

## *Metacrolobus festonatus* gen. n. sp. n. and *Scottnema lindsayae* Timm, 1971 (Nemata : Cephalobidae) from Subantarctic and Antarctic regions with proposal of the new subfamily Metacrolobinae

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**Summary** – A SEM Study is conducted for the first time on *Scottnema lindsayae* Timm, 1971 from Antarctica. *Metacrolobus festonatus* gen. n., sp. n. from Tierra del Fuego is described and illustrated. This new genus, included among Cephalobidae, is characterized by having three leaf-like lips (the dorsal one larger than the two subventrals) with incised margins and three tangential ridges around stoma, connected with lips by three pairs of radial ridges. The family Cephalobidae is discussed and the new subfamily Metacrolobinae is erected to accommodate the new genus *Metacrolobus* gen. n.

**Résumé** – *Metacrolobus festonatus* gen. n. sp. n. et *Scottnema lindsayae* Timm 1971 (Nemata : Cephalobidae) provenant des régions antarctique et subantarctique, et proposition de la nouvelle sous-famille des Metacrolobinae – Pour la première fois, *Scottnema lindsayae* Timm, 1971 provenant de l'Antarctique est étudiée au MEB. *Metacrolobus festonatus* gen. n. sp. n. provenant de la Terre de Feu est décrit et figuré. Ce nouveau genre, inclus parmi les Cephalobidae, est caractérisé par trois lèvres foliacées (la dorsale plus grande que les deux subventrales), à bord incisé et trois crêtes tangentielles autour du stoma, reliées aux lèvres par trois paires de crêtes radiales. La famille des Cephalobidae est discutée et la nouvelle sous-famille Metacrolobinae est proposée pour accueillir le nouveau genre *Metacrolobus*.

**Key-words** : Cephalobidae, Metacrolobinae subfam. n., *Scottnema*, *Metacrolobus* gen. n., taxonomy, SEM, Antarctica, Tierra del Fuego, nematodes.

Faunistic research expeditions to Antarctica and to Subantarctic Tierra del Fuego, made within the Italian Program of Antarctic Research, yielded numerous species of nematodes belonging to the family Cephalobidae. Among them, especially interesting was the finding in the Tierra del Fuego of a new genus, *Metacrolobus* gen. n., with the species *M. festonatus* sp. n., and the new finding in Antarctica of the rare genus *Scottnema*, known only from this continent, with the species *S. lindsayae* Timm, 1971. Like most Cephalobidae, both genera are characterized by very complex and elaborate labial structures, that are difficult to interpret with light microscope and were therefore studied with scanning electron microscope.

Nematodes were fixed in formalin 4 % and processed to glycerin with Seinhorst's rapid method to be observed at the light microscope. For SEM, two glycerin embedded specimens per species were first washed with gradually added distilled water; subsequently they were dehydrated by a gradual series of ethanol concentrations increasing till 100 %; then critical point dried with CO<sub>2</sub>, mounted on stubs and coated with gold.

Terminology of head structures is based on Rashid *et al.* (1989).

### *Scottnema lindsayae* Timm, 1971

(Figs 1 M, 2 H - M)

Seven specimens were collected from the following stations in Victoria Land, Antarctica : Kay Island, dry mosses with soil; "River", wet mosses; Tarn Flat, lake bottom detritus; Crater Cirque, lake bottom detritus and wet mosses. These specimens fit well to the description given by Timm (1971), except for a rather smaller size.

#### MEASUREMENTS

*Females* (n = 2) : L = 0.72-0.78 mm; a = 20-21; b = 4.3-4.5; c = 14.4-15.6; c' = 2.4-2.5; V = 64-65.

*Males* (n = 5) : L = 0.64-0.79 mm; a = 17-24; b = 4.1-5.0; c = 11.3-15.4; c' = 1.7-2.0; T = 33-39.

