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Review of the East African millipede genus *Elassystremma* Hoffman & Howell, 1981 (Diplopoda: Polydesmida: Ammodesmidae), with descriptions of three new species

Обзор диплопод восточноафриканского рода *Elassystremma* Hoffman & Howell, 1981 (Diplopoda: Polydesmida: Ammodesmidae) с описаниями трех новых видов

Didier VandenSpiegel[1] & Sergei I. Golovatch[2]
Дидье Ван-ден-Шпигель[1] и Сергей Ильич Головач[2]

[1] Royal Museum for Central Africa, Invertebrate Section, B–3080 Tervuren, Belgium.
[2] Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Leninsky prospekt 33, Moscow 119071 Russia.
[2] Институт проблем экология РАН, Ленинский проспект, 33, Москва 119071 Россия.

KEY WORDS: Diplopoda, Polydesmida, Ammodesmidae, *Elassystremma*, taxonomy, East Africa.

КЛЮЧЕВЫЕ СЛОВА: Diplopoda, Polydesmida, Ammodesmidae, *Elassystremma*, таксономия, Восточная Африка.

ABSTRACT: The genus *Elassystremma* Hoffman & Howell, 1981 is reviewed, and all of its four currently known species are keyed. Three new congeners are described: *E. michielsi* sp.n. and *E. prolaeve* sp.n. from the Taita Hills, Kenya, and *E. laeve* sp.n. from both the Taita Hills, Kenya and the Nyika Plateau, Malawi.

РЕЗЮМЕ: Приведен обзор рода *Elassystremma* Hoffman & Howell, 1981, для всех четырех входящих в его состав видов составлен ключ. Описаны три новых вида: *E. michielsi* sp.n. и *E. prolaeve* sp.n. с холмов Тайта (Кения), а также *E. laeve* sp.n. как с холмов Тайта (Кения), так и с плато Ньика (Малави).

Introduction

The Afrotropical family Ammodesmidae was first erected as a nomen nudum [Cook, 1895], but already next year Cook [1896a] proposed it properly and then [1896b, 1896c] provided descriptions, however succinct, of two constituent monotypic genera and species of minute millipedes he had discovered in Liberia [cf. Jeekel, 1970]. *Ammodesmus granum* Cook, 1896a was based upon a single female first mistaken for a grain of sand, while *Cenchrodesmus volutus* Cook, 1896b upon three females. As these descriptions were rather anecdotal, and as even the all–female material was accompanied by no illustrations whatever, naturally this group fell into oblivion for a very long time since the discovery. Only relatively recently, another presumed ammodesmid millipede was revealed [Hoffman & Howell, 1981], this time described as a new genus and species from Tanzania. In the lack of anatomical detail concerning the Liberian species, whose types could not be relocated for revision, as well as based on a slightly larger body size and the strongly remote provenance of new material, the East African *Elassystremma pongwe* Hoffman & Howell, 1981 was only incorporated into Ammodesmidae with qualifications. Despite this, using some of the fresh material reported below, Golovatch [2003] has recently accepted *Elassystremma* as representing a typical ammodesmid showing a rather peculiar pattern of volvation.

During recent field work in Kenya, three undescribed species of *Elassystremma* were collected. Two of them stem solely from the Taita Hills still supporting a number of remnant patches of primary tropical montane forest, a vegetation type once common all over the East African Mountain Arc. The third species was taken not only in the Taita Hills but it was also found among the undetermined material collected by Rudy Jocqué in a montane forest on the Nyika Plateau, Malawi, which is also considered by some authors as a part of the East African Mountain Arc. At both localities involved, the specimens were extracted from the litter using a Winkler–Mocsarski apparatus.

The present paper provides a review of the genus *Elassystremma* based not only on the description of three new congeners found in Kenya and Malawi, but also on additional material of the type species *E. pongwe*. Female characters are given for the new species as well as for *E. pongwe*, and the occasion is taken to present a key to all four species involved.

Abbreviations: MRAC — Musée Royal de l'Afrique Centrale, Tervuren, Belgium; NMK — National Museum of Kenya, Nairobi, Kenya; SEM — Scanning Electron Microscopy; VMNH — Virginia Museum of Natural History, Martinsville, USA; ZMUC — Zoological Museum, University of Copenhagen, Denmark; ZMUM — Zoological Museum, State University of Moscow, Russia.

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Taxonomic part

Elassystremma Hoffman & Howell, 1981

Elassystremma Hoffman & Howell, 1981: 229. Proposed for a new species. Gender neuter.

Type species: *Elassystremma pongwe* Hoffman & Howell, 1981, by original designation and monotypy.

DIAGNOSIS (after Hoffman & Howell [1981], with modifications): Minute polydesmoids (length 3.3–5.0 mm) adapted for conglobation (= rolling up into an oblate spheroid). Body with 18 or 19 segments, or rings (16 or 17+1+T) in both sexes. Head small, epicranium and interantennal region finely and densely granulose, lower half smooth. Three labral teeth equal in size and length. Antennae short; antennomere 5 longest and largest, strongly enlarged, about as broad as long; both antennomeres 5 and 6 each with a distodorsal group of 20 to 30 bacilliform sensilla; antennomeres 4, 5 and 6 each with a single macroseta on dorsal side near apical third; terminal antennomere with four usual apical cones. Collum rather large and convex, not covering the head from above. Tergum 2 with particularly strongly enlarged, spatuliform paraterga, latter of following segments not enlarged, typically set off at base both by an anterior and a posterior notch; lateral end subtruncate but rounded; overlap pattern typical from paratergum 4 onward. Ozopore formula somewhat abbreviated: 5, 7, 9, 12, 15, 17, (18); ozopores opening flush on tergal surface approximately in posterior one–third of paraterga. Telson relatively small, its posterior edge with a row of macrosetae; epiproct very short and stout, surmounted with four conspicuous macrosetae in pits; hypoproct subtrapeziform with a paramedian pair of macrosetae on small knobs. Sterna very narrow, most coxae nearly contiguous medially. Legs moderately robust, rather short and setose. Anterior legs with neither glands nor processes, nor other modifications. Gonopod aperture relatively large to modest, transversely oval. Coxae greatly enlarged, transverse, almost as wide as prozona, projecting ventrally and concealing most of the telopodites inside a gonocoel. Telopodites a little longer than coxae and attached on medial side. Vulva small, setose, poorly sclerotized, devoid of any spiral structures inside. Edge of bursa with particularly strong and long setae almost reaching the opening of vulval sac.

