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Description of six new species of *Pantecphylus* Karsch found in Central Africa near to, and in the North of the Equator (Democratic Republic Congo and South of Sudan) (Orthopteroidea, Ensifera, Tettigonoidea, Pseudophyllidae)

Abstract - The genus *Pantecphylus* Karsch, 1891 (Orthopteroidea, Ensifera,Tettigonoidea, Pseudophyllidae) is widely distributed in Central Africa. During the last century, more than hundred specimens were collected and preserved in European museums, but not further studied. Most of them were designated as *P. cerambycinus* Karsch, 1891. Taxonomical studies of the material, stored in the collections of Bruxelles and Tervuren, discriminated six new species, found near to, and North of the Equator by comparing several characters, as shape of fastigium ertices, supra-anal plate, cerci, styli, and structure of the male subgenital plate. According to the site of collection, the species were named *P. bambesai, P. banguensis, P. banzyvillei, P. congoensis, P. aequatori,* and *P. sudanensis.* In two cases, the holotype was the only known one. Several females could not be attached to one of the species. For males, a key to the species was presented.

Zusammenfassung - *Beschreibung von sechs* Pantecphylus-A*rten (Orthopteroidea, Ensifera, Tettigonoidea, Pseudophyllidae) aus Zentralafrika, nahe und nördlich des Äquators (Demokratische Republik Congo und Süden des Sudan).*

Die Gattung *Pantecphylus* Karsch, 1891, ist in Zentralafrika weit verbreitet. Während des letzten Jahrhunderts wurden mehr als hundert Exemplare gesammelt und in den europäischen Museen verwahrt, aber nicht weiter bearbeitet. Die meisten Exemplare werden als P. *cerambycinus* Karsch geführt. Taxonomische Untersuchungen des Materials, das in den Sammlungen von Brüssel und Tervuren gefunden wurde, ergaben sechs neue Arten, die in der Nähe des Äquators und nördlich davon erbeutet worden waren. Zur Determination der Arten eignete sich die Form des Fastigium verticis, Supraanalplatte, Cerci, Styli und die Struktur der männlichen Subgenitalplatte. Die Arten wurden nach dem jeweiligen Fundort benannt, wie *P. bambesai, P. banguensis, P. banzyvillei, P. congoensis, P. aequatori,* and *P. sudanensis.* In zwei Fällen wurde nur der Holotypus benannt. Einige Weibchen konten keinem Männchen zugeordnet werden. Ein Schlüssel zur Bestimmung der Männchen wurde angefügt.

Riassunto - *Descrizione di sei nuove specie di* Pantecphylus *Karsch trovate nell'area dell'Africa centrale a nord dell'Equatore (Repubblica Democratica del Congo e Sud del Sudan (Orthopteroidea, Ensifera, Tettigonoidea, Pseudophyllidae).*

Il genere *Pantecphylus* Karsch, 1891 è largamente diffuso nell'Africa Centrale. Nel corso dell'ultimo secolo sono stati raccolti più di cento esemplari, conservati in musei europei, ma non studiati in modo approfondito; la maggior parte è stata ascritta a *P. cerambycinus* Karsch, 1891. Studi tassinomici sul materiale conservato nelle collezioni di Bruxelles e Tervuren hanno permesso di discriminare sei nuove specie, raccolte in prossimità e a nord dell'Equatore, grazie all'analisi di alcuni caratteri, quali l'aspetto del fastigium verticis, la piastra sopra-anale, i cerci, gli stili e la struttura della piastra subgenitale del maschio. In correlazione con le località di raccolta, le specie sono state determinate come *P. bambesai, P. banguensis, P. banzyvillei, P. congoensis, P. aequatori,* and *P. sudanensis.* In due casi l'olotipo è l'unico esemplare conosciuto. Alcune femmine non possono essere attribuite ad alcuna delle specie descritte. Relativamente ai maschi, è stata predisposta una chiave per la classificazione.

Key words: *Pantecphylus* Karsch 1891, *P. bambesai, P. banguensis, P. banzyvillei, P. congoensis, P. aequatori,* and *P. sudanensis.* Pseudophyllidae, Central Africa.

INTRODUCTION

The genus *Pantecphylus* is widely distributed in Central Africa. In the last century, more than hundred specimens were collected and preserved in the European museums, mainly designated *P. cerambycinus* Karsch, 1891, belonging to the genus type. No further taxonomical studies were undertaken, except Griffini (1909) selected some large females as ´major´, which were grouped as new species, later on (Beier, 1954; Otte, 1997).

When Heller (1996) reported upon two stridulation mechanisms in males of the genus, the elytro-elytral one, well known in Ensifera; and an unusual abdomino-alary song mechanism, the author started extensive taxonomical investigations to find differences in the structure of males and females, then the abdomino-alary song mechanism was present in both sexes and might be helpful to differenciate species, especially if only females are available (Schmidt & Stelzer, 2004). In males, the subgenital plate (SGP) was most suitable to separate species. Further morphological studies showed that males were more helpful to solve taxonomical problems than females. Generally, the shape of the fastigium verticis was important to separate both sexes of a given species. Using both criteria, the shape of fastigium verticis and structure of SGP, two species of the genus could be identified in Cameroon (Schmidt, 2003). In Kivu province (Dem. Rep. Congo), five species of *Pantecphylus* were established among the material collected last century (Schmidt *et al.*, 2004) and one new species was found in Bas Zaire (Schmidt, 2006).

For the present paper, mainly specimens were elaborated which had been found near the Equator and further to the North of Democratic Republic Congo and Sudan, and preserved in Belgian collections.

MATERIAL AND METHODS

Most of the *Pantecphylus* specimens collected in the Congo region were preserved in Belgian museums. From the Musée Royal de l'Afrique Centrale Tervuren (African Mus. Tervuren) 35 specimens (12♂, 23♀), numbered from 20 to 54, designated *P. cerambycinus* Karsch by various authors, were borrowed and transported to Hannover for further studies. Additionally, 14 specimens (6♂, 8♀), numbered 01 to 14, also designated *P. cerambycinus* Karsch, were loaned from the Institut royal des Sciences naturelles de Belgique, Départment d'Entomologie, Bruxelles (Coll. R. I. Sc. N. B.). Furthermore, two females kept in the Museum für Naturkunde, Institut für systematische Zoologie, Berlin (Mus. Berlin) were examinated. From the African Museum Tervuren, the locations of the collection sites were determined by co-ordination of longitude and latitude (database).

For each individual numbered, special body features, like shape of fastigium verticis, spination of thorax and legs, tip of abdomen with supra-anal plate (SAP), cerci, subgenital plate (SGP), styli, and ovipositor, as taxonomical characters, were photographically documented. Measurements were taken from length of body, tegmen, thorax, hind femur and ovipositor. For further comparison, sizes of other body parts were calculated after magnification.

Drawings were made by using a WILD-drawing apparatus and a binocular microscope. Photographs were taken by means of a Zoom-binocular ZEISS-microscope and a Minolta camera using KODAKchrome EPY 64.

RESULTS

General characteristics of both sexes of the new species

Head conical hypognath, having small and protruding compound eyes, partly withdrawn under lobe bearing pronotum, acting as cap; frons smooth and rounded, mouthparts variably coloured; antennae inserting in front of compound eyes, longer than body with tegmina and ovipositor, base of antennae touching above frons; front ocellus localized directly below their touching point; scape bearing tooth most distally, directed outwards between bases of scapes; fastigium verticis narrowed and variably prolonged.

Pronotum spiny and warty, saddle-shaped, divided into three parts by two transverse sulci; on prozona protruding elevation with two long and strong spines directed obliquely up-, a bit for-, and outwards; mesozona short and restricted, hind part of pronotum longer than pro- + mesozona, laterally keeled and vaulted upwards; meta-

zona with spiny hind margin, rounded and dilated, raising up in both sexes, hind margin normally bearing eight to ten strong spines which may be more numerous by reducing their size; whole pronotum, inclusively of paranotal part, bearing many warty elevations scattered, accumulated on prozonal protuberance; on paranotal part, one strong brown spine on hind margin directing straight outwards, on either side.

Tegmina and alae always well developed; tegmina posteriorly rounded, showing tent-like structures with strengthened and elevated ulnar vein (vena ulnaris anterior); in proximal precostal area light spot always present; elytro-elytral stridulatory structures present in male, but without speculum; hindwings of both sexes fan-shaped, rounded and infumated showing strengthened anal veins with rips or pegs for producing sounds (Heller, 1996; Schmidt & Stelzer, 2004).

Fore and mid femora square-shaped and marginated; hind femora flatted with deep longitudinal furrow outside; coxa and trochanter of fore legs bearing short spines; spination of legs variable; auditorial foramen split-forming; four tarsomers on either leg; crawled limbs bearing long and large pulvillus.

Abdomen telescopic, tergites dark brown and ridged above in distal half of both sexes (Heller, 1996; Schmidt *et al.*, 2004).

Ovipositor long, strong and slightly serrated at tip, curved up at distal part.

Supra-anal plate (SAP) of both sexes sandy to light grey-brown.

Cerci yellow to light brown, short and haired; in males, with tooth most distally incurved.

