microtrichia, no ridges; inner posterior corner of periandrium with narrow mesal extension fused to central structures of inner telomere, articulation between inner telomere and cercus via long bent structure with anteriorly a triangular extension at bent, cercus (fig. 102) boot-shaped with rather obtuse nose; interparameral sclerite quite long, ratio width/ length = 1.1, anterior corners hardly extended laterally, periandrial fold long and narrow; hypandrial claspers long with one stout bristle-like hair and three thin hairs, three small hairs near its base, phallapodeme extending beyond hypandrium, epiphallus small, somewhat curved, not V-shaped, sparsely denticulated, phallophore long with apically subacute lateral sides (fig. 170), aedeagus slender, slightly broadening apically, several sclerotized structures subapically, the most apical one broad, tapering apically towards a serrated edge, aedeagal apex smooth but preapically serrated; ejaculatory apodeme and sac normally sized (fig. 121), apodeme fan-shaped.

Habitat: one specimen was collected in indigenous forest and one on grassland, both at an altitude of about 1500 m.

T. entabenensis is characterized by the glossy spot on either side of ocellar tubercle, dark maxillary palpi, uniformly dark mesonotum, clear wings, bristle formula (esp. the high number of tubercles on hind femur), brown stripe on distal half of femur 1, pale posterior edge of syntergum, large semi-circular mesal gap in tergum 7 of ♀, absence of sternum 8 in ♀, apically obtuse subanal plate, very broad trapezoid outer arm with 6.5 tubercles, short slender median arm with 3.0 small spinous bristles, curved inner arm, somewhat quadrangular inner telomere without ridges and with inner basal half covered with microtrichia, long phallophore with apically subacute lateral sides, serrated preapical edge of aedeagus and smooth apex. This species belongs to the *sanorum* complex.

Teloglabrus stuckenbergi sp. nov.
(figs. 10, 20, 35, 56, 76, 103, 122, 173–177)

Centrioncus prodiopsis; van Bruggen, 1961: 423 (in part), figs. 6–10.

Type material: ♀ holotype and 2 ♀ paratypes from Mariepskop, E. Transvaal, South Africa, x.1956, B.R. Stuckenberg and 1 ♂ paratype from the same locality, viii.1960, Leleup. All type material is in the Natal Museum, South Africa (NM 2646). Permanent slides were made of ♂ genitalia and ♀ postabdomen.

Measurements: length of body in ♀ 6.3 mm (range 6.1–6.5) and in ♂ 6.5 mm, width of head in ♀ 1.39 mm (1.37–1.40) and in ♂ 1.47 mm, length of wing in ♀ 6.0 mm (6.0–6.1) and in ♂ 6.0 mm and length of scutellar spine in ♀ 0.37 mm (0.34–0.38) and in ♂ 0.40 mm.

Head: frons slightly depressed mesally, dark brown but for anterior brown quarter and vague mesal line, slightly pollinose except for shiny spot on either side of ocellar tubercle; only outer half (near eye margin) of gena densely pollinose; posterior side blackish brown dorsally and yellowish brown ventrally, behind ocellar tubercle paler central area, thinly pollinose but densely pollinose in central area behind tubercle.

Thorax: pronotum yellowish brown with darker sutures, mesonotum yellowish with broad black mesal band (fig. 10) interrupted before scutoscutellar suture and then continuing on scutellum, lateral sides of mesonotum slightly darker, scutellar spines pale yellowish; pleura and postscutellum uniformly yellowish; scutellum sticking up at an angle of about 40° from body axis, spines diverging at an angle of about 28°, apical bristle slightly longer than spine.

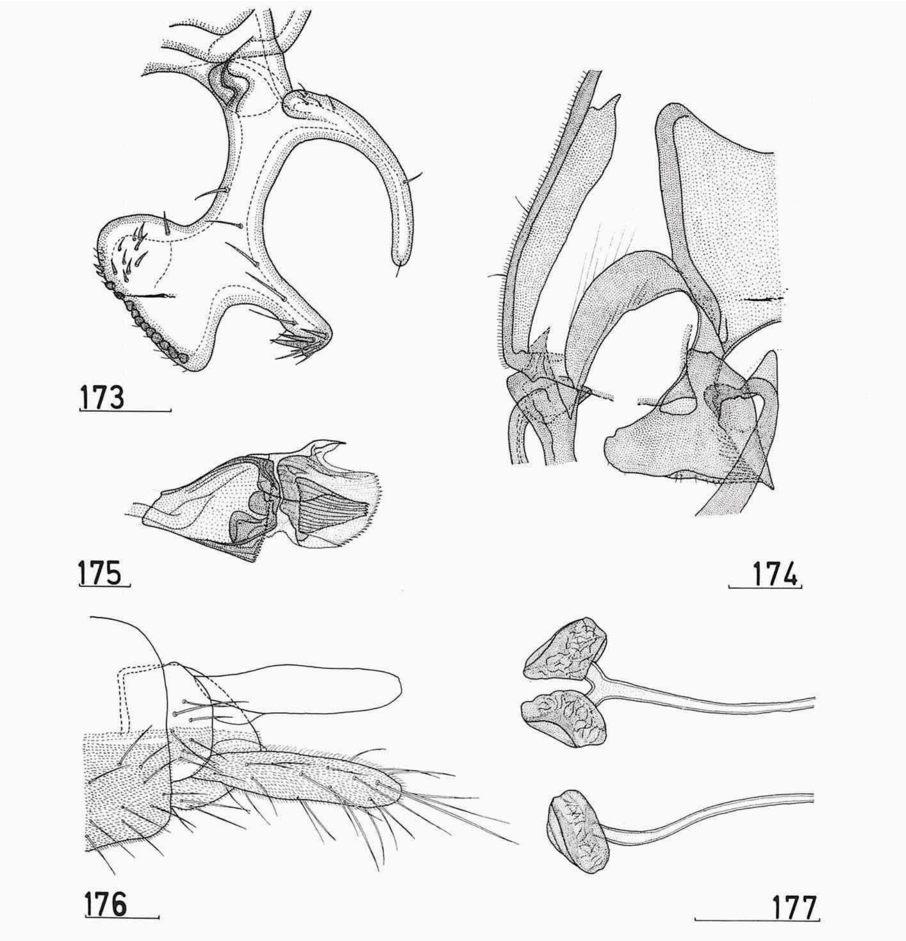
Wing: no microtrichia in basal tip of second basal cell and small section of first basal cell anterior of this tip; subcostal cell clearly visible; two vague, apical, triangular spots in submarginal and first posterior cell (fig. 20).

Legs: coxa 1, trochanter 1 and femur 1 pale yellowish, femur 1 with broad brown stripe on distal three-quarters of inner side, tibia 1 dark brown, tarsus 1 yellowish white; second and third leg pale yellowish, femora with brown distal stripe on inner and outer side, tibia 2 darker proximally, tibia 3 with continuous brown stripe on inner and outer side, stripes darker proximally and distally; bristle formula 3.1, 3.8, 17.9, 15.7, 2.6.

Preabdomen: dorsally brown, anterior and posterior sections of syntergum with yellowish lateral spots, ventral side yellowish.

Female postabdomen: tergum 7 with very large, circular, central gap on posterior half (fig. 35), the two longitudinal parts of sternum 7 slender and apically pointed, sternum 8 consisting of two small round sclerites, each with five hairs, sternum and tergum 9 each consisting of two, anteriorly broader, narrow sclerites; sternum 10 (fig. 176) rather angular, not narrower basally, with seven hairs, lateral sides glabrous; cerci narrow (length/width = 4.5), subanal plate (fig. 56) somewhat pentagonal, rather long, apically obtuse; spermathecae (fig. 177) with flattened appearance because of large dimples, somewhat wrinkled, spermathecal wall typically textured, no tubercles (?), spermathecal ducts hyaline except for darker proximal sections.

Male postabdomen: periandrium (fig. 76) large, triangular, yellowish with brown base; outer telomere in lateral position, outer and median arm not very separated and on very long slender common base (fig. 173), outer arm with rounded corners, ovoid and constricted at base, with 13.0 tubercles closely arranged in a row, furthermore about ten very short stout spinous bristles (about twice as high as the tubercles), median arm short and straight, with 4.0 short stout spinous bristles and about seven long hairs; inner arm curved, with one apophysis and about six hairs; connection between outer and inner telo-



Figs. 173–177. *T. stuckenbergi*. 173. Inner view of outer telomere. 174. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 175. Dorsal view of distal two-thirds of aedeagus. 176. Dorsal view of tip of ♀ abdomen. 177. Spermathecae. Scales 0.1 mm.

mere long (fig. 174), inner telomere constricted at base, triangular, inner side covered with microtrichia except for distal edge and basally, inner side with about 15 short hairs at the apical edge, 9 hairs centrally and 11 quite large hairs mesally, about 11 fine ridges along the diagonal to the inner posterior corner; inner posterior corner of periandrium not with mesal extension but simply linked to basal section of inner telomere, articulation between inner telomere and cercus via very long bent structure, cercus (fig. 103) somewhat boot-shaped but with strongly truncated nose; interparameral sclerite long, ratio width/length = 1.0, anterior corners not very extended laterally, periandrial fold long and narrow; hypandrial claspers long, with two stout terminal bristle-like hairs and one more basal hair, near base 2—3 short hairs, phallapodeme extending beyond hypandrium, epiphallus not V-shaped, well denticulated, phallophore long with apically rather obtuse lateral sides, aedeagus slender, slightly broadening apically, several sclerotized structures subapically, the most apical one almost triangular with a serrated tip (fig. 175), aedeagal apex serrated (almost filamentous); ejaculatory sac and apodeme (fig. 122) relatively small (given the large size of this fly), apodeme fan-shaped.

Habitat: the three females were collected "on summit" of Mariepskop and the male was "from humus above forest". These short notices seem to indicate that *T. stuckenbergi* occurs above forest level. As such it probably takes up another habitat than the other centrioncids, which might partly explain its aberrant size and colour. It occurred at an altitude of 1800 m.

T. stuckenbergi can easily be recognized by its large size, yellow colour and black mesal band on mesonotum. Furthermore it can be characterized by the glossy spot on either side of ocellar tubercle, clear wings with two vague apical spots, bristle formula (esp. the low number of tubercles on hind femur), brown stripe on distal three-quarters of femur 1, continuous brown stripes on tibia 3, yellowish, lateral spots of syntergum, large circular mesal gap in tergum 7 of ♀, two small sclerites forming sternum 8 (♀), long, apically obtuse subanal plate, large and triangular periandrium, very long and slender common base of outer and median arms, ovoid outer arm with 13.0 tubercles, short straight median arm with 4.0 spinous bristles, curved inner arm, triangular inner telomere covered on inside with microtrichia (except basally on distal edge) and 35 short hairs, truncated nose of ♂ cercus, long phallophore with apically subacute lateral sides and serrated, almost filamentous, apex of aedeagus. *T. stuckenbergi* has an isolated position in its genus.

Teloglabrus sabiensis sp. nov.
(figs. 77, 104, 123, 178—180)

Type material: ♂ holotype from Lone Creek Falls, 11 km W Sabie, Transvaal, South Africa, xii.1976, R. Miller and 1 ♂ paratype (teneral) from Frankfurt Forest Res., 10 km NE Sabie, xii.1976, R. Miller. All type material is in the Natal Museum, South Africa. A permanent slide was made of ♂ genitalia.

Measurements: length of body 5.0 mm (range 4.9—5.1), width of head 1.09 mm (1.05—1.13), length of wing 4.5 mm (4.2—4.7) and length of scutellar spine 0.28 mm.

Head: frons mesally depressed, dark brown but for paler anterior quarter, thinly pollinose; posterior side of head wholly black except for brown mesal region behind ocellar tubercle and region below cervix, thinly pollinose except for densely pollinose region behind tubercle.