RANGE: Liberia, Malawi and the northernmost part of the African Eastern Arc Mountains.

SPECIES: Four are currently known, further are very likely to exist.

KEY TO *ELASSYSTREMMA* SPECIES:

1. Metaterga of body rings smooth, without any distinct tubercles ..... *laeve*
–. Metaterga of body rings with distinct tubercles 2
2. Tubercles present on posterior body rings only ... *prolaeve*
–. Tubercles present on all body rings 3
3. Gonopod telopodite long and slender, with a falciform subterminal process ..... *pongwe*
–. Telopodite short and stout ..... *michielsi*

Elassystremma pongwe Hoffman & Howell, 1981
Fig. 1.

MATERIAL: Paratype ♂ (MRAC 14 433), Tanzania, Bagamoyo Distr. Pongwe Forest Reserve, 30 km west of Mzata, 06°19'S, 38°18'E, 31.XII.1978, K.M. Howell. — 1 ♂, 2 ♀♀ (ZMUC), Tanzania, West Usambara Mtns, Mazombai Forest, 04°49'S, 38°30'E, 1400–1800 m, 11–20 XI 1995, C.E. Griswold, N. Scharff, D. Ubick.

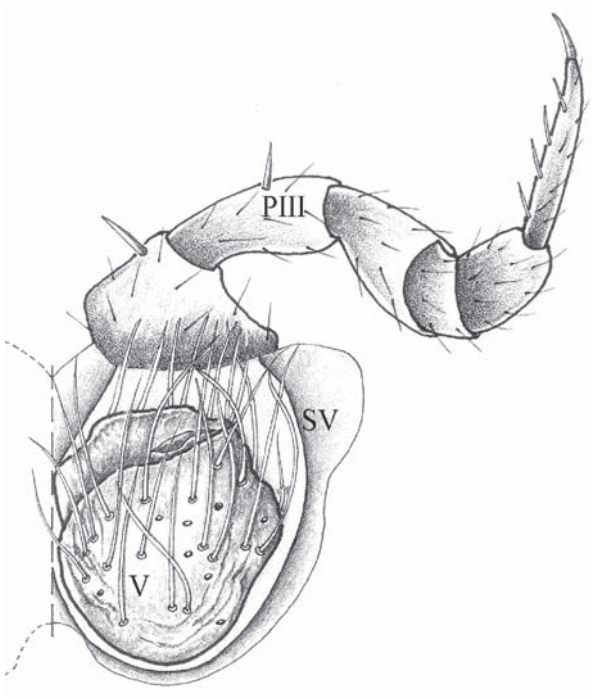


Fig. 1. Anterior view of right vulva of *Elassystremma pongwe* Hoffman & Howell.

Рис. 1. Вид спереди правой вульвы *Elassystremma pongwe* Hoffman & Howell.

REMARKS: The type–species of the genus, *E. pongwe*, has been thoroughly described by Hoffman & Howell [1981]. Only a few points of detail can be added based on the specimens observed.

Ozopore formula 5, 7, 9, 12, 15, 17, 18.

Vulva small, quite setose, poorly sclerotized, with strong and long apical setae reaching the opening of vulval sac (Fig. 1).

Elassystremma michielsi **sp.n.**
Figs 2–14.

Holotype ♂ (NMK), Kenya, Taita Hills, Yale Forest, 1800 m, VI.1999, D. VandenSpiegel. — Paratypes: 10 ♀♀ (MRAC: 18.553), same data as holotype; 3 ♀♀ (MRAC 18 565), Taita Hills, Sagla Forest, 03°50′S, 38°58′E, Winkler–Mocsarski extraction, 5.XII.1999, D. VandenSpiegel & J.-P. Michiels; 1 ♂, 1 ♀ (ZMUC), Taita Hills, Sagla Forest, 03°50′S, 38°58′E, Winkler–Mocsarski extraction, 5.XII.1999, D. VandenSpiegel & J.-P. Michiels; 1 ♂, 1 ♀ (VMNH), 2 ♂♂, 3 ♀♀ (ZMUM), 1 ♂, 1 ♀ (MNHN), Kenya, Taita Hills, Fururu Forest, Winkler–Mocsarski extraction, 09.XII.1999, D. VandenSpiegel & J.-P. Michiels.

NON–TYPE MATERIAL: 1 ♂, Kenya, Taita Hills, Sagla Forest, 03°50′S, 38°58′E, Winkler–Mocsarski extraction, 5.XII.1999, D. VandenSpiegel & J.-P. Michiels (SEM); Kenya, Taita Hills, Chawia Forest, 03°29′S, 38°20′E, Winkler–Mocsarski extraction, 7.XII.1999, D. VandenSpiegel & J.-P. Michiels (MRAC 18 502); Kenya, Taita Hills, Ngangao Forest, 03°22′S, 38°20′E, Winkler–Mocsarski extraction, 4.XII.1999, D. VandenSpiegel & J.-P. Michiels (MRAC 18 558); Kenya, Taita Hills, Ngangao Forest, 03°22′S, 38°20′E, Winkler–Mocsarski extraction, 4.XII.1999, D. VandenSpiegel & J.-P. Michiels (MRAC 18 570).

