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Review of *Callistodontopyge*, a genus of strikingly colored East African diplopods (Spirostreptida: Odontopygidae)

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ABSTRACT

Callistodontopyge is reviewed following the examination of all extant type specimens and numerous new samples. *C. cingulata* is described as new from the vicinity of Mogadisho, Somalia; *C. decora* is reduced to subspecific status under *C. latifasciata*; *C. rubropunctatus* is considered a junior subjective synonym of *C. sugillata*; *C. mitellata, C. maculata* and *C. sugillata* are redescribed from their type specimens and considered to be valid species.

INTRODUCTION

About two decades ago Hoffman & Howell (1982) published the description of a new species of odontopygid from northeastern Tanzania which was taken to represent an undescribed genus and which, in reference to its remarkable coloration, was given the name *Callistodontopyge decora*. At the time it was possible to confidently include in the genus two species described by Attems in 1914, and several others named a century ago by Karsch (1881) were also considered as possibly congeneric with *decora*.

Recent opportunities (1990, 1997) to study diplopod material in the Zoologisches Museum der Humboldt-Universität confirmed the generic status of the Karschian species and provided impetus for a general re-examination of *Callistodontopyge* to include additional samples taken in East Africa during the past decade. The organization of the genus is somewhat altered by the addition of a new species and the change in status of several names from species to subspecies.

Appreciation is expressed to Dr. Manfred Moritz for access to the Berlin collection (ZMB), to M. J.-P. Mauriès for the loan of Attemsian types from the Museum National d'Histoire Naturelle, Paris (MNHN), to Dr. Henrik Enghoff for the loan of material in the Zoologisk Museum, University of Copenhagen (ZMUC), and Mr. Paul Hillyard for sending material from The Natural History Museum, London (BMNH). Dr. Enghoff was also so kind as to review an early draft of the manuscript.

Callistodontopyge

Callistodontopyge Hoffman & Howell, 1981, Rev. Zool. afr., vol. 95, p. 688. Proposed with five species, one of them new. Type species: *Callistodontopyge decora* Hoffman & Howell, by original designation.

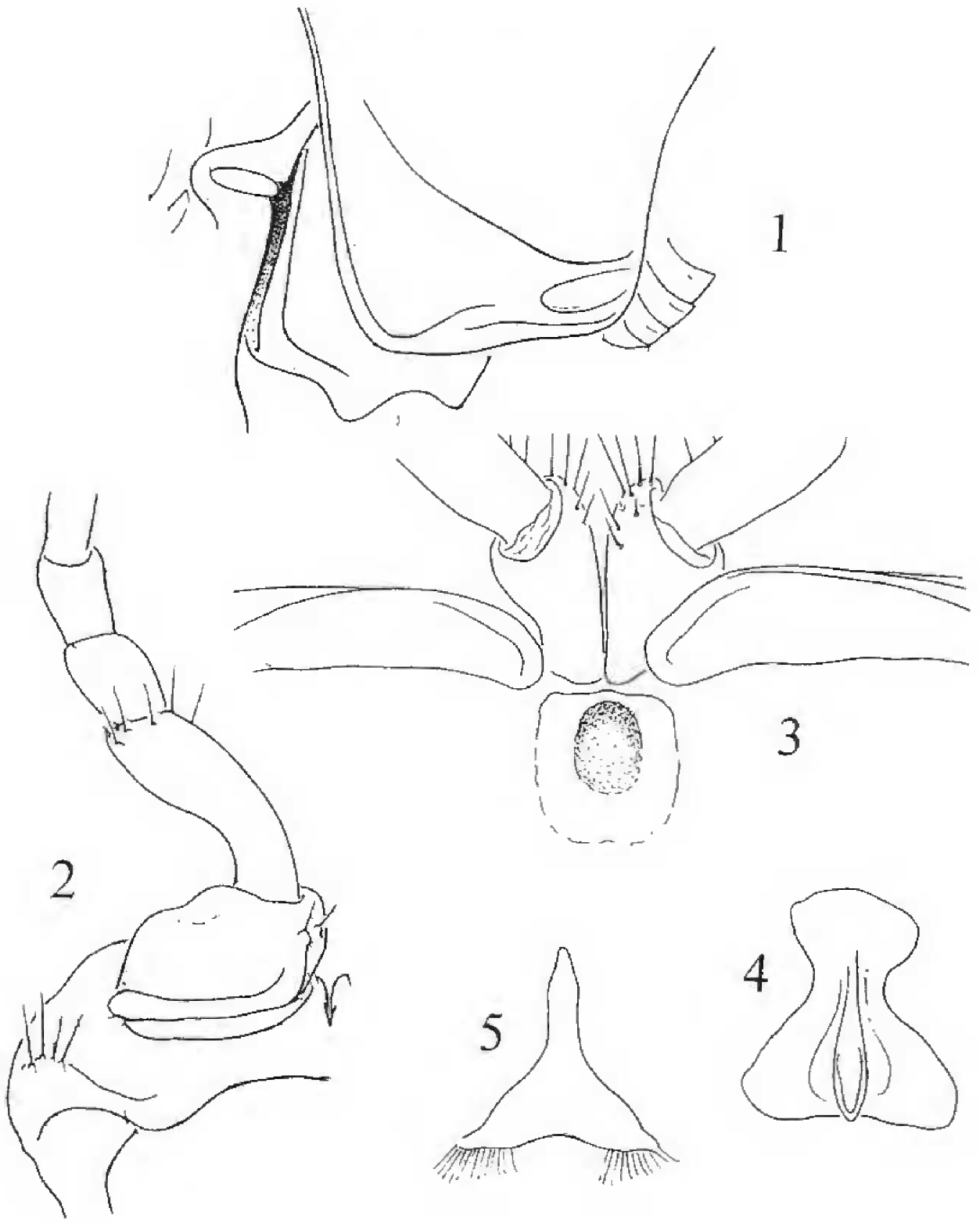
DIAGNOSIS. This genus is distinguished from all others in the family by the combination of stout body form (W/L ratio ca. 10%), presence of red and/or yellow pigmentation typically in the form of paramedian dorsal spots; conspicuous flexure and torsion at midlength of the gonopod solenomere; and production of the posterior gonosternum of males into a sharp median carina, highest posteriad.

