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Source: African Invertebrates, 53(2) : 601-613

Published By: KwaZulu-Natal Museum

URL: https://doi.org/10.5733/afin.053.0208

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African Invertebrates Vol. 53 (2): 601–613 Pietermaritzburg 18 December 2012

Porcelloderes impenetrabilis gen. & sp. n. from Tanzania, an assassin bug camouflaging in the adult stage (Hemiptera: Heteroptera: Reduviidae: Physoderinae)

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ABSTRACT

Porcelloderes impenetrabilis gen. & sp. n. (Hemiptera: Heteroptera: Reduviidae: Physoderinae) is described, based on males, females, and larvae from different localities in northeastern Tanzania. The new discovery extends the range of the subfamily (previously known from the Oriental Region and the Pacific, from Madagascar and neighbouring islands, and from Central and South America) to mainland Africa. In contrast to all previously described physoderine species, the new species is apterous, which is probably a result of neoteny; the neotenous aptery and its morphological consequences are discussed. The diagnosis of Physoderinae is extended in order to make it applicable to apterous taxa. In all examined specimens including larvae, the body surface is covered by a firm incrustation of soil, deposited between the long setigerous tubercles. This is the first record in the subfamily Physoderinae of camouflaging by application of material on the body, and the first report of such behaviour in the adult stage in Reduviidae.

KEY WORDS: Heteroptera, Reduviidae, Physoderinae, Afrotropical, Tanzania, new genus, new species, aptery, neoteny, camouflage.

INTRODUCTION

Physoderinae is a small subfamily within Reduviidae, which has an unusual geographic distribution. The largely unrevised *Physoderes* Westwood, 1846 occurs widely in the Oriental Region and the Pacific, with nearly 40 described species. Eleven small genera, each containing one to six (altogether 26) species, are distributed in Madagascar, Mauritius and the Comores; these were monographed by Villiers (1968). Two monotypic genera, *Cryptophysoderes* Wygodzinsky & Maldonado Capriles, 1972 and *Leptophysoderes* Weirauch, 2006, have been described from the New World: Panama and Ecuador, respectively. Of the two New World genera, *Cryptophysoderes* is rather similar to the Old World forms; however, *Leptophysoderes* shows several unique characters. No species have been known to occur on the mainland of Africa so far (Maldonado Capriles 1990; Weirauch 2006*a*).

Among material collected in Tanzania, a series of a physoderine assassin bug representing a previously unknown genus and species were found and the bug is described in the present paper. This discovery represents the first record of the subfamily from the African continent.

MATERIAL AND METHODS

All examined specimens of the new species are in the collection of the Hungarian Natural History Museum, Budapest. For this study, all described Old World genera of Physoderinae have been examined (the Malgasy genera were accessed in the Muséum National d'Histoire Naturelle, Paris). The New World genera were thoroughly documented and illustrated by their authors (Wygodzinsky & Maldonado Capriles 1972; Weirauch 2006*a*). Therefore, it was not necessary to re-examine them directly.

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In order to study the external morphology, specimens of the new species had to be cleaned. The solid soil incrustation covering the body turned out to be impossible to remove by using forceps or pins, even from specimens transferred to detergents. Consequently, a male and a female adult (paratypes) as well as a last instar larva were placed in alcohol and cleaned by ultrasonic cleaner at the Institute of Chemistry, Eötvös Loránd University, Budapest. Only from these three cleaned specimens was it possible to take exact measurements, which are given in millimetres.

External and genital structures were examined using a stereoscopic microscope (MBS-10) and uncleared and cleared alcohol-glycerol mounts were studied under a compound microscope (XSZ-N107), partly by oil immersion (Fig. 22). All drawings were made using a *camera lucida*. Measurements were taken using a micrometer eyepiece. Male genitalia were studied after brief maceration in potassium hydroxide solution.

TAXONOMY

Genus **Porcelloderes** gen. n.

Etymology: From Latin *porcellus* (piglet) and Greek *deire* (neck), the latter referring to *Physoderes*, the type genus of Physoderinae. Gender feminine.

Type species: *Porcelloderes impenetrabilis* sp. n.

Diagnosis: Recognized within Physoderinae by the combination of the following characters: body small, about 4.5–5.0 mm; apterous; body covered by wide, stiff, curved hairs arising from prominent, wart-like tubercles (Figs 5, 6), markedly affecting outlines of head and pronotum (Figs 7–10); ocelli absent; antennal segment I not reaching apex of clypeus (Fig. 9); pronotum transversal, its main body is formed by the anterior lobe, the posterior lobe is reduced to a narrow transverse rim, posterior margin without submedian lobes (Fig. 10); mesoscutellum not differentiated; tarsi two-segmented (Figs 11–14).

Description:

Body: Small apterous physoderines, length of adults about 4.5–5.0 mm. Body broad, robust (Figs 1–3); body surface covered by wide, stiff, curved hairs set on long, wart-like tubercles (Figs 5, 6); abdominal venter covered with short, adpressed hairs.