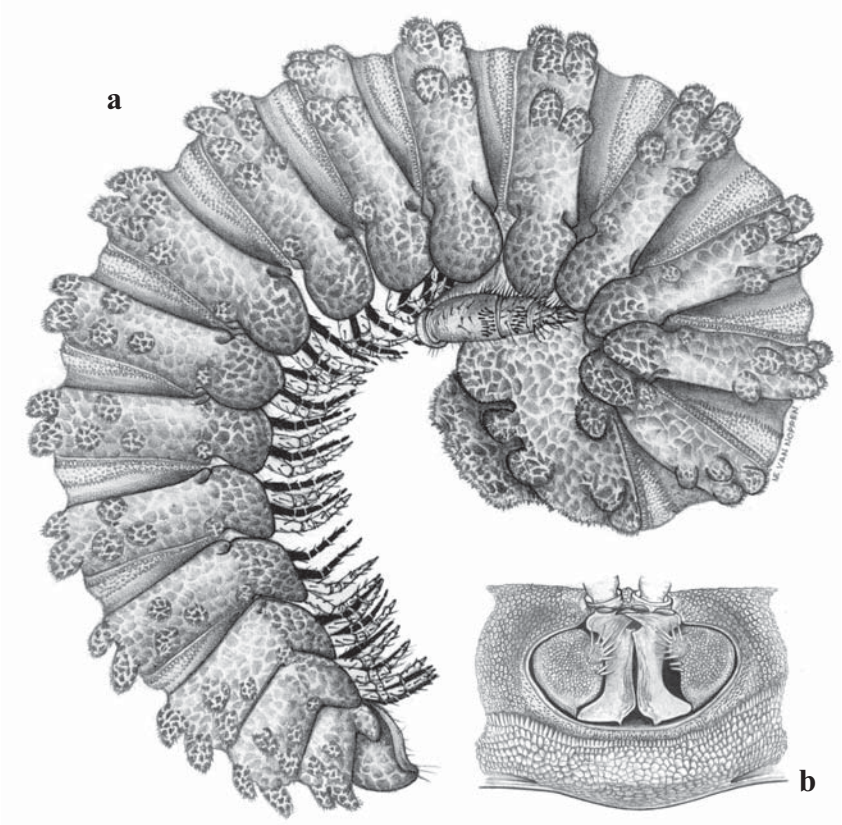


Fig 2. Male of *Elassystremma michielsi* sp.n.: a — lateral view of adult; b — ventral view of genitalia.

Рис. 2. Самец *Elassystremma michielsi* sp.n.: a — вид сбоку взрослого животного; b — вид гениталий снизу.

DIAGNOSIS: Body rings microgranular, with four rows of ovoid tubercles: two large paramedian and two smaller dorsolateral. Gonopod with a stout telopodite crowned with a flat corolla.

NAME: Dedicated to Jean-Pierre Michiels, who collected most of the specimens.

DESCRIPTION: Holotype ca 5 mm long; maximum width, 0.9 mm. Entire dorsal surface covered with a thin dark layer of secretion, often in a distinct box–work pattern (Figs 4, 8–10), under which the body integument is colourless. Body with 18 body rings (16+1+T), shape typical of *Elassystremma* (Fig. 2), with caudal body end tapered toward a relatively small telson not concealed by previous paraterga (Figs 2, 4).

Head small, partly concealed under edge of collum; upper half of head densely granular, lower half smooth and densely setose (Fig. 3). Interantennal isthmus about as wide as antennomere 1. Antennae typical of *Elassystremma*, as show in Fig. 5. Collum covered with numerous rounded tubercles (Figs 2, 3). Tergum 2 hypertrophied as usual, with strongly enlarged, spatuliform paraterga concealimng the head in lateral view (Fig. 4). Metatergum 2 with four tubercles on each side: two paramedian and two dorsolateral; 3rd and following body rings with an additional small ventrolateral tubercle (Figs 2A, 4). Prozona smooth anteriorly, with gradually evident, peculiar, scaly structures merging into a row of oblong–ovoid granules (Fig. 9). Limbus consisting in a row of scaly structures topped by a row of parallel spines, each scale being topped by two spines (Fig. 7). Paraterga set below middle of segment, continuing the convex outline of dorsum, their ends rounded, increasingly angular toward posterior body end (Figs 2A, 4). Ozopore formula 5, 7, 9, 12, 15, 17. Telson small, as in Fig. 11.

Gonopods as in Figs 1B, 12–14. Coxae large, conical, each with several apical setae. Telopodite large and robust, a little longer than coxite (Fig. 13); femur with a laminate process; apical part of telopodite enlarged, forming a flattened corolla (Figs 12–14).

The paratypes, both male and female, agree precisely in structural details with the holotype; they all are nearly of the same size and also have 18 body rings.

RELATIONSHIPS: *E. michielsi* sp.n. seems to be closely related to *E. pongwe*, as both show the integument covered with a thin dark layer of secretion and several rows of large tubercles on the metaterga, but the gonopods are distinct.

DISTRIBUTION: Only known from the Taita Hills in Kenya.

