ZOOTAXA

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Magnolia Press
Auckland, New Zealand

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(*Zootaxa* 1234)

63 pp.; 30 cm.

15 June 2006

ISBN 1-877407-87-9 (paperback)

ISBN 1-877407-88-7 (Online edition)

FIRST PUBLISHED IN 2006 BY

Magnolia Press

P.O. Box 41383

Auckland 1030

New Zealand

e-mail: zootaxa@mapress.com

http://www.mapress.com/zootaxa/

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

Zootaxa 1234: 1–63 (2006)
www.mapress.com/zootaxa/

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A revision of the weevil genus *Procas* Stephens (Coleoptera: Curculionoidea: Erirhinidae)

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Accepted by C.N. Duckett: 2 Feb. 2006; published: 15 Jun. 2006

Abstract

The Holarctic weevil genus *Procas* Stephens, 1831 is revised for the first time. Six species are recognized: four in the western Palaearctic Region, one in the eastern Palaearctic Region and one in the Nearctic Region. One new species, *P. michaelis*, **sp. n.** is described from Spain and one new subspecies, *P. picipes levantinus*, **ssp. n.** is described from the Levant. *P. picipes* (Marsham, 1802), **sp. rev.** and *P. p. steveni* (Gyllenhal, 1835), **ssp. rev.** are released from synonymy with *P. armillatus* (Fabricius, 1801). The species are separated using, among others, characters derived from sternite 8 of the male which is here used at species level for the first time.

Related genera are discussed. *Notodermus* Desbrochers, 1875, **gen. rev.** and *Apachiscelus* Desbrochers, 1875, **gen. rev.** are released from synonymy with *Procas*. *Pseudypera* Voss, 1936, is returned to synonymy with *Notodermus* (**stat. rev.**). *Syrdariellia* Ter-Minassian, 1978 = *Theanellus* Reitter, 1912, **syn. n.** *Hypera siccensis* (Normand, 1951), **comb. n.** (ex *Procas*) = *H. pollux* (Fabricius, 1796), **syn. n.** *Procas cottyi* Perris, 1864 = *P. armillatus* (Fabricius, 1801), **syn. rev.** The following new combinations are made in *Theanellus*: *T. alepensis* (Pic), **comb. n.** (ex *Procas*); *T. alternans* (Faust, 1885), **comb. n.** (ex *Procas*); *T. testaceus* (Bajtenov, 1974), **comb. n.** (ex *Procas*); *T. antoinei* (Hustache, 1932), **comb. n.** (ex *Procas*); *T. fastidiosus* (Pic, 1904b), **comb. n.** (ex *Procas*).

The relationships of the taxa are shown in a simple dendrogram, together with their habitats which vary from very wet to very dry.

Key words: Erirhinidae, *Procas*, taxonomy, morphology, ecology, Holarctic Region

Introduction

Procas is a small holarctic genus which occurs between 27°N (Canary Is) and 66°N (Canada). Some species have very wide ranges while others have very restricted ones. With the possible exception of the British and Spanish species, all seem to be allopatric. Differences between species are slight (Wollaston l865: 297). Their taxonomy and nomenclature are confused.

Like other erirhinids, most *Procas* species favour moist habitats; those from dry habitats are sometimes caked with mud, so it seems they are adapted to prolonged aestivation rather than to dryness *per se*. Even in temperate habitats the adults are active only in cool conditions and then only at night (Bedel 1884: 113). They are therefore often missed by collectors. Bedel (1879: xviii) gives a good account of their habits which is worth quoting in full (my translation):

> At Daya [Algeria] I saw a few. . . at the end of November; on 12th December, a fine day following some days of snow and strong winds, we took. . . nearly 80 specimens; in January and February we found only isolated individuals. By day, *Procas* stay deeply buried under stones or cowering under the broad leaves of *Salvia*; to make them come out, one has only to remove the stones in fallow fields from the places they frequent and visit them next day. The local *Procas* will then

be found, sometimes in numbers, still covered in dew.

It is not known for certain whether *Procas* flies but the wide ranges of some of the species (including islands) and the observation of a specimen in a collection with its wings extended, suggest that it does.

Fowles (1992) 0bserved *P. granulicollis* feeding on leaves of white climbing corydalis (*Ceratocapnos claviculata*) in the field and R. J. Booth (pers. comm.) reports the same species feeding readily on yellow corydalis (*Corydalis lutea)* in captivity. The former plant is a slender annual and could not support the larvae of *Procas*. The only other plant in the vicinity was bracken (*Pteridium aquilinum*) which is currently under investigation as a possible host plant (A.P. Fowles, pers. comm.). Even when some 300 individuals of *P. picipes* were taken in a field near Brighton in May 1930, nothing could be inferred regarding its life history. Cox (1930) comments:

> Nothing but grain and clover has been grown in this field for some time but every local weed is to be found there, though no wild plant that is not equally plentiful in the adjoining fields.

Although some species of *Procas* occur in open habitats, others are found only in woodland: *P. lecontei* in boreal forest (Anderson 1997b: 536), *P. biguttatus* in birch and larch forests (Egorov 1981: 66) and *P. granulicollis* in mixed deciduous woodland (Fowles, web site). The last species was found in regenerating oak-birch woodland both in Surrey (Alexander 1999) and Northumbria (Luff et al. 1996). Luff comments:

> [*P. granulicollis*] was restricted to an area of bracken litter at the edge of an oak wood, extending into a strip of former birch woodland, regenerating following tree clearance beneath an electricity power line. The weevils have not been found in other litter types, nor in moss or soil from the same area.

P. biguttatus has been found under the bark of conifers (Egorov, et al. 1996: 437); *P. armillatus* was found under the bark of trees in winter (in Sardinia)(Gené 1839: 37) and under the bark of *Eucalyptus* in Malta by D. Mifsud (see below, p.27). *P. granulicollis* was found ‘under firm bark of spruce stump’ in Cumbria (Atty 1996).

Methods

The length of the rostrum was measured from the apex to the front margins of the eyes and its width was measured in the middle of its length. The first antennal funicle segment was measured from the extreme base, beneath the apex of the scape; subsequent segments were measured from the apex of the preceding segment, except 7, where the narrow basal part was omitted.

The internal structures were prepared in the customary manner: the specimen was first soaked in warm water containing household detergent, then brushed under water to remove loose debris, laid on its back on an absorbent pad and a pin applied to the apex of the intercoxal process of ventrite 1. Pressing downwards and backwards on the pin was

often sufficient to disengage the abdomen but, if not, the pin was applied behind the coxae or between the venter and the elytra. Once loose, the abdomen was freed by raising the apex until the basal tergite detached from the metanotum. The entire abdomen was heated in 10% potash (KOH) solution at 70°C for about 20 minutes; after washing in water, the tergites were peeled back and carefully separated from the venter posteriorly so that all the internal structures were kept together, leaving the venter to be dried and mounted with the specimen. In females, sternite 8 was separated, taking care to preserve its peripheral membrane. In males, the aedeagus was pulled clear so that sternite 8 could be located and separated by very careful teasing with pins. Sometimes it was found advantageous to bisect tergite 8 with a scalpel and open out the cut halves to give better access to sternite 8. The dissected parts were preserved in glycerine in microvials except when the lender expressly forbade this. In this case, the parts were embedded in water-soluble resin (dimethyl hydantoin formaldehyde) on the card. The parts were drawn in glycerine by transmitted light, using a camera lucida. The pronota shown in Figs 11–14 had been thickly coated with transparent nail varnish which was allowed to harden overnight, then peeled off to remove most of the setae.

The lists of references given in the synonymies of the taxa are not intended to be exhaustive; for the most part I have included only those works that came readily to hand in the libraries of BMNH. I have not included entries in indexes, nomenclators, or abstracting journals. Synonymies are cited only when they are significant. If an author's concept embraces more than one species (as here interpreted) I have placed a single reference under the most appropriate one. I have included page numbers because many of the works cited lack indexes and the entries are often brief and easily missed.

Depositories

AMNH	American Museum of Natural History, New York, USA
BENHS	British Entomological and Natural History Society, Reading, UK
BGO	B.G. Osella private collection, L'Aquila, Italy
BMB	Booth Museum of Natural History, Brighton, UK
BMNH	The Natural History Museum, London, UK (formerly British Museum (Natural History))
CAS	California Academy of Sciences, San Francisco, USA
CCW	Countryside Council for Wales, Bangor, UK
CNC	Canadian National Collections of insects, arachnids and nematodes, Ottawa, Canada
CM	Castle Museum, Norwich, UK
CP	Carlo Pesarini private collection, Milan, Italy
DEI	Deutsches Entomologisches Institut, Eberswalde, Germany

DM	David Mifsud private collection, Malta
HM	Howard Mendel private collection, Ipswich, UK
HMG	Hunterian Museum and Art Gallery, University of Glasgow, Glasgow, UK
HNHM	Hungarian Natural History Museum, Budapest, Hungary
HUM	Hokkaido University Museum, Sapporo, Japan
IRSN	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
JC	Jonathan Cooter private collection, Hereford, UK
JR	John Read private collection, Whitehaven, UK
JU	Jagiellonian University, Cracow, Poland
KNU	Kyongbuk National University, Kyongbuk, Korea
KU	Kyushu University, Fukuoka, Japan
LM	Luigi Magnano private collection, Poggibonsi, Italy
MAF	Ministry of Agriculture and Forestry, Anyang, Korea
MCG	Museo Civico di Storia Naturale 'Giacoma Doria', Genoa, Italy
MCM	Museo Civico di Storia Naturale, Milan, Italy
MCSU	Maria Curie-Skłodowska University, Lublin, Poland
MGM	Mike Morris private collection, Dorchester, UK
MM	The Manchester Museum, University of Manchester, Manchester, UK
MNCN	Museo Nacional de Ciencias Naturales, Madrid, Spain
MNHN	Muséum national d'Histoire naturelle, Paris, France
MRSN	Museo Regionale di Scienze Naturali, Turin, Italy
MS	Michael Salmon private collection, Woodgreen, UK
MZPW	Museum and Institute of Zoology, Polish Academy of Sciences, Warsaw, Poland
NFH	Norman Heal private collection, Faversham, UK
NMB	Naturhistorisches Museum Basel, Basel, Switzerland
NMS	National Museums of Scotland, Edinburgh, UK
NMW	National Museum of Wales, Cardiff, UK
OUM	Oxford University Museum of Natural History, Oxford, UK
PH	Peter Hodge private collection, Ringmer, UK
RC	Roberto Caldara private collection, Milan, Italy
SMNH	Swedish Museum of Natural History, Stockholm, Sweden
SMNS	Staatliches Museum für Naturkunde in Stuttgart, Stuttgart, Germany
SMT	Staatliches Museum für Tierkunde, Dresden, Germany
TAU	Tel-Aviv University, Tel-Aviv, Israel
UN	University of Newcastle, Newcastle-upon-Tyne, UK
UZMC	University Zoological Museum, Cambridge, UK
ZIP	Zoological Institute, Russian Academy of Sciences, St Petersburg, Russia
ZMA	Zoological Museum of Amsterdam, Amsterdam, Netherlands
ZMUC	Zoological Museum, University of Copenhagen, Copenhagen, Denmark

ZMUM Zoological Museum of Moscow State University, Moscow, Russia
ZSM Zoologische Staatssammlung München, Munich, Germany

Taxonomy

Procas is one of a group of three genera (the others are *Notodermus* and *Apachiscelus*) which have often been regarded as synonymous (Klima 1934, Alonso-Zarazaga and Lyal 1999). However, Zumpt (1937) regarded them as distinct and the present study supports this view. Three further genera which may be related to *Procas* are included in the following key:

1 Rostrum, beyond antennal insertions, longer than broad ..[*Notaris* Germar, 1817, etc.]
- Rostrum, beyond antennal insertions, not longer than broad 2
2 Tibiae uncinate, without spurs..... *Jekelia* Tournier, 1874
- Tibiae mucronate, with spurs 3
3 Tarsi with segment 3 bilobed, distinctly wider than segment 1 4
- Tarsi with segment 3 notched, not, or only slightly, wider than segment 1 5
4 Elytra with scales; tibial spur formula 1-2-2; form elongate .... *Lepidonotaris* Zumpt, 1929
- Elytra with setae; tibial spur formula 2-2-2; form compact ..... *Procas* Stephens, 1831
5 Tibial spur formula 2-2-2; fully winged; male with broad flange-like expansion on underside of hind femur. (Body and legs setose.). ..... *Notodermus* Desbrochers, 1875
- Tibial spur formula 1-2-2; apterous; all femora simple 6
6 Body and legs densely scaly and setose; tibiae with setae of apical palisade stout, peg-like; hind tibial apex with inner flange very small but well defined and covered with scales; mandibles not overlapping (except for mesal tooth, when present) .... *Theanellus* Reitter, 1912
- Body and legs setose only; tibiae with apical setae fine; hind tibial apex with inner flange ill defined and bare; mandibles overlapping .... *Apachiscelus* Desbrochers, 1875

The hind tibial apex of *Theanellus* sometimes resembles the so-called ‘enclosed corbel’ of some Curculionidae but here the scaly plate is developed on the inner flange, mesad of the tibial apex, instead of on the outer bevel (Thompson 1992) and is therefore not homologous with the curculionid structure.

Of the genera included in the above key, *Jekelia*, *Notodermus* and *Apachiscelus* are small (1-2 species each) and occur around the Mediterranean; *Lepidonotaris* is monotypic and occurs in southern Russia, Central Asia and Siberia; *Theanellus* may comprise up to seven species (subject to revision) and occurs in North Africa, the Middle East and Central Asia.

Procas Stephens, 1831

Genus 297: Stephens 1829b: 167.

Procas Stephens, 1831: 90, 1839: 213; Curtis 1837: 63 [=*Hypera*]; Westwood 1838: 36; Schönherr 1842: 386; Calwer 1858: 513; Redtenbacher 1858: cxx, 731, 1874: cxxv, (2)270; Bose 1859: 493; Chenu & Desmarest 1860: 226 [*erratim Phocas*]; Lacordaire 1863: 467; Gemminger & Harold 1871: 2433; Tournier 1874: 68, 70; Seidlitz 1875: 119 (note), 1891: 162; LeConte & Horn 1876: 162, 1883: 473; Pascoe 1882: 21: Bargagli 1884: 206: Stierlin 1893: 470; Desbrochers 1894: 82; Kuhnt 1912: 914; Reitter 1912: 75, 1916: 196, 204; Blatchley & Leng 1916; 193, 200; Wagner 1916: 1097, 1099; Hustache 1930: 136, 140; Scheerpeltz & Winkler 1930: 251; Joy 1932: 225, 230; Klima 1934: 29; Reinkardt 1948: 574; Hoffmann 1958: 1419; Kissinger 1964: 14, 45; Sebö 1971: 4, 45; Pesarini 1978: 2; Angelov 1980: 267; Lohse 1983: 59, 68; Caldara & O'Brien 1995: 393, 403, fig. 19; Zherikhin, Egorov & Gratzev 1996: 258; Egorov, Zherikhin & Korotyaev 1996: 437; Alonso-Zarazaga & Lyal 1999: 70; Hong, et al. 2000: 17; Morris 2002: 36; Anderson 2002: 731; Morris 2003: 200.

Type species: *Curculio picipes* Marsham, 1802 designated by Westwood (1838).

Derivation of the name

Stephens has 'nomen viri' but according to Wright (1949) Procas was 'A king of Alba [Longa], a city of Latium (a country of Italy, near the river Tiber) destroyed by the Romans 637–640 B.C.'

Diagnosis

Medium-sized (3–8 mm) erirhinid Curculionoidea with exposed surfaces of head, thorax, legs and venter covered with very dense punctures, their interspaces sometimes forming a reticulate pattern, especially on pronotum; elytral striae deep, sharply defined, catenulately punctured (Figs 2–8), interstriae finely granulate; head, body and elytra black, antennae and tarsi dark brown to reddish brown, femora and tibiae usually black but sometimes brown. Fully winged.

Vestiture of body composed solely of blackish brown and white setae; the latter may be either fairly evenly distributed, segregated to form a variegated pattern or condensed to form white spots; middle and hind tibiae with dense mass of very fine, elongate brownish white setae in apical third, or more, of their length and, often, with a circlet of white setae at base.

Head globose, sometimes with a small frontal pit; eyes ovate, weakly convex; rostrum strongly curved, × 3.7–5.1 as long as broad and × 0.9–1.25 as long as pronotum, sides straight or weakly sinuous, widening distinctly, and usually rather abruptly, around preapical antennal insertions; mandibles porrect, blade-like, with two large teeth on mesal aspect.