DESCRIPTION. Moderate-sized odontopygids (diameter 4.5-7.0 mm) of robust form (W/L ratio about 10%) with 50 to 52 segments. Coloration brown to piceous with (one exception) two paramedian rows of dorsal spots and a variety of additional red and/or yellow markings on face, collum, and sides of body. Metazona longitudinally striated or coriaceous. Limbus with marginal row of acute subequal teeth. Epiproct with at least a trace of median carina. Paraprocts spined only at dorsal end. Tibial and postfemoral pads of males very small, virtually restricted to legs anterior to gonopods. Gnathochilarium of normal form; mandible of male with median lobe along ventral margin of basal segment, producing a trilobed effect (Fig. 1). Base of first pair of legs of male composed of syncoxosternum without evident suture lines, a few macrosetae at lateral ends of oral surface; prefemora enlarged, with broad, flattened, transverse, anteriorly directed lamella on oral side (Fig. 2).

Intercalary sclerite (sternum 6_2) poorly developed, a rounded-oval sclerotized center surrounded by membrane (Fig. 3).

Gonopods (legs 7_1) with unusually large paracoxal elements, sternum greatly reduced in size and scarcely sclerotized. Femoral region of telopodite rotated through two complete turns, with small femoral spine at base; solenomere long and slender, flagelliform, without processes but prominently torsate 360° near midlength; tarsus enlarged, of complex form with several distal lamellae standing at right angles to each other. Sternum of legs 7_2 with prominent sharp median carina, highest at posterior end (Figs. 4, 5).

REMARKS. Three of the following species (*latifolia*, *rubropunctata*, *sugillata*) were placed in *Haplothysanus* by Attems (1914) who noted that the first two (males of *sugillata* being unknown) differed from the other nine species in that their gonopods have small (rather than large) femoral spines. With the passage of time



Figs. 1 - 5. Structural features in *Callistodontopyge*. 1. Lateral end of collum and basal segment of mandible,. showing trilobed edge. 2. Left 2nd leg of male and syncoxosternum, aboral aspect. 3. Base of 6th legs of male and sclerotized remnant of sternum, aboral aspect. 4. Posterior gonopodal sternum, ventral aspect. 5. The same, aboral aspect. Drawings from *C. latifolia decora*, at various magnifications.

Haplothysanus became gradually more restricted in scope, as various units of its membership were transferred to other genera. Kraus (1960) admitted only six species, one of them named after 1914, and transferred *latifolius* and *rubropunctatus* into a rather heterogeneous *Odontopyge*. The original account of *Callistodontopyge* affirmed the removal of *latifolius* and *rubropunctatus* from *Haplothysanus*, and postulated affinity of the new genus with *Chaleponcus* and *Spinotarsus*. I see no reason to alter this opinion. On the basis of gonopod structure, the closer relationship appears to be with *Spinotarsus*, although it is difficult to precisely specify synapomorphies. The gonopod in *Chaleponcus* lacks a femoral spine and the apex of the telocoxite has a distinctly hood-like configuration, also the solenomere is substantially longer than the other telopodite elements. If this assumption of close relationship of *Spinotarsus* with *Callistodontopyge* is correct, we should expect species of one or the other to be found in the present hiatus between the two generic ranges in southern Tanzania and northern Mozambique.

Four major apomorphies of *Callistodontopyge*: the brilliant color patterns, unusually stout body form, cingulotorsate solenomere, and highly carinate form of sternum 7_2 set this genus apart from all other odontopygid genera that I have examined. Although the overall shape and structure of the gonopod telopodite varies among the several species known in the male sex, it is extremely difficult to demonstrate these appendages graphically owing to their transparency, and the difficulty of achieving identical orientation for drawing. However, species-differences appear to be expressed in the gonocoxite, and these are illustrated for four (five?) of the known forms. The coxae of *sugillata* and *latifolia* appear extremely similar, but the distinctive metazonal grooving of the former would seem to justify separate specific status for these two (although they may well be cladistic sister-species).