Male subgenital plate (SGP) variable and most suitable for separating species. In females, SGP divided into two parts by ovipositor, symmetrically arranged; hind margin of either half proximally rounded and distally tipped (Schmidt *et al.*, 2004).

Styli strong, like forceps, forming specific characters.

DESCRIPTION OF THE NEW SPECIES

Pantecphylus banguensis sp. n.

MATERIAL EXAMINED: 1♂, holotype, Equateur: Bangu [0°03' N, 19°12' E], XI. 1927, leg. R. Mayne (African Mus. Tervuren, n° 29); 1♂, Wenga Ifomi [1°05' N, 19°17' E], leg. E. Quineaux (Coll. R.I.Sc.N.B., n° 10).

MALE: Body length (mm) 23-24, pronotum 8.5, tegmen 15-17, hind femur 12.5.

Head: fastigium verticis conical, furrowed, not surpassing bases of antennae; broad-rounded at tip; distance between scapes, directed parallel, slightly smaller than one scape large.

Pronotum: pro- + mesozona shorter than metazona; hind margin upraised bearing 8 brown spines, outest strongest, brown paranotal spine longest, more slender; prozonal protuberance sulcated in midth, distance between tips of spines 7 mm; on disk of mesozona two warty humps, symmetrically arranged with two smaller humps behind last sulcus (Fig. 1K).

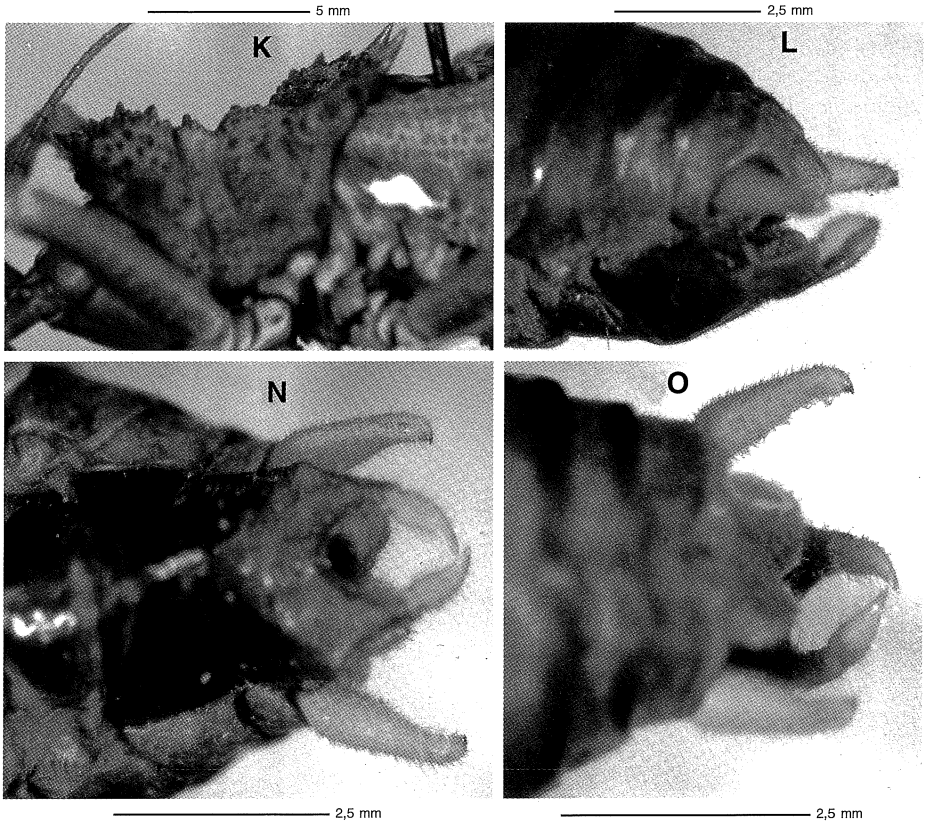

Fig. 1 - *Pantecphylus banguensis* sp. n. male, holotype (African Mus. Tervuren, n° 29); K: head and pronotum, left side view, showing white spot at base of tegmen in costal area, L: tip of abdomen showing SGP, styli, and cerci, left side view, N: SGP, styli and cerci, viewed from below, O: SAP, cerci, and styli upraised and incurved, viewed from above.

Spination of legs: fore femur with 4-5 spines, ventrally; on front margin; fore tibia with 2 dorsal minute spines interiorly, and one small spine exteriorly, short-haired; auditorial foramen split-shaped; mid femur with 3 ventro-lateral spines exteriorly; mid tibia with 3 dorsal spines, on inner and outer margin; hind femur below, 8 spines, distally accumulated, proximally some shorter spines; hind tibia above, two rows of 7-8 spines in male n° 29 [9 spines exteriorly, 10 spines interiorly, in male n° 10], short-haired; pulvilli reaching about 2/3 length of crawled limbs.

Tegmen brown, with brillant white spot proximally (Fig. 1K).

Abdomen brown, last five segments telescopic, tergites distally dark brown ringed; last tergite round-angularly excised, large yellow lobes haired (Fig. 1O).

SAP sandy, larger than long, [folded back in n° 10], hind margin rounded, hairy, in situ much shorter than cerci.

Cercus length 1.95 mm, in situ surpassing SAP and SGP, yellow, hairy, slightly conical, rounded at tip, distally dark tooth incurved.

SGP length 3.35 mm (in midth) and 3.66 mm (on side), dark brown to black sclerotized; at base concavely excised (0.31 mm deep) (Fig. 1N), proximal part keeled and rounded below, slightly shorter than lighter distal part pressed in, latter obtuse-angularly connected with proximal part, constricted to behind, flattened, almost straight, long-haired, hind margin almost circularly excised (0.78 mm deep), side lobe small and short, abruptly sloped to behind (Fig. 1L).

Styli sandy to yellow, length 1.10 mm, upraised and incurved, at base bulby, strongly constricted at distal third to acute tip, long-haired.

FEMALE: unknown.

DISTRIBUTION: Holotype near equator (Bolomba), n° 10 near Lulonga river, both about 120 km apart, East of Mbandaka region.

Pantecphylus banzyvillei sp. n.

MATERIAL EXAMINED: 2♂, syntypes (paralectotyes), 1♀ allotype, Yasanyama (=Banzyville) [4°18' N, 21°11' E], leg. Royaux before 1909 (no date); 1♂, Ubangi: Molegbwe [4°14' N, 20°33' E], XI.1951, leg. Rev. Fr. Tobel, R. Det. 6814c (African Mus. Tervuren, n° 47-50); 1♂, Kassac: Monga [4°06' N, 22°55' E], leg. V. Faryl (Coll. R. I.Sc.N.B., n° 06).

MALE: Body length (mm) 19-23, pronotum 7-8.5, tegmen 13-15, hind femur 9-11.

Head: fastigium verticis conical, furrowed, slightly surpassing base of antennae; distance between scapes, directed parallel, smaller than one scape large.

Pronotum: pro- + mesozona shorter than metazona; hind margin slightly upraised bearing 6-9 brown spines, outest as large as paranotal spine; prozona bearing low protuberance, sulcated in midth, distance between tips of spines 6-7 mm; on disk of mesozona two warty humps symmetrically arranged with two smaller ones on metazona behind sulcus (Fig. 2A).

Tegmen, left overlapping right, in n° 06, 48 and 49.

Spination of legs: fore femur with 3-4 ventro-anterior spines exteriorly, one may be small; fore tibia with 2 small spines, dorsally, on inner and outer margin, sometimes absent; auditorial foramen split-shaped; mid femur with 3-5 spines, ventro-exteriorly; mid tibia with 2-4 spines, dorsally, on inner and outer margin; hind femur below, 8-10 spines, distally arranged, proximally some smaller spines; hind tibia with two rows of 7-8 spines, dorsally, exter- and interiorly; pulvilli reaching about 2/3 of crawled limb.

Abdomen brown, last five segments telescopic, tergites dark brown ringed, distally, last tergite angularly excised (Fig. 2B-C).