Antennae (Figs 18–20) with 2(–3) basal funicle segments elongate, segments (3–) 4-7 quadrate (7 sometimes transverse).

Prothorax much narrower than elytra (Fig. 1), × 0.75–0.95 as long as broad, subglobose, with weak post-ocular lobes.

Scutellum small, isodiametric, convex.

Elytra about × 1.48 as long as broad; sides, in basal half, straight, parallel or weakly diverging posteriad (Figs 2–8), shoulders well developed, apex broadly rounded.

Legs with femora unarmed, isometric; tibiae distinctly mucronate, tibial spur formula 2-2-2; tarsi with segment 3 broad, strongly bilobed, segments 1–3 with dense setae beneath.

Venter with disc of ventrites 1 and 2 weakly to distinctly depressed in male, flat or weakly depressed in female.

Terminalia. Male: median lobe of aedeagus simple (tectum obsolete); internal sac without any large sclerites, extending anteriad to, or somewhat beyond, tips of apodemes (Fig. 15); dorsal plate of tegmen bilobed both posteriorly and, to a lesser extent, anteriorly; manubrium large, straight (Fig. 15); spiculum gastrale small, curved, forked posteriorly (Fig. 15); sternite 8 reduced to pair of small crescent-shaped hemisternites and a median unsclerotized column bearing a pair of elongate processes; hemisternites with simple setae, irregularly arranged (Figs 74–99). Female: ovipositor transverse, with strongly pigmented barrel-shaped styli (Fig. 17); bursa simple, membranous; spermatheca with distinct gland-lobe and long duct, inserted at base of oviduct (Fig. 16); sternite 8 broad, pigmented at sides, setose at apex, with slender spiculum (Figs 21–43).

Comments

The rostrum exhibits weak positive allometry in all the species. The surface puncturation extends, unusually, to the secondary scrobes but the inner (posterior) faces of the hind femora are smooth and polished (only clearly seen when femur is detached). Almost all of the clothing setae are simple but bifid or sometimes multifid setae occur on the sides of the prothorax, on the meso- and metepisterna and at the sides of ventrite 1 in most of the species. Low median carinae are often present on the rostrum and pronotum but are neither constant nor complete in any of the species.

The European species of *Procas* resemble one another very closely and each varies widely in size and, sometimes, in details of its clothing setae. This led Bedel (1879) to synonymize *picipes*, *steveni* and *cottyi* under *armillatus*; the first two species have remained in synonymy but *cottyi*, which really is a synonym of *armillatus*, was revived as a valid species by Winkler (1932). The status of *granulicollis* has hitherto been uncertain; it is usually cited as another synonym of *armillatus* (Klima 1934).

As a result of this study, I am able to recognize six species of *Procas*, one of which has three subspecies (including the nominate) thus:

granulicollis Walton, 1848
picipes (Marsham, 1802)
    p. picipes (Marsham, 1802)
        moestus (Bach, 1854)
        minutus Desbrochers, 1893

p. steveni (Gyllenhal, 1835)
***p. levantinus* ssp. n.**
***michaelis* sp. n.**
armillatus (Fabricius, 1801)
atomarius (Gené, 1839)
cottyi Perris, 1864
biguttatus Faust, 1882
okunii Kôno, 1930
lecontei Bedel, 1879
picipes LeConte & Horn, 1876, not (Marsham, 1802)

Since *Curculio picipes* Marsham, 1802 is a junior primary homonym of *Curculio picipes* Linnaeus, 1767 (= *Otiorhynchus singularis* (Linnaeus)), I (Thompson 2003) asked the International Commission on Zoological Nomenclature to validate Marsham's name under Article 23.9.5 of the Code and the Commission duly ruled in my favour (International Commission on Zoological Nomenclature 2005).

External characters for separating the species are not altogether reliable and some are difficult to see or interpret. Similar problems have been encountered with the traditional internal structures (aedeagus, spiculum ventrale). The spermatheca is better, if studied carefully, but the best structure by far is sternite 8 of the male. This has been used effectively among Curculionoidea at family-group level (Thompson 1992) and among Erirhinidae at generic level (Thompson 2005). All characters vary and this variation should, ideally, be studied throughout the range of each species. For this reason, I have included additional figures, where possible, to support my decisions.

Key to species of *Procas* Stephens, 1831

1 Antennal funicle segment 3 less than half as long as segment 1; elytra usually with 1–3 white spots at top of declivity; setae on female sternite 8 small (*c*. 0.03 mm long). *Non-European* 2
- Antennal funicle segment 3 at least half as long as segment 1; elytral declivity never with white spots; setae on female sternite 8 large (< 0.1 mm long). *Europe, North Africa, Middle East* 3
2 Antennal funicle segment 7 transverse; male sternite 8 with processes parallel or weakly diverging, merging with broad median column and often fused together in basal half or more of their lengths (Figs 96–99); female sternite 8 with pigmented area expanded apically (posteriorly)(Figs 41–43); spematheca with gland-lobe variable in shape, gland variable in size (Figs 68–73). *North America* ..... *lecontei*
- Antennal funicle segment 7 quadrate; male sternite 8 with processes elongate, strongly diverging, distinct from slender tapering median column (Figs 92–95); female sternite

8 with pigmented area expanded basally (anteriorly)(Figs 39, 40); spermatheca with gland-lobe usually tapering and weakly expanded at apex, gland small (*c.* 0.2 mm long)(Figs 65–67). *Russian Far East, Japan, NE China, Korea*..... *biguttatus*

3 Pronotum, on either side of midline, with a variable and ill defined area of low, setiferous granules, often obscured by their setae (Figs 13, 14); head usually with small frontal pit; antennal funicle segment 2 usually only slightly longer than 3; male sternite 8 with processes more or less curved (Figs 83–85); female sternite 8 with pigmented areas distinctly separate (Figs 21–23); spermatheca with gland-lobe more or less cylindrical and slightly expanded at apex (Figs 44–47). (Scutellum often covered with white setae (appearing white); clothing setae rather coarse (sometimes markedly so).) *United Kingdom, NW Spain* ..... *granulicollis*

- Pronotum more or less uniformly punctate on disc (sometimes with setiferous granules near sides)(Figs 11, 12); head usually without a frontal pit; antennal funicle segment 2 usually distinctly longer than 3; male sternite 8 with processes more or less straight (Figs 74–82); female sternite 8 with pigmented areas fused or narrowly separated (Figs 24–38); spermatheca with gland-lobe variable but not expanded at apex 4

4 Rostrum finely and evenly punctate, seldom with any trace of a median carina but usually with a very fine linear carinula near apex (Fig. 9); sides of rostrum widening smoothly at antennal insertions (in dorsal view); elytral setae mostly very small and recumbent, with a few (sometimes very few) much larger scattered semi-erect white setae, especially on declivity; punctures on sides of prothorax (above fore coxae) and on metepisterna containing simple linear setae; male sternite 8 with short processes (< 0.1 mm long)(Figs 88–91); female sternite 8 broad, somewhat straight-sided and angular anteriorly, spiculum broad (Figs 35–38). (Tibiae 2 and 3 with prominent circlet of white setae at base; spermatheca with gland-lobe small, strongly reflexed (Figs 59–64).) *North Africa, Atlantic and Mediterranean islands, Greece (?).* .... *armillatus*

- Rostrum with coarser, ovate punctures, their interspaces tending to form longitudinal rugulae, with a partial median carina but no pre-apical carinula (Fig. 10), sides widening somewhat abruptly at antennal insertions; elytral setae larger and more nearly uniform in size; setae in punctures on sides of prothorax and on metepisterna, in part, bifid or multifid; male sternite 8 with long processes (0.1–0.2 mm)(Figs 74–82, 86, 87); female sternite 8 ovate, spiculum slender (Figs 24–34) 5

5 Male sternite 8 with processes strongly divergent (sometimes almost in a line), their pigmented elements close together at narrow apex of median column, which they enter (Figs 86, 87); spermatheca with gland-lobe very strongly reflexed (Fig. 48). (Tibiae 2 and 3 with indistinct circlet of white setae at base.). *Spain* ..... *michaelis*

- Male sternite 8 with processes usually less strongly divergent, their pigmented elements clearly separate at broad apex of median column, which they seldom enter (Figs 74–82); spermatheca with gland-lobe only weakly reflexed (Figs 51–58).... [*picipes*] 6

6 Tibiae 2 and 3 with distinct circlet of white setae at base, separated from pale clothing setae of tibia by a dark gap. *W Europe*.....*p. picipes*

- Tibiae 2 and 3 without, or with indistinct circlet of white setae at base 7

7 Tibiae 2 and 3 with indistinct circlet of white setae at base, separated from pale clothing setae of tibia by a dark gap. *Ukraine, Caucasus, E Turkey*..... *p. steveni*

- Tibiae 2 and 3 without any circlet of white setae at base, tibia more or less uniformly covered with pale brownish-white setae (sometimes with dark area on dorsal edge of tibia, near base). *Middle East, Kurdistan*.....*p. levantinus*

***Procas granulicollis* Walton**

Procas granulicollis Walton, 1848: 166, 1852: 10, 1856: 18; Jacquelin du Val 1854: [14]; Dohrn 1855: 73, 1856: 69; Marseul 1857: 142; Waterhouse 1858: 71, 1861: 27; Schaum 1859: 85, 1862: 89; Lacordaire 1863: 468 (note); Crotch 1863: 21; Morris, O.F. 1866: 24; Rye 1866: 262; Stein 1868: 102; Stierlin 1893: 470; Kloet & Hincks 1977: 85; Shirt 1987: 25; Kenward 1990: 22; Fowles 1992:19; Fowles & Boyce 1992: 11; Hyman & Parsons 1992: 292, 1994: 211; Hodge & Jones 1995: 133; Atty 1996: 35; Luff et al. 1996: 264; Alexander 1999: 220; Morris, M.G. 2002: 26, 36, 2003: 200.
Procas picipes var. *granulicollis* Walton: Marseul 1867: 104; Sharp 1883: 30.
Procas steveni var. *granulicollis* Walton: Sharp 1871: 28; Matthews & Fowler 1883: 39.
Procas steveni granulicollis Walton: Crotch 1871: 10.
Procas armillatus var. *granulicollis* Walton: Fowler 1891: 266; Sharp & Fowler 1893: 36; Beare & Donisthorpe 1904: 40; Beare 1930: 45.
Procas armillatus (Fabricius): Read 1989: 7 . [Misidentification]

Description

Length 3.0–5.3 mm, mean (30) = 4.56. Head with frontal pit usually well defined and < 0.07 mm in diameter but sometimes smaller and indistinct; rostrum (both sexes) × 3.9–4.4 as long as broad, mean (14) = 4.21, × 1.1–1.25 as long as pronotum, mean (14) = 1.15; punctures of upper surface elongate, interspaces rugulose, with distinct traces of a median carina.

Antennae (Fig. 20) with lengths of funicle segments 1–3 in ratio 10: (5.8–7.5): 5.0–5.8), mean (10) = 10: 6.4: 5.5 (specimen with highest values, i.e. with segment l relatively short, is a dwarf); segment 2 × 1.0–1.3 as long as 3, mean (10) = 1.17.

Prothorax with sides strongly rounded, especially anteriorly; disc of pronotum usually with traces of smooth median line; area on either side of disc with more or less distinct setiferous granules Figs (13, 14).

Legs with tibiae more or less straight, each with circlet of white setae at base.

Vestiture variable, especially on elytra, usually consisting of tiny recumbent white setae forming a variegated pattern, with similar but dark brown setae on intervening areas and with larger but rather inconspicuous dark brown setae in rows along the interstriae (Fig. 3) (as in *P. picipes*); in some specimens, however, these latter setae are larger and

chestnut brown, hence conspicuous, and give the specimen a very different, somewhat shaggy appearance (Fig. 4); setae on scutellum sufficiently large and dense to make it appear white in contrast to the surrounding dark areas; multifid setae are regularly present in punctures of metepisternum and along anterior margin of ventrite 1; some small bi- or multifid setae occur on sides of prothorax above coxae.

Terminalia. Processes of male sternite 8 slender, curved (Figs 83–85); female sternite 8 with pigmented areas large and separate, with large setae (< 0.08 mm long)(Figs 21–23); spermatheca with gland-lobe small, cylindrical, reflexed (Figs 44–47).

Type material

The type material of *P. granulicollis* has not been found. Walton's description was based on a single specimen: "The only specimen I have seen was found. . . by T.C. Heysham, Esq., who kindly presented it to me." In his checklist of British Curculionidae, Walton (1856: 18) indicates that *P. granulicollis* was not then represented in the collection of the British Museum. In 1859, Walton presented the British Museum with 73 species of British weevils: "All the species were wanted to complete the Museum Collection, several were unique in the Waltonian Collection" (F. Smith, note in register). After Walton's death in 1862 his British weevil collection was purchased by J.A. Brewer who then sold a set to the British Museum. This comprised 328 species. Smith comments: "This purchase was as complete a set of British Curculionidae from Mr Walton's collection as could be obtained." All the material referred to above is listed in the BMNH registers but no *Procas* are included. It seems likely, therefore, that the specimen had been lost, or otherwise disposed of, between 1848 and 1859. Another possible explanation for its absence is suggested by Wollaston (1865). Having noted (p. 296) the slight differences between the then recognized species of *Procas*, he adds (p. 297, note): "Walton himself regarded [*granulicollis*] originally as a mere variety of *picipes* and afterwards thought that it might be identical with the *Steveni*" so perhaps it remained in his collection with his *picipes* and went to Brewer. This would explain why Heysham's specimens are listed in the sale catalogue (see below) as *picipes*, not *granulicollis*. Unfortunately, Walton seldom put *any* labels on his specimens and did not use the type concept, so the specimen, if it still exists, would now be difficult to authenticate.

When the collections of T.C. Heysham were auctioned, there were ten specimens of '*Procas picipes*' distributed among six of the lots (Stevens 1859). Two of these are now in BMNH; a specimen labelled 'Carlisle, Heysham, E.W. Janson' may be a third and one from Pascoe's collection labelled 'Carlisle' may be a fourth. All these specimens are *P. granulicollis*. It is likely that they are from the same site as the missing holotype and are therefore topotypes.

Accordingly, to ensure stability of nomenclature and having met the conditions of Article 75.3 of the International Code of Zoological Nomenclature, I now make the following designation:

NEOTYPE of *Procas granulicollis* Walton, male, with: BMNH 'neotype' disc; 'Nokes 1861 / Heysham's / Sale' (MS, under card); 'Probably Walton's / type (sec Fowler)' (? Power MS); 'Power./ [18]96-69' (printed, old label); 'J.A. Power./ B.M. 1896-69.' (printed, new label) and 'NEOTYPE Procas granulicollis Walton det. R.T. Thompson 2002' in BMNH. The specimen is 4.2 mm long, complete in all its parts and is carefully set on a card rectangle. Fowler's suggestion that this specimen may be Walton's type is clearly mistaken; Heysham gave the type specimen to Walton, so it would not have been in the former's possession when he died. The type locality is 'a wood [probably Baron Wood] at some distance from Carlisle' (UK, Cumbria).