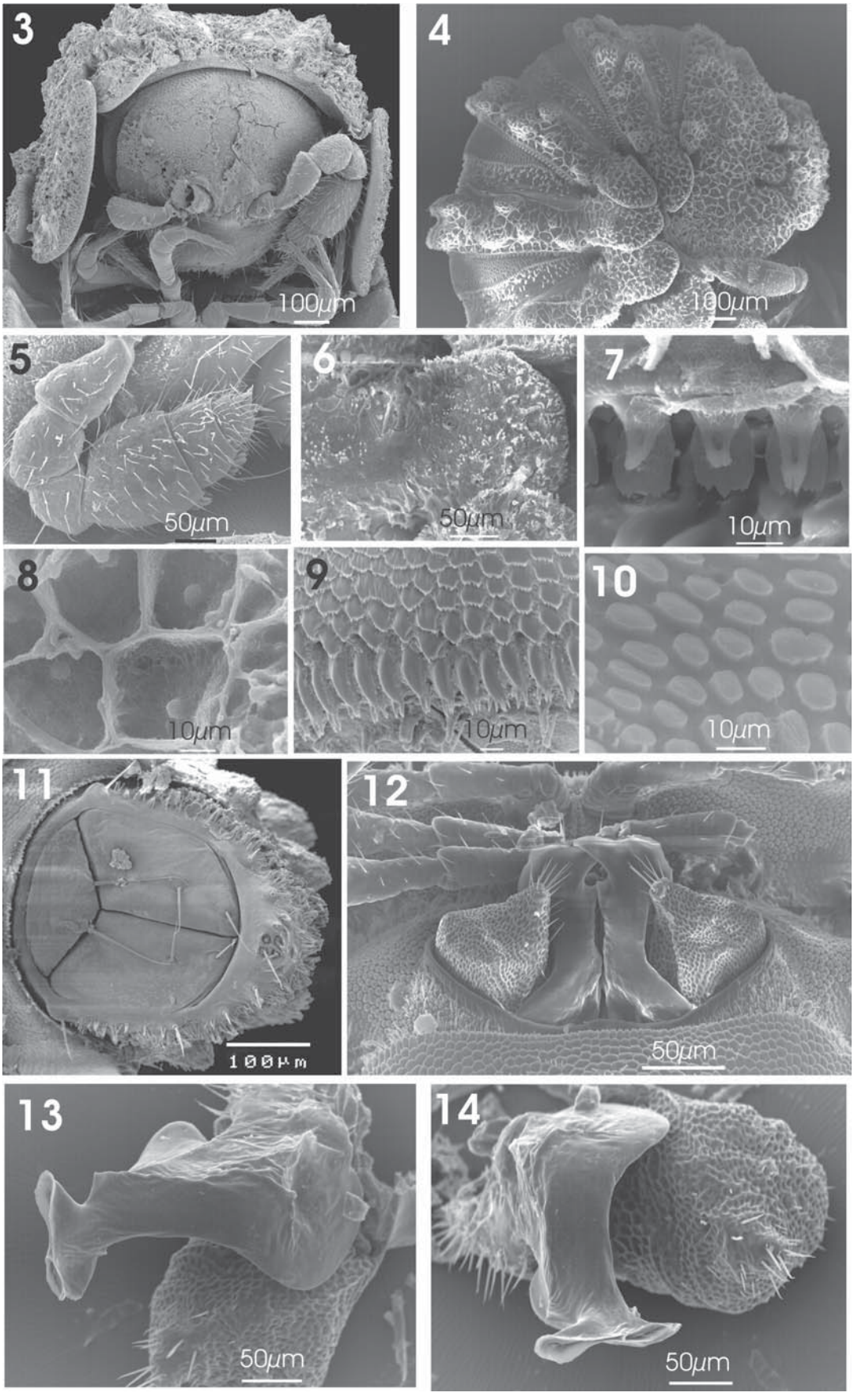
Elassystremma prolaeve **sp.n.**
Figs 15–22.

Holotype ♂ (NMK), Kenya, Taita Hills, Ngangao Forest, 03°22′S, 38°20′E, Winkler–Mocsarski extraction, 4.XII.1999, D. VandenSpiegel & J.-P. Michiels. — Paratypes: 1♂, 8♀♀, same data as holotype (MRAC 18 558).

NON–TYPE MATERIAL: 4 ♀♀, Kenya, Taita Hills, Mwachora Forest, Winkler–Mocsarski extraction, 10.XII.1999, D. VandenSpiegel & J.-P. Michiels (MRAC 18.580); 1 ♂, Kenya, Taita Hills, Mwachora Forest, Winkler–Mocsarski extraction, 10.XII.1999, D. VandenSpiegel & J.-P. Michiels (SEM); 6 ex., Kenya, Taita Hills, Fururu Forest, Winkler–Mocsarski extraction, 09.XII.1999 , D. VandenSpiegel & J.-P. Michiels (MRAC 19.937); 11 ex., Kenya, Kasigau Forest, 03°49′S, 38°40′W, Winkler–Mocsarski extraction, 6.XII.2000, D. VandenSpiegel (MRAC 20.527); 2♂♂, 3♀♀, Malawi, Nyika Plateau, Chisanga Falls, 10°40′S, 33°50′E, 1,800 m, Winkler–Mocsarski extraction, 9.XII.1981, R. Jocqué (MRAC 14.915).

DIAGNOSIS: Body rings microgranular, with rows of tubercles gradually developed on metaterga toward midbody. Gonopod with a falcate telopodite.

NAME: The specific name derives from only the anterior metaterga being smooth, with “pro” in Latin meaning “in front”, and “laevis” meaning “smooth”.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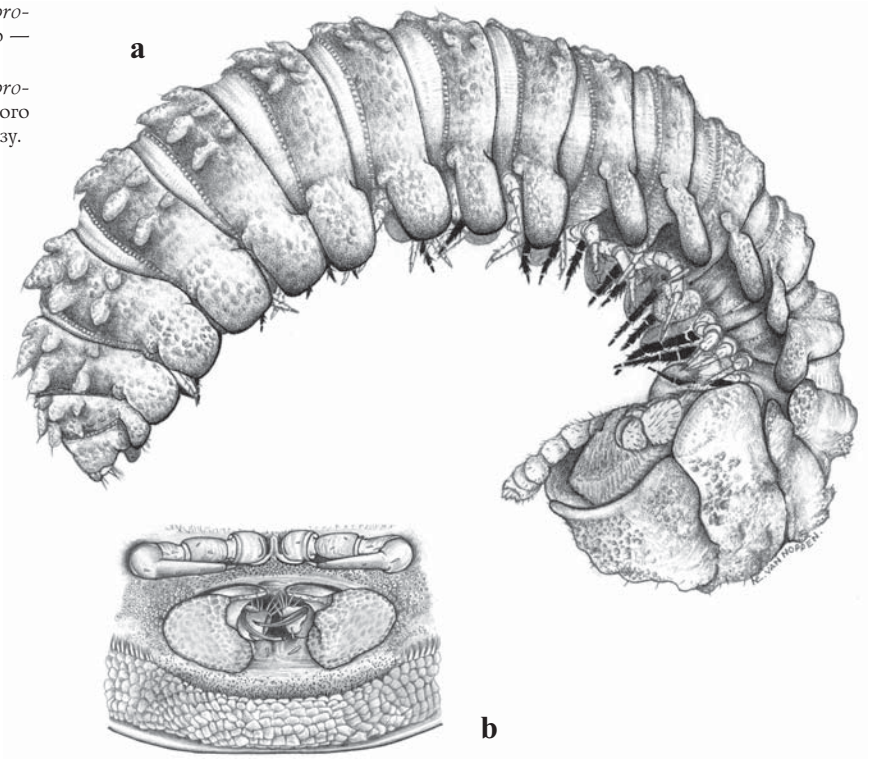


Fig 15. Male of *Elassystremma prolaeve* sp.n.: a — lateral view of adult; b — ventral view of genitalia.