#### DESCRIPTION

Pharynx 144-181  $\mu$ m; stoma length 17-21  $\mu$ m; lip width 13-14  $\mu$ m; male tail length 49-59  $\mu$ m; female tail length 49-51  $\mu$ m; spicule length 33-35  $\mu$ m; gubernaculum length 16  $\mu$ m; post-vulval sac length 42-45  $\mu$ m.

Observation by SEM combined to that by light microscope, allows a better interpretation of the complex lip region structure of this very rare genus. There are six flattened lips, two subdorsal, two subventral and two lateral, with incised edges. Each lip consists of a dentate lamina provided with a long setose projection (11-14  $\mu\text{m}$  long from the base of lips) directed anteriorly and rather inwards, flanked on either side by respectively three and one shorter pointed tines. The lips of each pair between two primary axils are symmetrically arranged with the single tine towards the axil. In each primary axil there is a pair of guard processes. Each lip bears a labial papilla, located between the first two tines; the subventral and the subdorsal lips bear also a prominent cephalic papilla. Amphids are small oval depressions lying below lateral lips. Three short and stout labial probolae, resembling those of *Acrobelloides*, 3-4  $\mu\text{m}$  high, joined by tangential ridges, are present.

### *Metacrolobus* gen. n.

#### DIAGNOSIS

Cephalobidae. Cuticle annulated. Lateral fields with three incisures extending beyond phasmids. Cephalic region with one dorsal and two subventral leaf-like lips with elaborate edges, separated by round clefts with incised margins, lacking guard processes; the two latero-subdorsal clefts larger than the ventral one. Three asymmetrical tangential ridges around the stoma opening, with the ventral one shorter than the others; tangential ridges not merging dorsally and subventrally, but prolonging into three pairs of joined radial ridges, each of which running along the median line of the internal surface of a lip till its apex. Labial probolae absent. Stoma cephalobid, tubular, with slightly distinct rhabdions, apparently with six sections: cheilostome only slightly wider than the following sections; cheilorhabdions rod-like in optical section; second stoma section, as refractive as subsequent sections, not surrounded by pharyngeal collar. Reproductive system cephaloboid, monodelphic, with post-vulval sac. Gubernaculum with antero-lateral extensions. Tail conoid, apically pointed in both sexes.

#### TYPE AND ONLY SPECIES

*Metacrolobus festonatus* gen. n. sp. n.

### *Metacrolobus festonatus* gen. n. sp. n.

(Figs 1 A - L, 2 A - G)