Identifications based upon coloration may be correct, but should be checked against gonopods for specimens from disjunct or isolated areas which may be unrecognized species simply sharing a known color pattern. In the material examined so far, however, pigmentation seems reliably correlated with gonopod structure.

The examination of numerous recently-collected samples from Tanzania indicates that some individual variability occurs in color pattern, and that some taxa considered to be valid species when known only from long-preserved types are in fact less defensible in the light of present knowledge. *C. latifolia* and *decora* fall into this category, and are here considered to be only geographic races of a single widespread form.

RANGE. Northern Tanzania, eastern Kenya, central Somalia (Fig. 00).

SPECIES. Seven, distinguished by the following key.

Key to species of ***Callistodontopyge***
(based on peripheral characters)

1. Color pattern consisting of transverse pronotal yellowish rings, no paramedian dorsal series of red or yellow spots . . . . . *C. cingulata*
– Color pattern composed of paramedian dorsal (and often lateral) rows of red and/or yellow spots. 2

2. Body uniformly dark brown without bright spots or bands on head or on sides of segments; prozona dorsally with two small, transversely elongated, paramedian red spots completely in **front of** transverse suture; metazona with broad, shallow, longitudinal grooves, imparting a costulate appearance. . . . . *C. sugillata*
– Dorsal coloration variable, but always with lateral series of yellow or red spots in addition to the paramedian series, which extend **across** the suture onto the metazona to a greater or lesser extent; metazona without ribs or grooving . 3

3. Face without interocular light band; paramedian dorsal spots extending ventrad and widened below level of ozopores, occupying most of metazonal surface ventrally; no series of red or yellow spots in front of ozopore. . . . .*C. mitellata*
-- Face with vivid yellow or ivory interocular band; paramedian spots extended ventrad or not, but if so only on anteriormost 10-12 segments. 4

4. Paramedian dorsal spots relatively small and not extended laterad and ventrad, pattern giving impression of four rows of spots; head without light marking behind ocellarium; collum without complete posterior light marginal band.. .. . . *C. maculata*
-- Paramedian dorsal spots large; head with light spot behind each ocellarium; posterior margin of collum with red or yellow band. 5

5. Paramedian spots extended ventrad on metazona, becoming yellow near ozopores and merging with anteporal spot, then running out as narrow wedge on prozona; posterior submarginal band on collum red middorsally, yellow toward the ends; antennae yellowish; legs dark maroon . . . . . *C. latifolia latifolia*
-- Paramedian spots not extended ventrolaterad on metazona; posterior band on collum narrow, yellow; antennae orange basally, dark red distally; legs reddish-orange. . . . . *C. latifolia decora*

Callistodontopyge cingulata, new species
Figures 6-8

MATERIAL: Male holotype and female topoparatype (ZMUC) from the Balcad Nature Reserve, 35 km north of Mogadisho, **Somalia**; Nikolaj Scharff leg. 15 May 1987.

DIAGNOSIS: This species is distinguished from all other members of the genus by the absence of dorsal paramedian red spots, the coloration expressed as transverse yellowish segmental rings occupying most of prozona.

HOLOTYPE: Length ca. 45 mm (broken and curled), diameter 4.0 mm; body with 50 segments. Prozona testaceous ventrolaterally, becoming creamy-yellow dorsally (between ozopores); metazona dark brown to piceous, the caudal edge narrowly reddish-testaceous. Epicranium dark brown, a vivid yellow interocellarial band, below which face uniform orange, no postocellarial light spot. Antennae orange