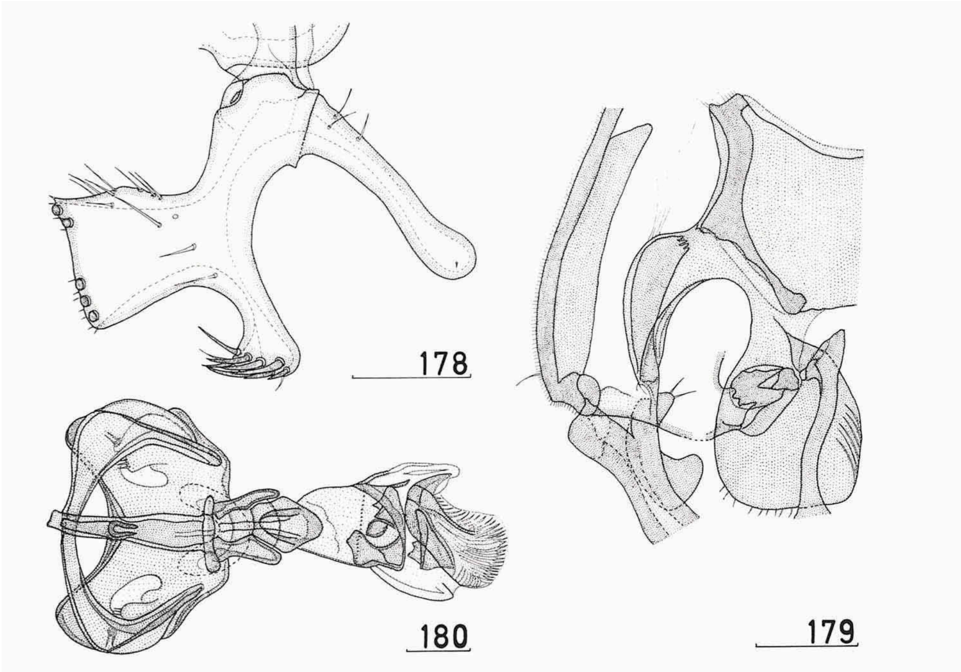
Thorax: pronotum brown with darker sutures, mesonotum blackish brown, area laterad of SA and IA and lateral sides of scutellum dark brown, scutellar spines pale brown; pleura blackish brown except for brown mesopleuron, subalar callus and dorsoposterior section of sternopleuron, postscutellum blackish brown; scutellum sticking up at an angle of about 32° from body axis, spines diverging at an angle of about 28°, apical bristles broken off.

Wing: no microtrichia in small section in basal tip of second basal cell and small section of first basal cell anteriorly of this tip; subcostal cell not visible; no wing markings.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale brown with brown stripe on distal half of inner side, tibia 1 dark brown, tarsus 1 yellowish white, base of metatarsus slightly darker; second and third leg pale brown, femur 2 with dark brown distal stripe on inner side and dark apex, femur 3 with dark brown distal stripes on inner and outer side, joining at the apex, tibia 2 darker basally, tibia 3 with dark brown basal and distal third; bristle formula 3.3, 4.0, 17.8, 15.3, 6.3.

Preabdomen: dorsally blackish brown, ventral side pale brown with darker sterna.

Male postabdomen: periandrium (fig. 77) bell-shaped, brown basally and yellowish brown apically; outer telomere in lateral position, outer and median arm on short common base (fig. 178), outer arm rectangular, somewhat longer than broad, slightly narrower at base, with 5.5 widely spaced tubercles and about twelve hairs, mediàn arm short, much broader apically, with 7.0 long spinous bristles and two hairs, between inner arm and base of other arms a typical fold-like process; inner arm more or less straight, with one apophysis and three hairs, connection between outer and inner telomere long (fig. 179), inner telomere constricted at base and of a very typical rounded to ovoid form, on inner side completely covered with microtrichia, eight small hairs at apical edge, 19 hairs centrally and five basally, with about six fine ridges on mesal side; inner posterior corner of periandrium with short broad mesal extension connected with central structures of inner telomere, articulation between inner telomere and cercus via long structure, first pointing anteriorly and then running out in posterior direction towards cercus, cercus (fig. 104) boot-shaped with obtuse nose; interparameral sclerite rather long, ratio width/length = 1.3, laterally hardly extended anteriorly, periandrial fold long and narrow; hypandrial clasper short with two terminal bristle-like hairs, two hairs near its base, phallapodeme hardly extending beyond hypandrium (fig. 180), epiphallus V-shaped, sparsely denticulated, phallophore with apically



Figs. 178–180. *T. sabiensis*. 178. Inner view of outer telomere. 179. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 180. Dorsal view of hypandrium, phallapodeme and aedeagus. Scales 0.1 mm.

obtuse lateral sides, aedeagus slender, somewhat broadening apically, several sclerotized structures subapically, whole apical tip strongly serrated; ejaculatory sac and apodeme (fig. 123) normally sized, apodeme well sclerotized, somewhat irregularly fan-shaped.

Habitat: one specimen came from a seepage area in a forest reserve, and the other from near falls. The species was collected between 900 and 1000 m.

T. sabiensis is characterized by its thinly pollinose frons, absence of wing-spots, bristle formula, brown stripe on distal half of femur 1, rectangular outer arm with 5.5 tubercles, short, apically broadening median arm with 7.0 long spinous bristles, fold-like process in axil between inner arm and base of other arms, straight inner arm, rounded to ovoid inner telomere, fully covered with microtrichia on inside and with about 32 small hairs, phallophore with apically obtuse lateral sides, and strongly serrated apex of aedeagus. This species comes close to the *sanorum* complex.

Teloglabrus lebombensis sp. nov.
(figs. 36, 57, 78, 105, 124, 181–184)

Centrioncus prodiopsis; van Bruggen, 1961: 423 (in part).

Type material: ♂ holotype and ♀ paratype from Gwaleni Forest, Ingwavuma Dist., Lebombo, Zululand, South Africa, ii.1957, B.R. Stuckenberg. All type material is in the Natal Museum, South Africa (NM 2640). Permanent slides were made of ♀ postabdomen and ♂ genitalia.

Measurements: length of body 4.9 mm (♀) and 5.3 mm (♂), width of head 1.14 mm (♀) and 1.29 mm (♂), length of wing 4.3 mm (♀) and 4.7 mm (♂) and length of scutellar spine 0.34 mm (♀) and 0.35 mm (♂).

Head: frons mesally depressed, dark brown but for paler anterior quarter, glossy, not pollinose; posterior side of head black except for brown mesal region behind ocellar tubercle and region below cervix, thinly pollinose except for densely pollinose region behind ocellar tubercle.

Thorax: pronotum brown with darker sutures, mesonotum blackish brown, lateroposterior side of scutum and scutellum brown, spines also brown; propleuron and region around anterior spiracle blackish brown, mesopleuron brown but central area darker, lateral side of sternopleuron brown but anterior tip darker, other pleura and postscutellum blackish brown, except for brown subalar callus of pteropleuron and brown posterior edge of metapleuron; scutellum sticking up at an angle of about 30° from body axis, spines diverging at an angle of about 35°, apical bristles slightly larger than spines.

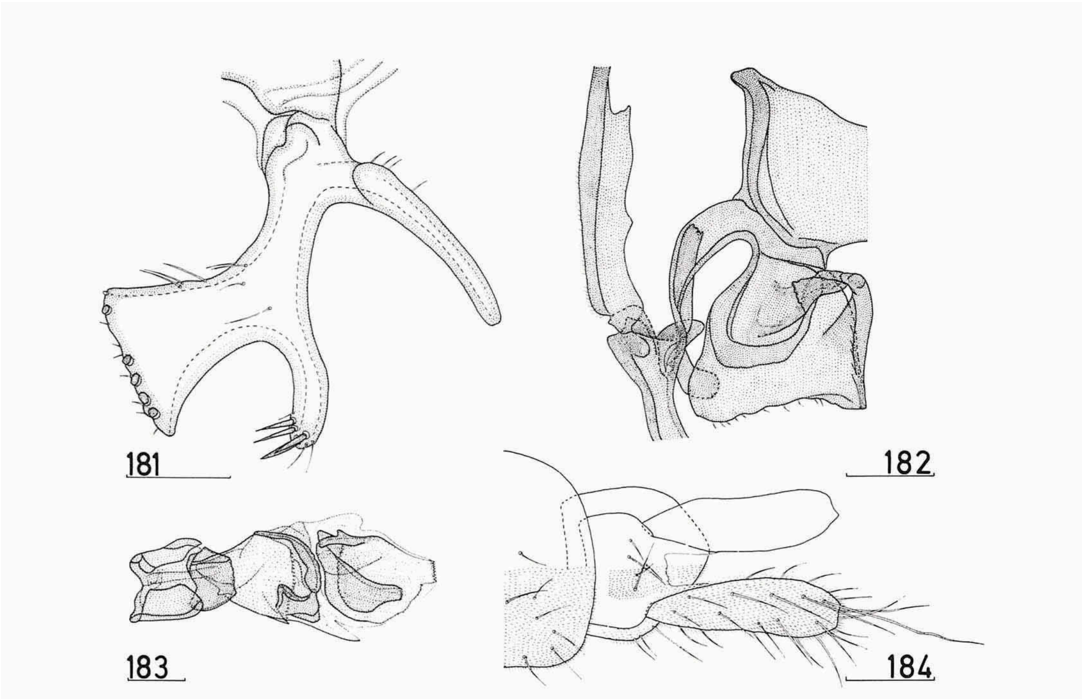
Wing: no microtrichia in small section in basal tip of second basal cell and small section of first basal cell anteriorly of this tip; subcostal cell present; some vague infuscation around anterior crossvein.

Legs: coxa 1, trochanter 1 and femur 1 pale brown, femur with brown stripe on distal half of inner side, tibia 1 dark brown, tarsus 1 yellowish, base of metatarsus darker; second and third leg pale brown, femora 2 and 3 with dark brown distal stripes on inner side and dark apices, tibia 2 darker basally and tibia 3 with dark brown basal and distal third; bristle formula 3.0, 4.8, 17.0, 15.5, 6.0.

Preabdomen: dorsally blackish brown, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 with rather large, semi-circular mesal gap posteriorly (fig. 36), the two longitudinal parts of sternum 7 slender; sternum 8 consisting of two small round sclerites with together nine hairs, sternum and tergum 9 each consisting of two, not so narrow sclerites; sternum 10 (fig. 184) rather angular, basally not narrower, with five hairs and only centrally with microtrichia; cerci not so narrow (length/width = 3.3), subanal plate (fig. 57) rather rounded laterally, apically obtuse; spermathecae lost during preparation.

Male postabdomen: periandrium (fig. 78) bell-shaped, brown basally and pale brown apically; outer telomere in lateral position, outer and median arm on long common base (fig. 181), outer arm rather long, trapezoid, narrower at base, with 5.0 tubercles and about seven hairs, median arm short, slender and slightly curved, with 3.5 spinous bristles and three hairs, inner arms slender, slightly curved, with one apophysis and four hairs; connection between outer and inner telomere long (fig. 182), inner telomere constricted at base, trapezoid (almost square), on inner side covered with microtrichia except for distal quarter, eleven small hairs at apical edge, ten hairs centrally and four mesally, about five fine ridges on mesal side; inner posterior corner of periandrium with short broad mesal extension connected to central structures of inner telomere, articulation between inner telomere and cercus via moderately long



Figs. 181–184. *T. lebombensis*. 181. Inner view of outer telomere. 182. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 183. Dorsal view of aedeagus. 184. Dorsal view of tip of ♀ abdomen. Scales 0.1 mm.

bent structure, cercus (fig. 105) boot-shaped with long acute nose; interparameral sclerite rather long, ratio width/length = 1.4, anterior corners hardly extended laterally, periandrial fold long and narrow; hypandrial clasper long with two terminal stout bristle-like hairs and one more basal hair, two short hairs near its base, phallapodeme extending beyond hypandrium, epiphallus more or less V-shaped, sparsely denticulated, phallophore (fig. 183) with apically acute lateral sides, aedeagus slender, somewhat broadening apically, several sclerotized structures subapically, the most apical piece tapering apically and serrated at tip, tip of aedeagus serrated over short distance; ejaculatory sac and apodeme (fig. 124) rather large, apodeme fan-shaped.

Habitat: both specimens came from a forest in the Lebombo mountains, at an altitude of 730 m.

T. lebombensis is characterized by its glossy frons, absence of wingspots, bristle formula, brown stripe on distal half of femur 1, two small sclerites forming sternum 8 (♀), rather large, semi-circular mesal gap of tergum 7 (♀), apically obtuse subanal plate, rather long, trapezoid outer arm with 5.0 tubercles, slender, slightly curved, median arm with 3.5 spinous bristles, slender, slightly curved inner arm, trapezoid (almost square) inner telomere, covered on inside with microtrichia (except for distal quarter), phallophore with apically acute lateral sides and partially serrated apex of aedeagus. This species belongs to the *sanorum* complex.

Teloglabrus milleri sp. nov.

(figs. 21, 37, 58, 79, 106, 125, 185–189)

Type material: ♀ holotype, 1 ♂ paratype and 1 ♀ paratype from Nkandla Forest Reserve, 20 km SE Nkandla, Natal, South Africa, i.1980, R.M. Miller, holotype and ♂ paratype in the Rijksmuseum van Natuurlijke Historie, Leiden, Holland, and ♀ paratype in the Natal Museum, South Africa. Permanent slides were made of ♀ postabdomen and ♂ genitalia.

Measurements: length of body in ♀ 5.6 mm (range 5.5–5.6) and in ♂ 5.0 mm, width of head in ♀ 1.31 mm (1.26–1.36) and in ♂ 1.11 mm, length of wing in ♀ 5.4 mm (both) and in ♂ 4.8 mm and length of scutellar spine in ♀ 0.41 mm (0.40–0.42) and broken in ♂.

Head: frons strongly depressed mesally, dark brown but for pale anterior quarter and pale narrow mesal line, glossy but for pollinose lateral and anterior edges and mesal line; dorsolateral blackish section of funiculus extending to almost halfway down; posterior side of head blackish on dorsal half, except for pale area behind ocellar tubercle, and pale brown on ventral half, thinly pollinose, area behind ocellar tubercle densely pollinose.