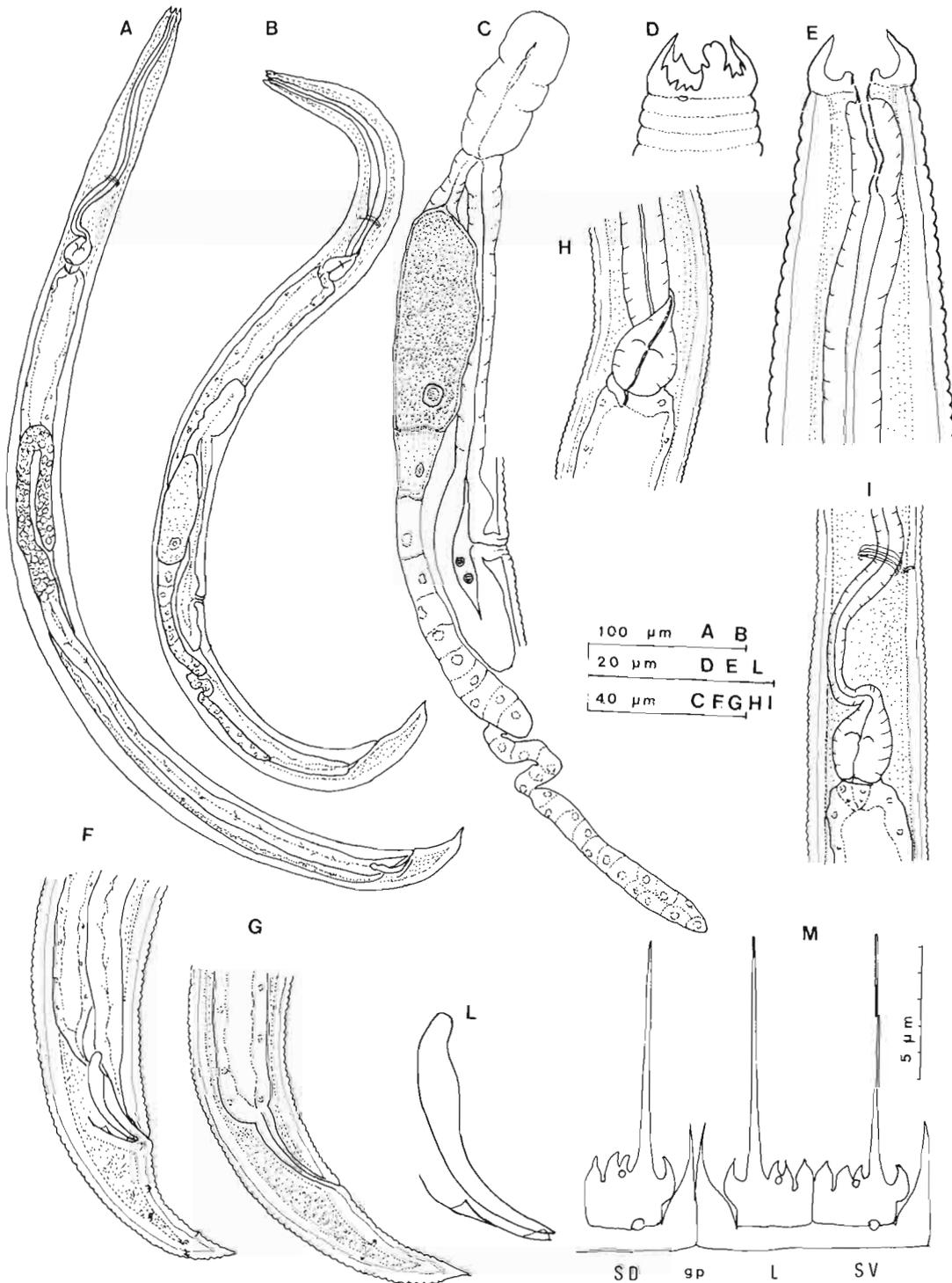
#### MEASUREMENTS

*Holotype* (female): L = 0.693  $\mu\text{m}$ ; a = 21; b = 3.3; c = 14; V = 63; c' = 2.4.