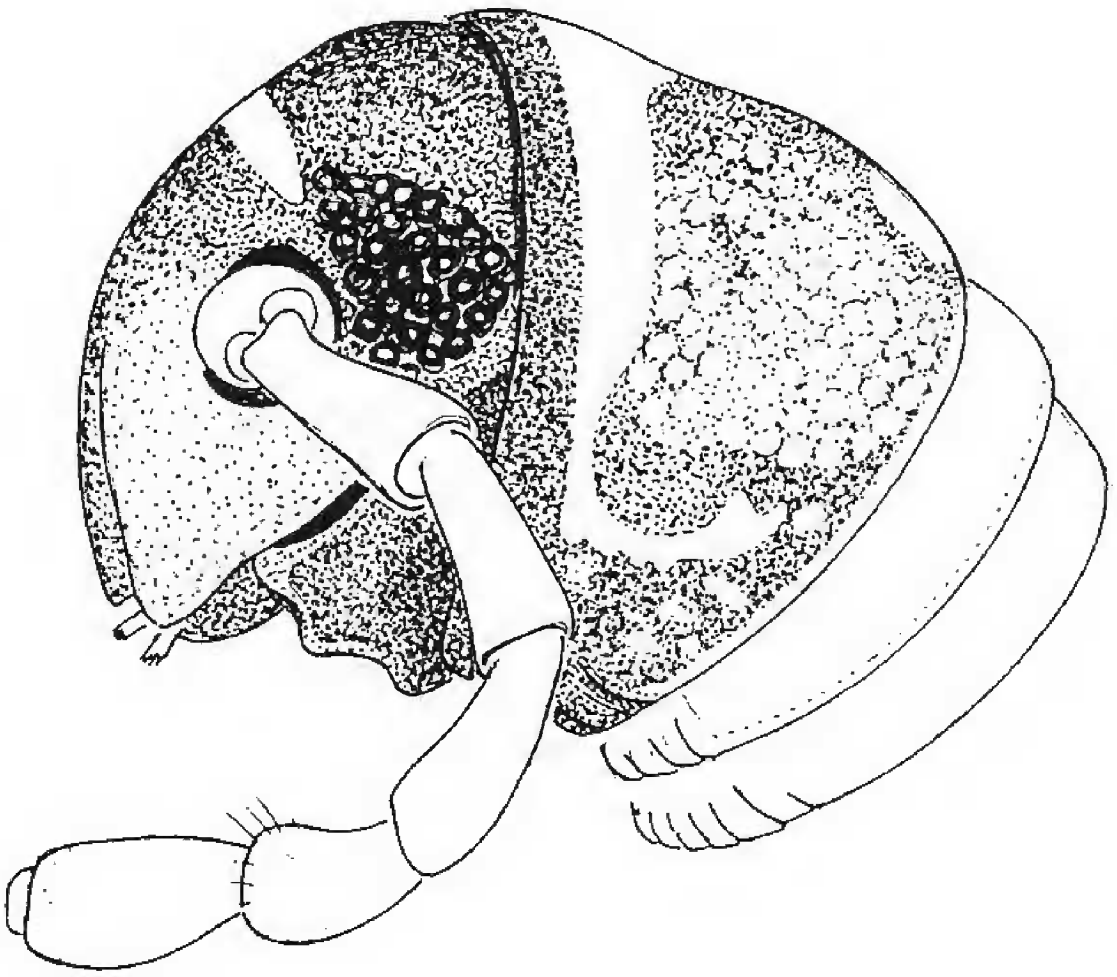


Fig. 6. *Callistodontopyge cingulata,* n. sp. anterior end of body, showing color pattern on head and collum, anterolateral aspect, from holotype.

basally, light brown distally. Collum mostly light brown with the pigmentation dispersed in fine vermiculate pattern, with an anterior submarginal transverse yellow band wider at middorsal line and extended posteriad just above lateral ends, and a middorsal spot just in front of caudal edge. Legs pinkish-beige basally, the distal podomeres nearly orange.

Form of head and anterior segments as shown in Fig. 6; mouthparts as in *C. latifolia decora* (Hoffman & Howell, 1982). Metazona finely rugostriate longitudinally, epiproct rugose-punctate with very weakly developed median carina. Postfemoral and tibial pads rudimentary, traceable only as far as legs of 10th segment.

Gonopods (Figs. 7, 8) generally similar to those of other species, but coxal folds somewhat differently shaped apically, e. g., in lacking a prominent subapical lateral lobe. Tibiotarsal region of telopodite relatively smaller and shorter than in other species. Form of posterior (7_2) sternum similar to that of *C. latifolia* (Fig. 4).

Figs. 7, 8. Gonopods of *Callistodontopyge cingulata*, n. sp. 7. Left coxal region, oral aspect (base of telopodite is indicated). 8. Telopodite of right gonopod, aboral aspect. Drawings from holotype.

REMARKS: The coloration described for the holotype was still evident after three years in alcohol. Five years later (1995) the legs and antennae had faded to nearly uniform yellowish and the prozonal light color was scarcely evident on many segments.

Callistodontopyge latifolia latifolia (Attems), new status
Figures 9, 10

Haplothysanus latifolius Attems, 1914, Zoologica, 25 (65-66): 193, figs. 227-228. Male holotype (MNHN) from Kibwesi (Ukamba), Kenya; C. Alluaud leg. 1904. – Chamberlin, 1927, Bull.Amer. Mus. Nat. Hist., 78: 206.
Odontopyge latifolia: Kraus, 1960, Ann. Mus. Roy. Congo Belge. sci. zool., 82: 56.
Callistodontopyge latifolia: Hoffman & Howell, 1981, Rev. Zool. afr., 95: 694.

MATERIAL: The ♂ holotype of *latifolia*. One of the gonotelopodites is missing (perhaps on a preparation in Attems' collection), the apical half of the other is broken off and lost. Also **Kenya**: Machakos District: Makuerri, April 1965 (MRAC 1♂). Several specmens apparently with some characters of *C. l. decora* are listed under that taxon.

Fig. 9. *Callistodontopyge l. latifolia* (Attems). Head and first three body segments, lateral aspect, showing color pattern (semigrammatic). Dorsal stippled areas are bright red, unstippled areas yellow.