Рис. 15. Самец *Elassystremma prolaeve* sp.n.: a — вид сбоку взрослого животного; b — вид гениталий снизу.

DESCRIPTION: Holotype ca 4 mm long; maximum width, 0.8 mm, very similar to the previous species except for the following characters. Body with 18 body rings (16+1+T). Tergum 2 with enlarged, scapuliform paraterga partly concealing the head in lateral view, ozopore formula 5, 7, 9, 12, 15, 17. Metaterga toward midbody with gradually and increasingly developed four rows of tubercles: two paramedian and two dorsolateral (Figs 15A, 16, 17). Prozona smooth anteriorly, finely scaled toward posterior edge and merging into a row of oblong–oval structures (Fig. 18). Limbus quite similar to that of the above species (Fig. 18).

Gonopod aperture relatively modest in size, transversely oval (Fig. 19). Coxae large, produced to protect telopodites (Figs 15B, 19, 20), beset with setae apically. Telopodite falcate, with a setose prefemur; femur with a small lateral indentation and a long, slender, curved postfemur carrying a seminal groove up to its tip (Figs 20–22).

The paratypes agree precisely in structural details with the holotype, all nearly of the same size and also with 18 body rings.

RELATIONSHIPS: A species very similar to *E. michielsi* sp.n. but differing by the not so strongly developed paraterga 2, by the dorsal tubercles being only visible on the posterior body rings, and in gonopod structure.

DISTRIBUTION: Known from the Taita Hills in Kenya as well as from the Nyika Plateau in Malawi.

Elassystremma laeve **sp.n.**
Figs 23–30.

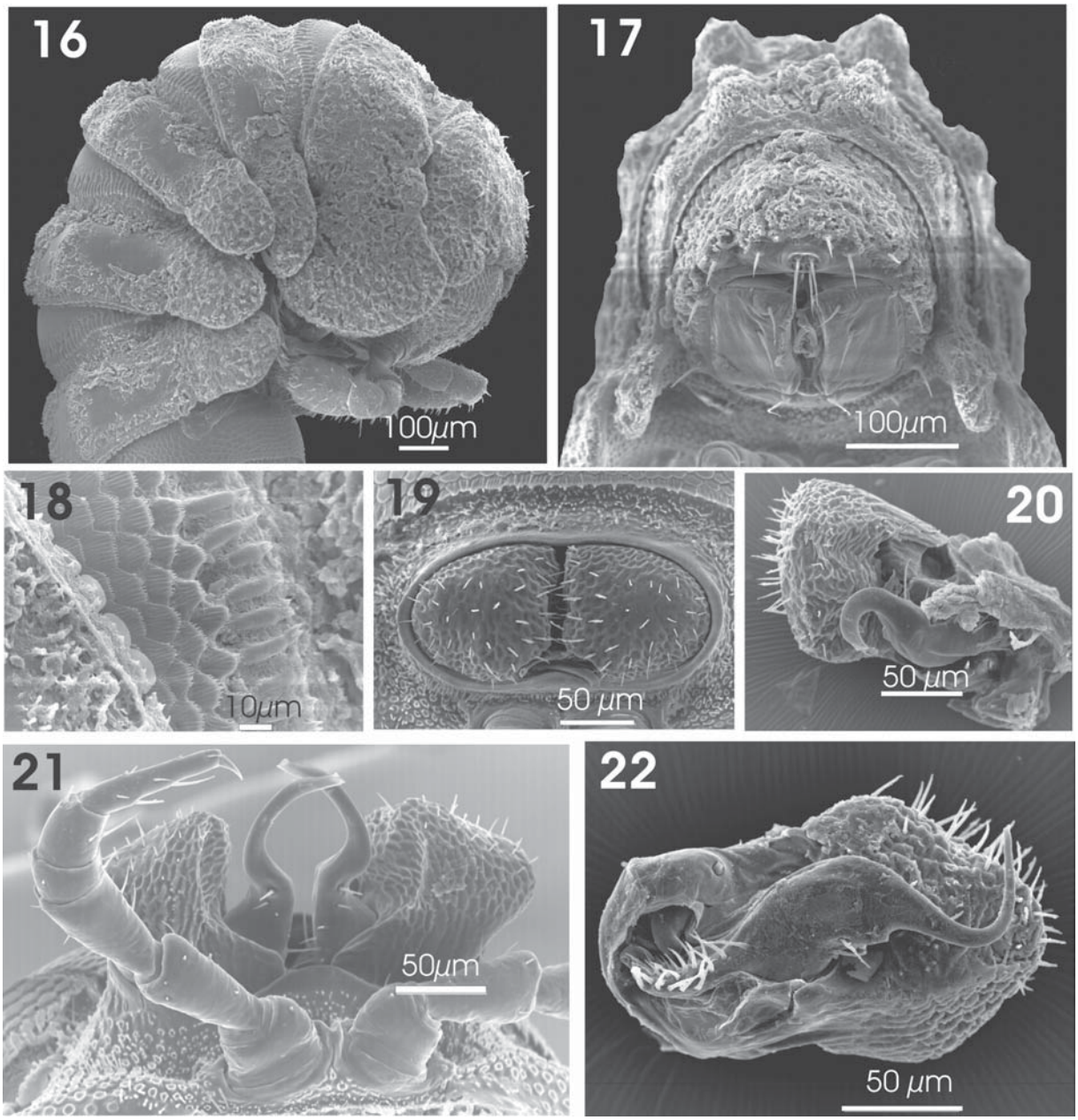
Holotype ♂ (NMK), Kenya, Taita Hills, Ngangao Forest, Winkler–Mocsarski extraction, 4.XII.1999, D. VandenSpiegel & J.-P. Michiels. — Paratypes: 1 ♂, 1 ♀ (NMK), 1 ♂, 1 ♀ (ZMUC), 1 ♂, 1 ♀ (VMNH), 1 ♂, 1 ♀ (MNHN), 9 ♀♀ (MRAC: 18.572), same data as holotype.

