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Ottedana cercalis: a new genus and species of phalangopsid cricket from the Mantiqueira Range of southeastern Brazil (Orthoptera: Grylloidea)

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Abstract

Ottedana cercalis, a new genus and species of luzarine phalangopsid cricket, is described from the Araucaria forest on the Serra da Mantiqueira range of southeastern Brazil.

Key words

Orthoptera, Grylloidea, Phalangopsidae, Atlantic Forest, South America, description

Introduction

Desutter (1990) recognized 3 clusters of genera within the tropical American Luzarinae crickets (Phalangopsidae) and referred to them as groups A, B and C. In that publication, the author defines "Group C" on the basis of 2 autapomorphies: 1) endophallic apodeme: tendency to the loss of the lamellae and development of the basal portion (only) of the mid-dorsal crest; 2) sclerite located on the base of the spermatheca channel shaped as a very long cone. Subsequently, Desutter-Grandcolas (1995) added other autapomorphies: A) loss of sclerite "C" of epiphallic arm; B) development of the base of the epiphallic arm (sclerite "B") into a large, free, spine (see Desutter-Grandcolas 1992a,b for the condition of sclerite "B" of epiphallic arm in *Lerneca* and *Smicrites*, respectively).

The following genera were listed by Desutter (1990) as belonging to "Group C": *Lerneca* Walker 1869, *Gryllosoma* Hebard 1928, *Tairona* Hebard 1928, *Eidmanacris* Chopard 1956 and *Strinatia* Chopard 1970. Later, other genera were added to the group (Desutter-Grandcolas 1995): *Prosthacusta* Saussure 1874, *Cophella* Hebard 1928, *Smicrites* Desutter-Grandcolas 1991, *Aracamby* Mello 1992, *Cacruzia* Mello 1992, *Koilenoma* Desutter-Grandcolas 1993 and *Microlerneca* Mello 1995. Here we add 5 more genera to the group: *Endophallusia* Mello 1990, *Lernecopsis* Mello 1995, *Izecksohniella* Mello 1992, *Guabamima* Mello 1992 and *Ottedana* n. gen.

In the present paper we describe a new genus and species of cricket belonging to Desutter's "Group C" of the Luzarinae. The species is quite abundant during the warmer months of the year on the litter of *Araucaria angustifolia* forest atop the Mantiqueira fault escarpment in the surroundings of Campos do Jordão, State of São Paulo, Brazil.

Terminology for the structures that comprise the phallic complex, as shown in Figs 14-18, follows Desutter (1990).

OTTEDANA, new genus

Diagnosis.—The following autapomorphies attest the monophyly of the genus: 1) male forewings densely pilose (Figs 2A, 19); 2) male cerci with a bud-shaped, swollen, clasping structure, garnished with a thick fringe of sturdy bristles (Figs 3, 4, 21-24); 3) male paraprocts migrated to a dorsal position, lying flat underneath the supra-anal plate, the median portion of each paraproct with a concavity that partially lodges the distal tip of the respective epiphallic spine; 4) internal face of epiphallic spines bearing a fringe of bristles (Figs 14-16).

Description.—Male body cylindrical, pubescent. Fifth joint of maxillary palpi short, the apical truncation occupying almost half its length (Fig. 1). Forewings barely reaching distal margin of metanotum; the internal borders straight, touching each other but not overlapping; dorsal surface densely pilose (Figs 2, 7); inferior face with a broad emargination along distal border (wide sulcus delimited by the wing border and a narrow inner carina). Metanotal gland complex as in Figs 2B and 20. Tibia I with 2 ventral apical spurs; auditory tympana absent; tibia II with 4 apical spurs, dorsoanterior one distinctly smaller than the others; superior apical spur of hind tibia the longest on inner face. Cerci bearing a bud-shaped, swollen, clasping structure on the inner side of its proximal third, that structure garnished with a thick fringe of sturdy bristles (Figs 3, 4, 21-24). Supra-anal plate as in Fig. 3. Paraprocts as described in the diagnosis. Phallic complex (Figs 14-18): epiphallic spines blade-shaped (not tubular), their internal face furnished with a vertical fringe of bristles; sclerite "A" of epiphallic arms undeveloped (regressed?); epiphallic parameres bearing an spheric membranous structure (MSph in Fig. 18); ectophallic apodemes short and broad; ectophallic arch located anteriorly to base of epiphallus; endophallic sclerite small, bearing distinct, longitudinal, crest-shaped dorsal apodeme. Female forewings vestigial, hidden under pronotum; cerci slightly enlarged (Fig. 5) at the point where male has a clasper; distal margin of supra-anal plate as in Fig. 5; distal margin of subgenital plate nearly straight, forming a 90° angle with the lateral margin; ovipositor longer than hind tibia, straight, slightly compressed laterally.