Head (Fig. 7): Elongate, porrect, densely covered by very long and dense setigerous tubercles; anterior and posterior lobes separated by a deep transverse impression dorsally at level of eyes; preocular part about twice as long as postocular part; eye (Fig. 9) very small, globular, strongly protruding in dorsal view, far removed from dorsal and ventral outline of head in lateral view (Fig. 7); antennae situated approximately halfway between apex of clypeus and anterior margin of eye. Antenna (Fig. 9) as usual in subfamily, short, apex of segment I not reaching apex of clypeus. Labium (Fig. 7) as usual in subfamily, long and slender, apparent first segment (II) relatively short, stout, not reaching to level of antenniferous tubercle, apparent second segment (III) very long and slender, narrowing posteriorly, apparent third segment (IV) shortest.

Thorax: Pronotum (Fig. 11) transversal, its main body formed by anterior lobe, posterior lobe reduced to narrow transverse rim along its posterior margin; anterior margin forming broad, flattened collar, anterolateral angles obtuse; distinctly marginated laterally, lateral margin with row of almost regularly arranged long setigerous tubercles; disc with more or less longitudinal rows of long setigerous tubercles. Mesonotum and metanotum short,

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transverse, with fairly long setigerous tubercles laterally, posterior margins thickened, forming transverse carinae. Pro- and mesonotum each with rather deep medial impression at their base; mesoscutellum not differentiated; metanotum impressed medially. Thoracic pleuron covered with sparse, fairly long setigerous tubercles. *Meso- and metathoracic wings* entirely absent. *Legs* (Figs 11–14) short and stout; coxae very short; trochanters long as characteristic in subfamily; all femora widened, with their ventral surface unarmed except for setigerous tubercles; tibiae simple, stout; femora and tibiae with regular longitudinal rows of small setigerous tubercles; tarsi two-segmented, segment I very small.

Pregenital abdomen (♂, Fig. 15): Wide and oval, much wider than thorax, strongly convex ventrally, less convex dorsally; dorsum with a few setigerous tubercles at posterior parts of mediotergites and epipleurites (= dorsal laterotergites). Abdominal tergites I–III fused, with transverse elevations along their fusion lines bearing setigerous tubercles; posterior margins of tergites (= mediotergites) IV–VI elevated, forming transverse carinae bearing setigerous tubercles. Dorsal abdominal gland orifices well developed, situated at basal half of tergites IV, V and VI. Epipleurites very broad, widths of epipleurites of segments IV–VI approximately one third of tergites (= mediotergites) of respective segments; epipleurites VII of male fused along midline posterior to tergite (= mediotergite) VII. Hypopleurites (= ventral laterotergites) relatively narrow (Fig. 3). Sternites II–VI shortened along midline, posterior margins of respective sternites elevated, forming transverse carinae. Spiracles I situated at anterolateral angle of syntergite I–III, spiracles II–VII ventral in position, found at lateral part of respective sternites, each situated on top of small, elevated tubercle.

Porcelloderes impenetrabilis sp. n.

Figs 1–29

Etymology: From Latin *impenetrabilis* (impenetrable), referring to the firm soil layer covering the body of all specimens examined.

Description:

Apterous male and female.

Colour: General body colour rather uniformly dark brown, head somewhat lighter. Antennal segment I light yellowish brown, segments II–III same colour as head, apical half of segment IV stramineous. Labial segment I and base of segment II light yellowish brown, apical 2/7 of segment II and entire segment III dark brown. Leg colouration the same as overall body colour, base of tibiae and apical tarsal segment light brown.

Body structure: General aspect as in Figs 1–3; body about 2.2 (♂) / 2.1 (♀) times longer than greatest width of abdomen.

Head: About 1.7 (♂) / 1.6 (♀) times longer than its width across eyes, preocular part about 1.85 (♂) / 1.95 (♀) times longer than postocular part, head across eyes about 1.5 (♂) / 1.45 (♀) times wider than interocular distance.

Thorax: Pronotum about 1.75 (♂) / 1.6 (♀) times wider than its medial length (♀, Fig. 10); mesonotum broadly convex posteriorly, with 1+1 large tumescences bearing setigerous tubercles laterally; metanotum extremely short along midline.

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Fig. 1. *Porcelloderes impenetrabilis* gen. & sp. n., holotype (apterous female), covered by thick mud layer. Scale bar in mm.

Abdomen: Almost circular in dorsal view (♂, Fig. 15), about 1.05 (♂) / 1.0 (♀) as long as its greatest width.

Male genitalia: Genital capsule as in Figs 16, 17, short, oval, dorso-apical part with short, stout, apically rounded process (Fig. 18). Paramere (Figs 19–21) short, apical half relatively narrow, angularly bent around middle, apical half thick, nearly straight, apically truncate, external margin with a series of tubercles, each having hair sensilla apically (Fig. 22). Articulatory apparatus of phallus (Figs 23, 24) stout, support bridge complex with narrow ponticulus transversalis, with 2+2 capitate processes, basal foramen transverse, oval, with thick ductifer; support bridge complex continued in 1+1 relatively short and thick support bridge prolongations fused along their whole length; phallotheca short and broad, oval, with tongue-shaped dorsal sclerotized plate (Figs 23, 24: dsp) and 1+1 broad, nearly triangular, ventral sclerotized plates (Fig. 23: vsp); endosoma with several minute, tooth-like sclerotized processes forming distinct fields; struts fused, spoon-shaped in dorsal view (Fig. 24: str), apical portion fused with dorsal sclerotized plate of phallotheca.