NON–TYPE MATERIAL: 17 ex. (MRAC: 18.567), Kenya, Taita Hills, Mbololo Forest, Winkler–Mocsarski extraction, 8.XII.1999, D. VandenSpiegel & J.-P. Michiels; 5 ex. (MRAC: 18.126), Kenya, Taita Hills, Mbololo Forest, Winkler–Mocsarski extraction, 22.VI.1999, D. VandenSpiegel; 1 ♂, Kenya, Taita Hills, Fururu Forest, Winkler–Mocsarski extraction, 9.XII.1999, D. VandenSpiegel & J.-P. Michiels (SEM); 17 ex. (MRAC: 18.545), Kenya, Taita Hills, Fururu Forest, Winkler–Mocsarski extraction, 9.XII.1999, D. VandenSpiegel & J.-P. Michiels; 34 ex. (MRAC: 18.504), Kenya, Taita Hills, Chawia Forest, Winkler–Mocsarski extraction, 7.XII.1999, D. VandenSpiegel & J.-P. Michiels; 26 ex. (MRAC:18.554), Kenya, Taita Hills, Yale Forest, 03°39′S. 38°33′E, Winkler–Mocsarski extraction, 6.XII.1999, D. VandenSpiegel & J.-P. Michiels; 40 ex. (MRAC: 18 559), Taita Hills, Ngangao Forest, 03°22′S, 38°20′E, Winkler–Mocsarski extraction, 4.XII.1999, D. VandenSpiegel & J.-P. Michiels; 51 ex. (MRAC 18 578), 9 ex. (ZMUM), Taita Hills, Mwachora Forest, Winkler–Mocsarski extraction, 10.XII.1999, D. VandenSpiegel & J.-P. Michiels.

DIAGNOSIS: This species differs from congeners in having the metatergal surface nearly smooth. Gonopod telopodite with a long femoral process.

Figs 3–14. Some structural details in *Elassystremma michielsi* sp.n. (SEM micrographs): 3 — head of male, anterior view; 4 — anterior body half of male, lateral view; 5 — lateral view of right antenna; 6 — details of paratergal structure showing ozopore position; 7 — limbus; 8 — details of metatergal surface, 9–10 — microsculpture of paratergite; 11 — caudal body part, ventral view. 12–14 — gonopod structure, general view, details of left gonopod, details of telopodite, and entire gonopod in ventral view, respectively.

Рис. 3–14. Некоторые детали строения *Elassystremma michielsi* sp.n. (SEM фотографии): 3 — голова самца, вид спереди; 4 — передняя половина тела самца, вид сбоку; 5 — правый усик сбоку; 6 — детали строения паратергитов с местоположением поры защитных желез; 7 — лимбус; 8 — детали поверхности метатергита; 9–10 — микроскульптура паратергита; 11 — хвостовой отдел тела, вид снизу; 12–14 — структура гоноподов, соответственно общий вид, детали строения левого гонопода, детали стоения телоподита м целиком гонопод снизу.



Figs 16–22. Some structural details in *Elassystremma prolaeve* sp.n. (SEM micrographs). 16 — anterior half of male body, lateral view; 17 — posterior view of caudal body part; 18 — fine structure of limbus and prozonite, dorsal view; 19 — ventral view of genitalia; 20 — gonopod, submedial view; 21 — gonopods and legs 8, front view; 22 — gonopod, medial view.

Рис. 16–22. Некоторые детали строения *Elassystremma prolaeve* sp.n. (SEM фотографии): 16 — передняя половина тела самца, вид сбоку; 17 — вид сзади хвостового отдела тела; 18 — микроструктура лимбуса и прозонита, вид сверху; 19 — гениталии снизу; 20 — гонопод, вид примерно изнутри; 21 — гоноподы и 8-я пара ног, вид спереди; 22 — гонопод, вид изнутри.

NAME: The specific name derives from "laevis", in Latin meaning "smooth".

DESCRIPTION: Holotype ca 4 mm long and 0.8 mm wide. Colourless or slightly pinkish, dorsal surface not covered by a layer of secretion. Body with 19 body rings (17+1+T), enrolled into a discoid sphere (Figs 23A, 24). Head small, upper half densely granular, lower half smooth with more or less dense setiferous punctation in clypeal part (Fig. 25). Collum large, convex, surface slightly granular (Fig. 24). Tergum 2 particularly strongly enlarged, with enlarged paraterga concealing both head and collum in lateral view. The following paraterga not enlarged. Metaterga 2 and following body rings smooth, with a few setae (Figs 23A, 24). Prozona finely granulose in anterior half, smooth in posterior half (Fig. 23A, 24). Stricture between pro– and metazona straight, limbus consisting of a row of scaly structures topped by a row of parallel spines (Fig. 26). Ozopore formula 5, 7, 9, 12, 15, 17, 18. Telson as in Fig. 23A, 27.

Gonopod aperture relatively modest, transversely oval. Coxae large, with numerous setae apically (Figs 23A, 28, 29); telopodite with a setose prefemur; femur bearing a long lamellate process; postfemur long and slender, slightly sinu-