Other specimens examined

UK, ENGLAND: 1 ex. with 'Heysham's sale (pencil) and '[18]59.42 / B.M.' (ink) under card, 'B.M. Coll.' (printed), '[18]59 / 42 (MS, on blue disc)["Purchased of J.C. Stevens"](BMNH); 1 ex. with 'Carlisle, Heysham / E. W. Janson' (E.W. Janson MS), 'Ex coll. / G.R. Crotch' (printed)(UZMC); 1 ex. with 'Carlisle' (F.P. Pascoe MS on small oval label), 'Procas / granulicollis / Walt.' (Pascoe MS) and 'Pascoe Coll./ B.M. 1893-60.' (printed); 1 ex. with '2t.73 / Stevens' (MS, under card), 'Ex Coll./ Stevens.', 'Brighton, Sussex.' and 'G.C. Champion / B.M. 1964-540' (all printed)(both BMNH); 2 ex. with 'S. Stevens coll [?] / Brighton' (pencil, under card)(HMAG); 5 ex. Northumbria, Heddon on the Wall, VC67 NZ16, with '5710-5714' (pencil, under cards), 3.i.1992 (M.L. Luff); 1 ex. ditto, except '5715' and 3.ii.1992; 1 ex. ditto, except '5641' and 12.vi.1990 (all UN); 1 ex. ditto, except '5725' and 3.v.1992 (PH); 2 ex. ditto, except 10.xi.1991 (J.A. Owen)(NMS); 3 ex. Surrey, Holmwood Common, 2.v.1998 (R.G. Booth), 'sieving bracken litter' (BMNH); 1 ex. ditto, except 5.vi.2001 (NMB); 6 ex. ditto, except 2.v.1998 (J.A. Owen); 1 ex. ditto, except 26.iv.1999 (all NMS). UK, WALES: 2 ex. Radnor, Cerrig Gwynion, 14.vi.1991 (D.C. Boyce)(BMNH); 4 ex. ditto, except 22.vi.1992 (J. Cooter)(JC); 9 ex. ditto, except 22.v.1992 (P. J. Hodge)(PH); 4 ex. ditto, except 13.vii.1991 (H. Mendel), 'Coryd. claviculata' (HM); 2 ex. Cardigan, Cwm Llyfnant, 14.v.1991; 2 ex. (fragments), Coed Cnwch yr Arian, 22.v.1992 (all A. P. Fowles)(all BMNH); 1 ex. Cwm Rheidol, 17.v.1991 (A P. Fowles) (NMS); 2 ex. Brecon, Carn Gefallt, 29.vi.1991 (D.C. Boyce)(all BMNH); 6 ex. Carnarvon, Coedydd Aber, 17.iv.1993 (A.P. Fowles)(3 BMNH, 3 MM). SPAIN: 2 ex. with 'Cancas [= Cangas] Ast[urias] / Paganetti' (printed)(DEI, SMNS); 1 ex. 'Cancas,' 'Mitscha / 1920' (ZMA); 3 ex. Caboalles (Paganetti)(SMT, SMNS, MRSN). Total: 66 specimens.

Other (published) localities

UK, SCOTLAND: Dumfries and Galloway, Kirkconnell Flow National Nature Reserve (Kenward 1990: 23). Three further Scottish localities (Lochmaben, Castle Loch; Moffat, Loch Wood; Gatehouse of Fleet, Castromon Wood) are listed in an unpublished report by Godfrey (1996). Up-to-date information on *P. granulicollis* will be found on Adrian Fowles's web site (see references). UK, ENGLAND: Cumbria, Wythop Woods (Atty 1996).

Notes

The first specimen listed above is one of 225 Coleoptera from Heysham's sale which were purchased by the British Museum from J.C. Stevens in 1859. Champion's 'Brighton' specimen is clearly wrongly labelled, as pointed out by Allen (in Kenward 1990: 25). Allen also states that Champion would not have recognized it (as distinct from *picipes*) but it was standing in Champion's collection over a printed series-label: 'v. granulicollis, Walt.' (now attached to the specimen).

According to M.A. Alonso-Zarazaga (pers. comm.) there are, in the Asturias region, two small towns called Caboalles which are close together. There are also two called Cangas which are further apart but one of which is quite near Caboalles (a third Cangas on the west coast of Galicia can be discounted). It seems likely, therefore, that Paganetti's specimens were all taken in a small area centred on 6° 25' W, 43° 0' N.

Comments

This species is notable for the pupillate granules on the disc of the pronotum and the shortness of antennal funicle segment 2 in relation to 3. It is the only species which commonly has a small frontal pit and 'white scutellum.' It is associated with damp mixed deciduous woodland with bracken and white climbing corydalis (*Ceratocapnos claviculata*)(Fowles 1992). It occurs widely in this habitat in upland Britain and in Surrey (Alexander 1999: 220) but attempts by myself and others (Fowles 1992: 20, Nigel Cuming, pers. comm.) to find it in this type of habitat in East Anglia have so far proved unsuccessful.

The Spanish specimens agree quite well with those from Britain; one of them is of the 'shaggy' variety mentioned in the description. This species was formerly thought to be a British endemic (Allen 1990). One reason for making this revision was to see if this was, in fact, the case.

***Procas picipes* (Marsham)**

Curculio picipes Marsham, 1802: 272.

Description

Length 3.5–6.9 mm. Head seldom with any trace of a frontal pit; rostrum not, or only slightly, longer than pronotum, usually with distinct median carina, often extending for most of its length; nasal plate without a distinct median carinula; sides very weakly tapering anteriad and often with faint constriction just before pre-apical expansion.

Antennae with funicle segment 2 × 1.2–1.8 as long as 3; segment 7 quadrate (weakly transverse in small specimens).

Pronotum with or without a smooth median line; punctures on disc fairly regular, with

hexagonal interspaces.

Vestiture of elytra uniformly variegated, never with larger scattered suberect white setae (Fig. 5); scutellum only rarely white; setae at sides of prothorax, above coxae, mostly bi- or multifid.

Terminalia. Column of male sternite 8 with elongate, straight or sinuous, flexible processes (Figs 74–82); sternite 8 of female with pigmented areas convergent or fused, apical setae large (< 0.1 mm long)(Figs 24, 25, 27–34); spermatheca with elongate tapering gland-lobe.

Comments

In this species antennal funicle segment 2 is, on average, longer, in relation to 3, than in the other species. In many specimens the pre-apical expansion of the upperside of the rostrum is displaced anteriad of the expansion of the underside, so that the rims of the latter are narrowly exposed when viewed directly from above. In other species the expansions coincide exactly. It is interesting that this character, first noticed by my colleague, Roger Booth, was used by Calder and Sands (1985: figs 5, 7) to separate two species of the South American erirhinid *Cyrtobagous*.

The range of *P. picipes* extends from Spain to Azerbaijan and the Middle East. I have seen enough material to convince me that three allopatric forms of this species exist, one in western Europe, another in the Russian Federation and a third in the Middle East. These forms differ chiefly in the vestiture of the tibiae, as indicated in the key (above, p.13). Although some variation has been detected in the shape of the duct-lobe of the spermatheca, this is not supported by any differences in male sternite 8. Moreover, the differences in vestiture of the tibiae seem to show a west-east progression from banded to uniform. For these reasons I treat these three forms as subspecies.

***Procas picipes picipes* (Marsham)**

Curculio picipes Marsham, 1802: 272; Burrell 1810: 173.
Rhynchaenus subnebulosus Samouelle, 1819: 390; Stephens 1829b: 167 (*nomen nudum*).
Hypera picipes (Marsham): Curtis 1826, No. 116, 1829: 49, 1837: 63.
N[ew] G[enus] *picipes* (Marsham): Stephens 1829a: 14.
Genus 297 *picipes* (Marsham): Stephens 1829b: 167.
Procas picipes (Marsham): Stephens 1831: 90, 1833: 55, 1839: 236; Spry & Shuckard 1840: 61, pl. 70, fig. 5; Jekel 1849: 113; Gaubil 1849: 159; Jacquelin du Val 1854: [14]; Dohrn 1855: 73, 1856: 69; Walton 1856: 18; Marseul 1857: 142; Calwer 1858: 513; Waterhouse 1858: 71, 1861: 27; Schaum 1859: 85, 1862: 89; Crotch 1863: 21; Lacordaire 1863: 468 (note); Morris, O.F. 1866: 24; Rye 1866: 262; Marseul 1867: 104; Stein 1868: 102; Gemminger & Harold 1871: 2433; Tournier 1874: 70; Des Gozis 1875: 72; Stein & Weise 1877: 143; Pascoe 1882: 39; Sharp 1883: 30; Stierlin 1893: 470, pl. 29, fig. 19; Edwards 1893: 487; Thompson 2003: 196; International Commission on Zoological Nomenclature 2005.
Erirhinus moestus Bach, 1854: 296, 1866: xlvii.

Procas moestus (Bach): Rottenberg 1868: 411.

Procas minutus Desbrochers, 1893: 9, 1894: 84; Heyden, Reitter & Weise, 1906: 657; Wagner 1916: 1100; Hustache 1930: 141, 142; Winkler 1932: 1540; Klima 1934: 31.

Procas armillatus minutus Desbrochers: Hoffmann 1958: 1421.

[Misidentifications:]

Procas armillatus (Fabricius): Heyden, Reitter & Weise 1883: 160, 1891: 304, 1906: 657; Bedel 1884: 113, 1887: 281; Everts 1887: 172 (note), 1903: 626, 1919: 120, 1922: 567; Schilsky 1888: 110, 1909: 171; Seidlitz 1891: 162; Fowler 1891: 266, pl. 166, fig. 6, 1905: 161; Sharp & Fowler 1893: 36; Fauconnet 1894: 378; Desbrochers 1894: 84; Acloque 1896: 371, pl. 111, fig. Pa; Walker 1896: 112, 1899: 626; Warnier 1901: 138; Edwards 1901: 134; Morley 1904: 719; Beare & Donisthorpe 1904: 40; Fowler 1905: 161, 1908: 173; Bedwell 1908: 274; Carpentier & Delaby 1908: 417; Roettgen 1911: 293; Kuhnt 1912: 968; Fowler & Donisthorpe 1913: 309; Carr 1916: 382; Reitter 1916: 204; Wagner 1916: 1099, pl. 39, fig. 19; Feige 1918: 209; Houlbert 1922: [54], pl. 7, fig. 83; Bedel & Sainte-Claire Deville 1924: 46; Scheerpeltz & Winkler 1930: 251; Hustache 1930: 141; Cox 1930: 231; Beare 1930: 45; Joy 1932: 230, pl. 65, fig. 13; Klima 1934: 30; Rapp 1934: 550; Portevin 1935: 217, fig. 241; Borchert 1938: 110; Kloet & Hincks 1945: 212, 1977: 85; Duprez 1947: 244; Caillol 1954: 202; Hoffmann 1958: 1420; Linssen 1959: 215, pl. 67, fig. 1; Massee 1964: 49; Brakman 1966: 197; Sebö 1971: 46, fig. 17; Allen 1971: 52; Angelov 1980: 267; Lohse 1983: 68, fig. 91:1; Dieckmann 1986: 148; Shirt 1987: 24; Read 1989: 7; Kenward 1990: 21; Mroczkowski & Stephańska 1991: 112, 195; Abbazzi & Osella 1992: 373; Hyman & Parsons 1992: 292; Fowles 1992: 20; Morris, M.G. 1992: 136; Duff 1993: 224; Burakovski et al. 1995: 47, 254; Salmon 1998: 109; Morris, M.G. 2002: 26, 36, 146, 2003: 200; Colonnelli 2003: 94.

Procas steveni (Gyllenhal): Jaquelin du Val 1854: 29, [14], pl. 13, fig. 58; Dohrn 1856: 69; Marseul 1857: 142; Redtenbacher 1858: 731, 1874: 270; Schaum 1859: 85 [= *moestus* Bach], 1862: 89; Bose 1859: 493; Grenier 1863: 54; Lacordaire 1863: 468 (note); Crotch 1871: 10; Stein 1868: 102; Kraatz 1869: 52; Sharp 1871: 28; Kellner 1874: 123; Cox 1874: 200; Martorell y Peña 1879: 50; Matthews & Fowler 1883: 39.

Erirhinus steveni (Gyllenhal): Lentz 1866: 95.

Description

Length 3.5–6.9 mm, mean (40) = 5.65. Head with rostrum (male) × 4.4–5.0 as long as broad, mean (8) = 4.75; rostrum (female) × 4.3–5.0 as long as broad, mean (8) = 4.62.

Antennae with lengths of funicle segments 1–3 in ratio 10: (7.5–10.0): (5.5–6.7), mean (20) = 10: 8.7: 6.2; segment 2 × 1.3–1.6 as long as 3, mean (20) = 1.4

Pronotum (Fig. 11) sometimes with smooth median line extending over most of its length.

Legs with middle and hind tibiae with long dense pale setae in apical third to half and a circlet of short white setae at base, intervening zone appearing black.

Terminalia. Male sternite 8, figs 74–78; female sternite 8, figs 27–31; spermatheca, figs 51–55.

Type material

There are four specimens of *P. picipes* in Stephens's collection but none bears the numbered disc which Stephens often placed on his Marsham specimens (Hammond 1972). Stephens (1831) gives several localities for the species and (1829b) indicates that he had

taken it himself. He does not say whether he obtained any Marshamian specimens. It is not, therefore, possible to say which, if any, of the four specimens is Marsham's. Worse still, a disc with the appropriate number (104) is attached to a specimen of *Hypera fuscocinerea* (Marsham), standing in Stephens's series of *H. pedestris* (Paykull). Nevertheless, his description of 1831 is clearly of *Procas*, not *Hypera* and his specimens of *P. picipes* are correctly named. Accordingly, in order to ensure stability of nomenclature and having met the conditions of Article 75.3 of the International Code of Zoological Nomenclature, I now make the following designation:

NEOTYPE of *Curculio picipes* Marsham, female, with BMNH 'neotype' disc, 'Britain / Stephens Coll.' (printed), 'NEOTYPE Curculio picipes Marsham det. R.T. Thompson 2003' and 'Procas picipes (Marsham) det. R.T. Thompson 2003.' The specimen measures 6.7 mm in length; it lacks part of the right hind leg and four of the remaining five claw segments; the metasternum is split. It is the only one of the four Stephensian specimens which is large enough to fit Marsham's description.

The type material of *Erirhinus moestus* Bach has not been found. Although previous editions of Horn and Kahle state that his collection is in Marburg, a recent supplement (Gaedike 1995) states: "Coleoptera in Marburg nicht registriert und nicht auffindbar." Bach attributes the name to Chevrolat on the authority of Erichson.

LECTOTYPE of *Procas minutus* Desbrochers, here designated, male, with 'Barcelona? / D. Türkeim' (MS); 'minutus' and 'type' (MS, both in same hand); 'Ex Museo / Desbrochers / 1914' (printed, in rectangle); 'Muséum Paris / Coll. Desbrochers' (printed) and 'LECTOTYPE Procas minutus Desbrochers det. R.T. Thompson 2002' in MNHN. The specimen measures 3.7 mm in length and is in good condition. A careful study of the description shows that Desbrochers is comparing *minutus* with *armillatus*, not *picipes*, of which his specimen is merely a dwarf (I have seen an even smaller British example).

No original specimens of *Rhynchaenus subnebulosus* Samouelle have been found. Stephens attributes the name to Simon Wilkin whose collection of British Coleoptera is in BMNH. Unfortunately, most of the Curculionoidea are missing. The name ('somewhat foggy') is suggestive of the variegated elytra of *Procas*.