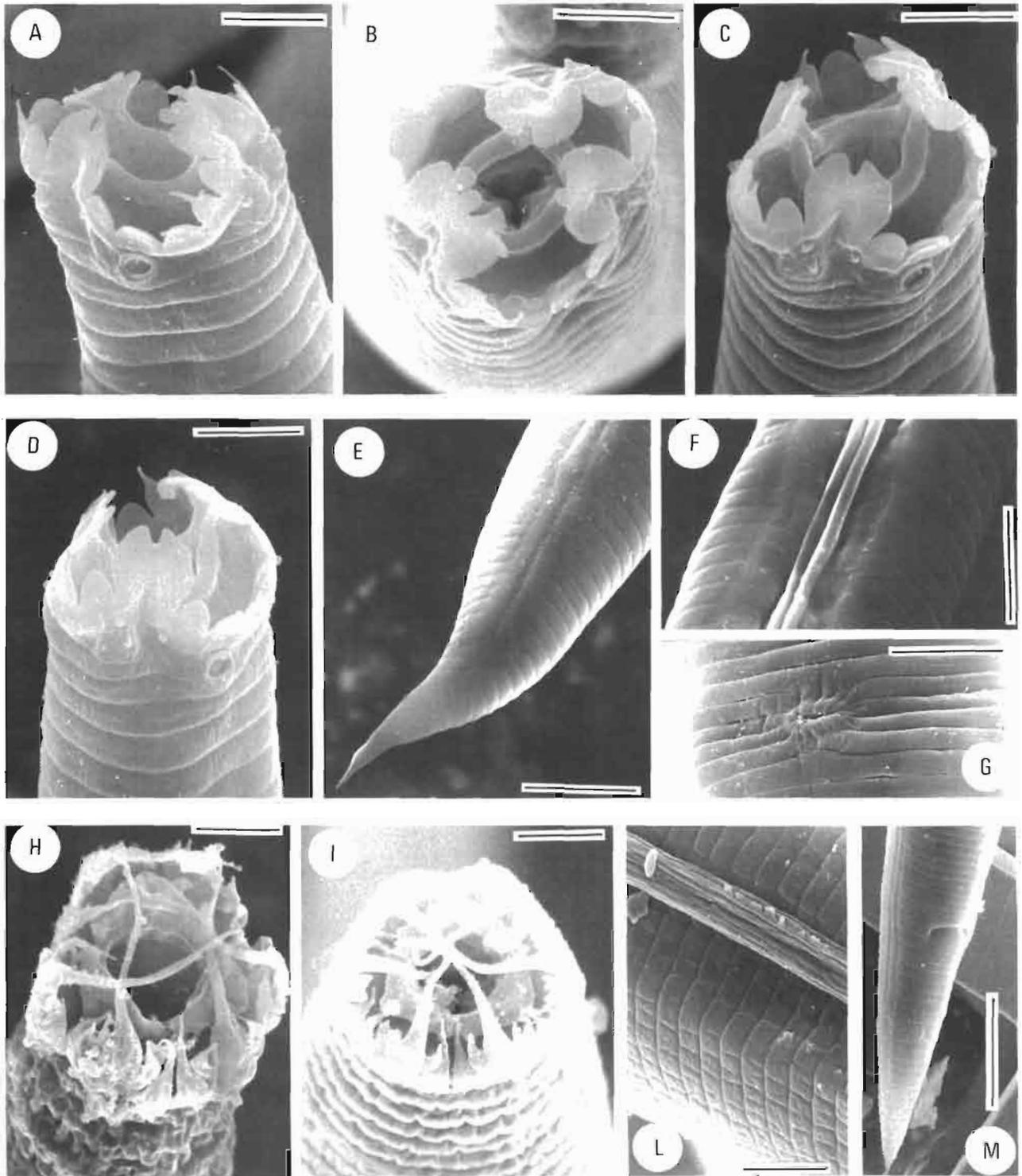
*Paratype* (male): L = 0.774  $\mu\text{m}$ ; a = 22; b = 4.2; c = 16.5; T = 62; c' = 2.