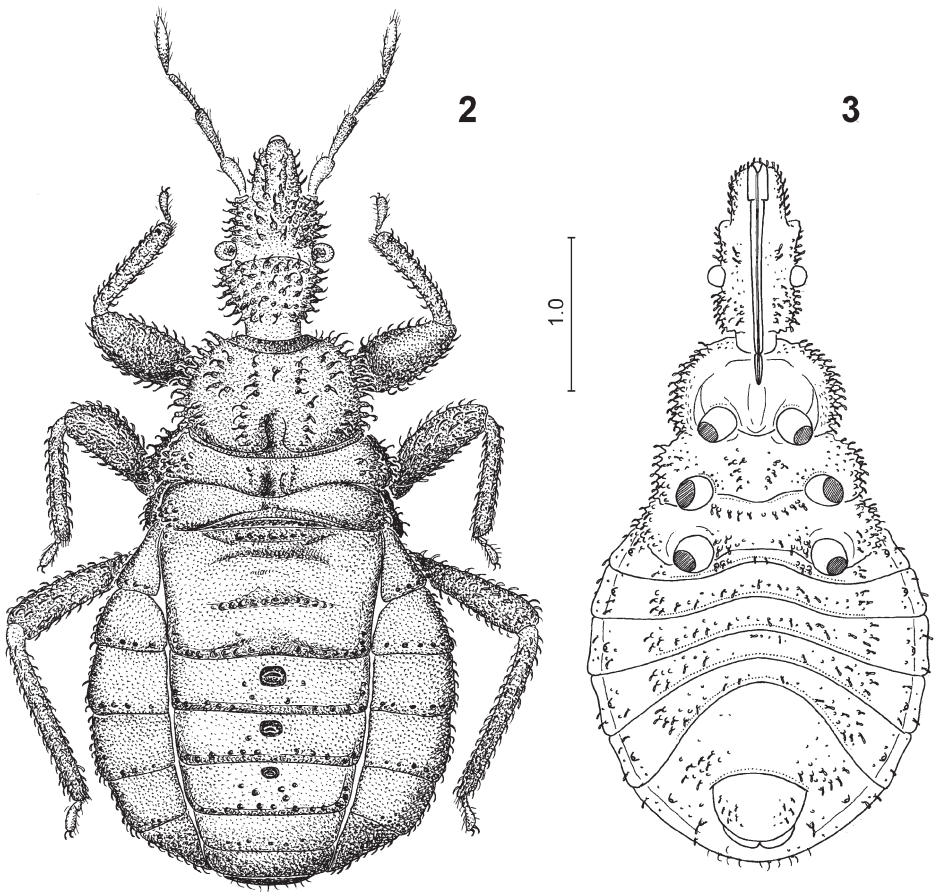
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Female genitalia: Terminalia in resting position as in Fig. 25, tergite IX (Figs 25, 27: t_9) declivous, broadly truncate posteriorly, valvifer VIII (Figs 25, 26, 29: vf_8) broadly elongate, articulated with the small, oval, dorsally broadly truncate valvula VIII (Figs 25, 26, 29: va_8), with distinct spiracle at base (Fig. 29: sp_8), valvifer IX (Fig. 27: vf_9) narrow, associated with the greatly membranous, lobe-like valvula IX (Fig. 27: va_9).

Measurements (cleaned paratype ♂ / cleaned paratype ♀): Body length 4.6/4.9. Length of head 1.16/1.15, preocular part 0.70/0.66, postocular part 0.38/0.34, width across eyes 0.68/0.71, interocular distance 0.46/0.49. Antennal segments I:II:III:IV as 0.25/0.25:0.28/0.32:0.27/0.34:0.39/?. Apparent labial segments I:II:III as 0.31/0.35:0.84/0.98:0.25/0.24. Medial length of pronotum 0.63/0.73, greatest width 1.11/1.18; medial length of mesonotum 0.28/0.25; medial length of metanotum 0.01/0.05. Length of abdomen to posterior border of tergite VII 2.21/2.33, greatest width of abdomen 2.10/2.31.

Last instar (?) larva.