Callistodontopyge latifolia decora Hoffman & Howell, new status
Figures 1-5, 11

Callistodontopyge decora Hoffman & Howell, 1981, Rev. Zool. afr., 95: 690. Male holotype (MRAC 14483) from vicinity of Pongwe, 10 km west of Msata, Bagamoyo District, Tanzania.

MATERIAL: **Kenya**: Shimba Hills, C. Kinze et al. leg. 1 January 1982 (ZMUC 1♂). **Tanzania**: Bagamoyo District, Kiono Forest Reserve, January 1990, Frontier Tanzania team (VMNH 2♀♀). Handeni District: Genda Genda Forest Reserve, Oct.-Nov. 1991, Frontier team (VMNH 2♂♂, 2♀♀). Lushoto District: Mazumbai Forest Reserve, West Usambara Mountains, 19 November 1974, I. Jacobsen (ZMC 1♂). Monduli District: Longido Mountain, 14 May 1986, Jan Kielland (VMNH 1♂).

REMARKS: The general similarity in coloration between this species and *latifolia*, in addition to that in gonopod structure, suggests the probability of a subspecific relationship between them. For the present, males of the two may be separated by the different form of the medial apical lobe (MAL, Fig. 10): long and acuminate in *latifolius*, short and truncate in *decora*. Discolored females may be less amenable to identification.

DISTRIBUTION: Northeastern Tanzania, extreme southeastern Kenya (Fig. 17, open triangles). As in the nominate subspecies, *decora* appears to be a lowland species avoiding montane rainforest. Its apparent absence from such well-collected sites as Amani in the East Usambaras casts some doubt on the record cited above for Mazumbai, also rather well-collected without other samples of *Callistodontopyge* being found.

INTERGRADATION WITH *C. L. LATIFOLIA*: Several samples contain male specimens which appear intermediate between the two forms of *latifolia:*

Gonopods like *latifolia;* coloration like *decora:*

Kenya: Kwale, 29 July 1977, G. Coulon (MRAC 1♂, 1♀)

Gonopods like *decora*; coloration like *latifolia*:

Kenya: Tsavo East Game Reserve, 31 December 1981, C. Kinze et al. (ZMC 1♂)

These presumptive intermediate populations are indicated on the map by half-shaded symbols. The far-inland capture of *decora* near Mount Longido implies that populations intermediate with nominate *latifolia* probably exist in the Masai Plains south of Nairobi.

Callistodontopyge sugillata (Gerstaecker)
Figures 12, 13

Spirostreptus sugillatus Gerstäcker, 1873, in: Van der Deckens Reise in Ostafrika, 3(II): 512. Male holotype (ZMB 610) from Mombasa, Kenya; Claus van der Decken leg.
Haplothysanus sugillatus: Attems, 1914, Zoologica 25 (65-66): 191.
Haplothysanus rubropunctatus Attems, 1914, Zoologica 25 (65-66): 192, fig. 235. Male holotype (MNHN) from Boura, Taita, Kenya; C. Alluaud leg. **New Synonymy!**
Spirostrptus sugillatus: Kraus, 1960, Ann. mus. Roy. Afr. Centr., sci. zool., 82: 192 (as a *nomen dubium*).
Callistodontopyge sugillata: Hoffman & Howell, 1981, Rev. Zool. afr., 95: 695.
Callistodontopyge rubropunctata: Hoffman & Howell, 1981, Rev. Zool. afr., 95: 694.

MATERIAL: The holotypes of *rubropunctata* and *sugillatus*, also one male from **Kenya**: Maungu, near Voi, 3 March 1935, B. Benzon leg. (ZMUC).

DIAGNOSIS: The combination of longitudinally costate metazona, absence of facial light markings, and restriction of the dorsal spots to the prozona readily distinguish this species from others of the genus.

DESCRIPTION: Holotype of *sugillata* 81 mm long, 8.7 mm in diameter. Color pitch black, with paramedian series of blood red or purplish-red transverse spots on the prozona; legs dark brown, tarsi apically yellowish (details from Attems, 1914, who saw the specimen in better color than at present). Not previously noted is the presence of a small round yellow spot in front of each ozopore.

Gonopod coxae very similar to those in *C. latifolia*, differing chiefly in the much larger subterminal convex lobe on the mesal side (Fig. 12, ←).

REMARKS: Attems specified that the type specimen of *sugillatus* was a female, and this was repeated by Moritz & Fischer (1974: 373); my own examination of the specimen in 1993, however, showed it to be a male. The apparent contradiction of label (Zanzibar) and published locality (Mombasa) is in fact not so: at the time of collection the Kingdom of Zanzibar included **not only** the island now so named, but also a wide belt of coastal region between present Mombasa and Dar es Salaam. Mombasa is merely the more precise indication within the broader context and should be taken as the type locality in this as in other such cases - such as *Astrodesmus laxus* (Gerstäcker) - of species which do not occur on Zanzibar Island..