#### DESCRIPTION

*Female*: Body slightly ventrally curved or S-shaped. Cuticle annulated, each annule 2.5-2.8  $\mu\text{m}$ ; cuticle thickness 2.5  $\mu\text{m}$  at mid-body. Lateral fields marked by three incisures, extending almost to tail end; the median incisure does not reach phasmids. Lip region offset, 11  $\mu\text{m}$  wide, slightly wider than body, and 7.5  $\mu\text{m}$  high. Lips completely fused two by two into three flattened, leaf-like structures (one dorsal and two subventral) with elaborate edges. Each subventral labial flap is triangular, with an incision at its apex and a deeper incision at each side dividing the flap into four tines; the dorsal flap appears larger and more elaborate than the others, in one specimen showing two secondary incisures in each apical tine. Between the lips there are wide, round clefts, corresponding to primary axils, also festooned with tines, each of which is provided with a tiny apical spine not always evident. The clefts between the dorsal and the two subventral flaps are wider than the one between the latter: each dorso-sublateral cleft is margined with three tines, while in the ventral cleft there is a single tine. The lip region symmetry is therefore not perfectly triradiate, but it is somewhat bilateral. The *en face* view shows the existence of three well developed tangential ridges, around the stoma opening, which are asymmetrical as well, with the ventral one shorter than the others. The tangential ridges do not merge dorsally and subventrally, but they give origin there to three pairs of joined rounded ridges running outwards till the lip base and then forwards along the median line of the internal surface of each lip. The pairs of ridges, although located in a position typical of labial probolae, are to be considered homologues of radial ridges which joined each other two by two (without fusing) in an intermediate position, along with the fusion of the corresponding lips. Each labial flap bears two labial papillae; the dorsal one bears two cephalic papillae as well, while each subventral flap bears only one of them. The amphids, small, oval, lie below the dorso-sublateral clefts, just where they end against the lower tines of the subventral lips. Stoma cephalobid, tubular, with hardly distinct rhabdions, 12.5  $\mu\text{m}$  long; cheilostome slightly wider than other stoma sections; cheilorhabdions rod-like in optical sections. A pharyngeal collar surrounds the stoma till prostome; a further stoma section, as refractive as the others, is present between cheilostome and prostome. Corpus of pharynx cylindroid, 158  $\mu\text{m}$  long; isthmus coiled, not measurable; basal bulb ovoid, 22  $\times$  17  $\mu\text{m}$ , with crescentic valves; cardia rounded with 4 cells. Nerve ring surrounds corpus at 150  $\mu\text{m}$  from anterior end. Excretory pore slightly posterior and hemizonid about at the same level as nerve ring. Deirids located 167  $\mu\text{m}$  far from anterior end, at bulbous level. Reproductive system monodelphic, cephaloboid. Ovary long, with small flexures posterior to vulva. Vulva small, transverse, with corrugated edges; vagina tubular, with thick walls,



**Fig. 1.** A-L. *Metacrolobus festonatus* gen. n. sp. n. A: Male body. B: Female body. C: Female genital apparatus. D, E: Male head end. F: Male posterior end. G: Female posterior end. H, I: Pharynx end. L: Spicule and gubernaculum. - M: *Scottinema lindsayae* Timm, 1971: diagram of lips on right side of lip region as seen with SEM. (gp = guard processes; L = lateral; SD = subdorsal; SV = subventral.)



**Fig. 2.** A-G. *Metacrolobus festonatus* gen. n. sp. n. A, B, C, D : Cephalic/labial region; E : Female tail; F : Lateral lines; G : Vulva. – H-M. *Scottinema lindsayi* Timm, 1971. H, I : Cephalic/labial region; L : Lateral lines; M : Female tail. (Bar = 5  $\mu$ m in A-D, H, I, L : 10  $\mu$ m in G, E, F; 20  $\mu$ m in M.)

11  $\mu\text{m}$  deep. Post-vulval sac 32  $\mu\text{m}$  long, about as long as corresponding body width. Rectum 31  $\mu\text{m}$  long. Phasmids 36  $\mu\text{m}$  from tail tip and 14  $\mu\text{m}$  from anus. Tail conoid, 49  $\mu\text{m}$  long, slightly ventrally bent, ending in a fine mucro.