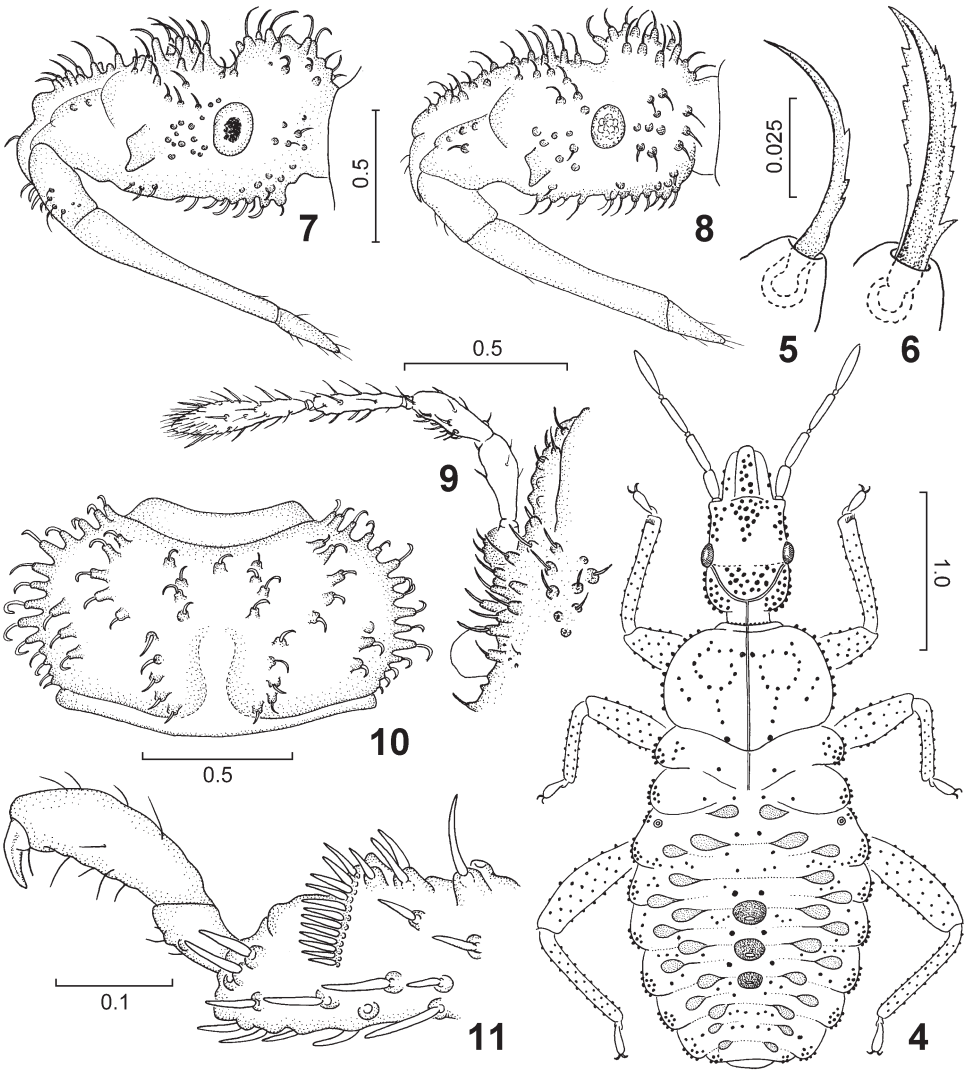
Colour: Similar to adult. *Body structure*: General aspect as in Fig. 4; integument with wart-like setigerous tubercles similar to those of adult but shorter. Head and thorax



Figs 2, 3. *Porcelloderes impenetrabilis* gen. & sp. n.: (2) apterous female, mud cover removed; (3) apterous male, mud cover removed, ventral view. Scale bar in mm.

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relatively strongly sclerotized, abdomen greatly membranous. *Head* (Fig. 8): Similar to that of adult, about 1.55 times longer across eyes than its width, preocular part about 2.15 times longer than postocular part; head across eyes about 1.2 times wider than interocular distance; eyes small, weakly protruding laterally. *Thorax*: Pronotum about 1.4 times longer than its greatest width, lateral margin broadly rounded, posterior margin projecting posteriorly along midline; meso- and metanota weakly sclerotized, short, incompletely separated from each other, their lateral margins rounded. *Legs*: Short and stout, similar



Figs 4–11. *Porcelloderes impenetrabilis* gen. & sp. n., apterous male (7, 9, 11), female (10) and fifth (?) instar larva (4–6, 8): (4) body in dorsal view, mud cover removed (schematical, hairs omitted, position of setigerous tubercles indicated by large black dots); (5, 6) two different anchor setae of the integument on the abdomen; (7, 8) head, lateral view; (9) left antenna and part of head, dorsal view; (10) pronotum, dorsal view; (11) right fore tarsus and apex of tibia, anterior (inner) surface. Scale bars in mm.

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to those of adult. *Abdomen*: Weakly sclerotized, elongate oval, lateral margins of each segment rounded, lateral margin of abdomen therefore lobate; dorsum with regularly arranged sclerotized plates (attachment surfaces of abdominal muscles).

Measurements (in mm; $N=1$): Body length 3.7. Length of head 1.05, preocular part 0.60, postocular part 0.28, width across eyes 0.67, interocular distance 0.56. Antennal segments I:II:III:IV as 0.22:0.24:0.25:0.38. Apparent labial segments I:II:III as 0.29:0.78:0.29. Medial length of pronotum 0.71, greatest width 1.02. Greatest width of abdomen 1.75.

Holotype: ♀ "Tanzania \ Amani, \ Tanga Region" [handwritten], "No. 135. \ 15. II. 1987. \ leg. S. Mahunka" [handwritten]. The holotype is intact, covered by soil, and mounted on card (Fig. 1).

Paratypes: 2♀ same labels as holotype; 1♂ (cleaned and dissected, genital capsule removed and dissected, preserved in plastic microvial with glycerol, pinned with the specimen; Figs 15–24), 1♂ (intact) "Tanzania \ Kwamgumi \ Tanga region" [handwritten], "No. 146. \ 17. II. 1987. \ leg. S. Mahunka" [handwritten]; 1♂ (genital capsule removed and dissected, preserved in plastic microvial with glycerol, pinned with the specimen) "Tanzania \ Kimboza \ forest reserve" [handwritten], "No. 44. \ 4. II. 1987 \ leg. S. Mahunka" [handwritten]; 1♀ (intact, mounted on card), 1♀ (cleaned and dissected, mounted on card; Figs 25–29) "Tanzania \ Matombo \ Morogoro region" [handwritten], "No. 34. \ 4. II. 1987. \ leg. S. Mahunka" [handwritten].