Etymology.—The genus name is a combination alluding to the name of orthopterist colleague and friend Dr. Daniel Otte, Academy of Natural Sciences of Philadelphia.

Table 1. Measurements (mm) of *Ottedana cercalis* n. sp. BL- body length; HW- head width; IOD- interocular distance; PL- pronotum length; PW- pronotum width; FWL- forewing length; FWW- forewing width; HFL- hind femur length; HTL- hind tibia length; OL- ovipositor length.

	BL	HW	IOD	PL	PW	FWL	FWW	HFL	HTL	OL
Males (n=10)										
Mean±s	16.32±2.3	3.01±0.13	2.32±0.33	2.76±0.2	3.96±0.19	1.61±0.19	1.85±0.14	10.39±0.48	10.39±1.11	//
Range	13.74-20.02	2.91-3.3	1.7-2.63	2.48-3.1	3.7-4.33	1.39-2.00	1.7-2.1	9.72-11.30	9.34-12.46	//
Females (n=10)										
Mean±s	15.26±1.2	3.16±0.19	2.62±0.15	2.65±0.22	4.2±0.26	//	//	10.67±1.03	10.24±0.63	13.26±0.95
Range	13.8-16.72	2.86-3.54	2.34-2.76	2.24-2.98	3.84-4.6	//	//	9.88-13.1	9.35-11.34	12.23-15.16

Type species.— *Ottedana cercalis* n. sp.

Discussion.— Desutter-Grandcolas (1995) noticed that in the genus *Eidmanacris* the epiphallallic parameres are divided into 2 well developed portions which she named “epiphallallic paramere 1” and “epiphallallic paramere 2” (here referred to as EpP1 and EpP2, respectively).

A look at several other genera belonging to Group C of the *Luzarinae* revealed that the presence of EpP1 and EpP2 is widespread within the cluster, but the relative development of each of these structures differs among subgroups of genera. EpP1, normally more ventral, is the one that articulates with the distal projection of the ectophallallic sclerite; EpP2, normally more dorsal, has no direct connection to that structure. This linkage of EpP1 with the distal end of the ectophallallic sclerite, is the safest criterion establishing the identity of both epiphallallic parameres. In *Ottedana* n. gen., both EpP1 and EpP2 are well developed, a similar condition to that found in *Eidmanacris*, *Strinatia* and *Endophallusia*.

As Desutter-Grandcolas (1995) has pointed out, in *Eidmanacris* EpP2 is more or less soldered to an elongate “sclerite A” of the epiphallus. We have observed that the same is true for *Strinatia* and *Endophallusia*, but have not examined specimens of *Smicrotes*, a genus which certainly belong to this cluster (cf. Desutter-Grandcolas, 1992b).

We have also noticed that some species of *Eidmanacris* and *Ottedana* n. gen. bear a bulbous membranal structure associated with EpP2 (that structure is referred to as the “membranal sphere” or MSph in the present paper). This device seems to work as a cushion that operates by means of hydraulic pressure, improving the clasping function of the parameres.

In other related genera, including *Ottedana* n. gen., sclerite “A” of the epiphallallic arm is missing. In *Aracamby*, *Guabamima*, and in an undescribed forest-litter genus from southeastern Brazil, EpP1 is much reduced in relation to the large EpP2, this latter structure being a free element which arises directly from the base of the epiphallus. Sclerite “A” is also missing in genera like *Cacruzia*, *Izecksohniella*, *Vanzoliniella* and an undescribed genus known from a southeastern Brazilian cave. But in this group the relative development of the epiphallallic parameres is opposite from the one above: here, while EpP2 is minute, EpP1 is well-developed. In fact, EpP1 in *Cacruzia*, *Izecksohniella* and *Vanzoliniella* is a highly specialized, large, inflatable structure which probably functions as a clasping device driven by hydraulic pressure. Despite the similarity in the hypothesized function, there is no relation between the EpP1 of the 3 latter genera and the “membranous sphere” which is attached to the EpP2 of *Ottedana* and species of *Eidmanacris*.

In *Guabamima*, there is a pair of small distal projections which bud off from sclerite B of the epiphallus, but we are not certain these are homologues to the epiphallallic spines present in all other genera cited in the present discussion (see Mello 1992). In *Eidmanacris*, *Strinatia*, *Endophallusia*, *Smicrotes*, both undescribed genera mentioned above and *Ottedana* n. gen., the epiphallallic spines vary from a somewhat laminar to a more decidedly rod-shaped structure, sometimes enlarged toward the apex. On the other hand, in *Aracamby*, *Cacruzia*, *Izecksohniella* and *Vanzoliniella*, the epiphallallic spines are typically tubular and associated with the delivery of secretions from the epiphallallic glands which characterize those 4 genera.