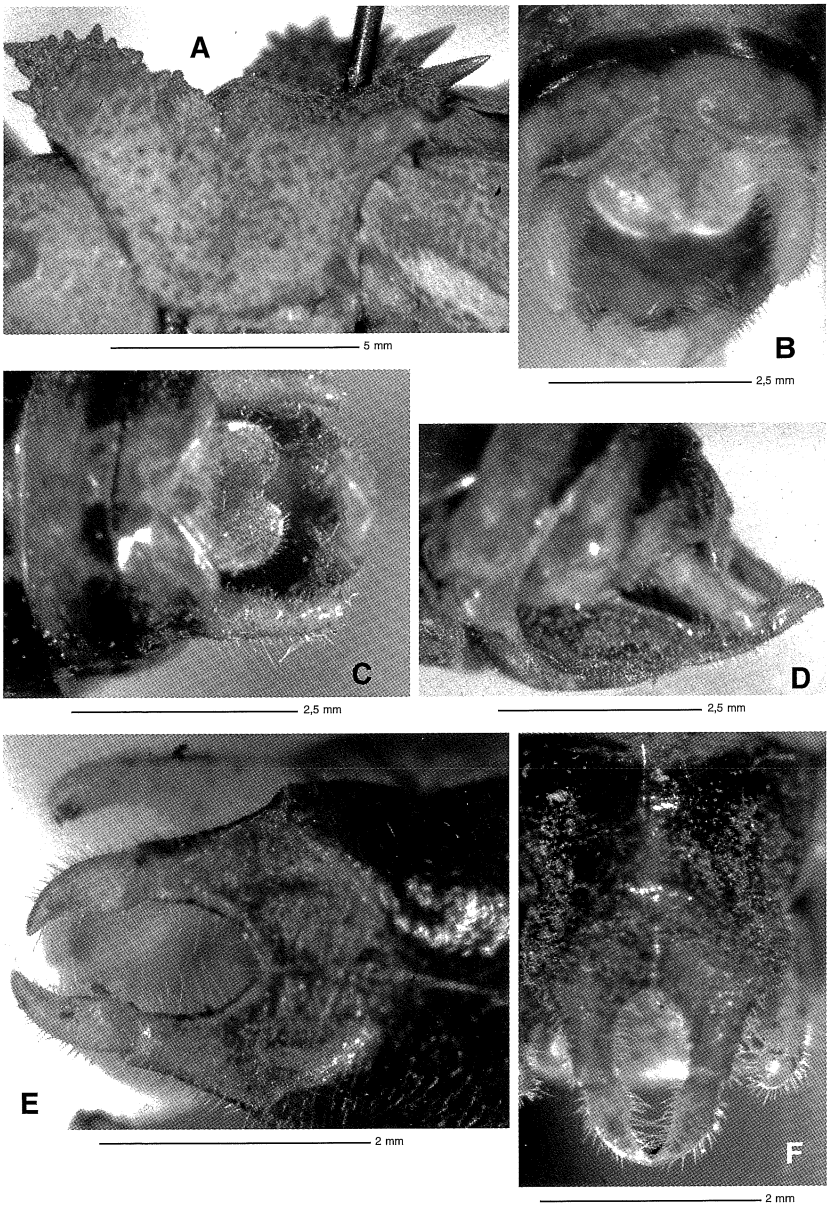

Fig. 2 - *Pantecphylus banzyvillei* sp. n., male, syntypes (African Mus. Tervuren, n° 47 and 48); A: pronotum, left side view, n° 47, B. SAP of n° 48 and C of n° 47, both viewed from above, with cerci and styli, D: tip of abdomen of n° 47, left side view, showing SGP and cerci, E: SGP of n° 48, and F SGP of n° 47, both viewed from below, showing tooth-bearing cerci.

SAP light brown to sandy, larger than long, folded back in one paralectotype, in situ 2/3 of cercus length, rounded behind, hairy.

Cercus length 1.43-1.65 mm, as long as, or in situ slightly longer than SGP, light brown to yellow, hairy, conical to cylindrical, bulbily rounded at tip, dark tooth most distally incurved.

SGP length 3.32 mm (in midth) and 3.53 mm (on side), at base broad-angularly excised (0.21 mm deep), rounded below, slightly keeled, long-haired, proximal part slightly shorter than distal one, dark brown sclerotized; distal part with styli constricted to behind and slightly upraised, flattened, round-angularly connected with proximal part, side lobe narrowed, weakly decreased to behind, hind margin angularly excised, somewhat variable (Figs. 2D,E,F).

Styli length 0.99-1.06 mm, light brown, slightly longer than SGP excision, at base rounded, constricted in distal half to acute tip incurved, long-haired.

FEMALE: Body length of allotye (mm) 25, tegmen 21, pronotum 10, hind femur 12.

Head: fastigium verticis furrowed, slightly surpassing bases of antennae, at tip rounded; distance between scapes, directed parallel, as large as one scape wide; mouth parts yellow, black-bordered.

Pronotum: prozonal protuberance sulcated in midth; distance between tips of strong spines 6 mm, additionally, two spines directed forward; metazona longer than pro-+ mesozona; on disk 4 warty humps trapezoidly arranged; on hind margin upraised 9 large brown spines, in between two smaller ones, outest largest; paranotal spine longest.

Tegmina brown-grey, alae almost as long as tegmina.

Spination of legs: fore femur below, left 4 and right 2 spines, distally arranged; fore tibia with 2-3 small spines, dorsally, on outer and inner margin, short-haired, auditorial foramen split-shaped; mid femur below, 3-(4) spines, on outer margin; mid tibia above, 2-3 spines, on inner and outer margin; hind femur below, 10 spines, on left and 7 spines on right one; hind tibia with two rows of 8 spines, dorsally, below distally, some small spines interiorly; pulvilli about 3/4 as long as crawled limb.

Abdomen: tergites dark brown ringed distally, last tergite concavely rounded.

SAP light grey to sandy, slightly larger than long (1.89/1.72 mm), rounded behind, bit haired (Fig. 3A).

Cercus length 1.55 mm, light brown to yellow, conical, straight, hairy; in situ, slightly surpassing SAP.

SGP divided in two parts by ovipositor, either part much longer than large (1.81/0.86 mm), forming acute tipped outer and rounded inner part (Fig. 3B).

Ovipositor length 14 mm (width 2.5), reddish-brown, lower valves black bordered, upcurved at distal third (Fig. 3C).

DISTRIBUTION: The specimens of this species were collected along the Ubangi river within a distance of about 500 km in the North of the Collines de Banzyville.

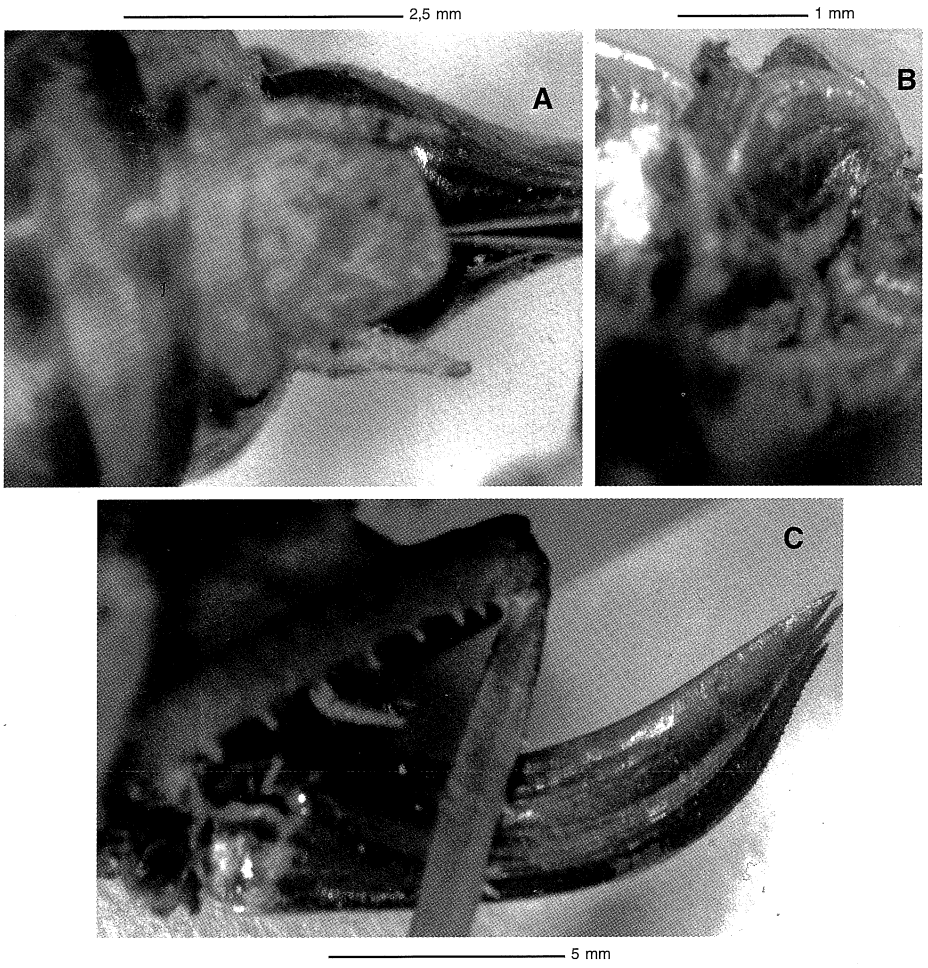

Fig. 3 - *Pantecphylus banzyvillei* sp. n., female, allotype (African Mus. Tervuren, n° 50); A: SAP and cerci, viewed from above, B: SGP, right half viewed from below, C: ovipositor, left side view.

Pantecphylus bambesai sp. n.

MATERIAL EXAMINED: 1♂, holotype, Bambesa [3°28' N, 25°43' E], IV.1937, leg. J. Vrydagh, (African Mus. Tervuren, n° 46); 1♀, allotye, Botongue (Uele-Nyroko), 18.X.1931, leg. J. Vrydagh (African Mus. Tervuren, n° 27).

MALE: Length of body (mm) 18, pronotum 7.5, tegmen 13, hind femur 9.

Head: fastigium verticis surpassing bases of antennae; furrowed; distance between scapes as wide as one scape large.