Other material examined: TANZANIA: Tanga region, Kwamgumi, No. 146, 17.ii.1987, S. Mahunka (1 larva); Kimboza forest reserve, No. 44, 4.ii.1984, S. Mahunka (1 larva); Morogoro region, Matombo, No. 34, 4.ii.1987, S. Mahunka (2 larvae, one of them cleaned and dissected; Figs 4–6).

Type locality: Tanzania, East Usambara Mountains, Amani (5.1°S 38.6°E). Paratypes from Tanzania, Kwamgumi (4.9°S 38.7°E), Kimboza Forest Reserve (7.0°S 37.8°E) and Matombo (7.1°S 37.8°E).

Habitat and biology: The specimens examined during the present study were collected in February 1987 from four localities in north-eastern Tanzania; the longest distance between two localities is approximately 250 km. Additional data on the localities were provided by Mahunka *et al.* (1987). Specimens from Matombo were extracted with a Moczarsky–Winkler bag from material sifted from accumulated debris near the entrance of a cave. Specimens from Kimboza Forest Reserve were captured on the same day from a locality of a few kilometres away from the previous one, at about 250–300 m a.s.l.; they were extracted with Berlese funnel from litter taken in the gallery forest surrounding the river Ruvu. Specimens from Kwamgumi were extracted about two weeks later with Berlese funnel from litter and soil collected in a primary rainforest in Segoma Forest Reserve. According to Mahunka *et al.* (1987), specimens from Amani were collected at light, which statement might be erroneous. However, specimens of several apterous hemipterans are known to approach light sources by walking. There was yellow, orange or red lateritic soil in all the localities.

DISCUSSION

Neotenous aptery in Porcelloderes *gen. n.*

All described members of Physoderinae are macropterous, brachypterous specimens probably representing an undescribed species of *Physoderes* have been deposited in some collections (W.S. Hwang pers. comm.); however, no apterous specimens have been known so far. Furthermore, no species exhibiting pterygopolymorphism (i.e., the occurrence of more than one alary morph) has been reported. Although the new species is therefore an unusual member of the group, its subfamily assignment is with certainty

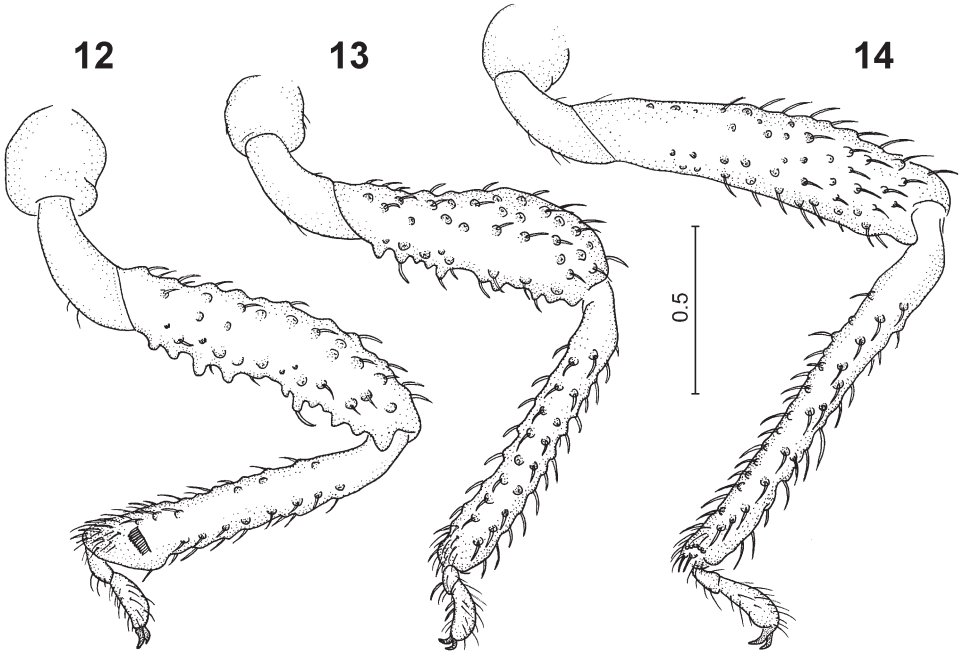
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based on the following characters: body surface with setigerous tubercles; labium straight, with apparent first and third segments short and apparent second segment longest (Fig. 7); trochanters long and proximally narrow (Figs 12–14); fossula spongiosa absent in all legs; and fore tibial comb set on a prominent spur (Figs 11, 12).

Porcelloderes impenetrabilis gen. & sp. n. is apparently a paedomorphic species: its peculiar morphology is a result of heterochronic changes in its ontogeny. Of the eight modes of heterochrony (Alberch *et al.* 1979), the new species probably exhibits neoteny, viz., paedomorphosis resulting from general slowing down of developmental rates in shape. In neotenously apterous adults, wings are completely missing, and a number of larval characters are retained in the adult stage. Such morphs occur in several groups of Heteroptera, at least in Enicocephalidae, various families of Gerromorpha, Aradidae, Termitaphididae, Blissidae, and Coreidae: Agriopocorinae. Among Reduviidae, this phenomenon is especially common, and occurs in at least the following subfamilies: Emesinae, Saicinae, Tribelocephalinae, Ectrichodiinae, Stenopodainae, Reduviinae, Salyavatinae, and Harpactorinae: Rhapidosomatini.