Regarding male forewing development and the condition of the stridulatory vein (pars stridens), *Ottedana* groups with *Eidmanacris*, *Strinatia*, *Endophallusia*, *Smicrotes*, *Koilenoma*, and both undescribed genera. These genera are truly brachypterous, the wing covering <half the abdomen, and lacking the stridulatory vein. None of these genera possess tibial tympanum. Males of the other cited genera normally have short wings, but in some cases these may cover more than half the abdomen and the stridulatory vein is functional at least in producing a courtship song (the calling song was never heard in this group by any of us); at least one tibial tympana is present. *Izecksohniella* is the exception in this group: while it has lost the pars stridens and tympana, courting males do vibrate their wings without audible sound production and the wings are also flipped back and forth seemingly to blow air puffs toward the female (e.g., Heinzel & Dambach 1987).

Most of the genera related to *Ottedana* mentioned above were described after the proposition of the phylogenetic hypothesis by Desutter (1990). The exact position of the new genus will only be inferred when a new cladistic analysis is performed.

Ottedana cercalis new species

Table 1, Figs 1 - 30

Type locality.— Brasil, SP, Horto Florestal de Campos do Jordão. Araucaria forest on summit of the Mantiqueira fault escarpment.

Description.— **Male:** Top of head with broad brown longitudinal bands on pale background; upper portion of gena dark brown, lower portion whitish, as well as middle area of outer face of mandible; frons dark brown with fine yellowish markings; compound eyes almost entirely black, the whitish portion on superoventral angle very narrow; antennae pale yellow proximad, gradually becoming brownish towards the apex and furnished with isolated white annuli along their length. Disk of pronotum varying from pale yellow to

medium brown, much lighter than lateral lobes which range from dark brown to nearly black; forewings whitish to light yellow. Abdominal tergites marbled, pale yellow to light brown; abdominal and thoracic sternites whitish to pale yellow. Supra-anal plate with a large unpigmented membranous area (Fig. 3). Cerci as for genus. Subgenital plate large, darker than preceding sternites; when in ventral view, proximal half swollen with rounded lateral borders; distal half much narrower, the borders somewhat W-shaped (Fig. 6). Legs relatively short (hindtibia / pronotum length *ca* 3.76). Phallic complex (Figs 14-18): epiphallal spines converging posteriorly, each element shaped as a nearly straight blade proximad but curled distad; bristle fringe on inner side occupying just lower half of structure height (other phallic attributes as described for genus). Spermatophore typically bearing a wide, emarginated depression on bottom (Figs 8-10, 25-30).

Female: Dorsum of abdomen with a median longitudinal whitish line which is more conspicuous from 4th to 9th sternites. Ovipositor long and narrow (ovipositor / hind femur ratio *ca* 1.24); subgenital plate as in Fig. 7. Copulatory papilla as in Figs 11-13.

Additional note.— Males kept in terraria with females frequently keep part of the phallic complex and spermatophore exposed in quite similar ways, as shown in Figs 4, 25, 26 and 27, even when they are not courting but just moving or feeding.

Material examined.— Brasil, SP, Campos do Jordão, Horto Florestal: holotype ♂, 5 ♂♂ and 14 ♀♀ paratypes, Feb 1999, F.A.F. Mello, A.C. Luchiari, H.R.J. Pereira Jr. and M. Ap. B. S. Andrade *leg.*; allotype ♀, 7 ♂♂ and 14 ♀♀ paratypes, Jan. 1997, F.A.G. Mello and N.D. Jago *leg.*; 2 ♀♀ paratypes, Feb 1996, F.A.G. Mello and S.S. Nihei *leg.*

Repositories.— Holotype, allotype, 5 paratypes of each sex at Museu de Zoologia da Universidade de São Paulo [MZSP]; 1 paratype of each sex at the Academy of Natural Sciences of Philadelphia [ANSP] and Muséum National d'Histoire Natural, Paris [MNHN]. Remaining paratypes kept at Departamento de Zoologia, Instituto de Biociências-UNESP, Botucatu, SP, Brasil.