Thorax: pronotum dark brown, mesonotum blackish brown, lateral side of scutum browner, lateral and apical edge of scutellum brown, scutellar spines pale brown; propleuron and region around anterior spiracle blackish brown, mesopleuron brown but centrally darker, sternopleuron brown but anterior tip darker, pteropleuron blackish brown expect for brown subalar callus, hypopleuron blackish brown except for brown anterior edge, metapleuron brown but callus dark, postscutellum blackish brown; scutellum sticking up at an angle of about 35° from body axis, spines diverging at an angle of about 25°, apical bristles as long as spines.

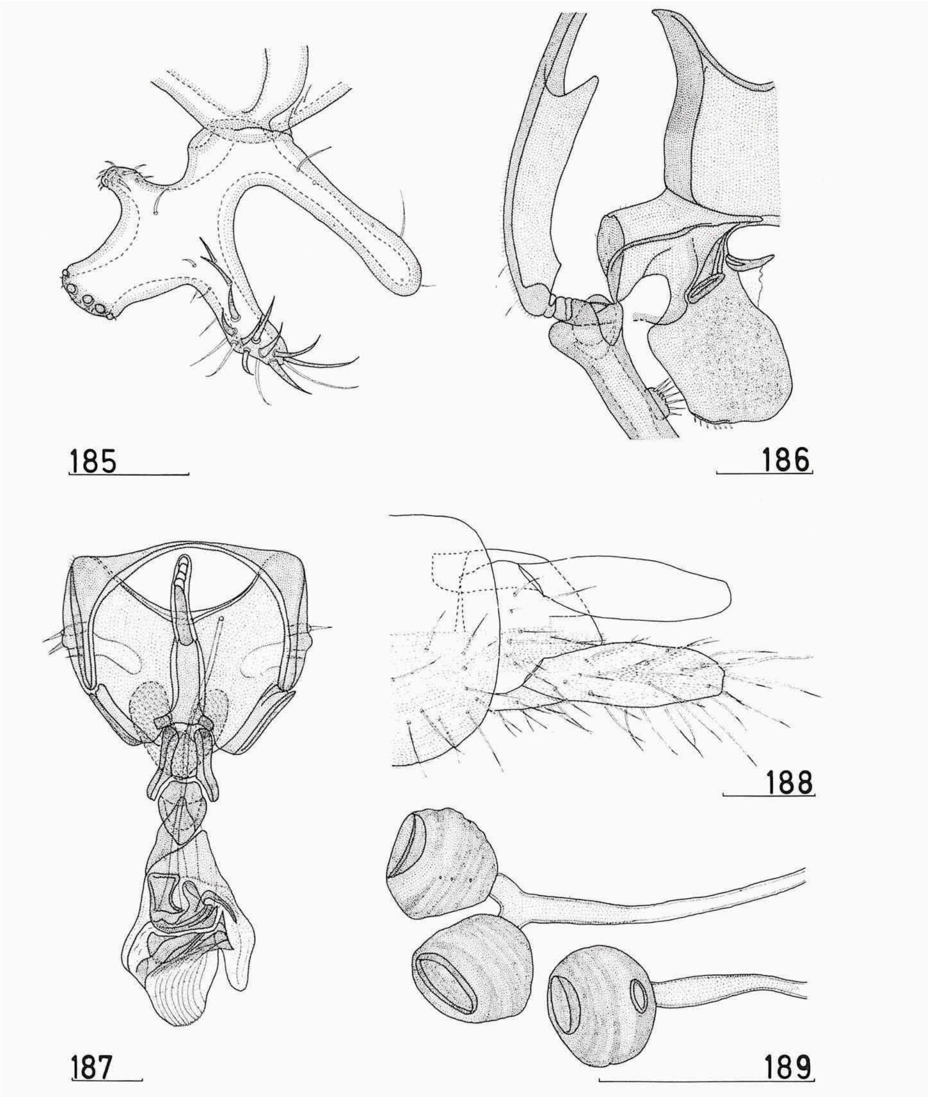
Wing: no microtrichia in small section in basal tip of second basal cell and section of first basal cell anterior of this tip; subcostal cell present; very vague infuscation around anterior crossvein, very vague triangular apical spot in submarginal cell and very vague linear apical spot in first posterior cell (fig. 21).

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale brown, with dark brown stripe on distal two-thirds of inner side, tarsus 1 yellowish white; second and third leg pale brown, femora with dark brown distal stripes on inner side, apex of femur 3, base of tibia 2 and basal and distal third of tibia 3 dark brown; bristle formula 3.0, 4.0, 15.7, 14.7, 3.3.

Preabdomen: dorsally dark brown, ventral side pale brown with darker sterna.

Female postabdomen: tergum 7 rather uniformly sclerotized with on posterior half a triangular mesal gap (fig. 37), the two longitudinal parts of sternum 7 not so slender; sternum 8 consisting of two small round sclerites, each with five hairs, sternum and tergum 9 consisting of two narrow sclerites; sternum 10 (fig. 188) somewhat onion-shaped, lateral sides rounded, with six hairs, laterally glabrous; cerci broad (length/width = 3.0), subanal plate small and narrow, apically obtuse (fig. 58); spermathecae (fig. 189) rather rounded, wrinkled, with large dimple and some tiny tubercles, spermathecal ducts hyaline except for darker proximal sections.

Male postabdomen: periandrium (fig. 79) bell-shaped, uniformly pale brown; outer telomere in lateral position, outer and median arm on short common base (fig. 185), outer arm not constricted at base, tapering apically, with a very typical dorsal protuberance, which almost forms a fourth arm, with 5.0 tubercles and about 13 short hairs on the protuberance, median arm short and straight, pointed apically, with 11.0 long stout spinous bristles and five long and three short hairs; inner arm straight, with one apophysis and three hairs; connection between outer and inner telomere short and broad (fig. 186), inner telemore somewhat constricted at base, oblong with rounded corners and a typical marmorated structure, no microtrichia on inner side,



Figs. 185–189. *T. milleri*. 185. Inner view of outer telomere. 186. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 187. Dorsal view of hypandrium, phallapodeme and aedeagus. 188. Dorsal view of tip of ♀ abdomen. 189. Spermathecae. Scales 0.1 mm.

about seven short hairs in lateroposterior corner and about twelve short hairs in lateral basal corner; inner posterior corner of periandrium not with mesal extension but simply with broad section linked to basal section of inner telomere, articulation between inner telomere and cercus via short mesal basal sclerite (as in *Centrioncus*), cercus (fig. 106) boot-shaped with short obtuse nose; interparameral sclerite long, ratio width/length = 1.1, anterior corners hardly extended laterally, periandrial fold long and narrow; hypandrial clasper long with one terminal bristle-like hair (fig. 187) and one more basal hair, about three short hairs near its base, phallapodeme not extending beyond hypandrium, epiphallus V-shaped, well denticulated, phallophore with apically rather obtuse lateral sides, aedeagus slender, broadening apically, several sclerotized structures subapically, not pointing apically, apex furcated with larger lobe apically serrated; ejaculatory sac and apodeme (fig. 125) very small, apodeme rather straight dorsally.

Habitat: the specimens were collected at an altitude of 1130 m at the margin of the forest and near a road through the forest.

T. milleri is characterized by its strongly depressed glossy frons, large scutellar spines, two very vague apical wingspots, bristle formula (esp. low number of tubercles on hind femur), triangular mesal gap of tergum 7 (♀), two small sclerites forming sternum 8 (♀), narrow apically obtuse subanal plate, apically tapering outer arm with hairy dorsal protuberance ("fourth arm") and 5.0 tubercles, straight median arm with 11.0 stout long spinous bristles, straight inner arm, short broad connection between outer and inner telomeres, oblong inner telomere with marmorated structure, without ridges and microtrichia, but with about 19 short hairs (seven in a typical lateroposterior position), short, mesad directed basal sclerite (as in *Centrioncus*) of inner telomere, apically obtuse lateral sides of phallophore, furcated apex of aedeagus with apically serrated larger lobe. *T. milleri* takes up an isolated position within the genus, although it might have a closer relation with *Teloglabrus* sp. 1.

Teloglabrus sp. 1

Material studied: 2 ♀ from Dlinza Forest Nat. Reserve, Natal, South Africa, xii.1979, R.M. Miller.

Measurements: length of body 5.5 and 5.9 mm, width of head 1.32 and 1.36 mm, length of wing 4.8 and 5.3 mm, and length of scutellar spine 0.35 and 0.42 mm.

The two females originate from indigenous evergreen forest (altitude 520 m) of the Dlinza Forest, about 80 km from Nkandla Forest. In size and external morphology they are very similar to *T. milleri*. The posterior femur has distal stripes on both sides, joining on the apex. The bristle formula is 3.3, 4.0, 18.5, 15.3, 7.0. In the female postabdomen some differences exist between the

Dlinza specimens and *T. milleri*. In the Dlinza specimens the two sclerites that form the eighth sternite are not visible, the posterior gap in the seventh tergite is much broader, the spermathecae are almost twice as large, the lateral sides of tergum 10 are more angular, the cerci are narrower and the subanal plate is broader and apically acuminate. However, these differences do not yet warrant the description of a new species. When the genitalia of males from Dlinza forest have become known, it will be interesting to see whether, and in how far, they show the same peculiarities as in *T. milleri*.

Teloglabrus sanorum sp. nov.
(figs. 1–4, 11, 23–25, 38, 45, 46, 59, 68, 80, 89, 91–93, 95, 107, 126)

Centrioncus prodiopsis; Shillito, 1950: 113 (in part).
Centrioncus prodiopsis; van Bruggen, 1961: 432 (in part).

Type material: ♂ holotype, 40 ♂ paratypes and 25 ♀ paratypes from Injasuti (Solitude), Drakensberg, Natal, South Africa, ii.1981, H.R., J.J. & M.D. Feijen, 1 ♀ paratype from Giants Castle (near Main Caves), Drakensberg, ii.1981, H.R. Feijen and 1 ♂ paratype from Royal Natal National Park, Drakensberg, ix.1963, B. & P. Stuckenberg. In total 53 ♂ and 77 ♀ (several of which were teneral) were collected in Injasuti. All type material is in the Rijksmuseum van Natuurlijke Historie, Leiden, Holland, except for some paratypes in the Natal Museum (NM 2645) and British Museum (N.H.). Permanent slides were made of head and thorax, wings, legs, ♂ and ♀ abdomen, ♂ genitalia, ♀ postabdomen and fungi.

Measurements: 20 ♀ and 20 ♂ were measured: length in ♀ 5.45 mm ± SE 0.07 (range 4.8–6.2) and in ♂ 4.92 mm ± 0.06 (4.5–5.3), width of head in ♀ 1.19 mm ± 0.01 (1.12–1.35) and in ♂ 1.13 mm ± 0.01 (1.05–1.24), length of wing in ♀ 4.85 mm ± 0.05 (4.3–5.2) and in ♂ 4.42 mm ± 0.05 (3.9–4.8) and length of scutellar spine in ♀ 0.317 mm ± 0.005 (0.27–0.37) and in ♂ 0.297 mm ± 0.005 (0.25–0.33).

Head: frons mesally depressed, dark brown but for pale brown anterior edge (fig. 3) and vague narrow mesal line, glossy but for pollinose lateral and anterior edges; posterior side of head black except for brown mesal region behind ocellar tubercle and region below cervix (fig. 1), thinly pollinose but densely pollinose behind ocellar tubercle.

Thorax: pronotum brown with darker sutures, mesonotum blackish brown, anteriorly of IA a typical small brown wedge (figs. 1 and 2), lateroposterior side of scutum brown, lateral and inferior sides of scutellum brown, spines pale brown; propleuron and region around anterior spiracle blackish brown except for brown ventral edge, mesopleuron brown, pteropleuron blackish brown except for brown subalar callus, lateral side of sternopleuron brown except for blackish brown anterior tip and dark central spot, hypopleuron blackish brown except for anterior edge, metapleural callus blackish brown, rest of metapleuron brown, postscutellum blackish brown with brown dorsal edge; scutellum sticking up at an angle of about 30° from body axis, spines diverging at an angle of about 30°, apical bristles just longer (5%) than spines.

Wing: no microtrichia in tiny section in basal tip of second basal cell and section of first basal cell anterior of this tip; subcostal cell present or not; some very vague infuscation around anterior crossvein (fig. 11).

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with apically broadening dark brown stripe on distal two-thirds of inner side, part of apical section of stripe darker and somewhat separated from main stripe (fig. 23), tibia 1 dull dark brown, tarsus 1 yellowish white, base of metatarsus darker; second and third leg pale brown, femur 2 with dark brown distal stripe on inner side and dark apex, femur 3 with dark brown distal stripes on inner and outer sides, base of tibia 2 and basal and distal third of tibia 3 dark brown, in a number of species the dark brown basal and distal sections of tibia 3 connect to form a stripe on the inner side: bristle formula 3.1, 4.1, 17.1, 15.5, 6.0.