Diagnostic characters and relationships of Porcelloderes *gen. n.*

Many unique characters of *Porcelloderes* are consequences of neoteny, most importantly the absence of ocelli, the features connected with the strong modification of the whole thorax (posterior lobe of pronotum strongly reduced, no articulating wings present, mesoscutellum not differentiated), and the two-segmented tarsi. Since no analysis of the evolutionary relationships within Physoderinae exist, no other apterous member of the subfamily is known, and many unique characters of *P. impenetrabilis* sp. n. obviously

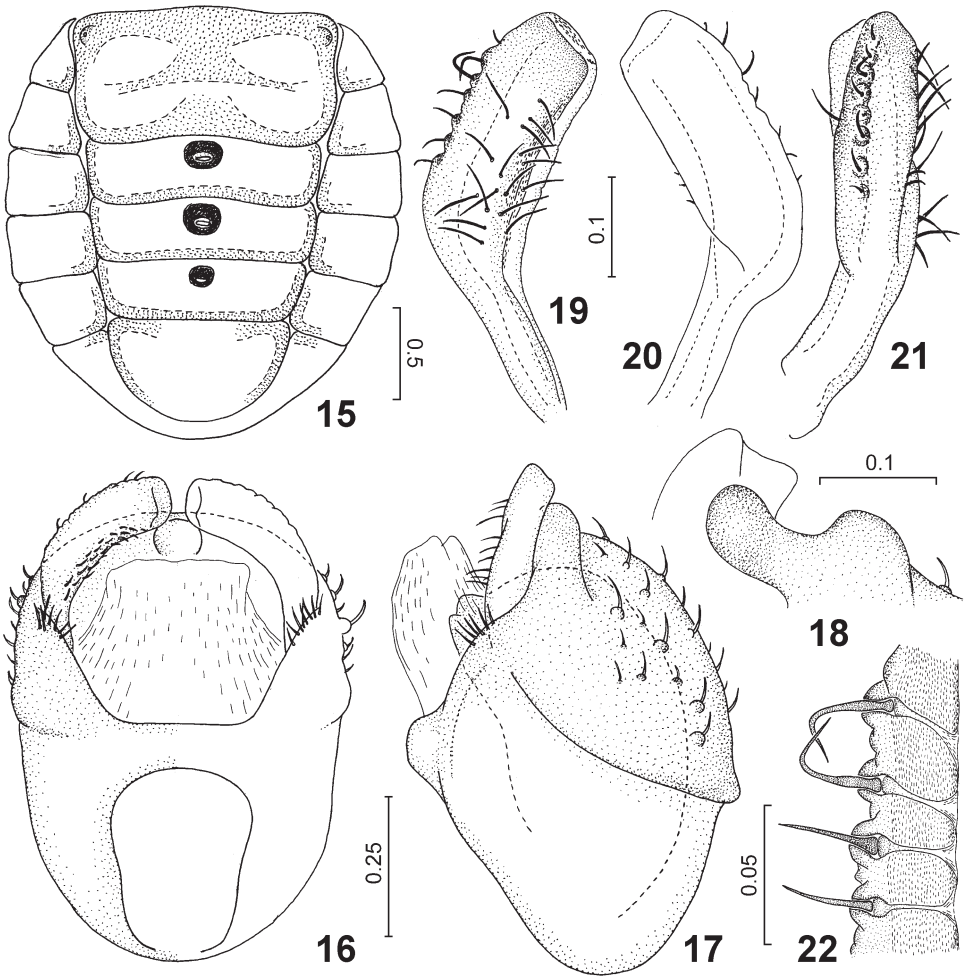


Figs 12–14. *Porcelloderes impenetrabilis* gen. & sp. n., apterous male: (12) left fore leg, anterior (inner) surface; (13) left mid leg, anterior (inner) surface; (14) left hind leg, anterior (inner) surface. Scale bar in mm.

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resulted from neoteny, it is difficult to speculate about the phylogenetic relationships of the new genus. The most important characters to consider are the following.

Two-segmented tarsi. — Within Reduviidae, as in the whole Cimicomorpha, the occurrence of three-segmented tarsi is a plesiomorphic condition. This character is shared by most genera of Physoderinae. Two-segmented tarsi, found in *Porcelloderes*, is shared only by the following physoderine genera: *Physoderoides* Miller, 1955, *Rodepirea* Villiers, 1972 (both from Madagascar), and the two New World genera, *Cryptophysoderes* and *Leptophysoderes*. The two-segmented condition probably evolved independently more than once in Physoderinae. This character is difficult to evaluate since its occurrence in *P. impenetrabilis* sp. n. is apparently a larval feature retained