Other material examined

SPAIN: 1 ex. with 'Barcelona / Januar unter Stein / Highf. [Himminghoffen]' (MS)(DEI); 1 ex. with 'Barcelona [?] / Highf.' (MS) and 'Portugal [!], coll. Gérard-Salme' (printed)(IRSN); 1 ex. with '117.' (printed), '2342' (MS), 'Bowring./ [18]63.47*' (printed), 'carbonarius Dej./Hispania' (MS), 'carbonarius / Hisp. (Erirhin.)(Dej.)' (H. Jekel MS)(BMNH). ITALY: 5 ex. Foggia, Lucera, 17.xii.1960, 8, 12, 13(2).ii.1961 (BGO); 2 ex. Lucera, 10.ii.1961 (LM, DM); 1 ex. Lucera, Puglia, 16.xii.1961; 1 ex. Abruzzo, Gran Sasso, Ofena, Colonia Frasca Estate, 550 m, 15.iii.1998 (B.G. Osella), in an olive grove on a sunny day; 1 ex. Abruzzo, Pescara, Poppoli, Valle Peligna, 300 m, 19.vii.1980

(Mammoli-Osella), in pit-fall traps in a swampy area; 1 ex. Mastromarco, 26.ii.1991, 'frumento trap' (all BGO). FRANCE: 1 ex. with 'Bass. Pyr. Gallia' (NMB); 1 ex. with 'Procas Stevenii Sp. nov. [!] Montpellier'; 1 ex. with 'D. Javeti: Duval Montpellier' (both OUM); 4 ex. Montpellier (V. Mayet)(JU); 1 ex. with 'Midi / D. Javet' (Chevrolat MS)(SMNH); 1 ex. Herault, Béziers (H. Lavagne)(IRSN); 1 ex. Béziers (v. Mayet)(BGO); 1 ex. Béziers (Lethierrey)(BMNH); 16 ex. Aix-en-Provence (Tisson)(9 DEI, 4 AMNH, 2 BGO, 1 ZMA); 5 ex. ditto, except 22.xii.1903, 'détritus, siphon' (DEI); 1 ex. ditto, but date illegible (NMB); 4 ex. ditto, except 27.xii.1903 (O. Leonhard)(DEI); 7 ex. Aix-en-Provence (no further data)(3 IRSN, 2 NMB, 1 ZMA, 1 MRSN); 2 ex. ditto, (Fagniez)(JU); 1 ex. ditto, (Staudinger)(ZMA); 1 ex. Marseille (J. l'Hermolte)(DEI); 3 ex. Marseille (no further data)(2 BMNH, 1 NMB); 1 ex. Midi (D. Javet)(Chevrolat MS)(SMNH); 2 ex. Daube (locality not found)(BGO, DEI); 1 ex. Auchel, iv.1916 (ZMA); 9 ex. with 'Gallia / Reitter' (7 BGO, 2 BMNH); 1 ex. with 'Gall. mer.' (Kiesenwetter)(ZSM); 1 ex. with 'Gall. occ.' (Hampe); 2 ex. Gallia (Tisson)(all DEI); 1 ex. Gallia (Kelecsényi)(NMB). UK, ENGLAND: 1 ex. with 'Brighton' under card; 1 ex. with 'Brighton 1930' under card, both N.H. Joy Coll. (BENHS); 2 ex. on card with 'Brighton 5.10 sweeping downs S.G. R[endel]' written beneath and 'Brighton / 14196' on disc (UZMC); 8 ex. Brighton (no further data)(MM); 4 ex. Brighton ([L.G.] Cox)(NMW); 60 ex. Brighton, 4.iii.1930 (mostly L.G. Cox)(37 OUM, 16 BMNH, 5 UZMC, 4 NM, 2 NMW, 1 JC, 1 NMS); 11 ex. Brighton, 2.v.1930 (UZMC), 22 ex. Brighton, 2.v.1930 (L.G. Cox)(20 BENHS, 1 NMW, 1 SMNS); 18 ex. Brighton, 4.v.1930 (Cox, Nicholson, Bedwell)(17 MM, 1 BENHS); 2 ex. Brighton, 8.v.1930 (L.G. Cox)(BMNH, BENHS); 4 ex. 11.v.1930 (L.G. Cox)(BENHS); 1 ex. Brighton, 11.v.1930 (A.M. Massee)(BENHS); 5 ex. Brighton, v.1930 (NMW); 2 ex. Brighton, 21.iii.1931 (MM); 6 ex. Brighton, 28.iii.1931 ([H.J.] Cribb)(BMB); 1 ex. Brighton, 2.iii1936[?] (L.G.Cox)(BENHS);. 13 ex. East Brighton, 10.v.1930 (H. StJ.K. Donisthorpe)(12 BMNH, 1 MM); 1 ex. with 'R.B / 591' (on disc)[Lewes, North Banks, 10.v.1884 (C.H. Morris)]; 1 ex. with '121 / 93' (on disc)[Bunkers Hill, 6.iii.1893 (C. H. Morris)](both BMB); 1 ex. Chatham, Darland Hill, 11.iii.1896 (J.J. Walker)(BMNH); 2 ex. Essex, Great Chesterford, TL/54, 10.v.1945 (G.H.L. Dicker, 'under dried grass in a chalk pit') (NFH); 1 ex. Bristol Channel, Lundy, 21–29.vi.1997, 'at roots of low plants near Quarter Wall' (M. Salmon)(MS); 1 ex. with 'Sherwood Forest./ 7–13.vi.1908' (CM); 1 ex. with 'Procas picipes Marsh.' (J. Walton MS); 1 ex. with '*Procas picipes* Marsh. Angl: Walton' (Schönherr MS)(both SMNH); 28 ex. without localities (9 BMNH, 7 MM, 4 UZM, 3 ENSA, 3 BENHS, 1 NMW, 1 HMAG); 7 ex. H. Britten Coll. (MM). BELGIUM: 1 ex. Tongeren, Ridderborn [Castle], *c.* 1865 (Maurissen)(ZMA). GERMANY: 1 ex. Magdeburg, Naturschutzgebiet "Kreutzhorst," 16.v.1976 (H. Breitbarth)(DEI); 1 ex. Wöllnau, Dübener Heide, 15.iv.1934 (Linke)(SMT). No localities: 1 ex. with 'de Rivaz 1869'; 2 ex. with small white disc, Lethierrey Coll. (all BMNH). Total: 289 specimens.

Additional (published) localities

FRANCE: Rouen, Evreux (Duprez 1947: 244); Marais de Renancourt-lez-Amiens; Mers (Carpentier & Delaby 1908: 417); Seine, Vitry; Calvados, monts d'Eraines près Falais; Fontenay-le-Marmioh (Bedel & Sainte-Claire Deville 1924: 46); Gard, La Musette, Nimes; Savoy, Conflans; Aude, La Ricardelle près Narbonne (Hustache 1930: 142); Pas de Calais, Boulogne-sur-Mer; Paris (Borchert 1938: 110); Bouches-du-Rhone, Marignane, canal du Verdon; Allauch; La Penne-sur-Huveane; Var, Isles d'Hyères; Vaucluse, Bords de l'étang de la Bonde; Avignon, crues du Rhône (Caillol 1954: 202). UK, ENGLAND: Norfolk, 'semel cepi' (I took it only once)(Burrell 1810: 173; Somerset; London, Battersea Fields (Stephens 1831: 91); Kent, Dartford (Fowler & Donisthorpe 1913: 309); 'Bristol, Glos.' (Massee 1964: 49); Mardon Moor (also known as Mardon Common), Devon (L.H. Woollatt)(Allen 1971: 52). NETHERLANDS: Limburg, Valkenburg (Everts 1919: 120). NORWAY: Tromsö (Borchert 1938: 110). GERMANY: Ahrweiler (Bose 1859: 493); Dossow, a single badly rubbed specimen (Lentz 1866: 95); Mansfeld (Kellner 1874: 123); Krefeld (Everts 1903: 626); Cleef (? = Kleve)(Everts 1922: 567); Eisleben, Goldgrund, under stone (Feige 1918: 209); Holzmarken; Göttingen (Rapp 1934: 550); Maastricht, Kleve (Borchert 1938: 110); Woferode (Borchert 1951: 209. POLAND: Babia Góra (von Hagens), one small specimen found on a wall (Rottenberg 1868: 411).

Additional (unpublished) record

UK, ENGLAND: Hertfordshire, St Albans, Aldenham, ix.1817 (Kirby MS). Two specimens in W. Kirby's collection (BMNH) may be those upon which this record is based; one has been labelled '?Type' by K.G. Blair but, since Marsham does not refer to Kirby in his description, Blair's suggestion is unlikely to be true.

Notes

The British records are listed in detail by Kenward (1990). 'Brighton' and 'East Brighton' refer to the same locality. The Sherwood Forest specimen, listed above, is from E.C. Bedwell's collection and is almost certainly the one recorded by him from Edwinstowe (Bedwell 1908: 274). This is at present the most northerly record for the species; I believe the record for Tromsö, listed above, is an error– it is too far north (70°). Babia Góra is a mountain on the Polish-Slovakian border.

***Procas picipes steveni* (Gyllenhal)**

Rhynchaenus steveni Krynicki, 1832: 147 (*nomen oblitum*).
Erirhinus steveni Gyllenhal, 1835: 287; Gaubil 1849: 158; Bach 1866: xlviii.
Procas steveni (Gyllenhal): Schönherr 1842: 387; Jekel 1849: 113; Marseul 1857: 142; Lacordaire 1863: 468 (note).
Procas picipes (Marsham)(*erratim pices* March.): Markovich 1909: 13.
Procas armillatus var. *steveni* (Gyllenhal): Heyden, Reitter & Weise 1883: 160.

Procas armillatus (Fabricius): Lacordaire 1863: 468; Reinkardt 1948: 574; Angelov 1975: 97, 1980: 267; Burakowski 1995: 47; Poiras 1998: 61. [Misidentifications]

Description

Length 4.0–6.5 mm, mean (22) = 5.76). Head with rostrum (male) × 4.2–5.0 as long as broad, mean (9) = 4.61; rostrum (female) × 4.3–4.8 as long as broad, mean (7) = 4.53.

Antennae with lengths of funicle segments 1–3 in ratio 10: (7.7–9.5): (5.0–6.5), mean (23) = 10: 8.5: 5.7; segment 2 × 1.3–1.8 as long as 3, mean (23) = 1.5.

Prothorax × 0.8–0.9 as long as broad, mean (16) = 0.85; pronotum without, or with only a trace of a smooth median line in middle of its length.

Legs with middle and hind tibiae with long dense pale setae in distal half and much shorter brownish setae in basal half, which appears dark; base without a distinct circlet of white setae.

Vestiture variable; sometimes fine, as in *P. p. picipes*, sometimes coarse, as in *P. p. levantinus*.

Terminalia. Male sternite 8, figs 79–81; female sternite 8, figs 32–34; spermatheca, figs 56–58.

Type material

LECTOTYPE of *Erirhinus steveni* Gyllenhal, here designated, male, with 'Paratypus' (printed, black on red), 'Charkov / Rossiae./ Steven.' (Schönherr MS), 'LECTOTYPE Erirhinus steveni Gyllenhal det. R.T. Thompson 2002' and 'Procas picipes steveni (Gyllehhal) det. R.T. Thompson 2002' in SMNH. The specimen is 6.0 mm long (allowing for displacement of the prothorax) and is complete, though the metathorax has been badly damaged by the huge pin upon which the specimen has been impaled. The 'Paratypus' label was probably used in the belief that other specimens had been returned to Steven and this may well have been the case (Schönherr states: ". . . ad describendum benevole missus"). However, the specimen is unusual in having a 'white scutellum' which is mentioned in Gyllenhal's description, so it is eminently suitable for designation. The present curator, Bert Viklund, tells me (pers. comm.) that it is the only specimen of *steveni* in Schönherr's collection.

Other material examined

UKRAINE: Kharkov Province: 3 ex. Elitnoye Village, v.1975, tree plantation (windbreak); 2 ex. Poltava, 22, 24.iv.1924 (F. Lukyanovich); 1 ex. Kamenets-Poldolskii, 3.iv.[1]911 (V. & I. Jakubovskii); 3 ex. Odessa, Khadzhibeiskii Park, 28.iii.1926 (F.K. Lukjanovich); 1 ex. Khadzhibeiskii Estuary, 30.(?).1920 (all ZIP); 1 ex. Odessa, Lgocki, 16.v.1904 (label with black border)(JU); 1 ex. Crimea, Simferopol (Artsimovich); 1 ex. Elizavetgrad (E. Yatzenkowskii); 1 ex. Zhadanov District, Veliko-Anadol (Silantiev); Nikolayev Province: 1 ex. Alexandrovskii District, Bogdanov-Kazikov, 1919 (Shreiner)(all ZIP). RUSSIA: Rostov Province: 1 ex. Novocherkassk Botanical Garden,

22.iii.1913 (Kizeritsky); 1 ex. Rostov-on-Don, Nedvigovka Village, v.1977 (Kozodaev); 2 ex. Rostov-on-Don, 4.v.1918 and 22.v.1922 (E. Zvierezomb-Zubovsky)(all ZIP); 3 ex. Don River (Eversman)(SMT); Stavropol Province: 1 ex. Stavropol, Shpakovskoye Village, 19.iv.1991 (V.A. Krivokhatskii); Krasnodar Province: 1 ex. 26 km ESE of Krasnodar, Kuban River, right bank, 12.v.1980 (B. Korotyaev); South Russia: 1 ex. Kursk, Shcheben, 10.iv.1907 (A. Serebryanik), oak forest (all ZIP); 1 ex. with 'Caucasus / occ.' (printed)(NMB). AZERBAIJAN: 3 ex. Nardaran Village, 6.ii.1982 (Alekperova); 1 ex. Apsheron Peninsula, Pirshagi Village, 30.vi.1985 (Alekperova)(all ZIP). TURKEY: 1 ex. Ezurum Province, 15 km south of Bayburt, 7.vi.1999 (B. Korotyaev), stony slope along road (ZIP). Total: 32 specimens.

Other (published) localities

MOLDOVA: (Poiras 1998: 61). BULGARIA: Razgrad (Markovich 1909: 13).

Comments

Present records show a wide gap between the ranges of the two European subspecies of *P. picipes*. Efforts by Polish colleagues have failed to produce any museum specimens from that country; Mroczkowski & Stephańska (1991) exclude *Procas* as Polish: '… mistakenly recorded over 120 years ago from Prussia and Babia Góra Mt.' while Wanat & Mokryzcki (2005) do not mention it. M. Merkl (pers. comm.) assures me that it does not occur in Hungary.

***Procas picipes levantinus* subsp. n.**
(Fig. 1)

[?] *Procas armillatus* (Fabricius): Bodenheimer 1937: 153. [Misidentification].
Procas alepensis auctt. (non Pic).

Description

Length 4.2–5.9 mm, mean (12) = 5.1. Head with rostrum (both sexes) × 4.2–4.7 as long as broad, mean (12) = 4.4.

Antennae with lengths of funicle segments 1–3 in ratio 10: (7.2–9.5): (4.5–6.3), mean (13) = 10: 7.9: 5.9; segment 2 × 1.2–1.7 as long as 3, mean (13) = 1.35.

Prothorax (male) × 0.83–0.86 as long as broad, mean (4) = 0.84; prothorax (female) × 0.81–0.88 as long as broad, mean (8) = 0.84.

Legs with middle and hind tibiae with dense pale setae throughout or with, at most, a small dark zone on dorsal edge, near base; basal circlet of white setae usually absent.

Vestiture coarser than in *P. p. picipes*; elytra with many prominent white setae (Fig. 2).

Terminalia. Male sternite 8, fig. 82; female sternite 8, figs 24, 25; spermatheca, figs 49, 50.

Type material

HOLOTYPE, female, JORDAN: Amman, 800 m, 22.iii.1957 (J. Klapperich), with 'Procas spec. Dieckmann det. 1987' in BGO. The specimen is 4.9 mm long, carded and undissected; some of its tarsi are imperfect. PARATYPES: 1 female, same data as holotype (BGO); 1 ex. Amman, 12.iv.1935 (W. Wittmer)(MCSN). ISRAEL/ PALESTINE: 1 ex. with 'Palaestina/ Reitter' (printed), C 12892 and 'Procas armillatus' (unknown hand)(TAU); 8 ex. Jerusalem, 12.iii.1933 (Schatzmayr), (5 MCSN, 2 NMB, 1 BMNH); 3 ex. ditto, except 13.ii.1933, Oliveto (2 NMB, 1 MCSN); 1 female, Jerusalem, iii.1933 (M. Aigner)(NMB); 1 female, Jerusalem, ii.1935 (F. S. Bodenheimer)(BMNH); 1 ex. Ben Schemen, 14.i.[19]26 (MZPW); 1 male, Mt Carmel, iii.1933 (M. Aigner)(ZMB). CYPRUS: 1 female, Limassol, 12.v.1920 (G.A. Mavromoustakis); 1 female, ditto, except 6.x.1923 (both BMNH); 1 female, no locality (Madon)(IRSN). TURKEY: 1 ex. with '40188' (A. Fry MS), Turcomenia, Kurdistan [pre-1872](Millingen), A. Fry Collection, B.M. 1905-100 (BMNH). Total: 23 specimens.

Comments

This subspecies is named after the region it mainly inhabits. It is strange that it should have been confused with *'P.' alepensis*, since Pic's description indicates a species with ". . . larges squamules denses qui garnissent le dessus de son corps." Records of *P. alepensis* Pic in Korotyaev 1991 refer to *Notodermus* sp. (specimens examined).

***Procas michaelis* sp. n.**

[?] *Erirhinus carbonarius* Dejean, 1835: 277 (*nomen nudum*).
[?] *Procas armillatus* (Fabricius): Barros 1907: 140. [Misidentification].

Description

Length 4.9–6.6 mm, mean (3) = 6.0. Head without a frontal pit; rostrum × 4.4–4.7 as long as broad, mean (3) = 4.64, punctures on upper surface finer and more regular than in *P. picipes* and with only faint traces of a median carina.

Antennae with lengths of funicle segments 1–3 in ratio 10: (7.1–7.7): (5.7–6.2), mean (3) = 10: 7.5: 5.9; segment 2 × 1.2–1.3 as long as 3, mean (3) = 1.26.

Legs with vestiture of middle and hind tibiae as in *P. p. picipes* but basal circlets of white setae ill defined.

Vestiture of body as in *P. p. picipes*.

Terminalia. Processes of male sternite 8 stiff, inflexibly united at base and very strongly divergent (Figs 86, 87); spermatheca with gland-lobe elongate, slender and very strongly reflexed (single example seen)(Fig. 48); pigmented areas of female sternite 8 large and narrowly separated, with medium to large setae (< 0.1 mm)(Fig. 26).