Preabdomen: dorsally blackish brown, ventrally pale brown with darker sterna.

Female postabdomen: tergum 7 with posteriorly a circular mesal gap (fig. 38), the two longitudinal parts of sternum 7 rather broad and rectangular; sternum 8 consisting of two small rectangular sclerites with three large and two small hairs each, sternum and tergum 9 each consisting of two narrow sclerites (fig. 25); sternum 10 (fig. 45) onion-shaped, lateral sides rounded, with 6.0 hairs, laterally glabrous; cerci not so narrow (length/width = 3.9), subanal plate (fig. 59) rather rounded laterally and apically broadly acuminate with slightly split apex; spermathecae (fig. 46) rather flattened because of large dimples, wrinkled and especially in the dimples a number of tubercles, spermathecal ducts hyaline but proximally somewhat darker.

Male postabdomen: periandrium (figs. 68 and 80) bell-shaped, yellowish brown with darker base; outer telomere in lateral position, outer and median arm together ax-shaped (fig. 89) and on short common base, outer arm trapezoid, constricted at base, with 6.9 ± SE 0.2 (range 5—8) tubercles and about nine short to long hairs, median arm short and slightly curved, with 4.4 ± 0.1 (range 4—6) long stout spinous bristles and two hairs; inner arm strongly curved, with one apophysis and four hairs; connection between outer and inner telomere long (fig. 91), inner telomere trapezoid with constricted base, lateral apical corner acute, on inner side covered with microtrichia, except for distal quarter, about six short hairs at apical edge, seven hairs centrally and five at basal mesal corner, about six short diagonal ridges in the mesal posterior corner; inner posterior corner of periandrium with short broad mesal extension connected to central structures of inner telomere, articulation between inner telomere and cercus via short bent structure with thin anterior prolongation, cercus (fig. 107) boot-shaped with short subacute nose; interparameral sclerite rather short, ratio width/length = 1.7, anterior corners hardly extended laterally, periandrial fold long and narrow; hypandrial clasper long, with 1.1 ± 0.1 (range 1–2) stout terminal bristle-like hairs and 2.3 ± 0.2 (range 2–3) subterminal hairs, 2.1 ± 0.1 (range 2–3) short hairs near its base, phallapodeme (figs. 92 and 93) extending beyond hypandrium, epiphallus V-shaped, rather sparsely denticulated, phallophore with apically obtuse lateral sides, aedeagus slender, broadening apically, several sclerotized structures distally, the most apical one being serrated, apex of aedeagus serrated; ejaculatory sac and apodeme (figs. 95 and 126) normally sized; apodeme fan-shaped.

Habitat: *T. sanorum* was collected in pockets of indigenous forest in valleys of the "little berg" of the Drakensberg at altitudes of between 1400 and 1550 m. It occurred in the most shady places, with little undergrowth, where it could be found on the leaves of small shrubs and plants. It was especially common around a place with some standing water. Some specimens collected were teneral and none of the females had eggs or developing eggs, indicating that the reproduction time ended at the beginning of the rainy season.

Fungi: of the 77 females collected three were parasitized by on the average 21.3 *Rhizomyces* sp. and of the 53 males one was parasitized by six fungi. This low parasitism rate also indicates that in February the flies were still young. In the females the fungi were in the immature phase and only found on the wings, equally distributed over right and left wing. In the male immature stages occurred on the ventral side of the second and third abdominal segment.

T. sanorum is characterized by its depressed glossy frons, dark brown mesonotum with small brown wedge anteriorly of IA, absence of wingspots, bristle formula, circular mesal gap of tergum 7 (♀), two small sclerites forming sternum 8 (♀), broadly acuminate subanal plate with split apex, trapezoid outer arm with 6.9 tubercles, short, slightly curved median arm with 4.4 spinous bristles, strongly curved inner arm, trapezoid inner telomere, covered on inner side with microtrichia (except for distal quarter), apically obtuse lateral sides of phallophore and serrated aedeagal apex. *T. sanorum* is the type species of *Teloglabrus* and it also gives its name to a complex of closely related species, the *sanorum* complex.

Teloglabrus duplospinosus sp. nov.
(figs. 81, 108, 127, 190—192)

Centrioncus prodiopsis; van Bruggen 1961: 423 (in part).

Type material: ♂ holotype and 3 ♂ paratypes from Lions Bush, Nottingham, Natal, South Africa, viii.1954, B.R. Stuckenberg. All type material is in the Natal Museum, South Africa (NM 2638). Permanent slides were made of ♂ genitalia and fungi.

Measurements: length of body 4.9 mm (range 4.7—5.0), width of head 1.15 mm (1.13—1.17), length of wing 4.5 mm (4.2 - 4.8) and length of scutellar spine 0.28 mm (0.27—0.29).

Head: frons slightly depressed mesally, dark brown but for pale anterior quarter and pale, narrow mesal line, wholly glossy; posterior side of head blackish, behind ocellar tubercle and below cervix yellowish brown, thinly pollinose but densely pollinose behind ocellar tubercle.

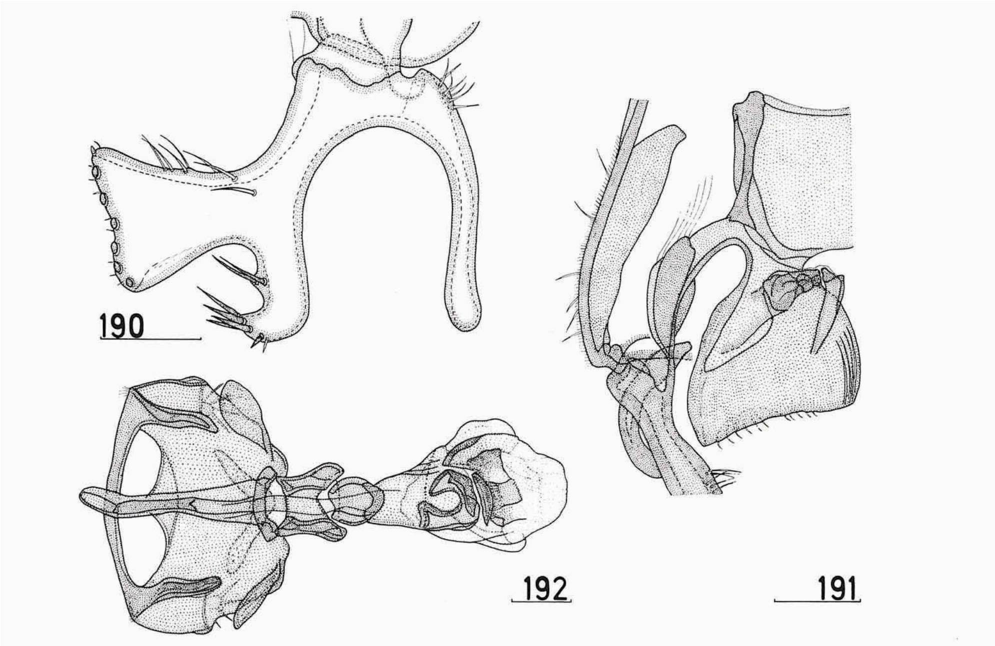
Thorax: pronotum brown with darker sutures, mesonotum blackish brown, lateral and inferior sides of scutellum brown, spines pale brown; propleuron and region around anterior spiracle blackish brown except for ventral edge, mesopleuron brown but darker centrally, pteropleuron blackish brown except for subalar callus, lateral side of sternopleuron brown except for blackish brown anterior tip and darker central section, hypopleuron blackish brown except for anterior edge, metapleuron and postscutellum blackish brown; scutellum sticking up at an angle of 30° from body axis, spines diverging at an angle of about 30°, apical bristle clearly longer (25%) than spine.

Wing: no microtrichia in small section of first basal cell anteriorly of basal tip of second basal cell; subcostal cell present; no wing markings.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with dark brown stripe on distal two-thirds of inner side, tibia 1 and most of metatarsus 1 dark brown, rest of tarsus 1 pale brown; second and third leg pale brown, femur 2 with brown distal stripe on inner side and dark apex, femur 3 with dark brown distal stripes on inner and outer side, basal and distal third of tibia 3 dark brown; bristle formula 3.1, 4.0, 16.4, 14.9, 2.9.

Preabdomen: dorsally blackish brown, ventrally pale brown with darker sterna.

Male postabdomen: periandrium (fig. 81) bell-shaped, yellowish brown with dark brown base; outer telomere in lateral position, outer and median arm on rather long common base (fig. 190), outer arm trapezoid, rather long and narrow, constricted at base, with 6.0 tubercles, some small "underdeveloped" t bercles and seven long hairs, median arm short, strongly curved apically and with small central protuberance, 3.5 stout spinous bristles apically



Figs. 190–192. *T. duplospinosus*. 190. Inner view of outer telomere. 191. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 192. Dorsal view of hypandrium, phallapodeme and aedeagus. Scales 0.1 mm.

and 2.0 on protuberance, also two hairs; inner arm slightly curved, with one apophysis and seven hairs; connection between outer and inner telomere long (fig. 191), inner telomere with constricted base, rounded sides and straight apical edge, on inner side covered with microtrichia except for distal quarter, about ten short hairs at apical edge, eleven centrally and two at basal mesal corner, about four longitudinal ridges in mesal posterior corner; posterior corner of periandrium with short broad mesal extension connected to centro-basal structures of inner telomere, articulation between inner telomere and cercus via bent structure, cercus (fig. 108) boot-shaped with subacute nose; interparameral sclerite rather short, ratio width/length = 1.8, anterior corners not extended laterally, periandrial fold long and narrow; hypandrial clasper long, with one stout terminal bristle-like hair and two terminal hairs, two short hairs near its base, phallapodeme (fig. 192) extending beyond hypandrium, epiphallus V-shaped, sparsely denticulated, phallophore with apically obtuse lateral sides, aedeagus slender, broadening apically, apex smooth; ejaculatory apodeme and sac (fig. 127) normally sized, apodeme fan-shaped.

Habitat: *T. duplospinosus* was collected at an altitude of 1700 m in a forest (Lions Bush) near Nottingham.

Fungi: one ♂ had one mature specimen of *Rhizomyces* sp. on its left wing.

T. duplospinosus is characterized by its slightly depressed glossy frons, absence of wingspots, bristle formula (esp. low number of tubercles on hind femur), trapezoid, rather long and narrow, outer arm with 6.0 tubercles, apically strongly curved median arm with apically 3.5 spinous bristles and on an apical protuberance 2.0 spinous bristles, slightly curved inner arm, inner telomere with rounded sides and straight edge, covered on inner side with microtrichia (except for distal quarter), apically obtuse lateral sides of phallophore and smooth aedeagal apex. *T. duplospinosus* belongs to the *sanorum* complex.

Teloglabrus pelecyformis sp. nov.
(figs. 39, 60, 66, 82, 109, 128, 193–197)

Type material: ♂ holotype, 2 ♂ paratypes and 5 ♀ paratypes from Town Bush, Pietermaritzburg, Natal, South Africa, ix.1980, J.J. Feijen. All type material is in the Rijksmuseum van Natuurlijke Historie, Leiden, Holland, except for two paratypes in the Natal Museum (NM 2642). Permanent slides were made of wing, egg, ♀ postabdomen, ♂ genitalia and fungi.

Measurements: length of body in ♀ and ♂ 5.5 mm (range 5.3–5.8), width of head in ♀ 1.22 mm (1.20–1.25) and in ♂ 1.25 mm (1.23–1.29), length of wing in ♀ 5.1 mm (4.9–5.3) and in ♂ 4.9 mm (4.7–5.3) and length of scutellar spine in ♀ 0.38 mm (0.36–0.40) and in ♂ 0.40 mm (0.38–0.43).

Head: frons strongly depressed mesally, dark brown but for pale brown anterior quarter, glossy but anteriorly of FOB very thinly pollinose; blackish section of funiculus extending to almost halfway down; dorsal half of posterior side of head blackish except for section behind ocellar tubercle, ventral half pale brown, thinly pollinose but densely pollinose behind ocellar tubercle.

Thorax: pronotum dark brown, mesonotum blackish brown, lateroposterior part of scutum, lateral and inferior side of scutellum brown, spines pale brown; propleuron and region around anterior spiracle blackish brown except for brown ventral edge, mesopleuron brown but darker centrally, pteropleuron blackish brown except for subalar callus, lateral side of sternopleuron brown except for blackish anterior tip and darker central section, hypopleuron blackish brown except for anterior edge, metapleuron and postscutellum blackish brown; scutellum sticking up at an angle of about 35° from body axis, spines diverging at an angle of 30°, apical bristle as long as spine.