*Male*: Similar to female in most respects. Lip width 10  $\mu\text{m}$ ; lip height 6  $\mu\text{m}$ ; stoma length 12  $\mu\text{m}$ . Corpus of pharynx 126  $\mu\text{m}$  long; isthmus 23  $\mu\text{m}$  long; basal bulb ovoid, 19  $\times$  16.5  $\mu\text{m}$ , with crescentic valves; nerve ring surrounds corpus at 118  $\mu\text{m}$  from anterior end. Excretory pore slightly posterior and hemizonid about at the same level as nerve ring. Deirids located 140  $\mu\text{m}$  far from anterior end, at isthmus level. Genital apparatus monorchic, testis anteriorly reflexed. Spicules cephaloboid, 30  $\mu\text{m}$  long; gubernaculum 17  $\mu\text{m}$  long, provided with a pair of antero-lateral extensions (*cornua cruris* of De Ley *et al.*, 1993). Five pairs of caudal papillae, three of them (one subdorsal, one lateral and one subventral) near tail tip, one lateral and one subventral anterior to phasmids; a pair of subventral adanal papillae and three pairs of subventral precloacal ones are also present. Tail similar as in female, 47  $\mu\text{m}$  long.

#### TYPE HABITATS AND LOCALITIES

Holotype, female and juvenile paratypes from coastal dunes between Capo S. Pablo and Capo Medio (Argentina: Tierra del Fuego): mosses and lichens with sand. Male paratype from Agua Fresca (Chile: Tierra del Fuego): mosses.

#### TYPE SPECIMENS

Holotype (female), 1 paratype female on stub, 1 paratype male, 1 paratype juvenile in the collection of the Dipartimento di biologia Animale, University of Catania, Italy.

#### POSITION AND RELATIONSHIPS OF *METACROLOBUS* GEN. N. WITHIN THE FAMILY CEPHALOBIDAE

The main differential characters of *Metacrolobus* n. gen. among Cephalobidae are: absence of labial probolae, presence of three labial flaps instead of the usual six lips, with incised margins; presence of three tangential ridges not merging, but giving origin to three pairs of radial ridges, each pair constituted by two closely running rounded ridges, which do not end at the lip base but run along the internal labial surface; lip region with imperfectly triradiate, almost bilateral symmetry. In the leaflike lips separated by deep clefts and in the absence of labial probolae the new genus comes close to *Acrolobus* Boström, 1985 and to *Teratolobus* Andrassy, 1968; with *Acrolobus* the new genus *Metacrolobus* shares also the trend towards bilateral symmetry in the lip region; it differs from both genera in having only three flap-like lips with incised edges instead of six with smooth edges; from *Teratolobus* it differs also in having tangential ridges (Rashid *et al.*, 1989) and from *Acrolobus* in the absence of knoblike projections on the radial ridges;

from both of them it differs in the peculiar connections of radial ridges both with tangential ridges and with lips.

The family Cephalobidae, after its definition and classification given by Andrassy (1984) has been discussed by several authors (Boström, 1988; Rashid *et al.*, 1989; De Ley *et al.*, 1993), as a consequence of the significant new knowledge obtained with SEM studies of the often complex and elaborate cephalic regions, hardly interpretable at light microscope, and of the revised study of some insufficiently known genera. The latest proposal of classification (De Ley *et al.*, 1993) recognizes within Cephalobidae the subfamilies Cephalobinae, Kirjanovii-nae and Acrolobinae. Because of the absence of labial probolae, of the deep clefts between lips and of the presence of well developed *cornua cruris*, *Metacrolobus* gen. n. is mostly related to the last subfamily. Still, the structure of the lips in the new genus is quite peculiar because of the complete fusion of the three pairs of lips into three flap-like structures and of the presence of tines on their margins; a further major peculiarity is represented by the structure of the tangential and of the radial ridges and by their connection with the lip surfaces. In consideration of these peculiar characteristics a new subfamily within Cephalobidae, Metacrolobinae subfam. n., is erected to accommodate *Metacrolobus* gen. n.

#### Metacrolobinae subfam. n.

#### DIAGNOSIS

Cephalobidae. Lips fused two by two into three leaf-like labial structures (one dorsal and two subventral) with incised margins, separated by deep axils lacking guard processes. Three tangential ridges not merging into each other, connected to the leaf-like lips by three pairs of radial ridges, each running along the internal surface of a lip.

#### TYPE AND ONLY GENUS

*Metacrolobus* gen. n.

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