The holotype of *rubropunctatus* has also been examined. Although Attems was correct to remark the virtual identity of its gonopods with those of *latifolia*, the differences in color pattern and tergal sculpture seem so great as to preclude specific identity of the two taxa represented by these names. On the other hand, identity of *rubropunctatus* and *sugillatus* can be asserted with some confidence on the basis of their shared color pattern and metazonal costulation. Attems himself remarked about

these two names *"Auffallend sind bei beiden Art die breiten flachen langsfürchen auf der Metazoniten."*

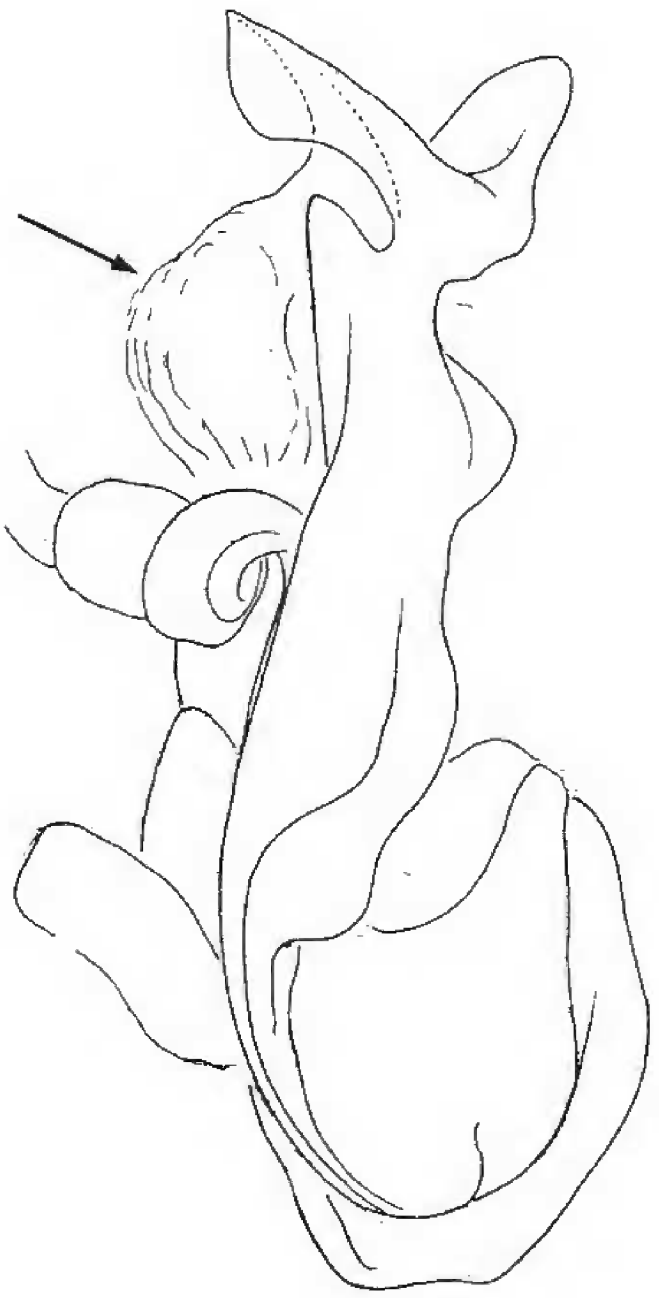


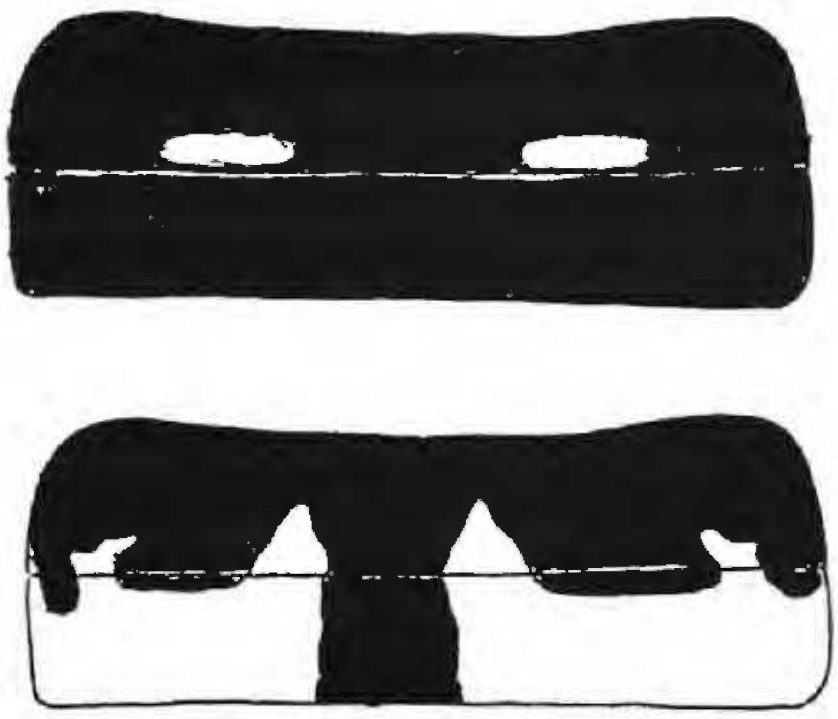
Fig.12. *Callistodontopyge sugillata* (Gerstaecker). Right gonopod, from holotype of *Haplothysanus. rubropunctatus.*