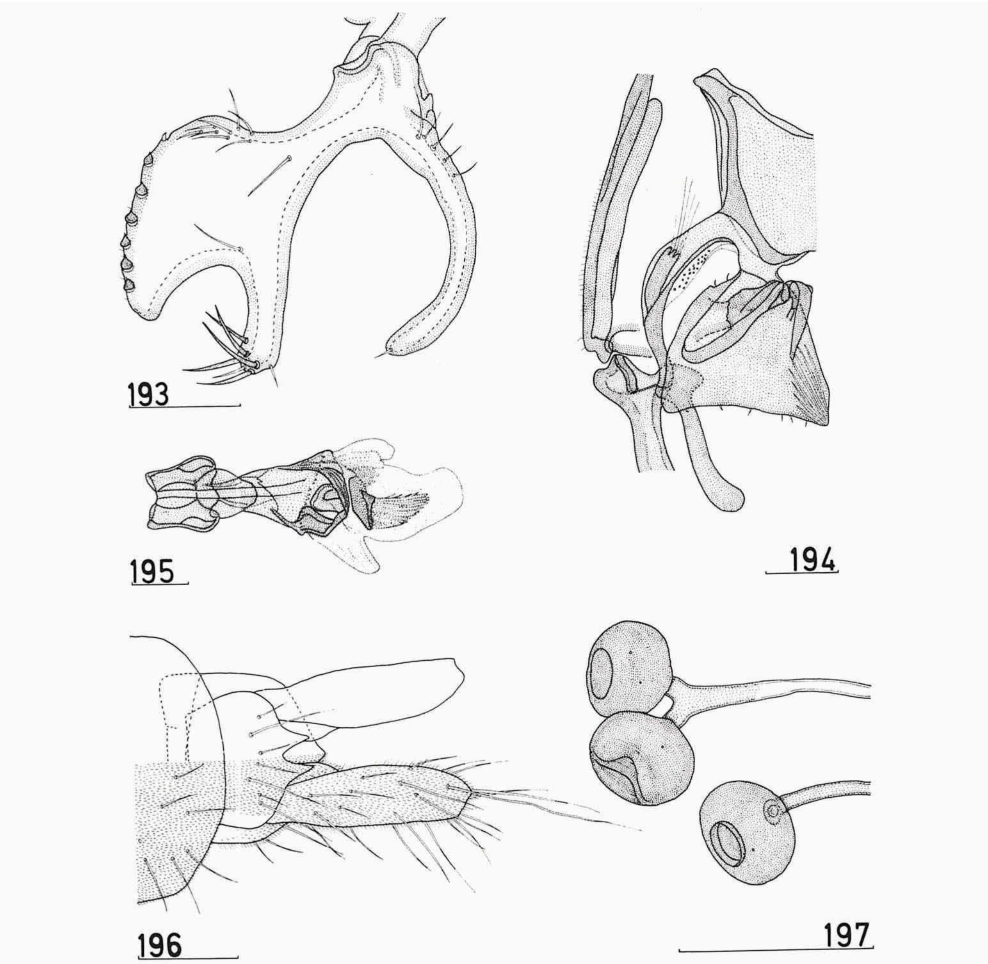
Wing: no microtrichia in small section in basal tip of second basal cell and in round area (with short prolongation along the second vein) of first basal cell anterior of this tip; subcostal cell present; no wing markings.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with dark brown stripe on distal two-thirds of inner side, tibia 1 dark brown, tarsus 1 pale yellowish, base of metatarsus darker (one specimen with wholly dark tarsus); second and third leg pale brown, femur 2 with brown distal stripe on inner side, femur 3 with dark brown distal stripes on inner and outer side, basal and distal third of tibia 3 darker; bristle formula 3.1, 4.1, 17.1, 15.5, 4.4.

Preabdomen: dorsally blackish brown, ventrally pale brown with darker sterna.

Female postabdomen: tergum 7 with posteriorly a large, somewhat triangular, mesal gap (fig. 39), the two longitudinal parts of sternum 7 somewhat pointed apically; sternum 8 consisting of two small circular sclerites with four hairs each, sternum and tergum 9 each consisting of two narrow sclerites; sternum 10 (fig. 196) onion-shaped, lateral sides rounded, with seven hairs, lateral edges glabrous; cerci not so narrow (length/width = 3.2), subanal plate (fig. 60) rounded laterally, acuminate apically: spermathecae (fig. 197) round, smooth, with medium sized dimple and some tiny tubercles, spermathecal ducts hyaline but proximally dark. The abdomen contained developing and developed eggs (fig. 66).

Male postabdomen: periandrium (fig. 82) bell-shaped, yellowish brown with darker base; outer telomere in lateral position, outer and median arm together ax-shaped (fig. 193), on medium sized, very narrow common base, broad outer arm with one apical corner rounded and the other acute, hardly constricted at base, with 6.0 tubercles and about ten long hairs, median arm quite straight, with 4.8 long stout spinous bristles and two hairs; inner arm strongly curved, with one apophysis and six hairs; connection between outer and inner telomere (fig. 194) long and with typical denticulation, inner telomere somewhat trapezoid, constricted at base, on inner side only centrally covered with microtrichia, with about five short hairs at apical edge, ten larger hairs centrally and five short ones at basal mesal corner, about eight ridges in diagonal/longitudinal position in mesal posterior corner; inner posterior corner of periandrium with short broad mesal extension connected to central/basal structures of inner telomere, articulation between inner telomere and cercus via short bent structure, cercus (fig. 109) boot-shaped with obtuse nose; interparameral sclerite long, ratio width/length = 1.0, anterior corners hardly extended laterally, periandrial fold long and narrow; hypandrial clasper long, with one fat terminal bristle-like hair, one terminal and one subterminal hair, one long stout hair and two short hairs near its base, phallapodeme extending beyond hypandrium, epiphallus V-shaped, sparsely denticulated, phallophore (fig. 195) with apically obtuse lateral sides, aedeagus slender, broadening api-



Figs. 193–197. *T. pelecyformis*. 193. Inner view of outer telomere. 194. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 195. Dorsal view of aedeagus. 196. Dorsal view of tip of ♀ abdomen. 197. Spermathecae. Scales 0.1 mm.

cally, several sclerotized structures distally, aedeagal apex smooth; ejaculatory sac and apodeme (fig. 128) rather large, apodeme fan-shaped.

Habitat: the specimens were collected in indigenous forest on a mountain slope at an altitude of 1000 m. They occurred in very shady places with little undergrowth, where they could be found on small shrubs.

Fungi: one of the five females was parasitized by a *Rhizomyces* sp., 14 on the left wing and four on the right wing, one of the three males had five *Rhizomyces* sp. on the left wing and four on the right wing and one male had about ten specimens on the ventral side of the first and second abdominal segment. The specimens on the wing were mature to old and the ones on the abdomen immature.

T. pelecyformis is characterized by its strongly depressed glossy frons, large scutellar spines, absence of wingspots, bristle formula, large triangular mesal gap of tergum 7 (♀), two small sclerites forming tergum 8 (♀), apically acuminate subanal plate, broad outer arm with one rounded and one acute apical corner and with 6.0 tubercles, quite straight median arm with 4.8 long spinous bristles, strongly curved inner arm, trapezoid inner telomere, on inner side only centrally covered with microtrichia, apically obtuse lateral sides of phallophore and smooth aedeagal apex. *T. pelecyformis* belongs to the *sanorum* complex.

Teloglabrus prolongatus sp. nov.
(figs. 40, 61, 83, 110, 129, 198–202)

Centrioncus prodiopsis; van Bruggen, 1961: 423 (in part).

Type material: ♂ holotype, 1 ♂ paratype and 2 ♀ paratypes from Deepdale, Umkomaas Valley, Natal, South Africa, v.1959, B. & P. Stuckenberg. All type material is in the Natal Museum, South Africa. (NM 2643). Permanent slides were made of ♀ postabdomen and ♂ genitalia.

Measurements: length of body in ♀ 4.8 mm (range 4.5–5.0) and in ♂ 4.7 mm (4.5–4.9), width of head in ♀ 1.08 mm (1.00–1.15) and in ♂ 1.11 mm (1.08–1.14), length of wing in ♀ 4.5 mm (4.2–4.8) and in ♂ 4.6 mm (4.5–4.6) and length of scutellar spine in ♀ 0.30 mm (0.27–0.32) and in ♂ 0.31 mm (0.30–0.31).

Head: frons strongly depressed mesally, dark brown but for pale anterior quarter, wholly glossy; dorsal two-thirds of posterior side of head blackish except for section behind ocellar tubercle, ventral third pale brown, thinly pollinose but densely pollinose behind ocellar tubercle.

Thorax: pronotum brown with darker sutures, mesonotum blackish brown, lateral and inferior side of scutellum more brown, spines pale brown; propleuron and region around anterior spiracle blackish brown except for brown ventral edge, mesopleuron brown, pteropleuron blackish brown except for subalar callus, lateral side of sternopleuron brown except for blackish anterior section and central area, hypopleuron blackish brown except for brown anterior edge, metapleuron and postscutellum blackish brown; scutellum sticking up at an angle of about 35° from body axis, spines diverging at an angle of 30°, apical bristle longer (20%) than spine.

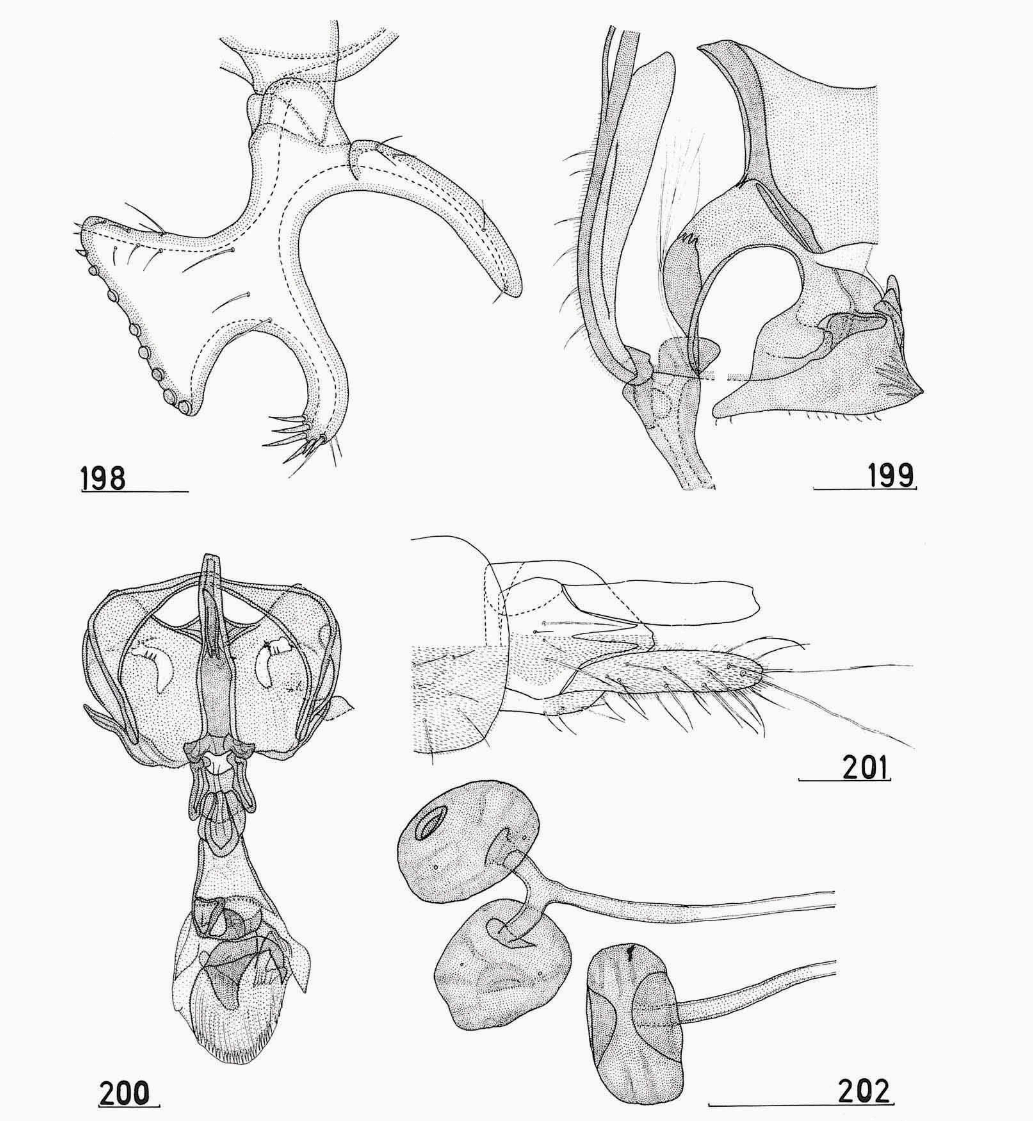
Wing: no microtrichia in small section in basal tip of second basal cell and small area in first basal cell anterior of this tip; subcostal cell present; no wing markings.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with dark brown stripe on distal two-thirds of inner side, tibia 1 dark brown, tarsus 1 pale yellowish, metatarsus slightly darker; second and third leg pale brown, femur 2 with brown distal stripe on inner side, femur 3 with vague brown distal stripes on inner and outer side, basal and distal third of tibia 3 darker; bristle formula 2.9, 3.9, 15.7, 14.6, 2.5.