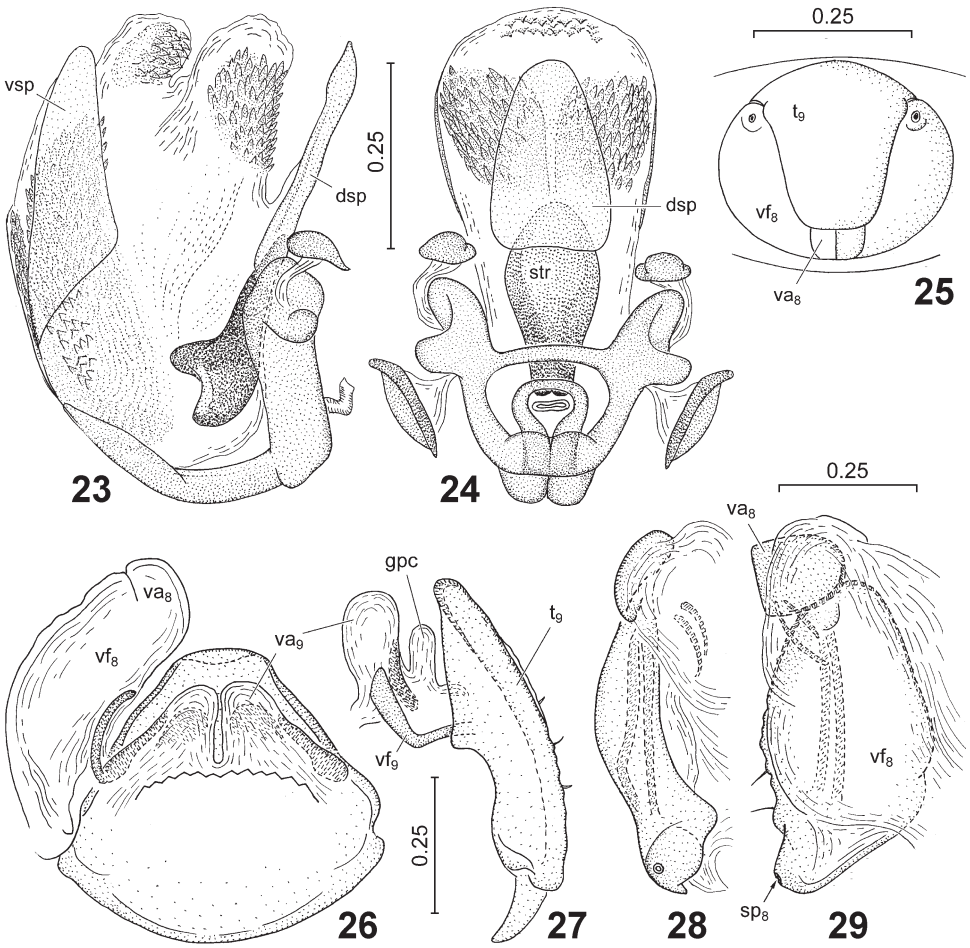


Figs 15–22. *Porcelloderes impenetrabilis* gen. & sp. n., apterous male: (15) abdomen, dorsal view; (16) genital capsule, dorsal view; (17) same, lateral view, outline of phallus shown by dotted line; (18) dorsoapical part of genital capsule with outline of apical portion of right paramere, lateral view; (19–21) right paramere, three different aspects; (22) cross-section of wall of right paramere along its external margin. In Fig. 15, dotted parts are ridge-like, thickened elevations of the sclerites. Scale bars in mm.

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in the adult stage. However, I am not aware of any genus within Heteroptera in which apterous species bearing two-segmented tarsi and macropterous species bearing three-segmented tarsi are accommodated.

Short antennal segment I. — The length of antennal segment I was considered by Villiers (1968) as being of generic importance within Physoderinae. The following genera have a short antennal segment I, not reaching the apex of the clypeus: *Paulianocoris* Villiers, 1953, *Epiroderoides* Villiers, 1962, *Befotaka* Villiers, 1962, *Henicocephaloides* Villiers, 1962, and *Maroantsetrana* Villiers, 1968 (all from Madagascar); *Physoderes* partim; and *Cryptophysoderes*. The relatively gracile *Maroantsetrana* with its weakly



Figs 23–29. *Porcelloderes impenetrabilis* gen. & sp. n., external male and female genitalia: (23) phallus, lateral view; (24) same, dorsal view; (25) female terminalia, caudal view; (26) tergite IX and ovipositor, ventral view, with valvifers and valvulae VIII removed; (27) tergite IX and ovipositor, lateral view, with ovipositor lobes of segment VIII removed; (28) right valvifer and valvula VIII, dorsal view; (29) same, median view. Abbreviations: dsp – dorsal sclerotized plate; gpc – gonoplac; sp_8 – spiracle of segment VIII; str – struts; t_9 – tergite IX; va_8, va_9 – valvulae VIII and IX; vf_8, vf_9 – valvifers VIII and IX; vsp – ventral sclerotized plate. Scale bars in mm.

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sculptured integument is clearly unrelated to *Porcelloderes*. The other genera and *Physoderes* may all have a variably close phylogenetic relationship with the new genus.

Strongly tuberculate integument. — Several of the physoderine genera have a rough, granulose or finely tuberculate integument; however, no species are known to have similar large and long tubercles that markedly affect the outlines of the head and pronotum.