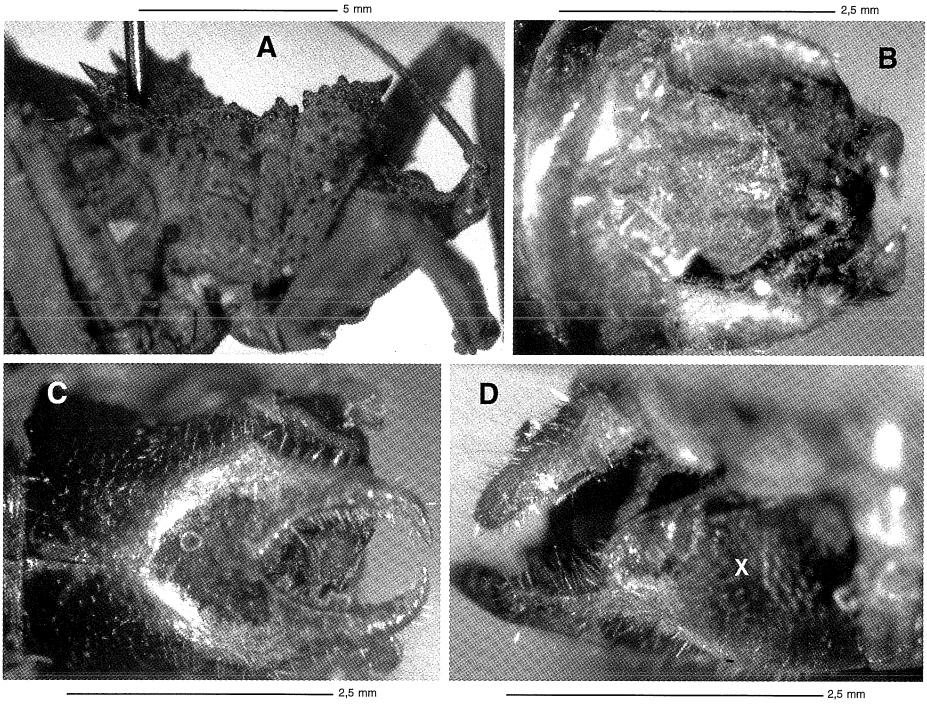

Fig. 4 - *Pantecphylus bambesai* sp. n., male, holotype (African Mus. Tervuren, n° 46); A: head and pronotum, right side view, showing low protuberance on prozona, B: SAP and cerci, viewed from above, and styli like forceps, C:SGP with styli, viewed from below, D: SGP and cercus, right side view, showing brown side lobe enlarged (x).

Pronotum: metazona longer than pro- + mesozona, prozonal elevation low (Fig. 4A), distance between tips of strong spines 6.5 mm, hind margin bearing 8 grey-brown spines, outest largest, similar to dark brown paranotal spine.

Tegmina grey-brown, right overlapping left; alae about as long as tegmina.

Spination of legs: fore femur with 2-(3) small ventro-anterior spines; fore tibia above, two minute spines, short-haired; auditorial foramen forming small split, almost closed; mid femur with 3 ventro-lateral spines; mid tibia above, 3 small spines interiorly, short-haired; hind femur below, 6 spines, distally acumulated; hind tibia above, two rows of 5 small spines.

Abdomen: tergites brown ringed distally, last 5 segments telescopic, last tergite obtuse-angularly excised, showing large light brown to sandy lobes, haired.

SAP larger than long, 2/3 as long as cercus, rounded behind, sidely excised, sandy to yellow, hairy (Fig. 4B).

Cercus length 1.53 mm, light brown to yellow, conical, slightly incurved at distal half, brown tooth at tip, hairy, in situ longer than SAP, and shorter than SGP.

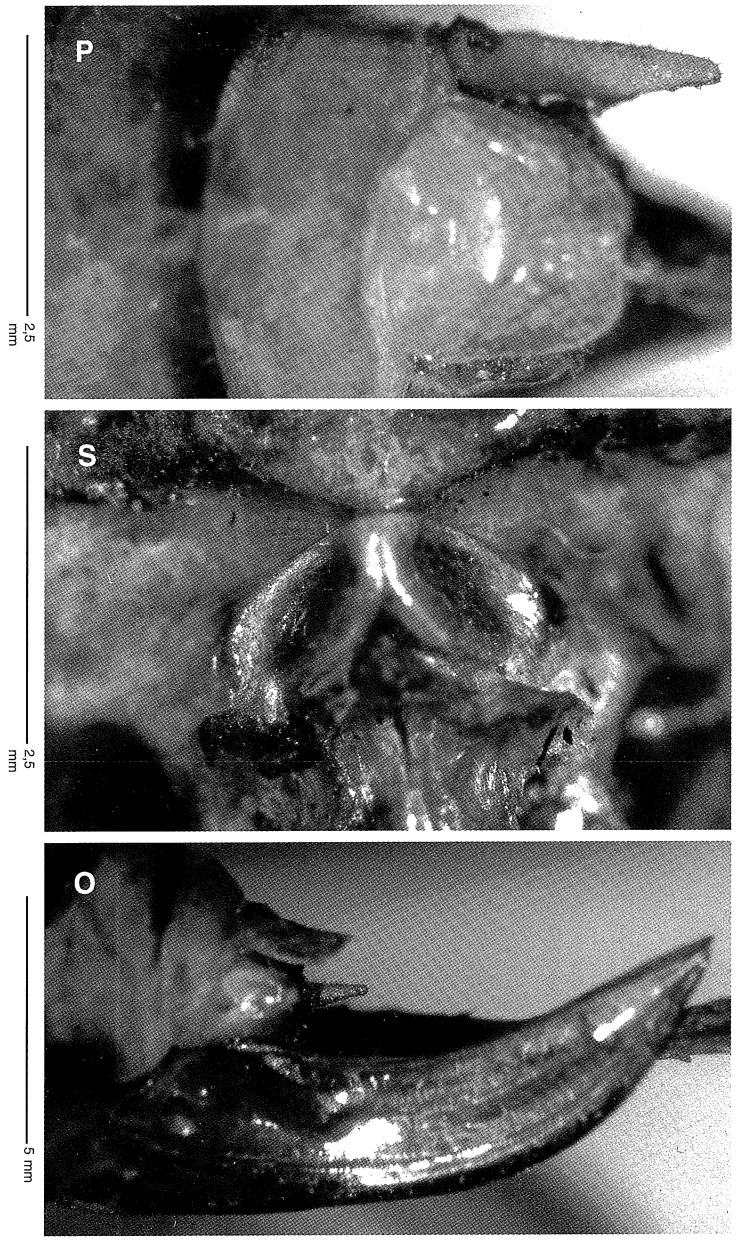

Fig. 5 - *Pantecphylus bambesai* sp. n., female, allotype (African Mus. Tervuren, n° 27); P: SAP and right cercus, viewed from above, next to the last tergite distally brown bordered, S: SGP from below, divided in two parts by ovipositor, O: ovipositor, left side view.

SGP length 2.92 mm, basically almost straight, distal part as long as proximal one, latter dark brown sclerotized, keeled in midth and rounded below, angularly connected with distal part pressed in, enlarged in midth, bearing large brown lobe on either side, deeply sloped to behind, below upraised and constricted, hind margin of distal part deep-angularly excised (Fig. 4C,D).

Stylus length 0.89 mm, almost as long as SGP excision, brown, up- and incurved, rounded and equally constricted to acute tip, long-haired.

FEMALE: Length of body (mm) 30, pronotum 9, tegmen 20, hind femur 13.

Head: fastigium vertivis surpassing bases of antennae, furrowed; distance between scapes, directed parallel, slightly wider than one scape large.

Pronotum: pro- + mesozona shorter than metazona, hind margin upraised bearing 8 brown spines, in between three smaller ones, distance between tips of long spines on prozonal lobe 8 mm, sulcated in midth, two warty humps on mesozonal disk, symmetritally arranged with two smaller ones on metazona near sulcus; paranotal spine brown, slightly longer than outest spine on hind margin.

Tegmina grey-brown; alae about as long as tegmina.

Spination of legs: fore femur with 4-5 ventro-anterior spines: fore tibia above, 2-3 spines, on inner and outer margin, short-haired; auditorial foramen small, split-shaped; mid femur with 4 ventro-lateral spines; mid tibia above, 2-3 spines on outer margin, short-haired; hind femur below, 9-11 spines; hind tibia above, 5 spines exteriorly, and 6 spines interiorly, short-haired.

Abdomen brown, tergites dark ringed distally, last tergite concavely rounded and narrowed.

SAP sandy, slightly larger than long (2.25/2.15 mm), hairy, hind margin rounded (Fig. 5P).

Cercus length 1.9 mm, straight conical, in situ surpassing SAP of 1/3, rounded at tip, sandy-yellow, hairy.

SGP divided into two parts by ovipositor (Fig. 5S), symmetrically arranged, either part longer than large (2.02/0.96 mm), distally tipped, proximally rounded.

Ovipositor 14 mm (width 2.5 mm), upcurved at distal half, lower valves black, upper valves reddish-brown (Fig. 5O).

DISTRIBUTION: Uele river (NE of Congo Republic, Haut Zaire).

Pantecphylus sudanensis sp. n.