Type material

HOLOTYPE, male, SPAIN: Ciudad Real, Tablas de Daimiel, 28.xii.1983 (Velazquez de Castro), on *Scirpus*, '3h. solar' (MNCN). The specimen is clean and in good condition (dissected).

PARATYPES. SPAIN: 1 male, Cordoba, Luque, Santa Lucia, 'Bajo piedra', 28.xii.1983, under stone; 1 female, Cordoba, Puente Genil (no further data); 1 male, Santander (C. Bolivar)(all MNCN). Total: 4 specimens.

Comments

This species is named in honour of Miguel Alonso-Zarazaga. It lies between *P. p. picipes* and *P. armillatus* both geographically and in some details of its morphology. A male specimen from Elche, SE Spain (E. Pons, 1937-8)(MNCN) may belong to this species but its internal parts have been destroyed by *Anthrenus*.

The identity of Dejean's species cannot be established with certainty. An original male specimen (IRSN, examined) lacks the apices of the venter and elytra; the genitalia are incomplete and sternite 8 is missing. The tibial setae are pale brown throughout, with no basal circlets and the proportions of the antennal funicle segments are appropriate for *P. michaelis* or *P. armillatus*. The type locality, 'Hispania' also suggests its placement here.

Barros's record of *P. armillatus* from Portugal may also refer to this species; the entry reads: 'S. Martinho d'Anta! Très rare, sur les Mauves [*Malva* spp].'

***Procas armillatus* (Fabricius)**

Rhynchaenus armillatus Fabricius, 1801: 444.

Procas armillatus (Fabricius): Dohrn 1855: 73, 1856: 69; Marseul 1867: 104; Gemminger & Harold 1871: 2433; Fauvel 1897a: 64; Escalera 1914: 456; Sainte-Claire Deville 1914: 431; Tenenbaum 1915: 127; Winkler 1932: 1540; Porta 1932: 246; Klima 1934: 30; ?Bodenheimer 1937: 153; Kocher 1953: 121, 1961: 131; Dieckmann 1986: 148; Gregori & Osella 1989: 439, fig. 29; Machado & Oromi 2000: 82.

Erirhinus atomarius Gené, 1839: 37, pl. 2, fig. 16.

Procas cottyi Perris, 1864: 298; Marseul 1867: 104; Gemminger & Harold 1871: 2433; Tournier 1874: 71; Marseul 1875: 286; Bedel 1879: xviii [= *armillatus*]; Desbrochers 1894: 84; Winkler 1932: 1540; Klima 1934: 31; Normand 1937: 252; Osella & Riti 1995: 648; Colonnelli 2003: 94.

[Misidentifications:]

Procas picipes (Marsham): Wollaston 1865: 296; Bargagli 1884: 206.

Procas steveni (Gyllenhal): Wollaston 1864: 318.

Description

Length 4.0–8.0 mm, mean (45) = 6.54. Head sometimes with a very small frontal pit; rostrum (male) × 4.6–5.1 as long as broad, mean (7) = 4.8; rostrum (female) × 4.6–5.0 as long as broad, mean (7) = 4.75; pre-apical dilation more gradual than in the other species,

upper surface finely and evenly punctured, often with no trace of a median carina but with a fine linear carinula at extreme apex (Fig. 9).

Antennae (Fig. 18) with lengths of funicle segments 1–3 in ratio 10: (6.8–7.8): (5.6–6.5), mean (15) = 10: 7.14: 6.02; segment 2 × 1.1–1.3 as long as 3, mean (15) = 1.19.

Prothorax with disc of pronotum finely and evenly punctured, the smooth median line, when present, sometimes broad and irregular.

Legs with hind tibiae straight; setae on middle and hind tibiae as in *P. picipes* but basal circlets of white setae more prominent.

Vestiture of body very fine and recumbent throughout; elytra with a few (sometimes very few) much larger, semi-erect white setae which stand out against the otherwise dark background; metepisternum and sides of prothorax usually with exclusively simple linear setae.

Terminalia. Processes of male sternite 8 small, stout, inflexibly joined together, forming a 'V' (Figs 88–91); female sternite 8 often straight-sided, pigmented areas convergent, setae large (< *c*. 0.1 mm), spiculum broad (Figs 35–38).

Type material

LECTOTYPE of *Rhynchaenus armillatus* Fabricius, here designated, male, with small square green card, red card rectangle with 'TYPE' (printed), a card with printed linear borders inscribed 'Tanger./ Mus: S[eherstedt]: & T[onder] L[und]/ Armilla./ tus. F.', 'LECTOTYPE Rhynchaenus armillatus F. R.T. Thompson det. 2002' and 'Procas armillatus (F.) R.T. Thompson det. 2002' in ZMUC. The specimen measures about 7.9 mm in length (excluding rostrum) and has a small frontal pit. At some time in the past it has been badly broken and rather clumsily reassembled, using brown water-soluble glue; the left fore leg and right hind leg are missing and the left hind leg, lacking tarsus, is glued to the venter.

The type material of *P. atomarius* Gené has not been found. Gené's Sardinian collection is stated to be in Turin Zoological Museum (Horn et al. 1990: 135) but most of it has been destroyed (M. Daccordi, pers. comm.). Apart from describing the pronotum and underside as 'granulatum' (not punctatum) the description fits *P. armillatus* well, especially "tibiae rectae, basi angustissime albo-annulatae, apice late griseo-flavescente-pilosae."

A putative type specimen of *P. cottyi* Perris (ENSA) has been examined. It is in poor condition, lacks data or determination labels and does not fit the original description. In particular, the "série un peu sinueuse de tubercles bien visible" on each elytral interstria (which is diagnostic of *P. armillatus*) is not evident. I have therefore refrained from designating this specimen as lectotype. The type locality is Lalla-Magrnia in the Oran Province of Algeria.

Other material examined

PORTUGAL, AZORES: 1 ex., with 'Livramento / 4', 'Procas / armillatus F.' (?Fauvel MS), curator's label: 'Portugal, coll. et det. A. Fauvel'; 1 ex., with curator's label: 'Portugal, Livramento April, coll. A. Fauvel' (see note below) (both IRSN); MADEIRA: 1 ex. with 'taken by Dr C. Wolff near the *Curral*' written under the card and 'Procas Steveni, Schön (Madeira)' (Wollaston MS)(BMNH). SPAIN, CANARIES: 4 ex. Gran Canaria, Moya, 11(3), 13.i.2004 (M.G. Morris), general tapping (MGM); 1 ex. Tenerife, Bajamar, 10.xi.1909 (cerca Barranco Perdoma); 1 ex. Montes de los Silos, v.1921; 1 ex. Cumbre de Aguirre, iv.1921 (all MNCN); 1 ex. Fuerteventura, on card with yellow edge [Oliva, iii.1859 (T.V. Wollaston)](BMNH); 1 ex. Palma, on card with green edge and 'Barr[anc]o de Nogales' written beneath [near Galga, v.1858 (R.T. Lowe)](OUM); 2 ex. Gomera, Chorros de Epina, xii.1983 (G. Israelson)(SMNH); 1 ex. Gomera, near Tunel de la Caleta (M.G. Morris), general tapping at roadside (MGM); 2 ex. Hierro, Lomo Blanco, 6 km W of Frontera, 550 m, 27º 44´ 39 N, 18º 02´ 45 E, 24.i.1998 (Behne), '*Faya-Brezel gesiebt*'; 1 ex. El Gretime, 8 km W of Frontera, 800 m, 27º 44´ 29 N, 18º 03´ 53 E (Behne), sweeping *Urtica* and *Carduus* (all DEI). MOROCCO: 1 ex. Tanger (M. Escalera); 1 ex. Tazzeka (? = Jebel Tazekka), 15.i.1973, Olivella (both MNCN). ALGE RIA: 1 ex. Aïn Sefra (JU); 7 ex. Oran, Sidi bel Abbes (Plason)(BGO); 4 ex. Oran (2 NMB, ZSM, BGO); 8 ex. Oran, Daya (Bedel)(3 JU, ZSM, DEI, ZMAN, SMT, MRSN); 3 ex. Daya, (BMNH, IRSN, MRSN); 3 ex. Batna, 15.ii.1929 (A. Schatzmayr)(2 NMB, 1 DM); 1 ex., with 'Batna' (printed), 'Batna D./ Lethierrey' and 'Cottyi / Descrip. au / 1862 p. 298' (Chevrolat MS, on pale blue paper)(SMNH); 1 ex. Batna, Lethierrey Coll. (BMNH); 2 ex. Batna, 15.ii.1929 (A. Schatzmayr)(MRSN); 2 ex. Constatine (Meinert)(ZMUC); 1 ex. Saida (Zanini)(BGO); 1 ex. ditto, with 'v.1936'(MRSN); 2 ex. Philippville (= Skikda)(IRSN); 1 ex. Setif, 1100 m, 27.xii.1985 (A. Warchalowski)(DEI); 2 ex. La Calle (= El Kala)(IRSN); 1 ex. Bone, with '85 / Db' (ZIP); 1 ex. Bone, with '55 / Db' (DEI); 4 ex. Chellala, 1895 (Vauloger)(3 ZSM, 1 MRSN); 3 ex. Chellala (SMT, BGO, IRSN); 2 ex. Cmemala (BGO); 17 ex. without precise locality (4 DEI, 4 BMNH, 3 BGO, 2 ZSM, SMT, ZMAN, IRSN, MRSN). TUNISIA: 2 ex. Tunis, Sidi Gaber, xi.1952 (H.P. Müller); 1 ex. Tunis (Baudi)(all ZSM); 2 ex. Tunis (NMB, MZPW); 34 ex. Tunis District, 1881–2 (G. & L. Doria)(27 MCG, 3 DEI, 2 MRSN, BGO, ZIP); 1 ex. ditto, except 'Tunisi Miceli' and '1881' (DEI); 4 ex. Teboursouk (NMB). LIBYA: 2 ex. Benghazi, 17.i.1924 (G.C. Krüger)(MCG, MRSN). ITALY: 1 ex. Sicily, Mazara del Vallo, 30.xii.1986 (L.L. Castelli)(MRSN); 2 ex. Sardinia, Golfo degli Aranci (A. Dodero); 1 ex. Cagliari, Bonaria; 1 ex. Quartu Santa Elena (both U. Lostia)(all MCG); 1 ex. Golfo degli Aranci, 1.xi.[?] (G.C. Krüger)(RC); 10 ex. Asinara [I.], vi.1918 (A. Oczkowski)(UMCS); 5 ex. ditto, but no date (4 JU, 1 DEI); 2 ex. Maddelena I., ix.1985 (Cesaraccio)(BGO); 1 ex. Sardinia [?] (SMNH). MALTA: 1 ex. iii.1976 (O. Kochen)(DEI); 1 ex. Ta'Quali, 13.ii.2000; 1 ex. Zejtun, 30.xi.1997; 1 ex. St Thomas Bay, Tal-Munxar, 19.i.2003 (all D. Mifsud)(DM). FRANCE: 5 ex. Corsica (Damry)(3 ENSA, BMNH, ZMAN); 1 ex. Corsica

(Baudi)(MRSN). GREECE: 1 ex. 'Attica' (Reitter)(ZMAN); 1 ex. 'Attika' (NMB). No data: 16 ex. (9 DEI, 3 MNCN, 3 BMNH, 1 SMNH). Total: 187 specimens.

Doubtful records

1 ex., with 'Ross. mér.' (IRSN); 2 ex., with 'Chypre / Janvier' (JU).

Additional (published) records

ITALY: Sicily Channel, Pantelleria I., Mursia, 8.ix.1983 (E. Ratti & G. Rallo)(Osella & Riti 1995: 648). SPAIN: Balearic Is, Mallorca; Palma (Moragues y de Manzanos 1894: 76; Tenenbaum 1915: 127). MOROCCO: Casablanca (Kocher 1953: 121); Meknès; Azrou (Kocher 1961: 131); Oujda (Kocher 1964: 166). TUNISIA: Bizerta; Le Kef (Normand 1937: 252).

Notes

The place-name 'Livramento' occurs in mainland Portugal (and in Brazil) but M.A. Alonso-Zarazaga assures me that Fauvel's specimens are from the Azorean locality (on São Miguel I.). Fauvel is known to have received Azorean material from Baron Guerne ". . . ajoutant ce que j'ai recueilli moi-même aux Madère et aux Salvages pendant mon voyage en 1896" (Fauvel 1897b: 237) The ZIP specimen from Bone bears a label: 'Procas cottyi / type' (MS, on squared paper) but it is highly unlikely to have any type status. According to Bargagli (1884: 206) Damry's Corsican specimens were taken at Bonifacio. The identity of specimens from the Balearic Is needs to be checked; there are no specimens of *Procas* in the Tenenbaum collection (Malgorzata Adamczewska (MZPW), pers. comm.).

Comments

The largest species. The smooth widening of the rostral apex is subtly different from the more abrupt widening in the other species; occasionally the lower rims of the scrobes are visible in dorsal view, as in some *P. p. picipes*. The diagnostic white elytral setae are, in fact, quite small; they stand out because the general vestiture of the elytra is very small and fine, so that the surface appears dark in contrast to the white setae. Dark brown setae are also present but do not stand out. As mentioned in the introduction, the size of the elytral granules reflects the size of the setae they bear, so in *P. armillatus* the elytral intervals are covered with very small granules with, in addition, an irregular row of much larger granules bearing the large setae. These granules remain evident after the setae have been lost (Perris 1864: 298). *P. armillatus* is the only species in which split setae do not regularly occur on the sides of the prothorax and on the metepisterna. Some specimens have a 'white scutellum.' In spite of its extensive range, including numerous islands, no localized variation has yet been detected in this species.

Procas biguttatus Faust

Procas biguttatus Faust, 1882: 275; Bedel 1884: 113; Desbrochers 1894: 84; Winkler 1932: 1540; Klima 1934: 30; Inoue et al. 1963: 378, pl. 189, fig. 28; Egorov 1977: 33, 1981: 66; Hayashi et al. 1984: 289; Kwon & Lee 1986: 75 [= *okunii* Kôno]; Somokuroku 1989: 505; Zherikhin & Egorov 1990: 25 (Fig. 39), 28, 29, 31; Anon. 1994: 205 [not seen]; Caldara & O'Brien 1995: 396; Egorov et al. 1996: 437; Hong et al. 2000: 17; Kojima & Morimoto 2004: 77.
Notaris okunii Kôno, 1930: 159; Klima 1934: 36; Kôno & Kim 1937: 29 [not seen].

Description

Length 4.9–6.5 mm, mean (24) = 5.46. Head usually with more or less distinct frontal pit or irregular smooth area (often with both); rostrum more slender in male: × 4.5–5.1 as long as broad, mean (6) = 4.78, than in female: × 4.2–4.8 as long as broad, mean (8) = 4.49; punctures on upper surface fairly regular, interspaces sometimes uniting to form irregular carinulae but often without any trace of a median carina or apical carinula; sides above scrobes usually widening somewhat abruptly but sometimes evenly, as in *P. armillatus*.

Antennae with lengths of funicle segments 1–3 in ratio 10: (6.0–7.1): (3.3–4.8), mean (15) = 10: 6.6: 4.1; segment 2 × 1.5–1.9 as long as 3, mean (15) = 1.6; segment 1 × 2.1–3.0 as long as 3, mean (15) = 2.46; segment 7 weakly transverse, × 0.8–0.9 as long as broad, mean (12) = 0.87.

Prothorax with pronotal punctures fairly regular, interspaces forming a regular reticulum on disc; smooth median line vestigial.

Legs with fore tibiae straight or weakly sinuous, middle tibiae straight, hind tibiae evenly curving dorsad (as in *P. picipes*).

Vestiture rather coarse, white setae forming a variegated pattern on elytra and condensed at top of declivity to form white flecks in interstriae (2), 3 and (4) which together can form a short interrupted transverse band (Fig. 8); tibiae as in *P. p. picipes*.

Terminalia. Male sternite 8 with very slender column and slender curved blade-like processes (Figs 92–95); female sternite 8 with pigmented areas more or less fused, setae small (< 0.03 mm)(Figs 39, 40); spermatheca with gland-lobe conical at base, weakly expanded at apex and not, or only weakly, deflexed (Figs 65–67).