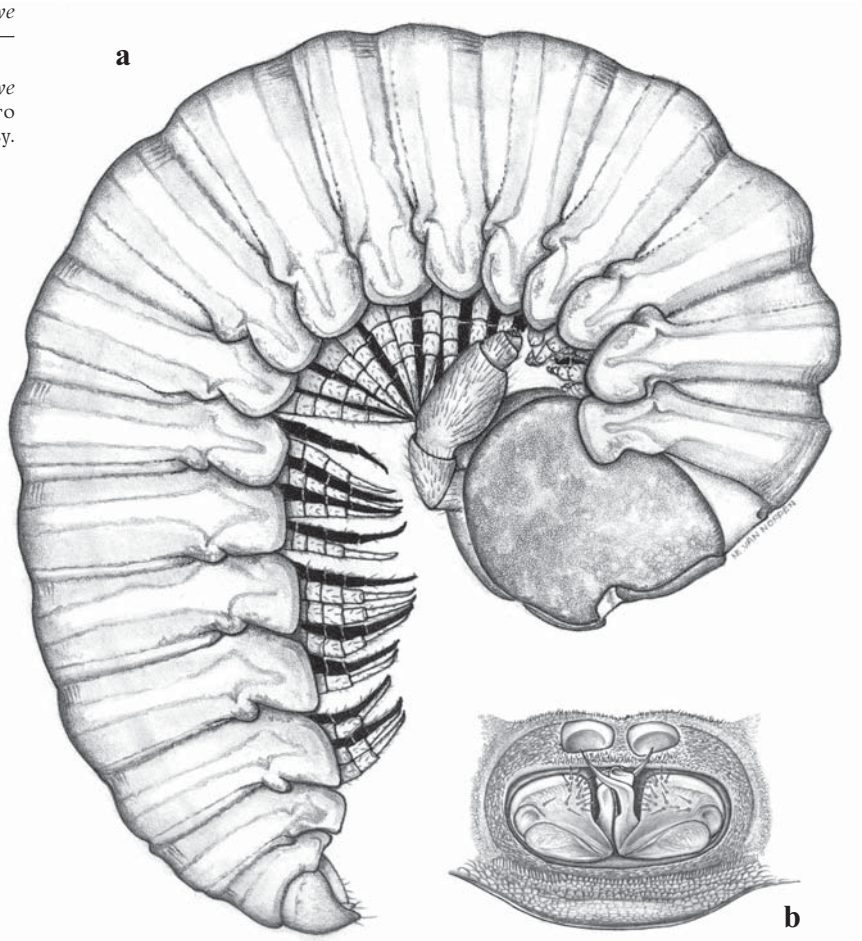


Fig 23. Male of *Elassystremma laeve* sp.n.: a — lateral view of adult; b — ventral view of genitalia.

Рис. 23. Самец *Elassystremma laeve* sp.n.: a — вид сбоку взрослого животного; b — вид гениталий снизу.

ous, unbranched, carrying a seminal groove up to its tip (Figs 23B, 28, 29).

Vulva as in Fig. 30.

One of the female paratypes (MRAC: 18.572), though adult, is only with 18 body segments.

RELATIONSHIPS: According to the succinct description as presented by Cook [1896a], *E. laeve* sp.n. seems to be related to *Cenchrodesmus volutus*, in which the metaterga are also nearly smooth. However, this resemblance can only prove to be superficial. Based on gonopod structure, this new species is an unquestioned *Elassystremma*.

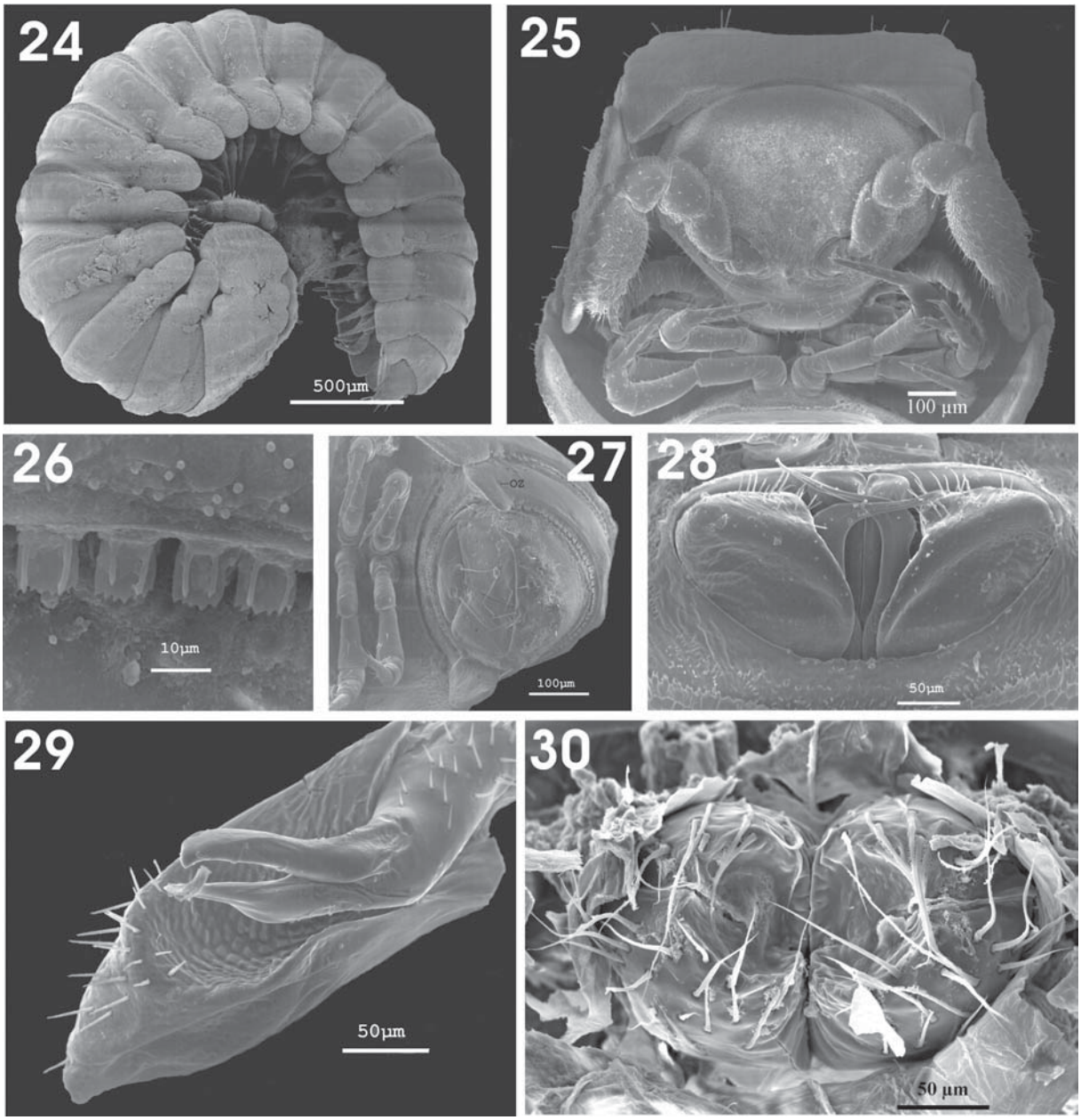
DISTRIBUTION: Only known from the Taita Hills in Kenya.