MATERIAL EXAMINED: 1♂, holotype, Sudan, Iado, equiment [5° 10' N, 31° 32' E], no date and collector (Coll. R.I.Sc.N.B., n° 13)

MALE: Body length (mm) 19, pronotum 8, tegmen 14, hind femur 9.

Head: fastigium verticis short and wide, conical, furrowed, broadly rounded at tip, surpassing bases of antennae (Fig. 6A), latter broken; distance between scapes, directed parallel, as large as one scape wide; mouthparts light green.

Pronotum: strongly saddle-shaped, pro- + mesozona shorter than metazona, distance between tips of strong prozonal spines 5.5 mm, elevation depressed in midth,

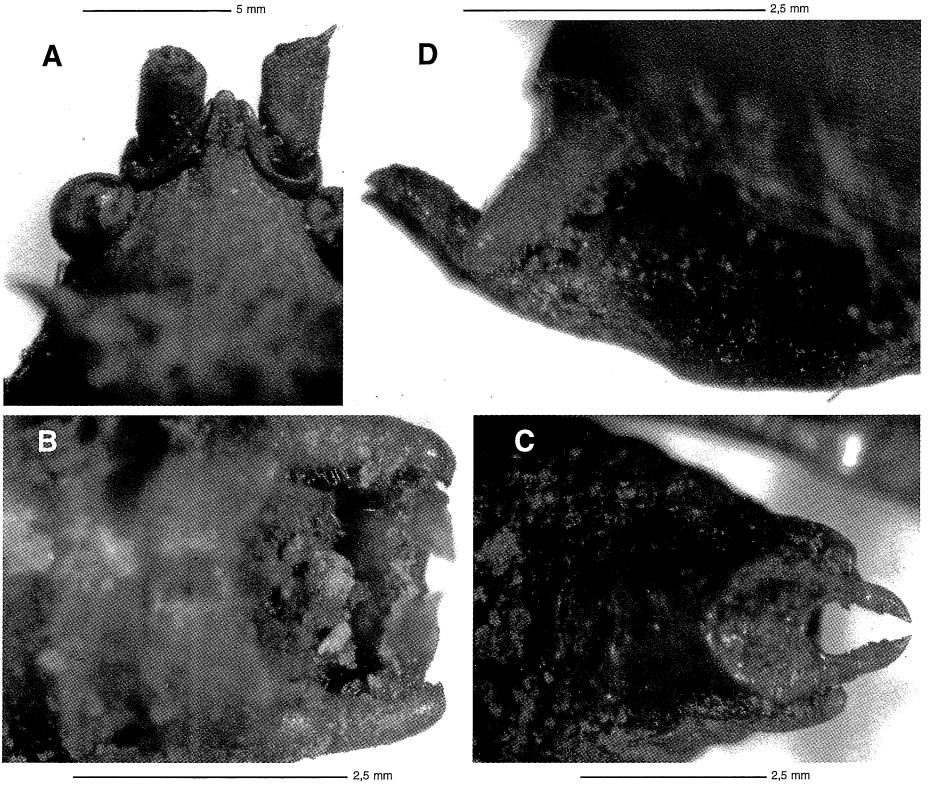

Fig. 6 - *Pantecphylus sudanensis* sp. n., male, holotype (Coll. R.I.Sc.N.B., n° 13); A: head, viewed from above, showing fastigium verticis bordered by bases of antennae, and scapes with tooth most distally located, B: tip of abdomen viewed from above, showing SAP folded back and cerci, C: SGP and styli, viewed from below, showing constriction of distal half of the part pressed in, and styli with tooth-like projections on inner side, irregularly arranged, D: tip of abdomen, right side view, showing upraised SGP and cercus.

mesozona bearing two warty humps on disk, symmetrically and trapezoidly arranged with two warty elevations on metazona near hind sulcus; hind margin upraised, bearing 8 spines, outest largest; paranotal spine brown (absent on left side); 2nd sternite reddish.

Tegmina brown, showing five large radial cells; alae not reaching tip of tegmina.

Spination of legs: fore femur with 4-5 spines, below on outer margin; fore tibia dilated with oval-shaped auditorial foramen, and with 4 small spines dorsally, beiow still 3 smaller spines, on distal half, short-haired; mid legs absent, except left femur bearing 3(4) spines ventrally; hind femur below, 8 spines distally accumulated; hind tibia above, 7-9 spines, on inner and outer margin, below 3 small spines distally, short-haired; pulvilli 3/4 as long as crawled limb.

Abdomen light brown, telescopic, last tergite round-angularly excised.

SAP sandy, folded back, hairy, hind margin rounded, larger than long.

Cercus length 1.69 mm, longer than SAP, yellow, truncated, distally dark tooth incurved, hairy (Fig. 6B).

SGP length 3.50 mm, dark brown sclerotized, proximal part on base almost straight, keeled and rounded below, slightly shorter than distal part pressed in, and raised up, hind margin weak-circularly excised, both parts round-angularly connected, side lobe black, and steeply sloped to behind (Fig. 6C,D).

Styli light brown, length 0.83 mm, longer than depth of SGP exision, forming strong and broad forceps, tooth-like projections on inner margin, distal third strongly constricted to acute tip, basically haired.

FEMALE: unknown.

LOCAL DISTRIBUTION: South of Sudan.

Pantecphylus aequatori sp. n.

MATERIAL EXAMINED: 1♂, holotype, Equateur: Flandria [0° 20' S, 19° 06' E], 1929, leg. R.P. Hulstaert (African Mus. Tervuren, n° 28).

MALE: Body length (mm) 22, pronotum 8, tegmen 15, hind femur 11.

Head: fastigium verticis short, not surpassing bases of antennae (Fig. 7A), not furrowed; distance between scapes, directed parallel, slightly larger than width of scape; antennae partly broken; mouthparts black-brown.

Pronotum: metazona longer than pro- + mesozona; on disk 4 warty humps, trapezoidly arranged; hind margin upraised, bearing 8 grey spines, as long as brown paranotal spine more slender (Fig. 7A).

Tegmen left overlapping right; alae almost as long as brown tegmina.

Spination of legs: fore femur with 3-4 ventro-anterior spines, and small spines on posterior margin; fore tibia above, 3 spines interiorly and minute ones exteriorly, short-haired; auditorial foramen split-shaped; mid femur with 3-5 ventro-lateral spines, and some smaller ones interiorly; mid tibia two rows of 3 small spines dorsally, hind femur below, 10 spines accumulated on distal half; hind tibia above, 7 spines on inner and outer margin, and below, 4 small spines, on distal half exteriorly, and one spine interiorly in midth; pulvilli 2/3 as long as crawled limb.

Abdomen grey, dark ringed, hind margin of last tergite obtuse-angularly excised, two last tergites much smaller, telescopic.

SAP sandy, larger than long, rounded behind, feltlike hairy (Fig. 7D).

Cercus length 1.42 mm, light brown, in situ as long as SGP, and longer than SAP, cylindrical, hairy, at tip brown tooth, sligthly incurved, surpassing base of SGP excision for more than half of its depth (Fig. 7B).

SGP on base convexly (0.26 mm) rounded, length 3.4 mm (in midth) and 3.66 mm (on side), dark brown to black, proximal part rounded below and keeled, longer than lighter distal part pressed in, constricted behind; hind margin almost circularly

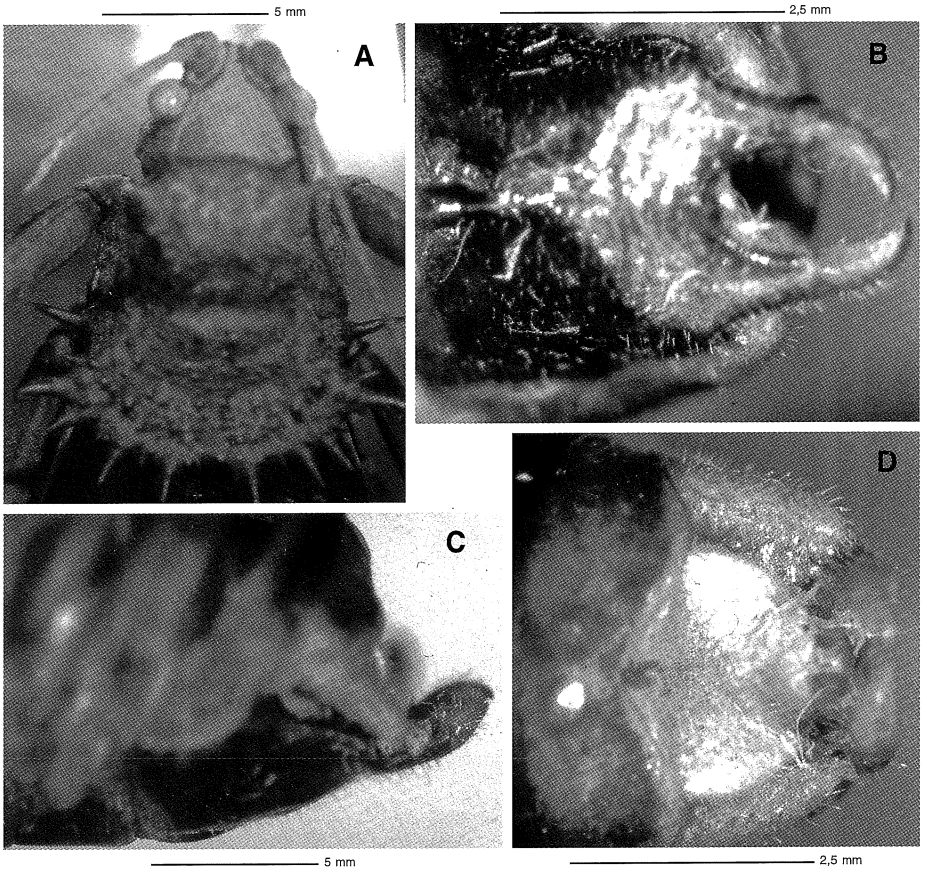

Fig. 7 - *Pantecphylus aequatori* sp. n., male, holotype (African Mus. Tervuren, n° 28); A: head and pronotum, showing fastigium verticis not surpassing bases of antennae; B: SGP, viewed from below, and styli short-haired; C: tip of abdomen, left side view, showing short haired SGP and cercus, D: feltlike SAP, cerci slightly incurved at tip, and last tergite obtuse-angularly excised, viewed from above.

excised to half of length, both parts round-angularly connected, side lobe slightly narrowed behind (Fig. 7B,C), hairy.