Type material

LECTOTYPE of *Procas biguttatus* Faust, here designated, female, with small square of gold-surfaced paper (now oxidised to brown); 'Wladiwast./ Christoph.' (Faust MS); 'Coll. J. Faust / Ankauf 1900' (printed, on yellow card); 'Type' (printed on red card); 'biguttatus' (MS, on yellow card) and 'LECTOTYPE Procas biguttatus Faust det. R.T. Thompson 2003' in SMT. The specimen is carded and in good condition (two tarsi are incomplete); it has white spots on both interstriae 2 and 3, so fits the description better than the other syntypes. PARALECTOTYPES: 3 females with same labels as lectotype; one is mounted below the lectotype, on the same pin, the other two have no original

determination label. Faust states that he had four specimens but adds 'und vom Amur.'

HOLOTYPE of *Notaris okunii* Kôno, male, with 'Sapporo / T. Okuni' (printed) and 'late August [in Japanese]/ 1912' (MS, under label); 'Notaris / okunii / Kôno' (MS) and 'Type' (printed) on pale crimson label; 'Procas / biguttatus / Faust' (MS) and 'det. H. Kôno' (printed) on white label in HUM. The specimen is 6.3 mm in length and lacks the right hind leg which was apparently pushed off by the pin, which has also displaced the venter. The tibiae, femora and parts of the elytra are dark red-brown in colour, indicating that the specimen is somewhat teneral. The eighth tergite is exposed and shows that the specimen is male, not female, as stated by Kôno.

Other material examined

RUSSIA: 1 ex. Amur [18]77 (Christoph)(DEI); 1 ex., with 'Amur / 4997' (on yellow card), '7224' (red ink) and 'fasciatus / Faust' (on yellow paper with '?' added later in pencil (SMT); 4 ex. Amur (Radde)(NMB); 1 ex., with 'Saghalien [= Sakhalin] / K. Tamanuki' (printed), 28.vi.1927 (MS, under label) and 'Notaris okunii Kôno' (ZIP); 2 ex., with 'Chabarowka [= Khabarovsk] am Amur' (SMT); 1 ex. with 'Nikolsk-Ussurijsk, fl. B. Elduga' (locality not found), 11.vi.1930 (T. Samoilov)(BMNH); 3 ex. Ussuysk, 10 and 12.vi.1930 (T. Samoilov)(2 KU, 1 MAF); 1 ex. Ussuri District, Bikin River, Island, 10.vii.1927 (Martynov); 2 ex. Suchan District, Tigrovaya River, 9.vi.1927 (Sokolov); 1 ex. ditto, but 8.vi.1927 (Shtakelberg); 1 ex. Suchan Town, vii.1925 (A. Chernysh. [?]); 1 ex. Primorye District, 'Iman.' [?], 22.iv.1911 (Shingarev); 4 ex. Evseevka, 10, 28, 29.v and 1.vi.1910 (Shingarev); 1 ex. ditto, but 14.v.1911 and (Ikonnikov)(all ZIP); 1 ex. South Primorye, Kamenushka, 19.vi.1979 (Mikheechev and Nikitsky)(BMNH); 1 ex. ditto, except 4.vi.1984 and (Nikitsky)(ZMUM); 2 ex. with 'Ost-Siberien / Vladivostok, Kangauz Village, 22.vi.1927 (A. Porvi [?])(SMT); 2 ex. With 'E[aster]n/ Siberia', F.P. Pascoe Coll. (BMNH). JAPAN: 1 ex. Honshu, Schizuoka Prefecture, Mount Amagi-san, 14.vi.1953 (K. Kusama); 1 ex. Gifu Prefecture, Kamitakara-mura, 16.vii.1967 (T. Nohira); 1 ex. Hokkaido, Mount Nipesotsu, Mamishihoro, 19.vii.1976 (H. Irie)(all KU). KOREA: 1 ex. Gyeongbug Province, Mount Pelgongsan, 6.vi.1978 (Y.J. Kwon)(KNU). CHINA: 1 ex. with 'Manshukuo, Erzendjanzsy' [? = Erdaodianzi], 30.vi.1940 (W. Alin)(DEI). Total: 40 specimens.

Other (published) localities

RUSSIA: Kuril Islands, Kunashir (Egorov et al. 1996: 437). KOREA, NORTH: (No details) (Kwon & Lee 1986: 75).

Comments

All the specimens examined have at least one white spot at the top of the elytral declivity but none has a 'white scutellum.' The specimen figured by Caldara & O'Brien 1995 ('*Procas* sp.') appears to be *P. armillatus*.

Procas picipes (Marsham [*erratim* Stephens]): LeConte & Horn 1876: 162; Hubbard & Schwarz 1878: 642.[Misidentifications]

Procas lecontei Bedel, 1879: lii, 1884: 113; LeConte & Horn 1883: 473; Henshaw 1885: 139; Leng 1920: 318; Klima 1934: 31; Arnett 1962: 983, 1003; Kissinger 1964: 47; Obrien & Wibmer 1982: 89; Arnett 1985: 394, 2000: 516; Bousquet 1991: 339; Downie & Arnett 1996: 1526; O'Brien & Anderson 1996: 5; Anderson 1997b: 528, 536, 560, 2002: 731.

Procas sp. Anderson 1997a: 439.

Description

Length 4.1–5.9 mm, mean (23) = 5.1. Head with frontal pit indistinct or absent; rostrum (male) × 3.67–5.0 as long as broad, mean (7) = 4.24; rostrum (female) × 4.0–4.57 as long as broad, mean (5) = 4.26, × 0.88–1.03 as long as pronotum, mean (12) = 0.95; upper surface coarsely and irregularly punctate, with no trace of a median carina.

Antennae (Fig. 19) with lengths of funicle segments 1–3 in ratio 10: (5.0–7.1): (3.7–5.2), mean (16) = 10: 6.1: 4.5; segment 2 × 1.11–1.56 as long as 3, mean (16) = 2.23; segment 4 quadrate, usually broader than 3; segment 7 distinctly transverse, × 0.60–0.75 as long as broad, mean (13) = 0.7.

Prothorax × 0.83–0.88 as long as broad, mean (12) = 0.85; pronotum often with no trace of a smooth median line.

Elytra usually with white flecks at top of declivity in interstriae (2) and 3 (Fig. 6) but they are often reduced, obscure, or even (apparently) absent.

Legs sometimes entirely dark red-brown (except coxae).

Vestiture as in *P. p. picipes*.

Terminalia. Male sternite 8 with processes short, stout, fused together along half their length or more but with sclerotized elements remaining separate (Figs 96–99); female sternite 8 with pigmented areas fused, fringing setae small (< 0.03 mm)(Figs 41–43); spermatheca with gland-lobe small, shape variable (Figs 68–73).

Type material

Bedel's type has not been examined but the La Vita Pass specimens are topotypes and Bedel's comments clearly refer to this species.

Other material examined

UNITED STATES: 3 ex. Colorado, [La] Vita Pass, [2869 m], 28.vi (Hubbard & Schwarz)(2 BMNH, 1 CNC); 1 ex. ditto, except 22.vi (BMNH). CANADA: 1 ex. Ontario, with 'E. Ont./ Can./ 1884 H.F. W[ickham]'; 1 ex. Ottawa, vi.1914 (G. Beaulieu); 1 ex. Ottawa, 12.v (C.H. Curran); 1 ex. Ottawa, Nepean St., 15.x.192[?]; 1 ex. with 'Ayl[mer] Rd.', 15.x ; 1 ex. Pearson, Smith, 28.v.[19]46; 2 ex. Pearson [Point], 5.viii.[19]46, nos. 10, 11; 1 ex. Pearson P[oin]t, 2.vii.[19]46, ('R.'); 1 ex. Lake Ontario (?), Wilson I.,

6.viii.[19]46; 1 ex. Hull, Chelsea, 19.vi.1911 (all CNC); 2 ex. Quebec, Duparquet, 1, 3.vi.1938; 5 ex. Duparquet, 1, 3.vi.1938, 30.vi.1940, 17.v.1942, 24.vi.1943, all '16924' (all G. Stace Smith)(all CAS); 1 ex, Manitoba, Aweme, 1.vii.1924 (N. Criddle); 1 ex. North West Territories, Exmouth L[ake], 65° 02' N, 115° 54' W, 24.viii.1966 (G.E. Shewell), M.T.S. Gravity Survey Camp; 1 ex. Yukon, Dawson, with '60 Mi. Rd.', vii.1949 (W. Judd)(all CNC). Total: 25 specimens.

Other (published) localities

UNITED STATES: Michigan, Marquette; Michipicoton River (Hubbard & Schwarz 1878: 642).

Comments

The white elytral spots resemble those of *P. biguttatus* but are less extensive (often reduced to a single spot on elytral interstria 3) and the setae composing them are often finer, so they are less conspicuous; in some specimens the spots seem to be absent. A 'white scutellum' is present in some specimens. The vestiture varies, as in *P. granulicollis*; in most of the specimens from La Vita Pass it is coarser and browner than in those from other localities. In spite of the extraordinary variation in the shape of the gland-lobe of the spermatheca (Figs 68–73) and the wide geographical separation of the populations studied, there is no clear evidence of localized variation among them.

Phylogeny

Given our present ignorance of their biology, any attempt at establishing a phylogeny for *Procas* and its relatives must be highly speculative. However, using *Notaris* as an outgroup, I have arrived at a scheme which, interestingly, demonstrates adaptation to increasingly dry habitats (Diagram 1). The characters used in the diagram are as follows:

1. Body: alate (0); apterous (1).
2. Vestiture of body: scales and setae (0); setae only (1).
3. Elytral setae: subequal (0); dimetric (1).
4. Pair of pale elytral declivital spots: absent (0); present (1). (This character occurs elsewhere in both Erirhinidae and Curculionidae.)
5. Rostrum, beyond antennal insertions: longer than broad (0); not longer than broad (1).
6. Rostrum, sides: not or weakly widening towards apex (0); distinctly widening (1).
7. Rostrum, secondary scrobe: smooth (0); punctate (1).
8. Rostrum, upper surface, fine median carina: present (0); vestigial or absent (1).
9. Pronotum, surface of disc: punctate (0); (in part) granulate (1).
10. Antenna, funicle segment 2: < × 1.3 as long as 3 (0); longer (1).
11. Antenna, funicle segment 1: < × 2 as long as 3 (0); longer (1).

12. Antenna, funicle segment segment 7: quadrate (0); transverse (1).
13. Hind femur of male: simple (0); with blade-like ventral expansion (1). (This structure is only doubtfully homologous with the femoral tooth of many Curculionidae).
14. Fore-tibial spurs: 2 (0); 1 (1).
15. Tibiae, setae of apical fringe: slender (0); stout, peg-like (1). (State 1 occurs generally in species that live on sand.)
16. Hind tibiae, apex, inner flange: bare (0); squamose (1). (State 1 parallels a condition in some Curculionidae that dig in sand.)
17. Tibiae, clothing setae: uniform (0); denser in distal third (1).
18. Tibiae, basal circlet of white setae: absent or indistinct (0); present (1).
19. Tarsi, segment 3: large, with adhesive pads (0); small, without pads (1). (State 0 is an adaptation to walking on smooth surfaces, e.g. plants; state 1, in this case, is an adaptation to walking on rough surfaces, e.g. rocks, soil.)
20. Sternite 8 of male, processes: firmly fused to apex of column (0); loosely attached (1).
21. Sternite 8 of male, processes: diverging (0); subparallel (1).
22. Sternite 8 of male, setae: simple (0); split (1); absent (2).
23. Sternite 8 of female: broad, with elongate spiculum (0); elongate, with short spiculum (1).
24. Sternite 8 of female, apex: expanded (0); not expanded (1).
25. Sternite 8 of female, pigmented areas, apically: separate (0); converging or fused (1).
26. Sternite 8 of female, apical setae: small (0); large (1).
27. Spermatheca, gland-lobe: not strongly reflexed (0); strongly reflexed (1).

Species *incertae sedis*

Procas rasus Desbrochers

Procas rasus Desbrochers, 1897: 2; Heyden et al. 1906: 657; Wagner 1916: 1100; Winkler 1932: 1540; Klima 1934: 31.

The type material of this Spanish species has not been found. The original, and only, account of it includes some characters that are appropriate for *Procas*, as here interpreted, and others that are not. Desbrochers's statement: "Très distinct du *P. Steveni et de ses congénères* [my italics]. . ." suggests that it belongs in another genus but I am unable to say which.

Procas sibiricus Pic

Procas sibiricus Pic, 1904a: 27; Winkler 1932: 1540; Klima 1934: 31; Caldara & O'Brien 1995: 396.

The type material of this species has not been found. The type locality is 'Sibérie Or.' Pic's description consists of generic characters of *Procas*; he compares his species with *P. biguttatus* (the only other Siberian species) thus: "Moins robuste. . . et n'ayant pas de macules blanches."

Procas maculatus Pic

Procas maculatus Pic, 1915: 1; Klima 1934: 31; Zumpt 1937: 212 [? = *Notodermus saulcyi* Reiche].
Notodermus maculatus (Pic): Winkler 1932: 1540.

The type material of this species has not been found. The type locality is 'Liban.' Pic compares his species with *Notodermus saulcyi* Reiche and I am content to follow Zumpt and Winkler in regarding it as belonging to that genus.

Note

Scudder (1893) has described two fossil species, *P. vinculatus* and *P. verbenatus*, from Colorado, USA. The author himself concedes that "they can not be regarded as properly members of this genus" and his descriptions amply support this view.

Procas pyrrhodactylus, sensu Stephens, not Marsham

Procas pyrrhodactylus (Marsham): Stephens 1831: 91.

Marsham described *Curculio pyrrhodactylus* from a specimen in Kirby's collection. Stephens regarded this species as a *Procas* but his concept of it was based on specimens from Marsham's collection, not Kirby's. These specimens have not been found and the only specimen now standing in Stephens's collection as *pyrrhodactylus* is a *Hypera rumicis* (Linnaeus). This specimen does not bear a 'Marsham number' and does not fit Stephens's description of *pyrrhodactylus.* Interestingly, in John Curtis's collection, a printed label '2 pyrrhodactylus Mar.' stands above that of *rumicis.* It may be significant that *pyrrhodactylus* is entirely omitted from Stephens's *Manual* of 1839. It seems likely, therefore, that its identity will remain unknown.

Comments

The identity of *Curculio pyrrhodactylus* Marsham is not immediately obvious. The description does not fit any known European weevil. Marsham states that the type is in Kirby's collection, so it may not have been before him when he prepared the description. He places it in a group with ". . . rostro pectori intra pedes sese applicante, sive pectus

premente" (rostrum decurrent between the legs or resting on the chest). Of the 32 nominal species in the group, 22 are Ceutorhynchinae, the others mostly Cryptorhynchinae and Tychiinae. Species now in *Procas* and *Hypera* are placed together in another group. In Kirby's collection there stands a severely abraded (therefore black) example of *Sibinia potentillae* bearing a label '4 pyrrhodactyla Kir.' Its most striking feature is its bright wine-red tarsi which suggests that this specimen, or one like it, is what Marsham saw (the name means 'red-finger'). This view is supported by the fact that Kirby (MS) lists *pyrrhodactylus* under *Sibinia*. I therefore support Caldara's (1985) designation of the above-mentioned specimen as lectotype of *C. pyrrhodactylus.*

Nomenclatural changes

Notodermus Desbrochers, 1875 and *Apachiscelus* Desbrochers,1875, **genn. rev.** (not synn. of *Procas* Stephens).

Pseudypera Voss, 1936 = *Notodermus* Desbrochers, not *Procas* Stephens (**stat. rev.**).

Syrdariella Ter-Minassian, 1978 = *Theanellus* Reitter, 1912, **syn. n.** *T. grisea* (Ter-Minassian)(Uzbekistan) closely resembles *T. bagoides* Reitter, 1912. Types examined.

Hypera siccensis (Normand), **comb. n.** (ex *Procas*). Syntype examined. *H. siccensis* (Normand, 1951) = *H. pollux* (Fabricius, 1796), **syn. n.** Normand's material came from Tunisia but I have been unable to find any other record for *H. pollux* from North Africa.

Procas cottyi Perris, 1864 = *P. armillatus* (Fabricius, 1801), **syn. rev.** (see above, p.10).

Theanellus alepensis (Pic, 1915), **comb. n.** (ex *Procas*). Syntype examined.

Theanellus alternans (Faust, 1885), **comb. n.** (ex *Apachiscelus*). Type series examined. Bajtenov (1974a) redescribed *T. alternans* in *Procas* and (1974b) added a new species, *T. testaceus* (Bajtenov), **comb. n.** (ex *Procas*).

Theanellus antoinei (Hustache, 1932), **comb. n.** (ex *Procas*). Syntype examined.

Theanellus fastidiosus (Pic, 1904b), **comb. n.** (ex *Procas*). Syntype examined.