Preabdomen: dorsally blackish brown, ventrally pale brown with darker sterna.

Female postabdomen: tergum 7 with posteriorly a large, semi-circular mesal gap (fig. 40), the two longitudinal parts of sternum 7 very irregularly shaped; sternum 8 consisting of two small round sclerites with three or four hairs each, sternum and tergum 9 each consisting of two narrow sclerites; sternum 10 (fig. 201) onion-shaped, lateral sides somewhat angular, with two pairs of hairs, laterally glabrous; cerci narrow (length/width = 4.5), subanal plate (fig. 61) pentagonal, apically somewhat obtuse; spermathecae (fig. 202) somewhat flattened, wrinkled, large dimples and some tiny tubercles, spermathecal ducts hyaline but proximally dark.

Male postabdomen: periandrium (fig. 83) bell-shaped, yellowish brown with slightly darker base; outer telomere in lateral position, outer and median arm on short narrow common base (fig. 198), outer arm symmetrically trapezoid, broad apically and constricted basally, with 8.0 tubercles and about twelve hairs, median arm clearly curved, with 6.0 stout spinous bristles and three hairs; inner arm curved, with one apophysis and five hairs, connection between outer and inner telomere (fig. 199) long, inner telomere constricted at base, irregularly shaped, with a typical lateral process apically, inner side covered with microtrichia except for mesal edge, distal quarter and prolongation, with about twelve short hairs at apical edge, seven hairs centrally and five at mesal basal corner, about six short diagonal ridges in mesal posterior corner; inner posterior corner of periandrium with short broad mesal extension connected to central structures of inner telomere, articulation between inner telomere and cercus via short bent structure, cercus (fig. 110) boot-shaped with obtuse nose; interparameral sclerite long, ratio width/length = 1.0, anterior corners hardly extended laterally, periandrial fold long and narrow; hypandrial clasper long, with one terminal stout bristle-like hair and two hairs, three short hairs near its base, phallapodeme (fig. 200) just extending beyond hypandrium, epiphallus V-shaped, very sparsely denticulated, phallophore short, with apically obtuse lateral sides, aedeagus slender, broadening apically, several sclerotized structures distally, apex serrated; ejaculatory sac



Figs. 198–202. *T. prolongatus*. 198. Inner view of outer telomere. 199. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 200. Dorsal view of hypandrium, phallapodeme and aedeagus. 201. Dorsal view of tip of ♀ abdomen. 202. Spermathecae. Scales 0.1 mm.

and apodeme (fig. 129) rather small, apodeme irregularly fan-shaped.

Habitat: the species was collected at an altitude of 950 m in indigenous forest in the Umkomaas valley.

T. prolongatus is characterized by its strongly depressed, wholly glossy frons, absence of wingspots, bristle formula (esp. the low number of tubercles on hind femur), large semi-circular mesal gap of tergum 7 (♀), two small sclerites forming sternum 8 (♀), only four hairs on tergum 10, apically obtuse subanal plate, narrow ♀ cerci, apically broad, trapezoid outer arm with 8.0 tubercles, curved median arm with 6.0 spinous bristles, curved inner arm, inner telomere on inner side covered with microtrichia (except for mesal and distal sections) and apically with a lateral process, short phallophore with apically obtuse lateral sides and serrated aedeagal apex. *T. prolongatus* belongs to the *sanorum* complex.

Teloglabrus curvipes sp. nov.
(figs. 41, 62, 84, 111, 130, 203—207)

Type material: ♂ holotype, 1 ♂ paratype and 2 ♀ paratypes from Ingeli Forest, Kokstad District, Griqualand East, South Africa, x.1959, B. & P. Stuckenberg. All type material is in the Natal Museum, South Africa (NM 2637).. Permanent slides were made of ♀ postabdomen, ♂ genitalia and fungi.

Measurements: length of body in ♀ 5.4 mm (range 5.3—5.4) and in ♂ 5.0 mm (5.0), width of head in ♀ 1.21 mm (1.20—1.22) and in ♂ 1.17 mm (1.13—1.20), length of wing in ♀ 4.8 mm (4.6—5.0) and in ♂ 4.8 mm (4.7—4.8) and length of scutellar spine in ♀ 0.34 mm (0.33—0.34) and in ♂ 0.31 mm (0.28—0.33).

Head: frons mesally depressed, dark brown but for pale brown anterior quarter and mesal line, glossy but below OVB thinly pollinose; dorsal side blackish except for brown section behind ocellar tubercle and below cervix, thinly pollinose but densely pollinose behind ocellar tubercle.

Thorax: pronotum brown with darker sutures, mesonotum dark brown, scutellum brown with two dark longitudinal spots dorsally, spines pale brown; propleuron and region around anterior spiracle blackish brown except for brown ventral edge, mesopleuron brown with darker spots, pteropleuron dark brown except for subalar callus, lateral section of sternopleuron brown with darker anterior section and darker central spot posteriorly, hypopleuron dark brown except for paler anterior edge, metapleuron and postscutellum dark brown; scutellum sticking up at an angle of about 30° from body axis, spines diverging at an angle of 33°, apical bristle as long as spine.

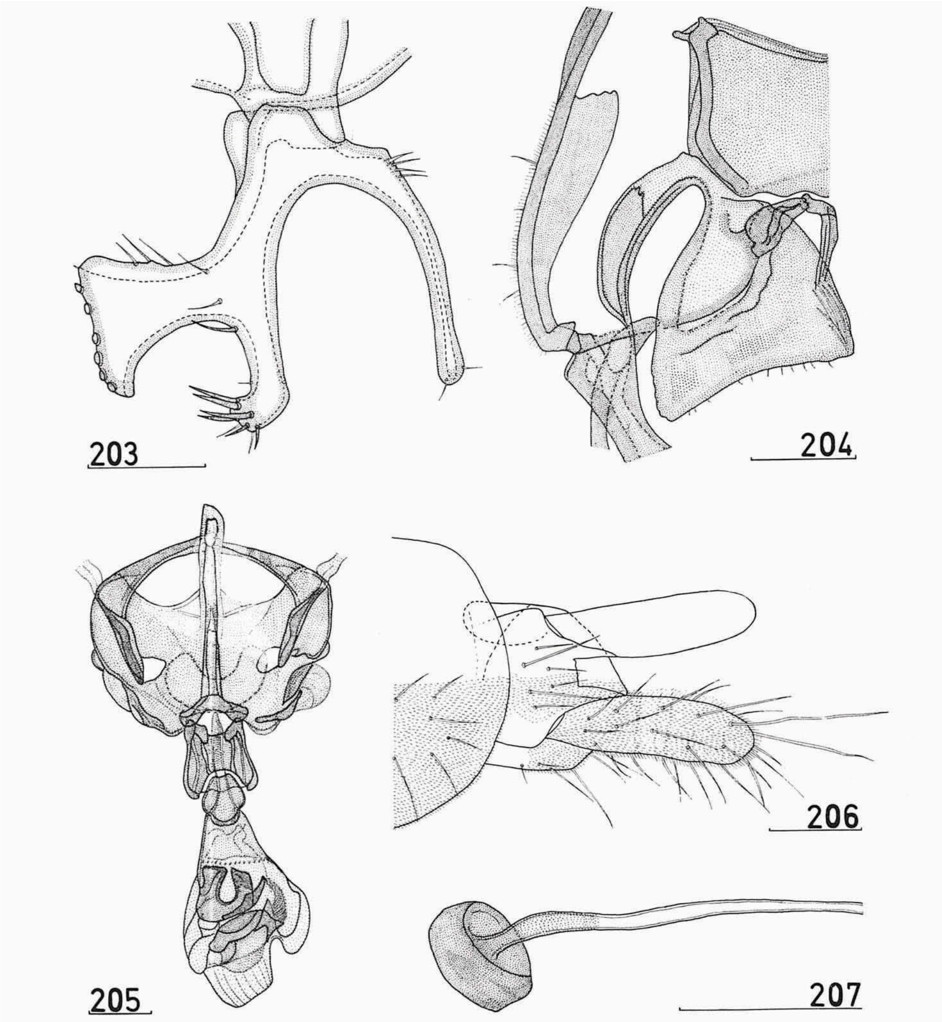
Wing: no microtrichia in tiny section in basal tip of second basal cell and small round area in first basal cell anterior of this tip; subcostal cell present; no wing markings.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with dark brown stripe on distal two-thirds of inner side, tibia 1 dark brown, tarsus 1 pale yellowish with darker metatarsus; second and third leg pale brown, femur 2 with brown distal stripe on inner side, femur 3 with distinct brown distal stripes on inner and outer side, base of tibia 2 and basal and distal third of tibia 3 darker; bristle formula 3.0, 3.9, 16.8, 16.0, 3.4.

Preabdomen: dorsally blackish brown, ventrally pale brown with darker sterna.

Female postabdomen: tergum 7 with posteriorly a large, semi-circular mesal gap (fig. 41), the two longitudinal parts of sternum 7 rather broad and apically pointed; sternum 8 consisting of two small round sclerites with five hairs each, sternum and tergum 9 each consisting of two narrow sclerites; sternum 10 (fig. 206) onion-shaped, laterally with an angular curve, with three pairs of hairs, laterally glabrous; cerci not so narrow (length/width = 3.5), subanal plate (fig. 62) pentagonal, apically obtuse; spermatheca (fig. 207) somewhat wrinkled, with a flattened appearance because of large dimples, some tiny tubercles, spermathecal duct hyaline but proximally dark (paired spermathecae lost during preparation).

Male postabdomen: periandrium (fig. 84) bell-shaped with a typically curved inner edge, yellowish brown with slightly darker base; outer telomere in lateral position, outer and median arm on long slender common base (fig. 203), outer arm slender, constricted basally, asymmetrical, one apical corner obtuse and the other one pointed, with 6.0 tubercles and about five hairs, median arm strongly curved distally, with 5.5 stout spinous bristles and about four hairs, also a stout spinous bristle basally; inner arm almost straight with one apophysis and about six hairs; connection between outer and inner telomere (fig. 204) long, inner telomere very large, somewhat trapezoid with rounded sides, base strongly constricted, inner side only centrally and laterally covered with microtrichia, with about twelve short hairs at apical edge, ten centrally and three at mesal basal corner, about six almost longitudinal ridges running out from mesal posterior corner; inner posterior corner of periandrium with short broad mesal extension connected to central structures of inner telomere, articulation between inner telomere and cercus via short bent structure, cercus (fig. 111) boot-shaped with subacute nose; interparameral sclerite rather long, ratio width/length = 1.4, anterior corners not extended laterally, periandrial fold long and narrow; hypandrial clasper long with one terminal stout bristle-like hair and two hairs, two short hairs (one stout) near its base, phallapodeme (fig. 205) extending beyond hypandrium, epiphallus V-shaped, rather sparsely denticulated, phallophore with apically rather obtuse lateral sides, aedeagus slender, broadening apically, several sclerotized structures distally, apex bifurcated and smooth; ejaculatory sac and apodeme (fig. 130) normally sized, apodeme fan-shaped.



Figs. 203–207. *T. curvipes*. 203. Inner view of outer telomere. 204. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 205. Dorsal view of hypandrium, phallapodeme and aedeagus. 206. Dorsal tip of ♀ abdomen. 207. Spermatheca. Scales 0.1 mm.

Habitat: the species was collected in indigenous forest (Ingeli Forest) at an altitude of 2000 m.

Fungi: one female was parasitized by five immature specimens of a *Rhizomyces* sp. on the right wing.

T. curvipes is characterized by its depressed glossy frons, dark brown mesonotum with two dark spots on scutellum, absence of wingspots, bristle formula, large semi-circular mesal gap of tergum 7 (♀), two small sclerites forming sternum 8 (♀), apically obtuse subanal plate, typically curved inner edge of periandrium, slender asymmetrical outer arm with 6.0 tubercles, distally strongly curved median arm with 5.5 stout spinous bristles, almost straight inner arm, very large inner telomere with rounded sides and on inner side with only centrally and laterally microtrichia, apically obtuse lateral sides of phallophore and smooth bifurcated aedeagal apex. *T. curvipes* belongs to the *sanorum* complex.

Teloglabrus londti sp. nov.
(figs. 42, 63, 85, 112, 131, 208–211)

Type material: ♂ holotype and 1 ♀ paratype from Botanical Gardens, Grahamstown, Cape Province, South Africa, xi.1978, J.G.H. Londt & R.M. Miller. All type material is in the Natal Museum, South Africa (NM 2641). Permanent slides were made of ♀ postabdomen and ♂ genitalia.

Measurements: length of body in ♀ 4.7 mm and in ♂ 5.2 mm, width of head in ♀ 1.03 mm and in ♂ 1.24 mm, length of wing in ♀ 4.1 mm and in ♂ 4.6 mm and length of scutellar spine in both ♀ and ♂ 0.32 mm.