Key to sort *Ottedana* from other brachypterous genera without stridulatory apparatus, belonging to Desutter's (1990) "Group C" of the Luzarinae

- 1- Ectophallic arch located posteriorly to basal line of epiphallal arms 2
- 1'- Ectophallic arch located anteriorly 3
- 2- Maxillary palpi long and slender, apical truncation of 5th joint occupying one third its length; pronotum inflated, disk and lateral lobes glabrous; apex of forewings glandular on inferior face; median apical spur of hindtibia the longest on inner face *Eidmanacris*
- 2'- Maxillary palpi shorter, apical truncation of 5th joint occupying half its length; pronotum not inflated, disk and lateral lobes pilose; apex of forewings not glandular; superior apical spur of hindtibia the longest on inner face *Endophallusia*
- 3- Superior apical spur of hindtibia not the longest on inner face (*i.e.*, subequal or shorter than median) (except for *Koilenoma*) 4
- 3'- Superior apical spur of hindtibia clearly the longest on inner face 5

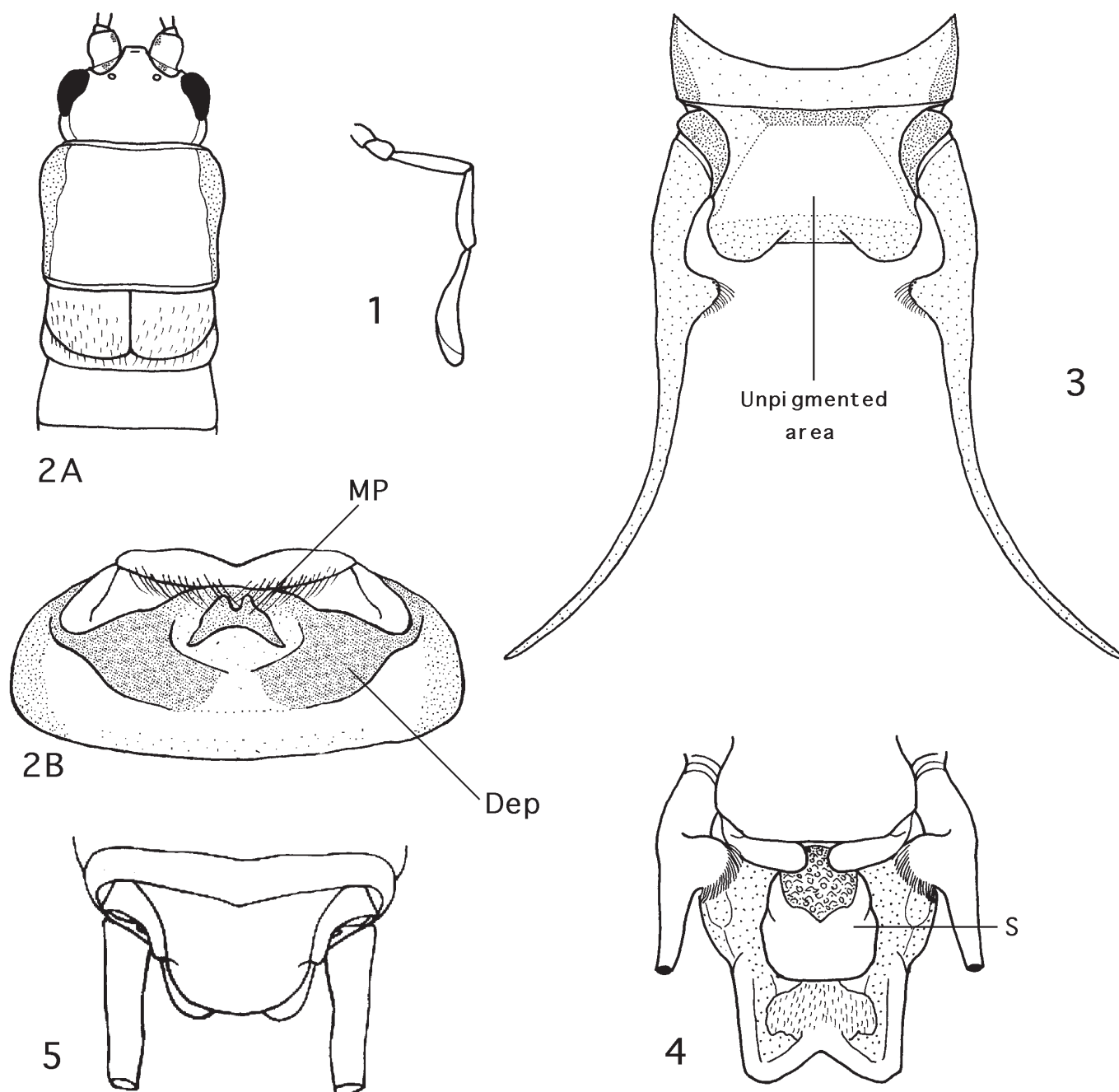
- 4- Antennal scape clearly taller than wide; hind tibia slightly longer than respective femur, its serrulation regressed; male abdomen cylindrical, narrower in the median portion and wider near the base of supra-anal plate; distal portion of epiphallal spine bearing bristles *Koilenoma*
- 4'- Antennal scape depressed; hind tibia decidedly longer than respective femur, serrulation not regressed; male abdomen wider in the middle than posteriorly; epiphallal spine without bristles *Strinatia*
- 5- Metanotal gland present; male forewings not triangular, the inner margins juxtaposed; male cerci with a distinct bud-shaped clasping structure furnished with fringe of sturdy bristles; outline of male subgenital plate W-shaped at distal half; internal face of epiphallal spine with fringe of bristle; endophallic sclerite small; ectophallic fold very short; ovipositor slightly compressed laterally *Ottedana*
- 5'- Metanotal gland absent; male forewings triangular, the inner margins spaced, except at basal third; male cerci without clasping device; male subgenital plate not W-shaped; ovipositor depressed dorsoventrally; internal face of epiphallal spines without a fringe of bristles; endophallic sclerite and ectophallic fold very long *Smicrotes*