Styli light brown, at base rounded, constricted to acute tip incurved, hairy, slightly shorter than SGP excision, length of stylus 0.90 mm.

FEMALE: unkown.

LOCAL DISTRIBUTION: Momboyo river near the Equator.

Pantecphylus congoensis sp. n.

MATERIAL EXAMINED: 1♂,Yangambi [0°47' N, 24°28' E], 1955, leg. C. Doms, 3♀, syntypes, Yangambi (Stan.), 13.X.1959, XI.1959, leg. J. Decelle (African Mus. Tervuren, n° 21 (paratype), 23 (paratype), 37 (holotype) 38 (allotype), 2♂, Stanleyville [0°30' N, 25°12' E}, Congo, 1930, Coll. E. Müller, R.M.H.N.B.,16 364, 1♀, Stanley Falls [0°30' N, 25°12' E], leg. Malfeyt (Coll. R.I.Sc.N.B, n° 05, 11, 12); 1♀, Bunsandi (forest village), Comm. Isangi (=Issanga) [0°46' N, 24°15' E], 27.12.1891, leg. Armin Auscha (Mus. Berlin). The latter was misidentified by Rehn J., 1914.-. Wiss. Ergebn. Dtsch. Zentr. - Afr. Exped. 5, Zool. 3/1, p. 187, *as P. major* Griffini, 1909.

MALE: Body length (mm) 22-24, pronotum 7-8, tegmen 14-17, hind femur 11-14.

Head: fastigium verticis furrowed, slightly surpassing bases of antennae; distance between scapes, directed forwards, about one and a half of width of scape.

Pronotum strongly saddle-shaped; pronotal protuberance sulcated in midth; pro- + mesozona little shorter than metazona, on hind margin 8 grey spines, outest largest, brown paranotal spine of similar length.

Tegmen left overlapping right in holotype; reverse in n° 11 and 12; alae almost as long as brown tegmina.

Spination of legs: fore femur with 2-3 ventro-anterior spines, more distally arranged; fore tibia with 1-3 small spines exteriorly and 2 spines interiorly, short-haired; auditorial foramen split-forming; mid femur with 3-4 ventro-lateral spines outside [and one spine inside distally in n° 12]; mid tibia above, 1-3-4 small spines, interiorly and exteriorly; hind femur below, 5-12 spines, more distally arranged, proximally often some small or absent; hind tibia above, 6-7 on inner and 3-5 on outer margin.

Abdomen brown, last five tergites telescopic and constricted, last tergite concavely excised, short-haired, light brown lobes slightly enlarged (Fig. 8A,B).

SAP sandy to grey, little larger than long, about half-circled, hairy.

Cerci length 1.65-1.70 mm, yellow-brown, conical, hairy, in situ reaching hind border of SGP, surpassing base of SGP excision and reaching half of length of styli (Fig. 8A,B,F).

SGP length 2.99 mm (in midth) to 3.49 mm (on side), at base broad-concavely rounded (0.50 mm deep), below almost straight, dark brown sclerotized, proximal part rounded below, slightly keeled, longer than distal part pressed in and round-angularly connected with former, slightly incurved and constricted to behind, hairy, hind margin a bit angularly to almost half circularly excised, as deep as length of stylus (0.97 mm) (Fig. 8C,D,E).

Styli yellow and long-haired, sickle-shaped, with broad base, incurved to acute tip [broken in n° 12].

FEMALE: Body length (mm) 24-29, tegmen 22-24, pronotum 8-10, hind femur 13-17, ovipositor 12-17 (width 2.5-3).

Head: fastigium verticis narrowed, slightly surpassing bases of antennae (Fig. 9B);

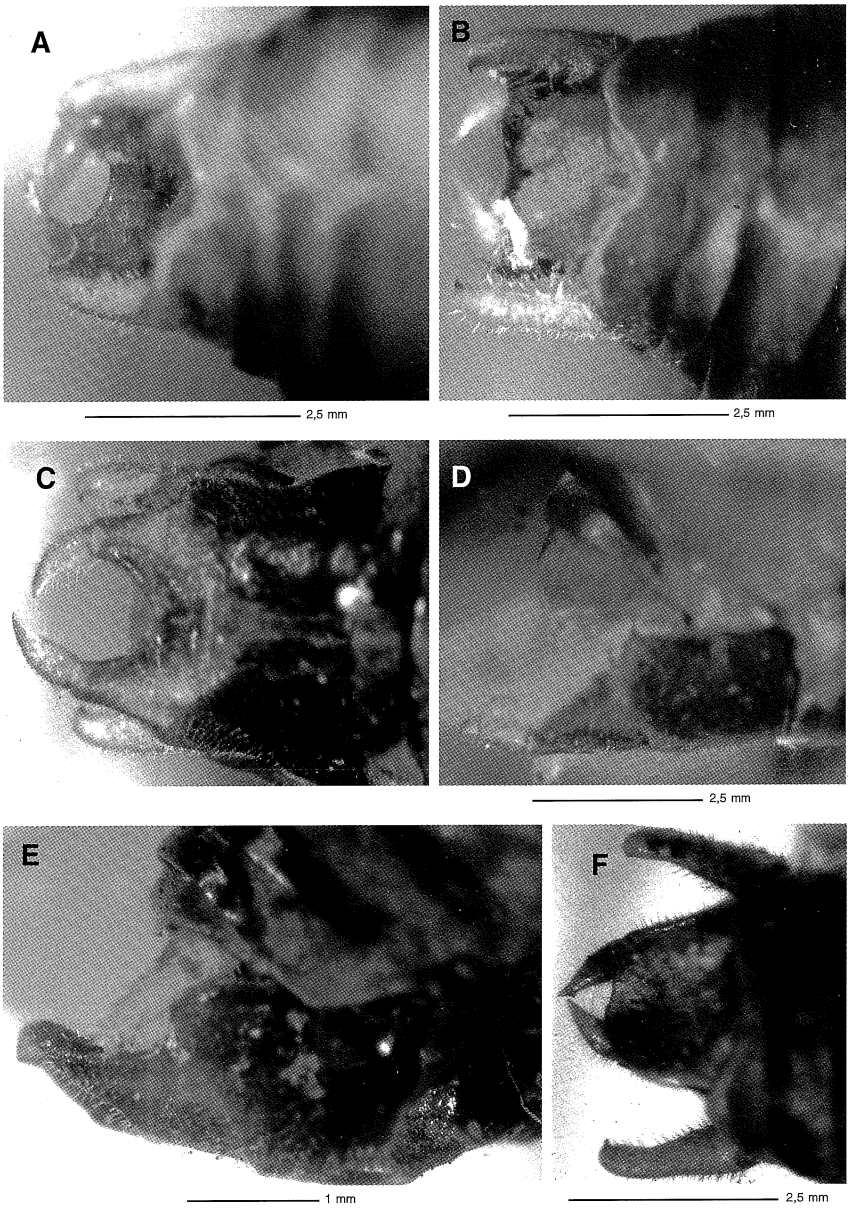

Fig. 8 - *Pantecphylus congoensis* sp. n., male, hind part of abdomen; A: from above, n° 11, SAP folded back, B: n° 37, holotype, SAP folded, F: n° 06, SAP normally rounded between cerci, C: n° 37, SGP from underside with styli and cerci, D: n° 37, from right side and cercus, E: n° 11, lateral side view, and cercus.

distance between scapes directed parallel, little wider than one scape large; scape almost twice as long as pear-shaped pedicle; mouthparts yellow, black-bordered to grey-sandy and blue-ultramarine.

Pronotum saddle-shaped (Fig. 10A), prozonal protuberance sulcated in midth, with two strong spines, distance between tips of spines 6-7 mm, on disk 4 humps; hind margin of upraised metazona bearing 8 grey spines, outest little larger, equal to brown paranotal spine, between large hind metazonal spines some smaller ones.