Head: frons mesally depressed, glossy, blackish brown except for pale anterior quarter; posterior side blackish except for brown section behind ocellar tubercle and below cervix, thinly pollinose but densely pollinose behind ocellar tubercle.

Thorax: pronotum brown with darker sutures, mesonotum blackish brown, lateral and inferior sides of scutellum brown, spines pale brown; propleuron and region around anterior spiracle blackish brown except for brown ventral edge, mesopleuron brown but centrally much darker, pteropleuron dark brown except for subalar callus, lateral section of sternopleuron brown except for subalar callus, lateral section of sternopleuron brown with darker anterior section and dark spot posteriorly, other pleura and postscutellum blackish brown; scutellum sticking up at an angle of about 30° from body axis, spines diverging at an angle of 30°, apical bristle as long as spine.

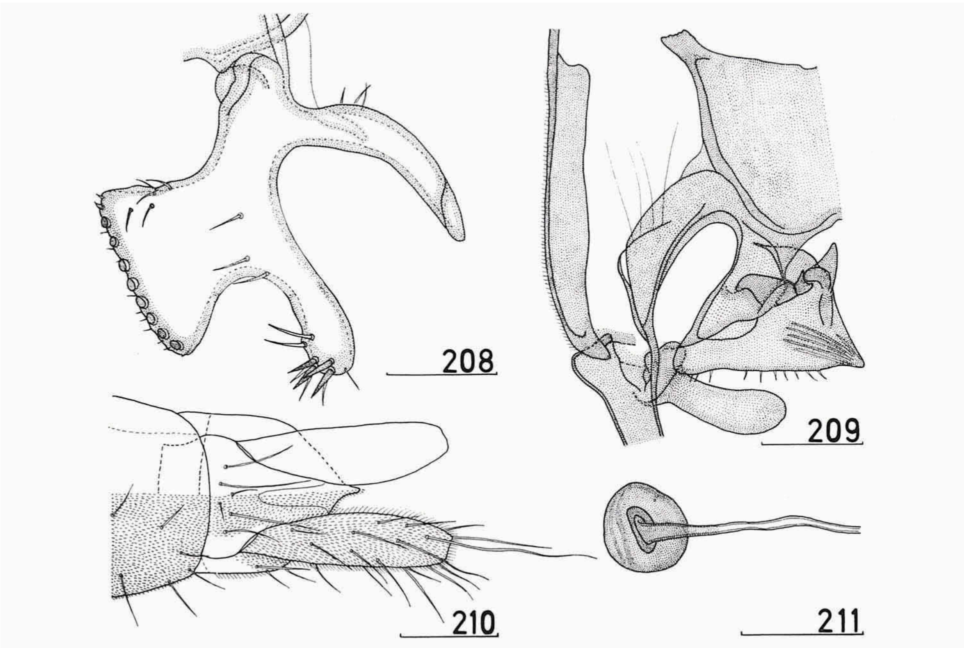
Wing: no microtrichia in tiny section in basal tip of second basal cell and in area in first basal cell anteriorly of this tip; subcostal cell just visible; slightly tinged, in ♂ with triangular subapical clear spot in submarginal cell.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with dark brown stripe on distal two-thirds of inner side, tibia 1 dark brown, tarsus 1 pale yellowish with darker metatarsus; second and third leg pale brown, femur 2 with brown distal stripe on inner side, femur 3 with dark brown distal stripes on inner and outer side, base of tibia 2 and basal and distal third of tibia 3 darker; bristle formula 3.5, 4.5, 17.8, 14.3, 3.8.

Preabdomen: dorsally blackish brown, ventrally pale brown with darker sterna.

Female postabdomen: tergum 7 with posteriorly a rather large, semi-circular mesal gap (fig. 42), the two longitudinal parts of sternum 7 rather broad and not pointed apically; sternum 8 consisting of two small round sclerites with five hairs each, sternum and tergum 9 each consisting of two narrow sclerites; sternum 10 (fig. 210) onion-shaped, with rounded lateral sides, with six hairs, laterally glabrous; cerci not so narrow (length/width = 3.5), subanal plate (fig. 63) rounded laterally and finely acuminate apically; spermatheca (fig. 211) somewhat wrinkled, large dimples, some tiny tubercles, spermathecal duct hyaline, but proximally dark (paired spermatheca lost during preparation).

Male postabdomen: periandrium (fig. 85) bell-shaped, yellowish brown with darker base; outer telomere in lateral position, outer and median arm on short common base (fig. 208), outer arm broad, trapezoid, constricted at base, with 8.5 tubercles and about eight hairs, median arm almost straight, broad, slightly broader distally, with 5.0 stout spinous bristles, four hairs and two subterminal bristle-like hairs; inner arm curved, with one apophysis and four



Figs. 208–211. *T. londti*. 208. Inner view of outer telomere. 209. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 210. Dorsal view of tip of ♀ abdomen. 211. Spermatheca. Scales 0.1 mm.

hairs; connection between outer and inner telomere (fig. 209) long, inner telomere neatly trapezoid, constricted at base, inner side almost glabrous, centrally with small round area covered with microtrichia, with ten short hairs apically, five small, almost tubercle-like, hairs subapically, and six short hairs in mesal basal corner, about six strong diagonal ridges in mesal posterior corner; inner posterior corner of periandrium with short broad mesal extension connected to central structures of inner telomere, articulation between inner telomere and cercus via short bent structure with triangular anterior extension at bend, cercus (fig. 112) boot-shaped with rather massive foot, short broad nose and short mesal extension on heel; interparameral sclerite rather long, ratio width/length = 1.2, anterior corners hardly extended laterally, periandrial fold long and narrow; hypandrial clasper long and with one terminal stout bristle-like hair and two hairs, two unequal short hairs near its base, phallapodeme well extending beyond hypandrium, epiphallus V-shaped, sparsely denticulated, phallophore small with apically rather obtuse lateral sides, aedeagus slender, broadening apically, several sclerotized structures distally, apex bifurcated and superficially serrated; ejaculatory apodeme and sac (fig. 131) small, apodeme fan-shaped and slender.

Habitat: *T. londti* was collected in the Botanical Gardens of Grahamstown at an altitude of 850 m.

T. londti is characterized by its depressed glossy frons, absence of wingspots, bristle formula (esp. the high number of bristles on front femur), not so large semi-circular mesal gap of tergum 7 (♀), two small sclerites forming sternum 8 (♀), finely acuminate subanal plate, short common base of inner and median arms, broad trapezoid outer arm with 8.5 tubercles, broad almost straight inner telomere with on inner side centrally a small patch of microtrichia, cercus with short broad nose and short mesal extension on heel, apically obtuse lateral sides of phallophore and weakly serrated aedeagal apex. *T. londti* belongs to the *sanorum* complex.

Teloglabrus sp. 2

Centrioncus prodiopsis; van Bruggen, 1961: 422 (in part.).

Material studied: 1 ♂ from Alexandria forest, Cape Province, South Africa, ix.1954, P. Graham. One permanent slide was made of ♂ genitalia.

Measurements: length of body 4.4 mm, width of head 1.05 mm, length of wing 4.0 mm and length of scutellar spine 0.30 mm.

This male originates from a place (altitude 300 m) rather close to the origin of *T. londti* and it was at first presumed to be conspecific with this species.

However, closer study revealed it to be different. The single specimen and its condition do not warrant description of a new species. Its more important differential characters are: funiculus only dorsally darker, frons depressed and glossy with pale anterior region larger than in *londti*, posterior side of head black, mesonotum blackish brown, scutellum brown with dorsal side centro-anteriorly dark brown, no wing markings, bristle formula 4, 5, 14, 14, 4.0, outer arm with 7.0 tubercles and median arm with 6.0 spinous bristles, inner telomere rectangular distally, on inner side laterally and centrally covered with microtrichia, with 22 short hairs, cercus with acute nose and no mesal extension on heel, same type of connection between inner telomere and cercus as in *londti*, phallophore with apically rather obtuse lateral sides and aedeagal apex smooth.

Teloglabrus tsitsikamensis sp. nov.
(figs. 43, 64, 86, 113, 132, 212–216)

Type material: ♂ holotype and 1 ♀ paratype from Storm River Pass, Tsitsikama Range, Cape Province, South Africa, x.1959, B. & P. Stuckenberg. All type material is in the Natal Museum, South Africa (NM 2648). Permanent slides were made of ♀ postabdomen and ♂ genitalia.

Measurements: length of body in ♂ 4.5 mm, width of head in ♀ 1.12 mm and in ♂ 1.10 mm, length of wing in ♀ 4.5 mm and in ♂ 4.3 mm and length of scutellar spine in ♀ 0.33 mm and in ♂ 0.29 mm.

Head: frons mesally depressed, blackish brown except for pale anterior quarter, glossy but below FOB thinly pollinose; dorsal side blackish except for brown section behind ocellar tubercle and below cervix, thinly pollinose but densely pollinose behind ocellar tubercle.

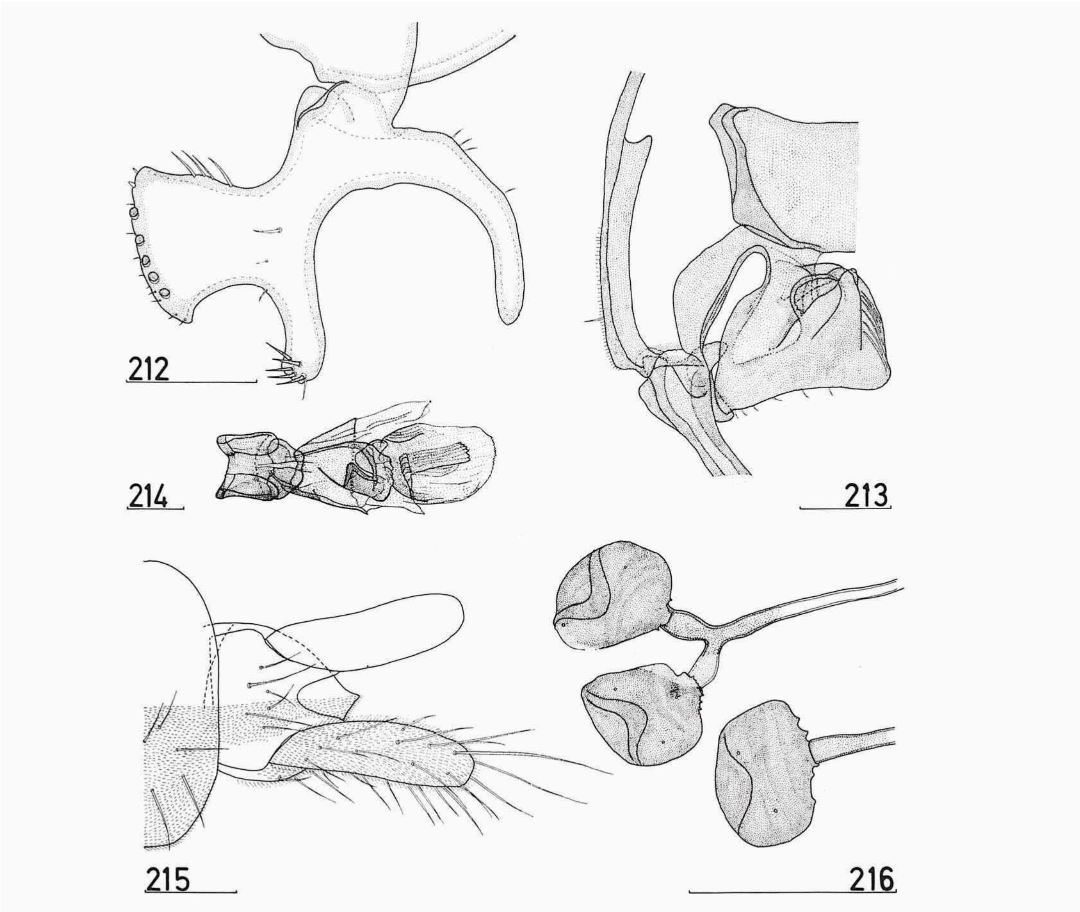
Thorax: pronotum brown with darker sutures, mesonotum dark brown, scutellum, especially inferior side, less dark, spines brown; propleuron dark brown, mesopleuron dark brown except for ventro-posterior area, pteropleuron dark brown, lateral section of sternopleuron brown with darker anterior section, hypopleuron dark brown, paler brown anteriorly, metapleuron and postscutellum dark brown; scutellum sticking up at an angle of about 34° from body axis, spines diverging at an angle of 28°, apical bristle shorter (15%) than spine.

Wing: no microtrichia in very small section in first basal cell anteriorly of basal tip of the second basal cell; subcostal cell just visible; very vague infuscation around anterior crossvein and fifth vein.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with dark brown stripe on distal two-thirds of inner side, tibia 1 dark brown, tarsus 1 yellowish white, metatarsus slightly darker; second and third leg pale brown, femur 2 with brown distal stripe on inner side, femur 3 with dark brown distal stripes on inner and outer side, base of tibia 2 and basal and distal third of tibia 3 darker; bristle formula 3.0, 4.0, 14.5, 12.8, 3.8.