Acknowledgements

To the 84 people who helped me with this study I extend my warmest thanks and to the 14 who did not I grant my forgiveness. I am especially grateful to my colleague, Max Barclay, for computer assistance and to Svetlana Nikolaeva for help with Russian localities and texts. The photographs and SEM images were prepared by staff of BMNH photographic and EM units, respectively.

The manuscript was checked by M. A. Alonso-Zarazaga, H. Mendel and R. G. Booth before submission.

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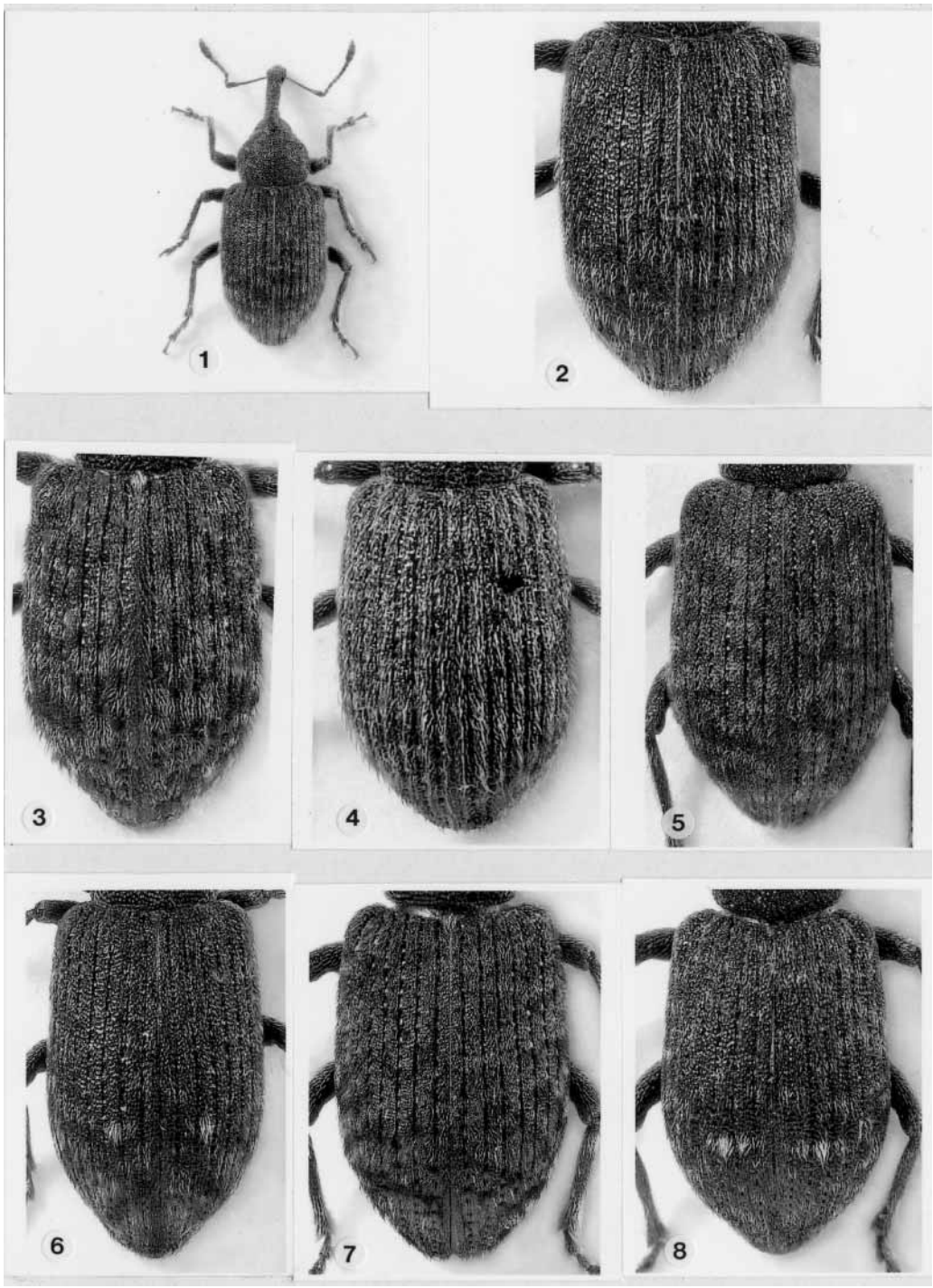
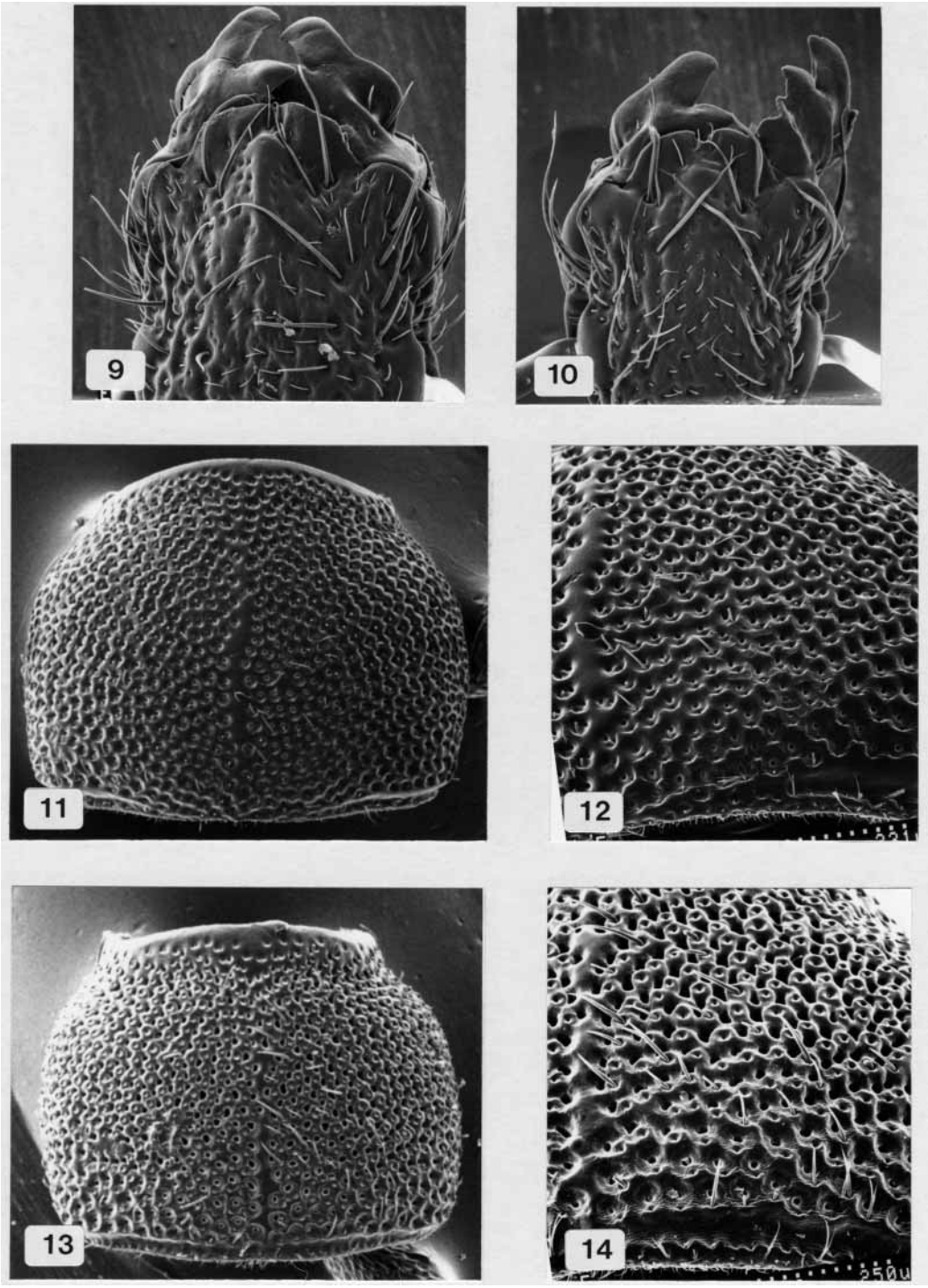
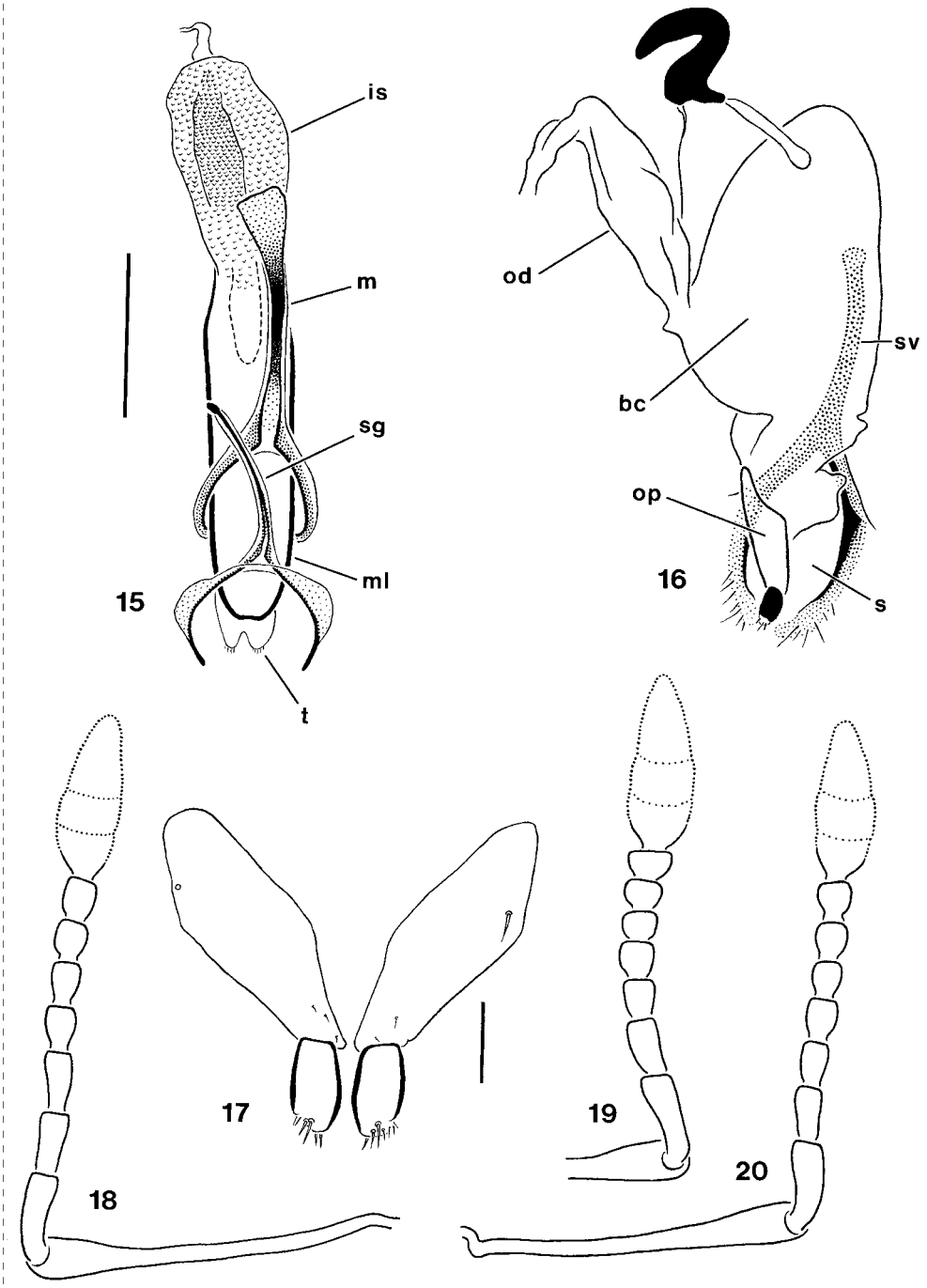


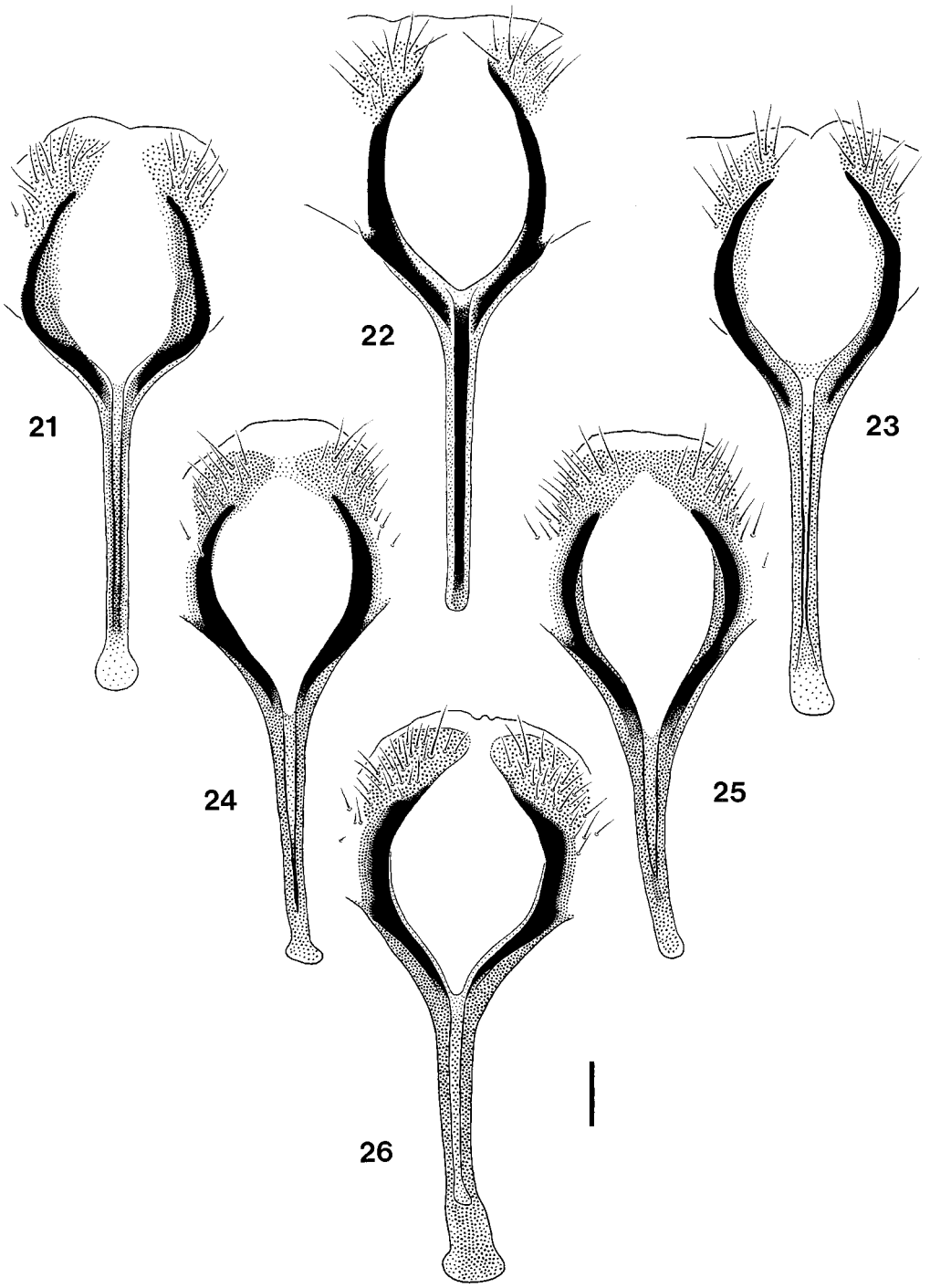
FIGURES 1–8. 1. Habitus, dorsal, of *Procas picipes levantinus*; 2–8. Elytra, dorsal, of (2) *P. p. levantinus*, (3) *P. granulicollis* (normal form), (4) ditto ('shaggy' form), (5) *P. p. picipes*, (6) *P. lecontei*, (7) *P. armillatus*, (8) *P. biguttatus*.