Callistodontopyge mitellata (Karsch), new combination
Figure 15

Spirostreptus (*Odontopyge*) *mitellatus* Karsch, 1881, Zeitschr. Naturw., 54: 21. Female holotype (Zool. Mus. Berlin 860) from "Mombasa", Hildebrandt leg. – Kraus, 1960, Ann. Mus. Roy. Afr. Centr., sci. zool. 82: 192 (as a *nomen dubium*). – Hoffman & Howell, 1981, Rev. Zool. afr., 95: 695 (as possible junior synonym of *Callistodontopyge sugillatus*).

Odontopyge mitellata: Attems, 1914, Zoologica, 25 (65-66): 219 (as "*Species incertae sedis*).

DIAGNOSIS: The absence of a vivid yellow or ivory interocular facial band and ventrolateral expansion of the paramedian red spot series readily distinguish this species. Pattern on head and collum shown in Figure 12. Male characters are unknown.



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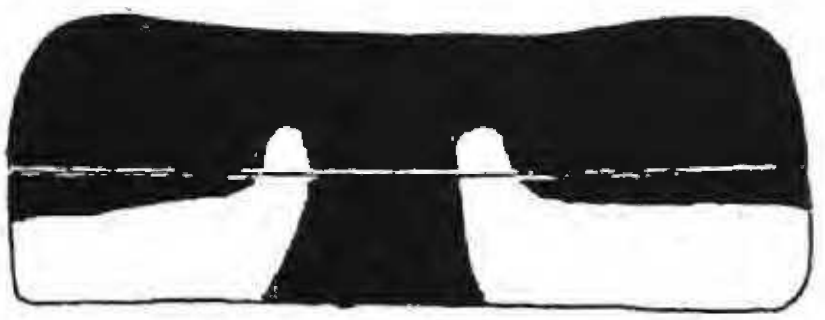

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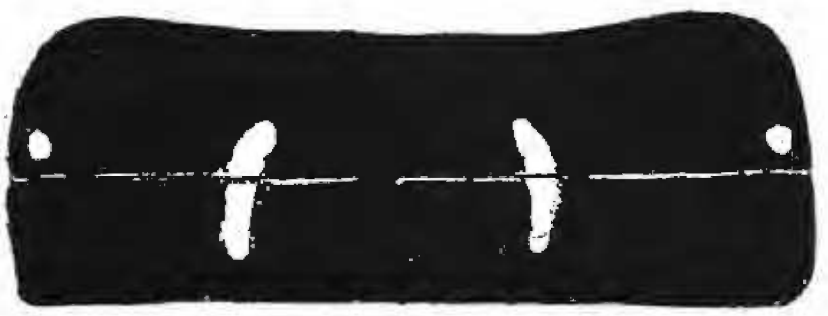

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Figs. 13 - 16. Diagrammatic color pattern, from representative midbody segments. 13. *C. sugillata*. 14. *C. l. latifolia*. 15. *C. mitellata*. 16. *C. maculata*.

HOLOTYPE: Female, 11.9 mm in diameter. Head and antennae piceous, no interocular or postocular yellow markings. Collum with transverse red bands along front and rear margins, neither attaining lower ends, anterior band broadened medially. Dorsal red spots originate in prozona, where about 3.7 mm apart, thence crossing over to caudal edge of metazona and continued ventral, becoming abruptly broadened below level of ozopores. In dorsal aspect, the impression is gained of a reddish milliped with broad black middorsal longitudinal band (Fig. 15).

REMARKS: The previous reference of this name to the synonymy of *sugillatus* was unjustified, as shown by a direct comparison of the holotypes of the two names.

Callistodontopyge maculata (Karsch)

Figure 16

Spirostreptus (*Odontopyge*) *maculatus* Karsch, 1881, Zeitschr. Naturw., 54: 21. Female holotype (ZMB 807, from "Wito" [=Witu, Kenya]; Fischer leg. – Kraus, 1960, Ann. Mus. Roy. Afr. Centr., sci. zool. 82: 219 (as *nomen dubium).*

Odontopyge maculata: Attems, 1914, Zoologica, 25 (65-66): 219 (as *Species incertae sedis*).

Callistodontopyge maculata: Hoffman & Howell, 1981, Rev. Zool. afr., 95: 695.

DIAGNOSIS: The widely separated rows of small, elongated, red spots on all segments except 1st and 2nd, absence of postocular light mark, and reduction of yellow markings on the collum distinguish this species. Pattern on midbody segment (Fig. 16). Male characters are not yet known.

MATERIAL: Only the holotype examined.

REMARKS: The general similarity in color pattern to that of *C. l. decora* suggests that this name may prove to be the older synonym when male topotypes have been seen from Witu.