Tegmina brown-grey; alae almost as long as tegmina, sounds were produced by touching (indicated by the collector).

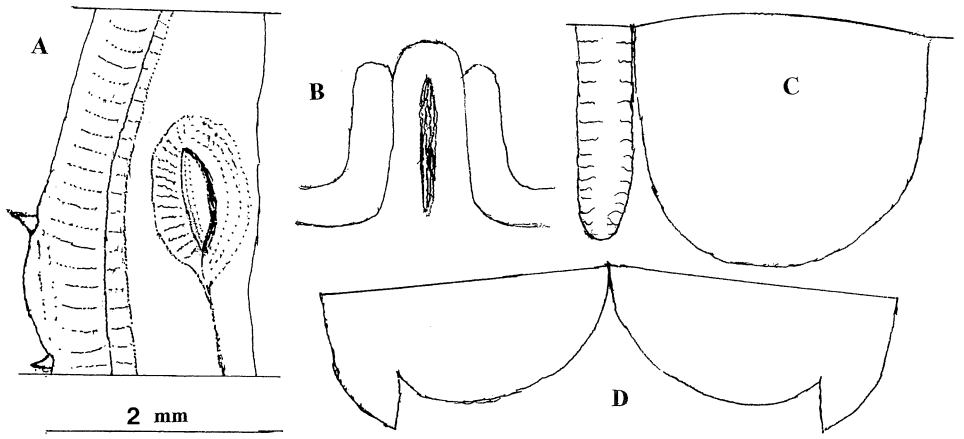

Fig. 9 - *Pantecphylus congoensis* sp. n., female collected at Isangi/Republic of Congo, preserved in Mus. Berlin; A: splitted auditorial foramen of right fore leg, front side view, B: narrowed fastigium furrowed, between bases of antennae, C: SAP and right cercus, from above, D: SGP, divided into two parts, symmetrically arranged, either part interiorly rounded and exteriorly tipped to behind.

Spination of legs: fore femur with 3-4 ventro-anterior spines, accumulated in distal half; fore tibia above, 2-4 small spines interiorly, and with 4-5 ventral spines, 2-3 small spines on inner margin, short-haired; auditorial foramen split-shaped (Fig. 9A); mid femur with 3-5 ventro-lateral spines; mid tibia with 3-4 dorsal spines on inner and outer margin; hind femur below, 9-12 spines; hind tibia above, 5/6-7/5-6/8 spines exteriorly and 7/9/7-8/8 spines interiorly, below distally, 3 small spines interiorly.

Tarsomers alive almost yellow to light brown (reported by a collector); pulvilli about 3/4 as long as crawled limb.

Abdomen brown, tergites often dark-brown ringed, distally, last tergite concavely rounded (Fig. 10B).

SAP length 2.68 mm, light grey to sandy, as large as long (n° 05), or slightly larger than long, rounded behind, hairy (Figs. 9C, 10B).

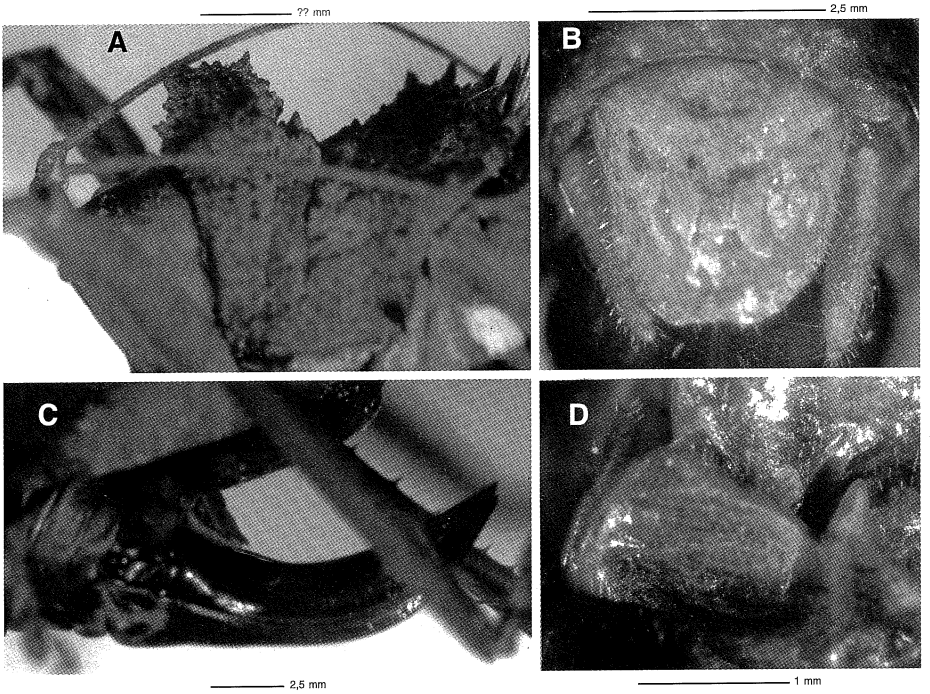

Fig. 10 - *Pantecphylus congoensis* sp. n., female, allotype (African Mus. Tervuren, n° 38); A: spiny pronotum, saddle-shaped, left side view, B: SAP and cerci, viewed from above. C: ovipositor, left side view, D: right half of SGP, viewed from below, separated by ovipositor.

Cercus length 2.36 mm, conical, rounded at tip, straight, hairy, in situ a bit shorter than SAP, or as long as SAP, movable under latter.

SGP divided in two equal parts, symmetrically arranged (Fig. 9D), either part much longer than large (2.03/0.75 mm), hind margin acute tipped distally and rounded proximally (Fig. 10D).

Ovipositor upcurved at distal half, brown-black to reddish-black coloured, except lighter base, length (allotype)14 mm (Fig. 10C).

DISTRIBUTION: Surroundings of Kisangani (= Stanleyville), about 300 km in diameter (Yangambi, Isangi, Stanley Falls).

FEMALES NOT SPECIFICALLY IDENTIFIED

Several females, found in the region studied, could not be attached to a male and were, therefore, not specifically identified. For that, a male has to be collected at the same site and during the same time.

Ibembo [2°38' N, 23°37' E[, leg. De Smet (Coll. R.I.Sc.N.B., n° 07);

Mongbwalu [1°57' N, 30°02' E] (Kilo), 1937, leg. Mme. Scheitz (African Mus.Tervuren, n° 34);

Tshuapa: Bosekele-Lukolenge [1°10' N, 22°32' E], XII.l952, leg. J. van Vynckt (African Mus. Tervuren, n° 41);

Ituri, Epulu [1°23' N; 28°30' E]; 600 a.s.l. 28.II.-03.III.1957, leg. R. N. Heidrich, ex coll. Dr. H. Knipper (Coll. Mus. Karlsruhe);

Ituri: Nduye - Makara [1°50' N, 29°01' E], X-XI.1921, leg. A. Pilette (African Mus Tervuren, n° 35);

Bumba [2°11' N. 22°32' E], 1931, leg. Mme Babilon (African Mus. Tervuren, n° 24);

Boende [0°13' S, 20° 32' E], I.l952, leg. R.P.Lotens (African Mus. Tervuren, n° 42).

KEY TO THE NEW SPECIES (MALES)

For a clear identification of the species, males were needed. The main differences of the species were found in the arrangment of fastigium verticis, in combination with length of cerci, SAP and the male SGP structure. The SGP of the females is divided in two parts and almost similar in the species.

1. Fastigium verticis prolonged, surpassing bases of antennae 2
– Fastigium verticis not surpassing bases of antennae 5
2. Male SGP basically roundly excised 3
– Male SGP at base straight 4
3. Length of male cercus 1.43-1.65 mm, bulby at tip; proximal part of SGP shorter than distal part, at base slightly excised (about 0,2 mm), side lobe weakly decreased to behind [female: SAP slightly larger than long (1.89/1.72 mm), cercus: about 1,55 mm] ..... ***banzyvillei*** n. sp.
– Male cercus length 1.65-1.70 mm, SGP at base broad-largely excised, about 0.45-0.50 mm deep [female: SAP as long (2.68 mm); cercus: about 2.3-2.4 mm long] ..... ***congoensis*** n. sp.
4. SGP hind margin deep-angularly excised, deeper than length of sickle-shaped stylus with tooth-like elevations, cerci truncated ..... ***sudanensis*** n. sp.
– SGP proximal part shorter than distal part, styli rounded and equally constricted to acute tip, brown side lobe steeply sloped to behind ..... ***bambesai*** n. sp.
5. SAP shorter than cerci, strong hairy, feltlike; SGP at base convexly shaped, hind excision rounded, half as long as part pressed in ..... ***aequatori*** n. sp.
– SAP less hairy, larger than long, reaching slightly more than half of cercus length, SGP base weakly excised (between 0.2-0.3 mm) ..... ***banguensis*** n. sp.

In Fig. 11, the structural differences of the male subgenital plate of the various species were presented for an easier comparison, and in Table 1 the most important specific features of the males were summarized.