Acknowledgments

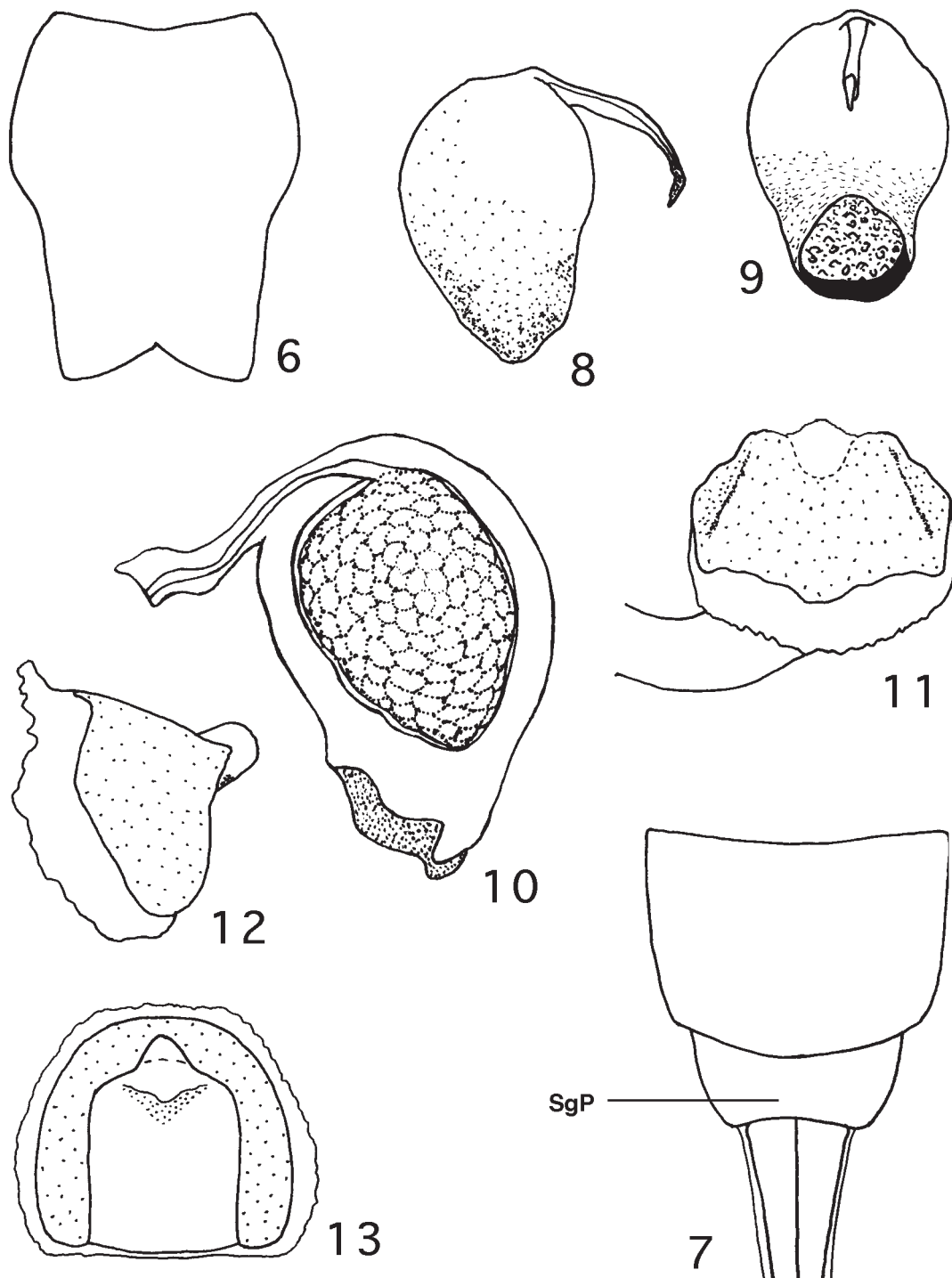
The senior author is deeply indebted to Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) for financial support of field work (grant 95/0408-0). We also thank Instituto Florestal do Estado de São Paulo for logistical help concerning authorization to collect specimens at Parque Estadual de Campos do Jordão. The aid provided by Dr. João Evangelista de Melo Neto and Adriane Moreira Tempest was much appreciated. Ana Carolina Luchiari, Hélio Rubens J. Pereira Jr., Nicholas D. Jago, and Silvio Shigueo Nihei were excellent field companions.