DISTRIBUTION

Northeastern Tanzania to Somalia, chiefly in the coastal lowlands but extending inland as far as Machakos, Kenya, and Longido, Tanzania (Fig. 00). The genus is only dubiously recorded in the Usambara Mountains, and apparently is still unknown in the Taita Hills despite relatively thorough collecting in recent years, and known occurrences at nearby Voi, Maungo, and Bura. The majority of the species are represented in southeastern Kenya.

To the south in Tanzania the genus has not been discovered south of the Wami River, nor on either Zanzibar or Pemba islands. There is a great distance between the type localities of *maculatus* (Witu) and *cingulata* (Mogadisco) from which no members of the genus have been found, although one or more species almost certainly occur there. The same may be said for the upper reaches of the Tana River.

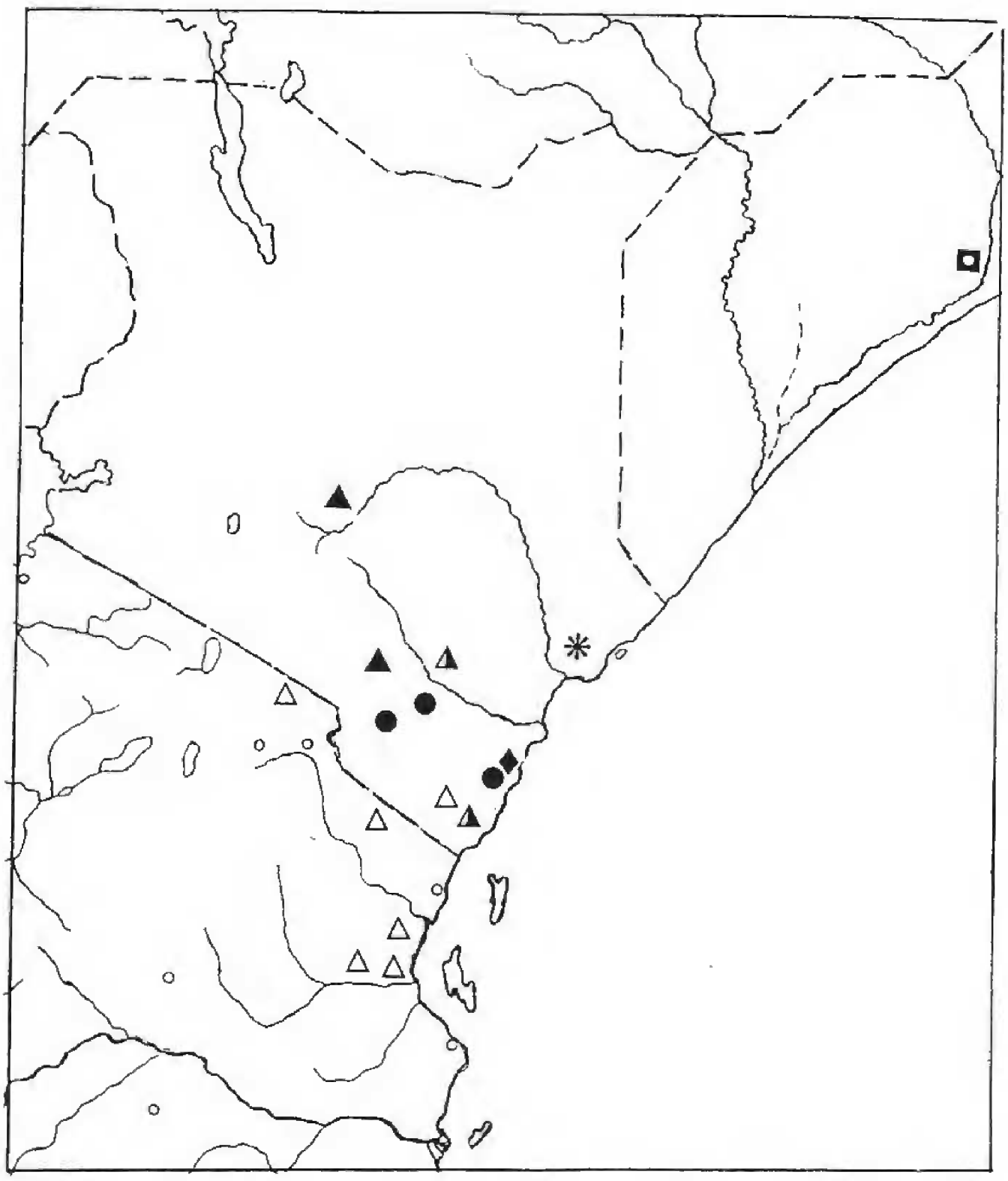

Fig. 17. Distribution of *Callistodontopyge*. Square with open center, *C. cingulata*. Asterisk, *C. maculata*. Diamond, *C. mitellata*. Solid dots, *C. sugillata*. Solid triangles, *C. l. latifolia*. Open triangles, *C. l. decora*. Half-shaded triangles, inrtermediate populations.

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