Preabdomen: dorsally blackish brown, ventrally pale brown with darker sterna.

Female postabdomen: tergum 7 with posteriorly a large, semi-circular mesal gap (fig. 43), the two longitudinal parts of sternum 7 rather short and not pointed apically; sternum 8 consisting of two small round sclerites with three or four hairs each, sternum and tergum 9 consisting of two rather narrow sclerites, tergites being broader than sternites; sternum 10 (fig. 215) onion-shaped



Figs. 212–216. *T. tsitsikamensis*. 212. Inner view of outer telomere. 213. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 214. Dorsal view of aedeagus. 215. Dorsal view of tip of ♀ abdomen. 216. Spermathecae. Scales 0.1 mm.

with rather rounded lateral sides, with six hairs, laterally glabrous; cerci not so narrow (length/width = 3.4), subanal plate (fig. 64) rounded laterally and acuminate apically; spermathecae (fig. 216), somewhat wrinkled, large apical dimple, some tiny tubercles, spermathecal ducts hyaline but proximally dark.

Male postabdomen: periandrium (fig. 86) bell-shaped, uniformly yellowish brown; outer telomere in lateral position, outer and median arm on rather short common base (fig. 212), outer arm somewhat trapezoid, slightly constricted at base, one apical corner somewhat pointed, with 5.5 tubercles and about five hairs, median arm short, almost straight, with 4.5 short stout spinous bristles and one or two hairs, inner arm curved with one apophysis and about four hairs, span between apices of median and inner arm large; connection between outer and inner telomere (fig. 213) long, inner telomere somewhat rectangular with rather rounded sides, constricted at base, inner side covered with microtrichia except for distal quarter and mesal edge, five short hairs on apical edge and seven centrally, about six ridges along mesal edge; inner posterior corner of periandrium with short broad mesal extension connected to central structures of inner telomere, articulation between inner telomere and cercus via short bent structure with small triangular anterior extension at bent, cercus (fig. 113) boot-shaped with obtuse nose; interparameral sclerite rather long, ratio width/length 1.5, anterior corners not extended laterally, periandrial fold long and narrow; hypandrial clasper long, with two terminal stout bristle-like hairs and one hair, two unequal short hairs near its base, phallapodeme well extending beyond hypandrium, epiphallus broadly V-shaped, rather sparsely denticulated, phallophore small with apically rounded lateral sides (fig. 214), aedeagus slender, hardly broadened apically, several sclerotized structures distally, apex marginally serrated; ejaculatory apodeme and sac (fig. 132) rather large, apodeme fan-shaped.

Habitat: *T. tsitsikamensis* was collected in indigenous forest in the Tsitsikama Range at an altitude of 100 m.

T. tsitsikamensis is characterized by its depressed glossy frons, dark brown mesonotum with paler brown scutellum, absence of wingspots (except for some infuscation around anterior crossvein and fifth vein), bristle formula (esp. the low number of tubercles on front femur), large semi-circular mesal gap of tergum 7 (♀), two small sclerites forming sternum 8 (♀), laterally rounded, acuminate subanal plate, somewhat trapezoid outer arm with 5.5 tubercles, short, almost straight, median arm with 4.5 short stout spinous bristles, curved inner arm, large span between apices of median and inner arm, somewhat rectangular inner telomere covered with microtrichia on inner side (except for distal quarter and mesal edge) and with only twelve short hairs, small phallophore with apically rounded lateral sides and serrated aedeagal apex. *T. tsitsikamensis* belongs to the *sanorum* complex.

Teloglabrus australis sp. nov.
(figs. 22, 44, 65, 87, 114, 133, 217–221)

Centrioncus prodiopsis; van Bruggen, 1961: 422 (in part).

Type material: ♂ holotype, 1 ♂ paratype and 2 ♀ paratypes from Garden of Eden forest, Knysna District, East Cape Province, South Africa, x.1959, B. & P. Stuckenberg. All type material is in the Natal Museum, South Africa (NM 2636). Permanent slides were made of ♀ postabdomen, ♂ genitalia, eggs and fungi.

Measurements: length of body in ♀ 5.2 mm (range 5.0 - 5.3) and in ♂ 4.5 mm (4.4 - 4.6), width of head in ♀ 1.25 mm (1.24 - 1.26) and in ♂ 1.07 mm (1.05 - 1.08), length of wing in ♀ 5.0 mm (4.9 - 5.0) and in ♂ 4.0 mm (range 3.9 - 4.0) and length of scutellar spine in ♀ 0.36 mm (0.35 - 0.36) and in ♂ 0.27 mm (0.26 - 0.27).

Head: frons slightly depressed mesally, blackish brown except for pale brown anterior quarter, thinly pollinose with glossy spot on either side of tubercle; dorsal side blackish except for brown section behind ocellar tubercle and below cervix, thinly pollinose but densely pollinose behind ocellar tubercle.

Thorax: pronotum brown with darker sutures, mesonotum dark brown with a blackish mesal band flanked by narrow brown bands, more laterally also vague, blackish, longitudinal bands, scutellum brown with dorsally two blackish spots, sutures black; pleura brown with darker brown pteropleuron and metapleuron, subalar callus of pteropleuron pale brown, postscutellum dark brown; scutellum sticking up at an angle of about 30° from body axis, spines diverging at an angle of 37°, apical bristle shorter (15%) than spine.

Wing: no microtrichia in small section in first basal cell anteriorly of basal tip of second basal cell; subcostal cell just visible; two vague preapical spots (fig. 22), one triangular, centrally clear spot in the submarginal cell and a band-like spot in the first posterior cell.

Legs: coxa 1 and trochanter 1 yellowish white, femur 1 pale yellowish brown with dark brown stripe on distal two-thirds of inner side, tibia 1 dark brown, tarsus 1 yellowish white, metatarsus slightly darker; second and third leg pale brown, femur 2 with brown distal stripe on inner side, femur 3 with dark brown distal stripes on inner and outer side, base of tibia 2 and basal and distal third of tibia 3 darker; bristle formula 3.0, 3.6, 16.5, 13.9, 4.5.

Preabdomen: dorsally brown, ventrally pale brown with darker sterna.

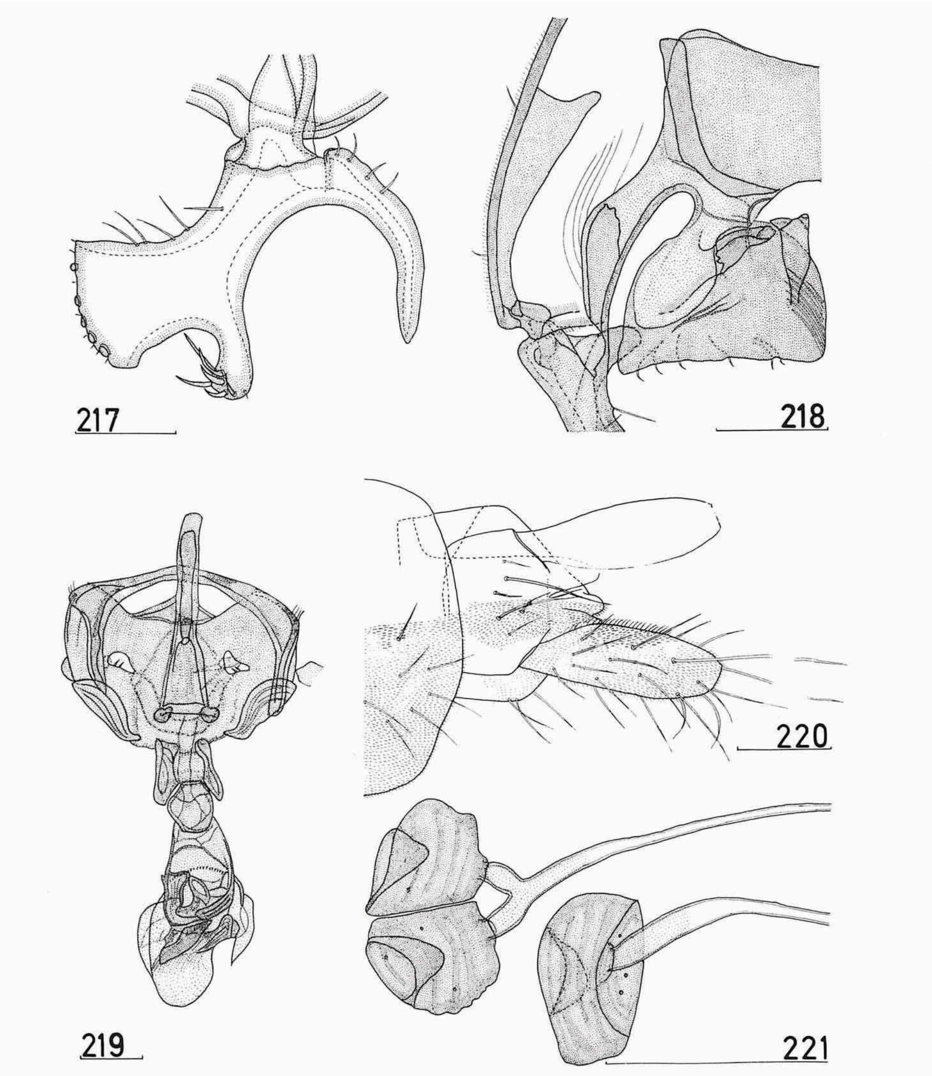
Female postabdomen: tergum 7 with posteriorly a large, semi-circular mesal gap (fig. 44), the two longitudinal parts of sternum 7 irregularly shaped; sternum 8 consisting of two small round sclerites with together eight hairs, sternum and tergum 9 each consisting of two longitudinal sclerites, tergites being much broader than sternites; sternum 10 (fig. 220) somewhat pentagonal with six hairs, laterally glabrous; cerci not narrow (length/width = 3.0), subanal plate (fig. 65) rather rounded laterally with a small protuberance apically; spermathecae (fig. 221) somewhat wrinkled, with large dimples and some tiny tubercles, spermathecal ducts hyaline, proximally slightly darker. The abdomen contained developing and developed eggs.

Male postabdomen: periandrium (fig. 87) bell-shaped, uniformly yellowish brown; outer telomere in lateral position, outer and median arm on long broad common base (fig. 217), outer arm almost rectangular, slightly broader apically, hardly constricted basally, with 6.0 tubercles and five hairs, median arm very short with six long stout spinous bristles and one hair, inner arm curved with one apophysis and about five hairs; connection between outer and inner telomere (fig. 218) long, inner telomere somewhat rectangular with rounded sides, constricted at base, covered with microtrichia, except for distal, mesal and lateral quarter, seven short hairs on apical edge, eight centrally and three in mesal basal corner, about seven vague, diagonal ridges in distal mesal corner; inner posterior corner of periandrium with short, broad mesal extension connected to central structure of inner telomere, articulation between inner telomere and cercus via short bent structure with small triangular anterior extension at bent, cercus (fig. 114) boot-shaped with obtuse nose; interparameral sclerite rather short, ratio width/length = 1.7, anterior corners not extended laterally, periandrial fold long and narrow; hypandrial clasper long, with one terminal stout bristle-like hair and two hairs, two unequal short hairs near its base, phallapodeme extending beyond hypandrium (fig. 219), epiphallus broadly V-shaped, rather sparsely denticulated, phallophore small with apically obtuse lateral sides, aedeagus slender, broader distally, several sclerotized structures distally, apex smooth; ejaculatory apodeme and sac (fig. 133) rather large, apodeme fan-shaped.

Habitat: *T. australis* was collected in indigenous forest in the Garden of Eden forest at an altitude of 200 m.

Fungi: one female and one male were each parasitized by six specimens of a *Rhizomyces* sp., equally distributed over both wings. The fungi on the male were in the mature phase and on the female in the immature phase.

T. australis is characterized by its slightly depressed frons with glossy spot on either side of ocellar tubercle, dark brown mesonotum with blackish mesal band flanked by narrow brown bands, vague subapical wingspots in submar-



Figs. 217—221. *T. australis*. 217. Inner view of outer telomere. 218. Dorsal view of periandrial fold, interparameral sclerite and inner telomere. 219. Dorsal view of hypandrium, phallapodeme and aedeagus. 220. Dorsal view of tip of ♀ abdomen. 221. Spermathecae. Scales 0.1 mm.

ginal and first posterior cell, bristle formula, large semi-circular mesal gap of tergum 7 (♀), two small sclerites forming sternum 8 (♀), rounded subanal plate with small apical protuberance, long broad common base of outer and median arms, rectangular outer arm with 6.0 tubercles, very short median arm with six long stout spinous bristles, curved inner arm, somewhat rectangular inner telomere covered with microtrichia on inner side (except for distal, mesal and lateral quarters), small phallophore with apically obtuse lateral sides and smooth aedeagal apex. *T. australis* belongs to the *sanorum* complex.

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