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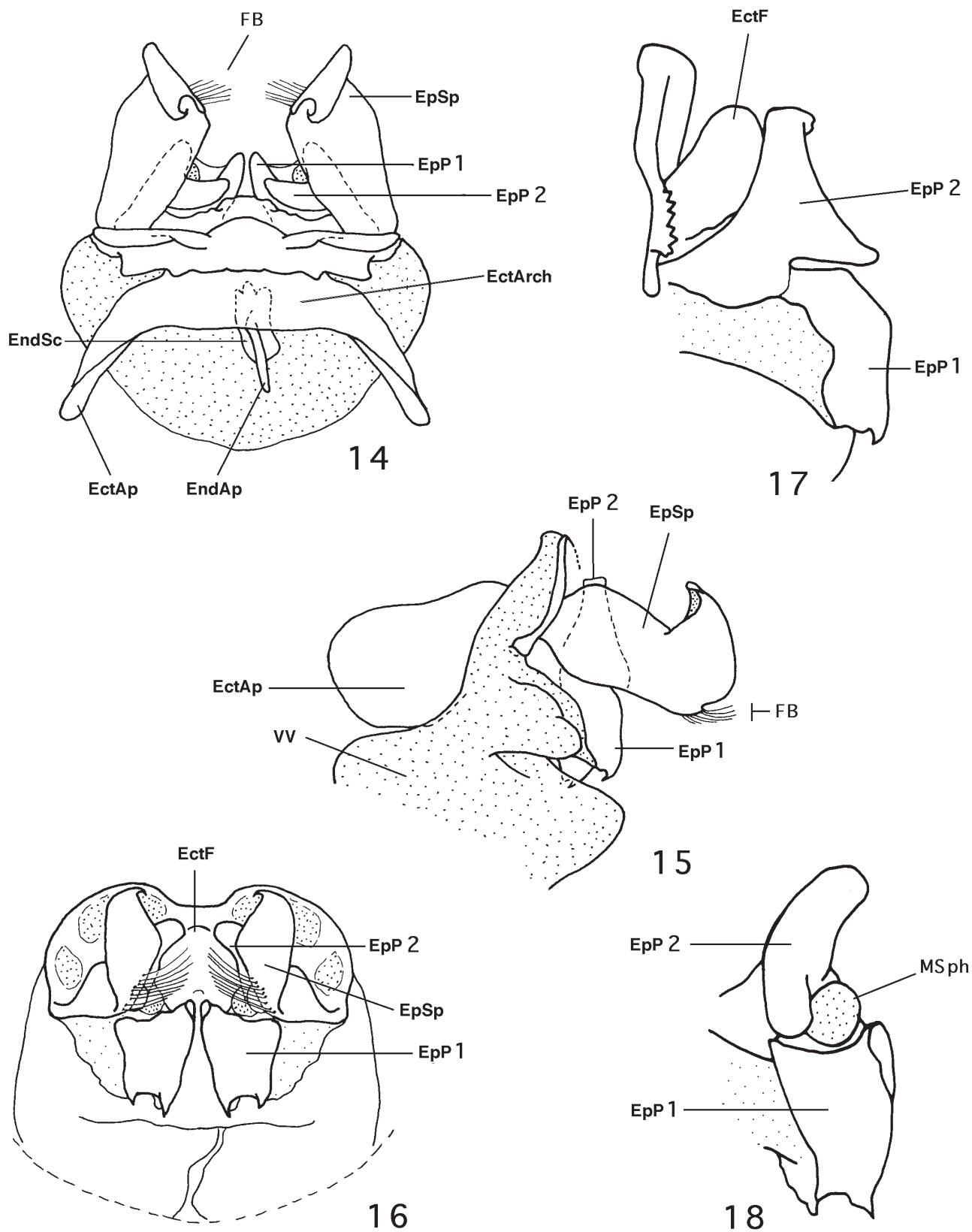
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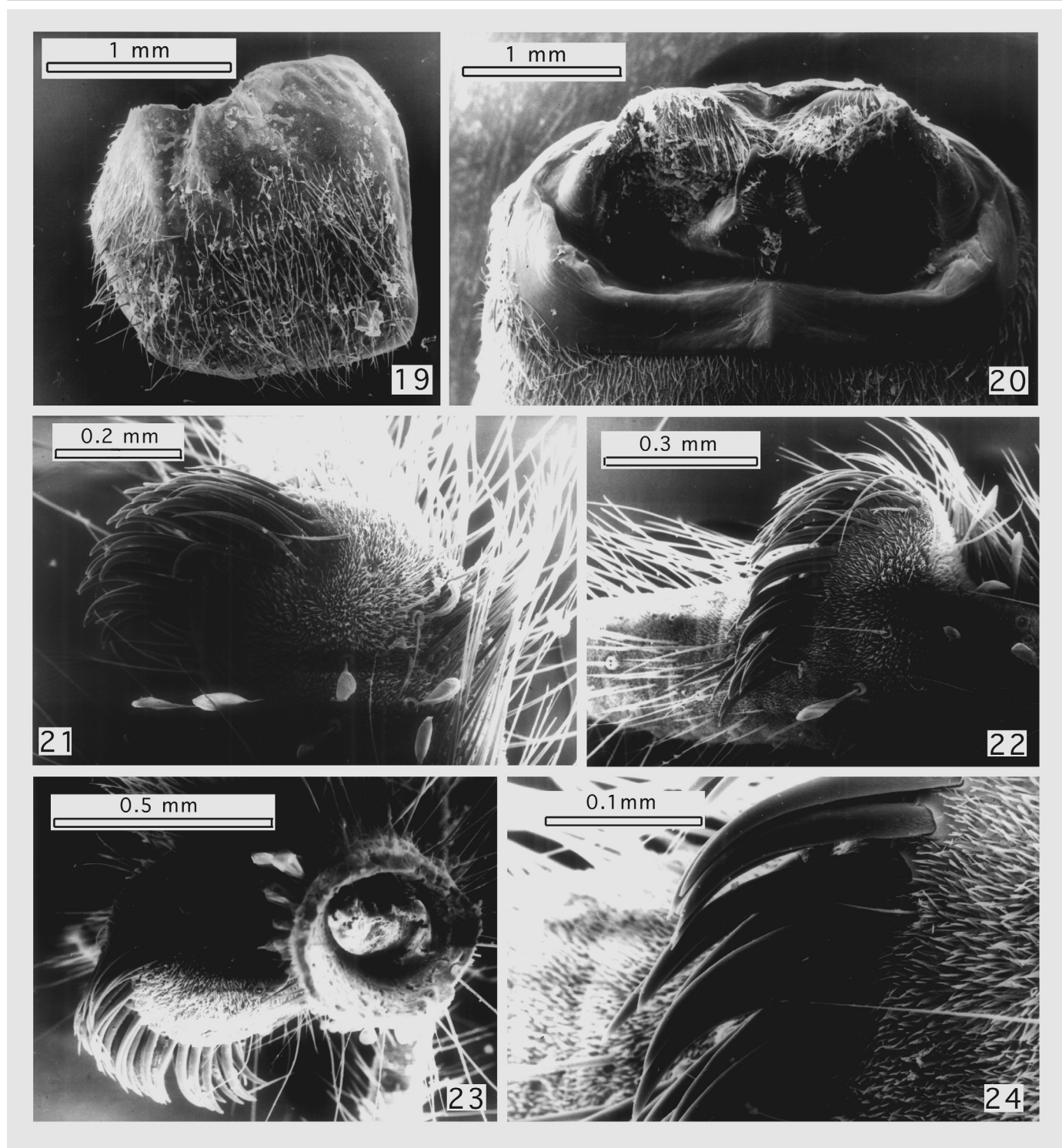
Figs 1-5. *Ottedana cercalis*, n. sp.: 1) external face of male maxillary palpus; 2A) dorsal outline of anterior portion of male body; 2B) male metanotum showing the glandular area restricted to the bristle-bearing portion, the depressed area (Dep) and the median projection (MP); 3) dorsal view of male terminalia (subgenital plate omitted); 4) posterior view of male terminalia showing spermatophore (S); 5) dorsal outline of female terminalia.