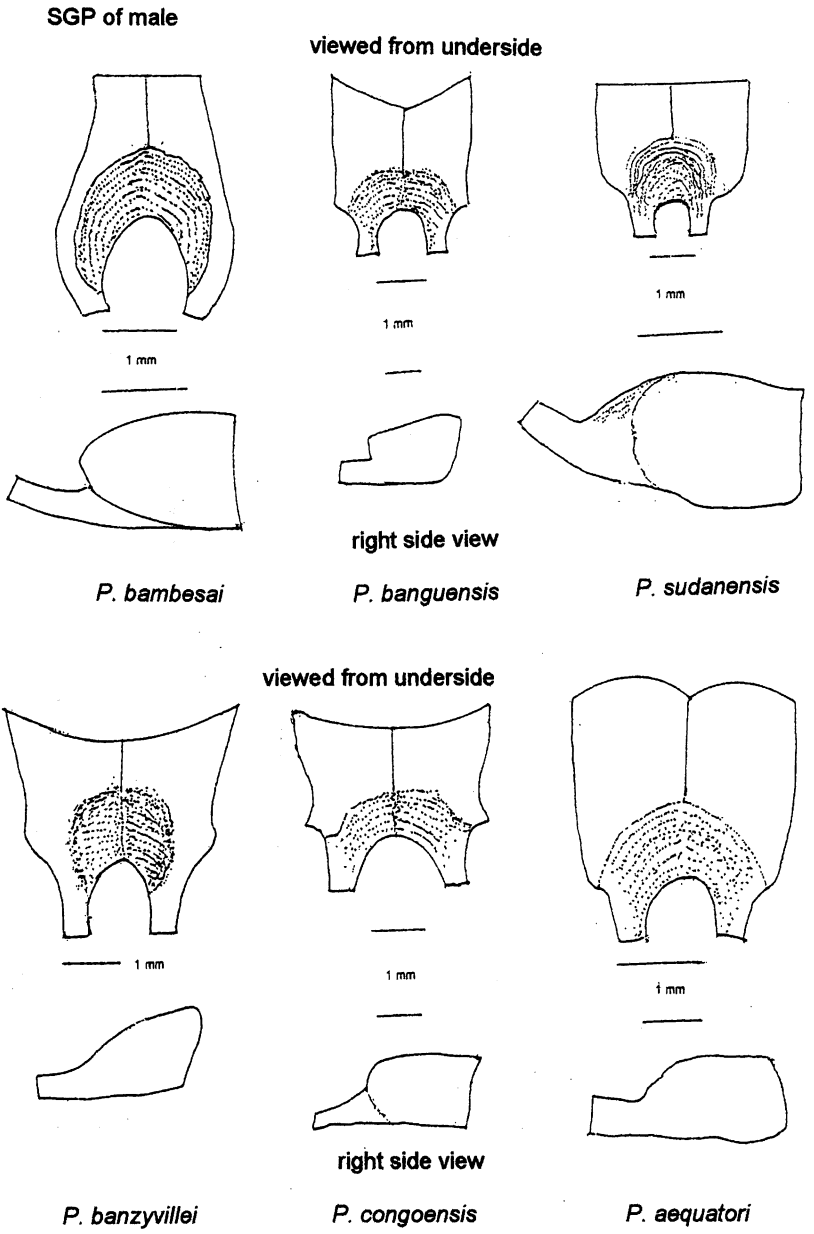

Fig. 11 - Structural differences of the male subgenital plate (SGP) of the six new *Pantecphylus* species, compare also the descriptions of the species.

Table 1 - Comparison of the male characteristics of the new species; fastigium verticis: ∩ prolonged, ∧ slightly longer than bases of antennae, □ short, not surpassing bases of antennae; quotient ant / scape: distance between antennae to width of scape; SGP base: ∪ broad-concavely excised, ~ slightly excised, — straight SGP base: — straight, ∪ broadly excised, ∨ deeply excised.

Species	***banguensis***	**banzyville**	**bambesa**	**sudanensis**	**aequator**	**congoensis**
Holotype no	2 Ter 29	3 Ter 47, 48	4 Ter 46	5 Brux 13	6 Ter 28	7 Ter 37
Body length	23	19-20	18	19	22	22-24
Tegmen	15	13-15	13	14	15	14-17
Fastigium	□	∧	∩	∧	□	∧
Quotient a/s	<	<	=	<	>	>>
Pleural spine	br	br	br	br	br	br
SGP-base	∪	∪	—	—	∪	∨
excision (mm)	0.31	0.21	-	-	0.26	0.50
length (mm) midth-side	3.35-3.66	3.32-3.53	2.92	3.50	3.40-3.66	2.99-3.49
proximal / distal part	⟨	⟨	⟨	⟨	⟨	⟩
excision hind margin	0.78 mm, circular	angular	triangular	circular	deep circular	deep as stylus
Styli-length	1.10	0.99-1.03	0.89	0.83	0.90	0.97
shape	bulby	rounded	rounded	sickle-elev	rounded	rounded
SAP-haired	poorly	poorly	poorly	poorly	feltlike	poorly
Cerci-length	1.95	1.43-1.65	1.53	1.69	1.48	1.65-1.70
shape	conical	cylindrical	conical	truncated	cylindrical	conical

DISCUSSION

In the genus *Pantecphylus*, morphological structures showed that the individuals of the species studied may not rapidly spread over long distances by flying. Due to the tent-forming tegmina and fan-shaped alae bearing strengthened anal veins with rows of stridulatory pegs, found in all individuals examined, a long active transfer by air will not be possible. Basing on low mobility, inbreeding became dominant and cross-breeding was hindered by the low capacity to disperse. The populations were isolated and geographical races and new species could evolve during the long geological period in which the genus surely existed in Africa. The species developed combinations of different morphological features justifying the designation of new species.

The relatively few specimens collected in the large area of Central Africa studied, did not allow much suggestion upon the evolution of the species. Mostly males developed features useful for specific taxonomical studies. The evolution of the genitalia led to specific structures. The subgenital plate (SGP) became most differently evolved. In females, the genitalia showed less specific characters. The shape of ovipositor varied little (Schmidt *et al.*, 2004). The spination of legs was variable, small species-specific structures were found in the enlarged and spiny thorax. In connection with the site of collection (Fig. 12), some combined features may be helpful for identification, if their variability is known.

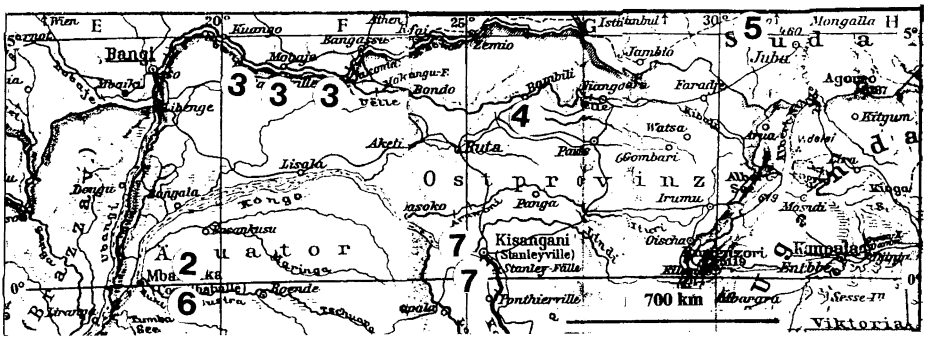

Fig. 12 - Map of northern Central Africa showing the distribution of the newly described *Pantecphylus* species, 2: *banguensis,* 3: *banzyvillei*, 4: *bambesa*i, 5: *sudanensis*, 6: *aequatori*, 7: *congoensis.*

In four of the species regarded here, the tip of the conical fastigium verticis was prolonged and rounded at tip, surpassing the bases of antennae. In two cases, *P. banguensis* and P. *aequatori*, the fastigium verticis was short and truncated, clearly belonging to different species, the latter was the single one having a feltlike SAP.

In both sexes, the paranotal spine was regionally of different colour. In the North of the equator and up to about 2° S, the paranotal spine was brown, as described here. Further to the South, it became brown-black to black (Schmidt *et al.*, 2004, Schmidt, 2005). The combination of the taxonomically important features showed that different trends were followed in the evolution of the species. In *P. congoensis* n. sp., *P. banzyvillei* n. sp., and *P. banguensis n.sp.* the base of SGP was concavely rounded, but differently shaped. Differences were also found in the length of fastigium verticis and cerci.

The features, which were found useful for the differenciation of species, were striking. The key presented allows a safe identification of males. Females were only known from few species, and the locality of sampling was helpful for specification. If two or more males were available from the same locality, the specific structures were similar. Without having a male from the same site, it is not desireable to create a new species. Several females, sampled at various places of the area studied, showing

some morphological differences, could not be attached to a species established. More structural information of the female SGP, the shape of the auditorial foramen, and the structures needed for abdomino-alary stridulation (strengthened hind wing veins with stridulatory pegs, structure of dorsal surface of the tergites), present in male and female, may allow a better and safer specific discrimination.

In spite of lacking material, the spination of legs was documented for the type material of either species. This feature may be variable, but showing some regional tendencies. Under the same point of view, the shape of the prozonal protuberance may be helpful, as *Pantecphylus* Karsch is a highly polytypic genus. Studies of further material will bring more light in the taxonomically dark box.

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