Discussion

Geographically, the family Ammodesmidae seems to be restricted to tropical Africa (Fig. 31), both *Ammodesmus* and *Cenchrodesmus* being obviously confined to western Africa, and *Elassystremma* to eastern Africa. Such a disjunct pattern of distribution can be genuine, but it can also prove to be an artifact due to the too poor collecting effort in the central parts of the continent. These minute millipedes live on and in the ground in and under the litter, and are capable of coiling into a sphere when disturbed. Then the animal so readily reminds of a grain of sand that it becomes nearly invisible [Cook, 1896b].

The use of Winkler–Mocsarski apparatuses and/or Berlese funnels, both these collecting techniques deemed the most appropriate in sampling particularly cryptic soil/litter fauna, is most likely to further extend and refine the distribution of this family. The unusually vast and also disjunct range of *E. prolaeve*, currently reported from the Taita Hills, Kenya and the Nyika Plateau, Malawi, seems to attest not only to the above suggestion but also to the formerly apparently (sub)continuous afforestation of the East African Mountain Arc. These animals being so tiny and obviously hygrophilous, this species could only be assumed to have once been widely distributed and may have since become extinct in similar mountain forests like the Ulugurus and Usambaras [Hoffman, 1993]. However, *E. prolaeve* can also prove to still occur in Tanzania as well but it simply has not been revealed there yet. At least *E. pongwe* does inhabit the inselberg forests in Tanzania, whereas in the Taita Hills the sympatry/syntopy of 2–3 congeners is very common.

The number of body segments varying individually in *E. laeve* is remarkable, as only three species in the entire order Polydesmida have hitherto been known to display such a trait, i.e. *Desmonus pudicus* (Bollman, 1888) (Sphaeriodesmidae), *Psochodesmus crescentis* Cook, 1896, and *Poratia obliterata* (Kraus, 1960) (both Pyrgodesmidae) [Adis et al., 2001].



Figs 24–30. Some structural details in *Elassystremma laeve* sp.n. (SEM micrographs): 24 — lateral view of adult; 25– front view of head; 26 — fine structure of limbus; 27 — posterior view of caudal body part; 28 — ventral view of genitalia; 29 — details of right gonopod structure, medial view; 30 — ventral view of vulva.

Рис. 24–30. Некоторые детали строения *Elassystremma laeve* sp.n. (SEM фотографии): 24 — вид сбоку взрослого животного; 25 — вид гшоловы спереди; микроструктура лимбуса; 27 — вид сзади хвостового отдела тела; 28 — гениталии снизу; 29 — детали строения правого гонопода, вид изнутри; 30 — вульва снизу.

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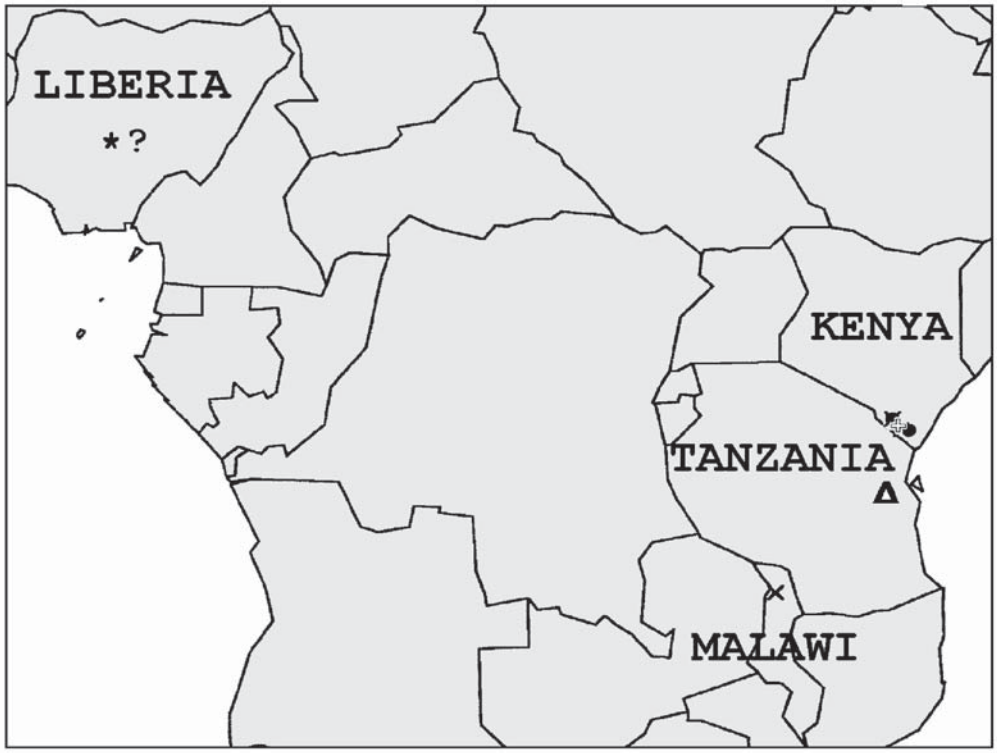

Fig. 31. Distribution of the family Ammodesmidae.

Рис. 31. Распространение семейства Ammodesmidae.

* — *Ammodesmus granum* Cook & *Cenchrodesmus volutus* Cook; ● — *Elassystremma michielsi* sp.n.; △ — *Elassystremma pongwe* Hoffman & Howell; X — *Elassystremma prolaeve* sp.n., + — *Elassystremma laeve* sp.n.

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