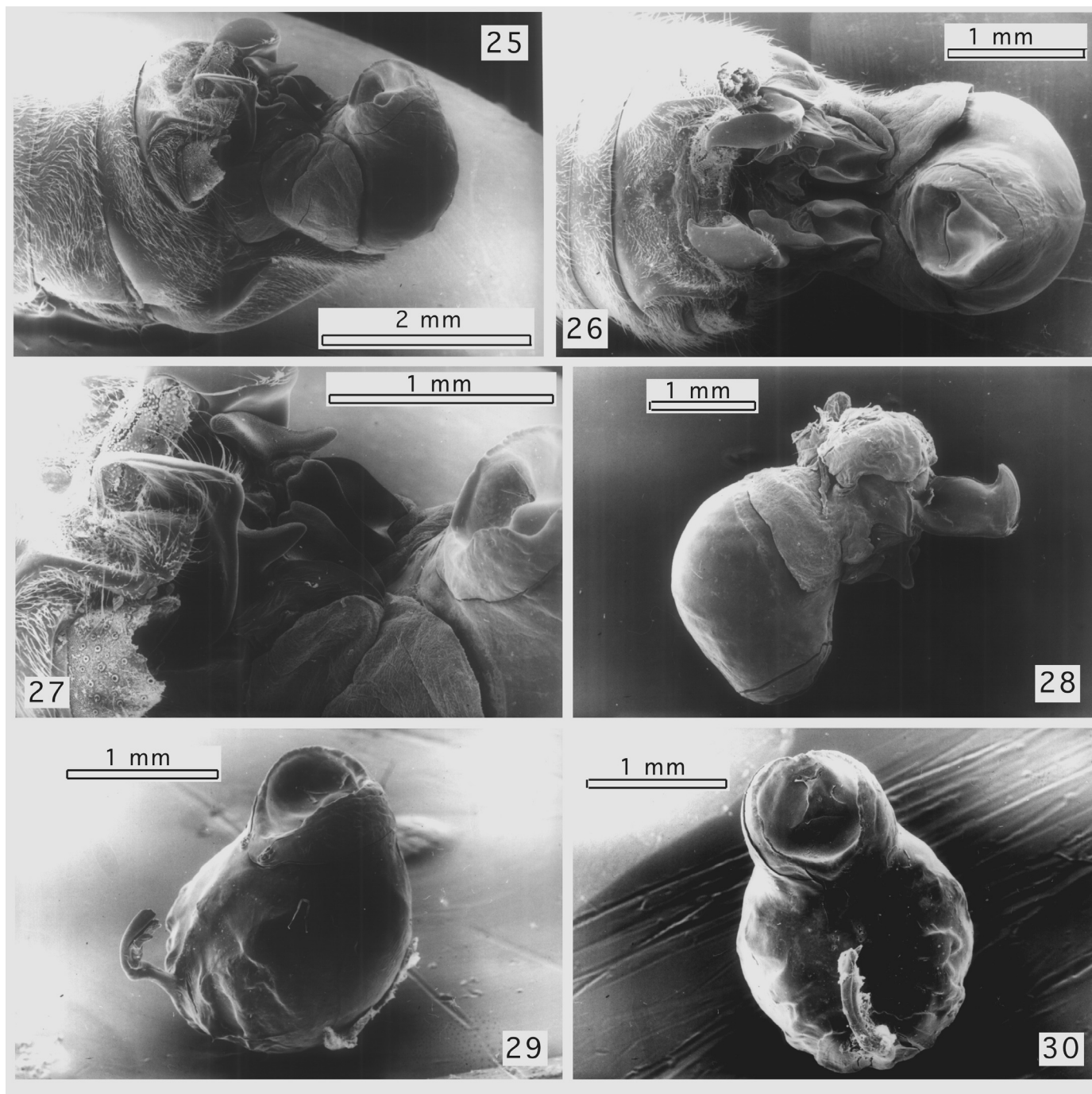
Figs 6-13. *Ottedana cercalis*, n. sp.: 6) male subgenital plate; 7) ventral view of female terminalia showing subgenital plate (SgP); 8, 9) spermatophore; 10) sagittal cut of spermatophore; 11, 12, 13) dorsal, lateral and posterior view of copulatory papilla.



Figs 14-18. *Ottedana cercalis*, n. sp.: 14,15,16) respectively dorsal, lateral and posterior view of phallic complex; 17) lateral close-up view of a portion of male genitalia after removal of epiphallallic spine; 18) posterior view of left epiphallallic paramere. Abbreviations: EctAp- ectophallallic apodeme; EctArch- ectophallallic arch; EctF- Ectophallallic fold; EndAp- endophallallic apodeme; EndSc- endophallallic sclerite; EpP1- epiphallallic paramere 1; EpP2- epiphallallic paramere 2; EpSp- epiphallallic spine; FB- fringe of bristles; MSph- (membranous sphere); VV- ventral valves.



Figs 19-24. Scanning electron microscopy of *Ottedana cercalis*, n. sp.: 19) male right forewing; 20) metanotal gland; 21, 22, 23) upper, inferior and posterior views, respectively, of left cercal claspers; 24) closer posterior view of left cercal clasper.



Figs 25-30. Scanning electron microscopy of *Ottedana cercalis*, n. sp.: 25) upper-lateral view of everted male terminalia after cercal removal showing part of epiphallus and spermatophore; 26) same, dorsal; 27) close up view; 28) lateral view of whole male genitalia and spermatophore; 29, 30) spermatophore.