In conclusion, since it is impossible to positively place the new species into any of the existing genera, and also taking into consideration that no members of the subfamily have hitherto been reported from the mainland of Africa, the establishment of a new genus to accommodate the new species is justified. The phylogenetic relationships of *Porcelloderes* gen. n. remain unknown.

Extended diagnosis of Physoderinae

Weirauch (2006*a*) critically revised the original definition of Physoderinae (Miller 1954). However, since only macropterous morphs have been known up until now, some characters in her revised diagnosis apply only to these. The diagnosis of Physoderinae is accordingly supplemented with the following:

In apterous morphs, ocelli absent; thorax strongly modified as follows: pronotum short, transverse, its main body is formed by the anterior lobe, posterior lobe is reduced to a narrow transverse rim along its posterior margin, which is without paramedian lobes; mesonotum very short, transverse, mesoscutellum not differentiated; metanotum very short; meso- and metathoracic wings entirely absent.

Camouflaging in Porcelloderes *gen. n.*

Very few field observations exist on physoderines. Most species are cryptic, and specimens have been found mainly among vegetable debris, the bases of banana and *Pandanus* leaves, in the staminate strobilus of *Cycas*, in hollow trees, and in caves (Usinger 1946; Miller 1954; Wygodzinsky & Usinger 1960; Wygodzinsky & Maldonado Capriles 1972; Schuh & Slater 1995). Specimens have sometimes been collected from plants by insecticidal fogging (Weirauch 2006*a*), from traps baited with human faeces, or while feeding on dipteran larvae (Martínez & Carcavallo 1989). The single report of the Neotropical *Cryptophysoderes fairchildi* feeding on vertebrate blood (Carvacallo & Tonn 1976) needs confirmation.

All examined adults and larvae of *P. impenetrabilis* sp. n. collected in various localities were uniformly covered by a thick and firm layer of soil. Camouflaging in Reduviidae by application of material on the body was reviewed by Cai *et al.* (2002) and Weirauch (2006*b*). Such behaviour is known for larvae of certain genera of the subfamilies Reduviinae, Cetherinae, Salyavatinae, Stenopodainae, Triatominae, and Sphaeridopinae. Although museum specimens of physoderines more or less covered by dirt are not rare (W.S. Hwang pers. comm.), no specimens with what approaches the firm mud layer on *Porcelloderes* have been reported. Camouflaging by application of material on the body has never been documented in this subfamily; the present observation on camouflaging in *P. impenetrabilis* sp. n. is the first record of such behaviour in the subfamily Physoderinae, and also in adult Reduviidae.

In the camouflaging of reduviid larvae, two different kinds of structures facilitate attachment of the camouflaging particles to the body surface: the anchor setae hold the

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material mechanically, whilst the trichomes, which are composed of glandular units and hair-like projections, fix the particles with the sticky secretion of the glands. These structures were documented in detail by Weirauch (2006*b*) in various species belonging to several subfamilies. A larva of *P. impenetrabilis* sp. n. was carefully macerated, and both surfaces of the integument of the abdomen were carefully examined under a microscope, but no glandular units could be detected. However, the fact that the soil particles on the body are firmly cemented together and difficult to remove mechanically even if the specimen is soaked in water, alcohol, moisturizers or detergents, makes it highly possible that the soil particles are glued together by a sticky secretion of unknown origin.

In adults of *P. impenetrabilis*, both the dorsal and the ventral surfaces of the abdomen are ornamented with highly elevated carinae (Figs 2, 15). The anterior, lateral and posterior margins of syntergite I–III, the fusion lines between mediotergites I–II and II–III, the posterior and lateral margins of mediotergites IV–VI, the lateral margins of mediotergite VII, the posteromedian angles of epipleurites II–VI, and the posterior margins of all visible abdominal sternites are conspicuously elevated, and ornamented with setigerous tubercles. Areas surrounded by setigerous tubercles on the head, pronotum and abdomen are smooth. The camouflaging material (soil) is certainly deposited in these deep, smooth areas surrounded by tubercles, and fixed mechanically partly by the high tubercles themselves and partly by their serrate apical setae. The abdomen of the larva is weakly sclerotized and lacks such conspicuous carinae; as a consequence, the mud layer on larvae is thinner and concentrated mainly on the head and pronotum.

In some reduviid genera, species that exhibit camouflaging behaviour possess a fan of long setae. It is situated at the apex of the apical tarsal segment of the hind leg, and is responsible for gathering and loading camouflaging material on to the body. A tarsal fan such as this is absent in other genera (Weirauch 2006*b*). No similar application structures were found on the tarsi of any of the adults and larvae of *P. impenetrabilis* sp. n. In this species, the method of application of the camouflaging material on to the body remains unclear.

ACKNOWLEDGEMENTS

I am grateful to Eric Guilbert and Dominique Pluot-Sigwalt (Muséum National d'Histoire Naturelle, Paris) for their help and hospitality during my visit to the collection under their care, and to the MNHN for financial support of my trip. Wei Song Hwang, Dimitri Forero (University of California, Riverside) and an anonymous referee are acknowledged for their constructive comments on the manuscript. My sincere thanks are due to Zsuzsanna Kolos (Institute of Chemistry, Eötvös Loránd University, Budapest) for her kind help in the ultrasonic cleaning of the examined specimens of the new species, and to Herbert Zettel (Naturhistorisches Museum, Vienna) for taking the Automontage photograph.

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