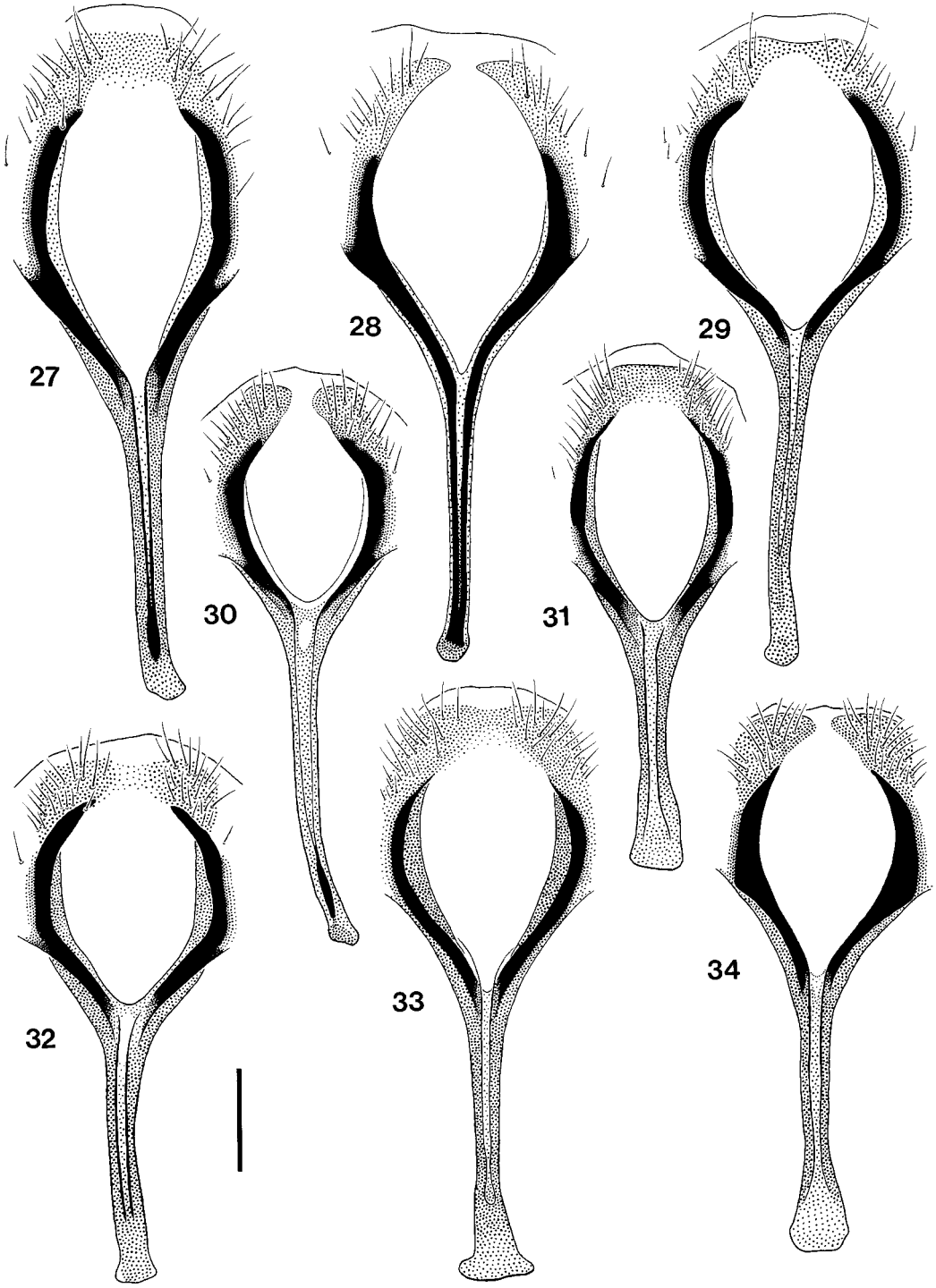
FIGURES 9–14. 9, 10. Apex of rostrum, dorsal, of (9) *Procas armillatus*, (10) *P. p. picipes*; 11–14. Prothorax of (11) *P. p. picipes* (setae removed), (12) ditto, part enlarged and in oblique view to show detail), (13) *P. granulicollis* (setae removed), (14) ditto, part enlarged and in oblique view to show detail.



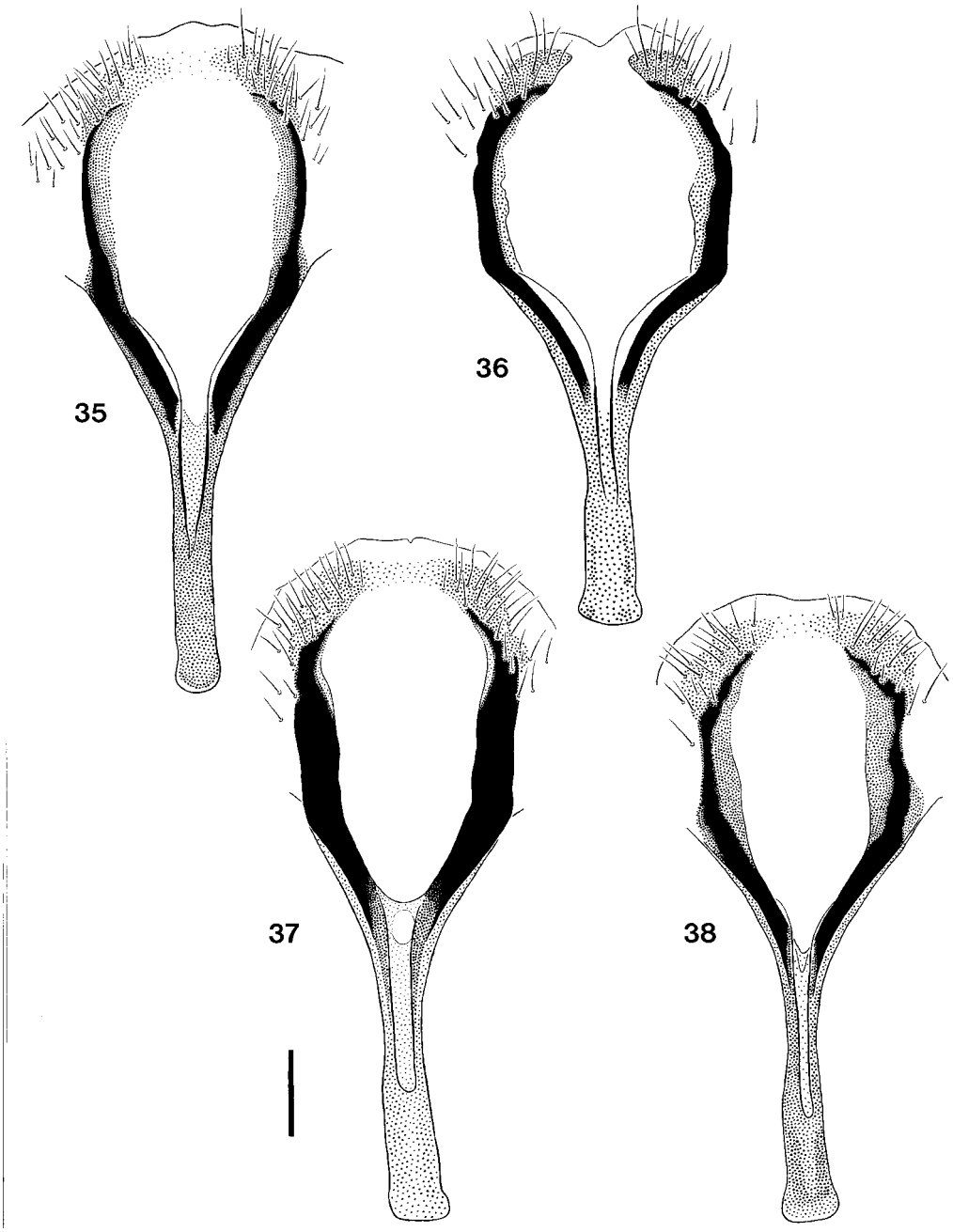
FIGURES 15–20. Terminalia of (15) *Procas granulicollis*, male, ventral view, (16) *P. p. picipes*, female, dorsal view (right valve of ovipositor omitted). Scale-bar = 0.5 mm. Key: bc, bursa copulatrix; is, internal sac; m, manubrium; od, oviduct; op, ovipositor; s, sternite 8; sg, spiculum gastrale; sv, spiculum ventrale; t, tegmen (apex of dorsal plate). Ovipositor of *P. p. picipes* (17). Scale-bar = 0.1 mm. Antennae, ventral view, of (18) *P. armillatus*, (19) *P. lecontei*, (20) *P. granulicollis*. Scale as figs 15, 16.



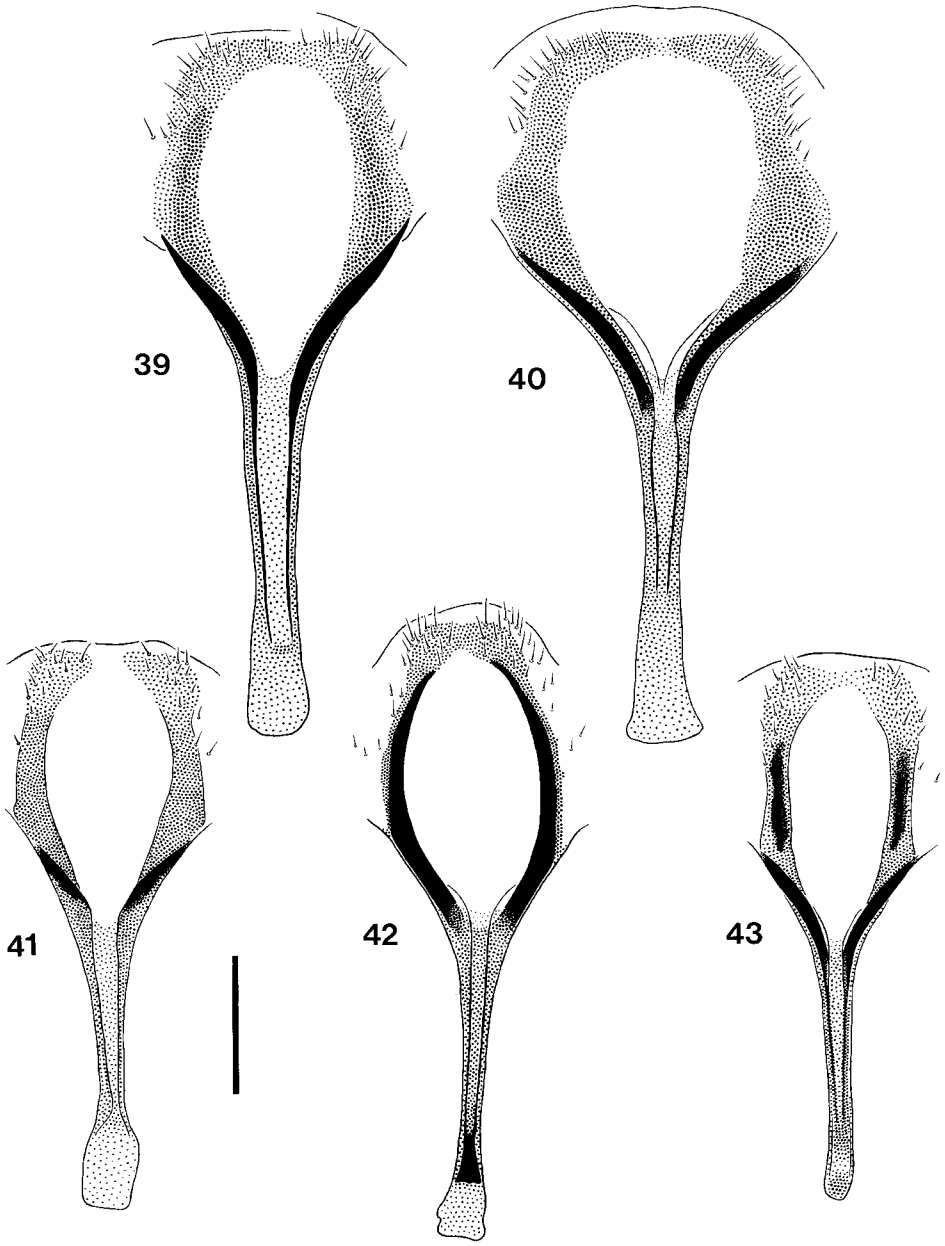
FIGURES 21–26. Sternite 8 of female of (21) *Procas granulicollis*, 'shaggy' form from Spain, Cancas, (22) normal form from Wales, Carn Gefalt, (23) ditto, from Spain; (24) *P. picipes levantinus* from Israel, Jerusalem, (25) ditto from Jordan, Amman; (26) *P. michaelis* from Spain, Puente. Scale-bar = 0.2 mm.



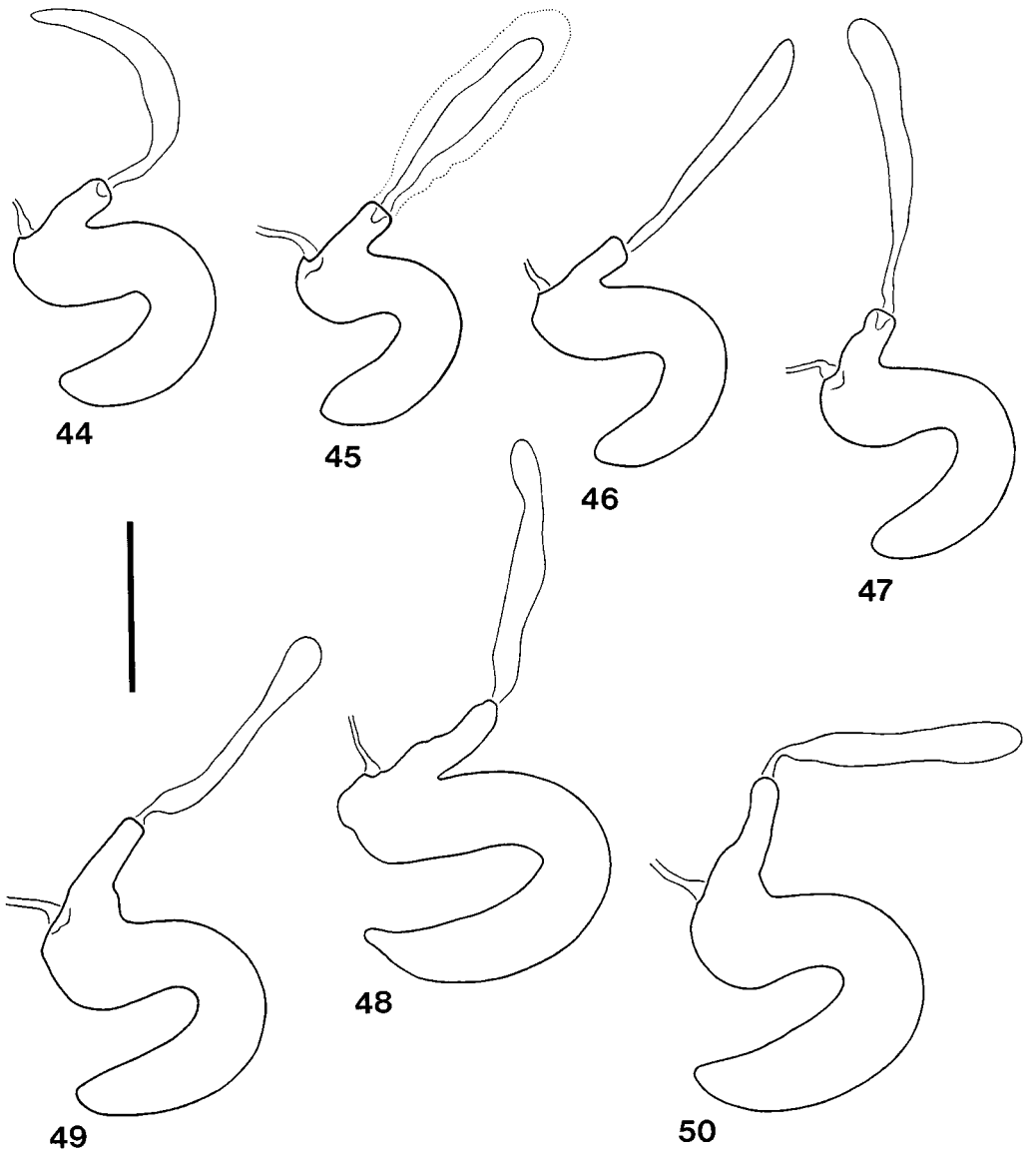
FIGURES 27–34. Sternite 8 of female of *Procas p. picipes* from (27, 28) England, Brighton, (29) France, Marseille, (30) Spain, Barcelona, (31) Germany, Duben; *P. p. steveni* from (32) Russia, Rostov, (33) Caucasus, (34) Azerbaijan. Scale-bar = 0.2 mm.



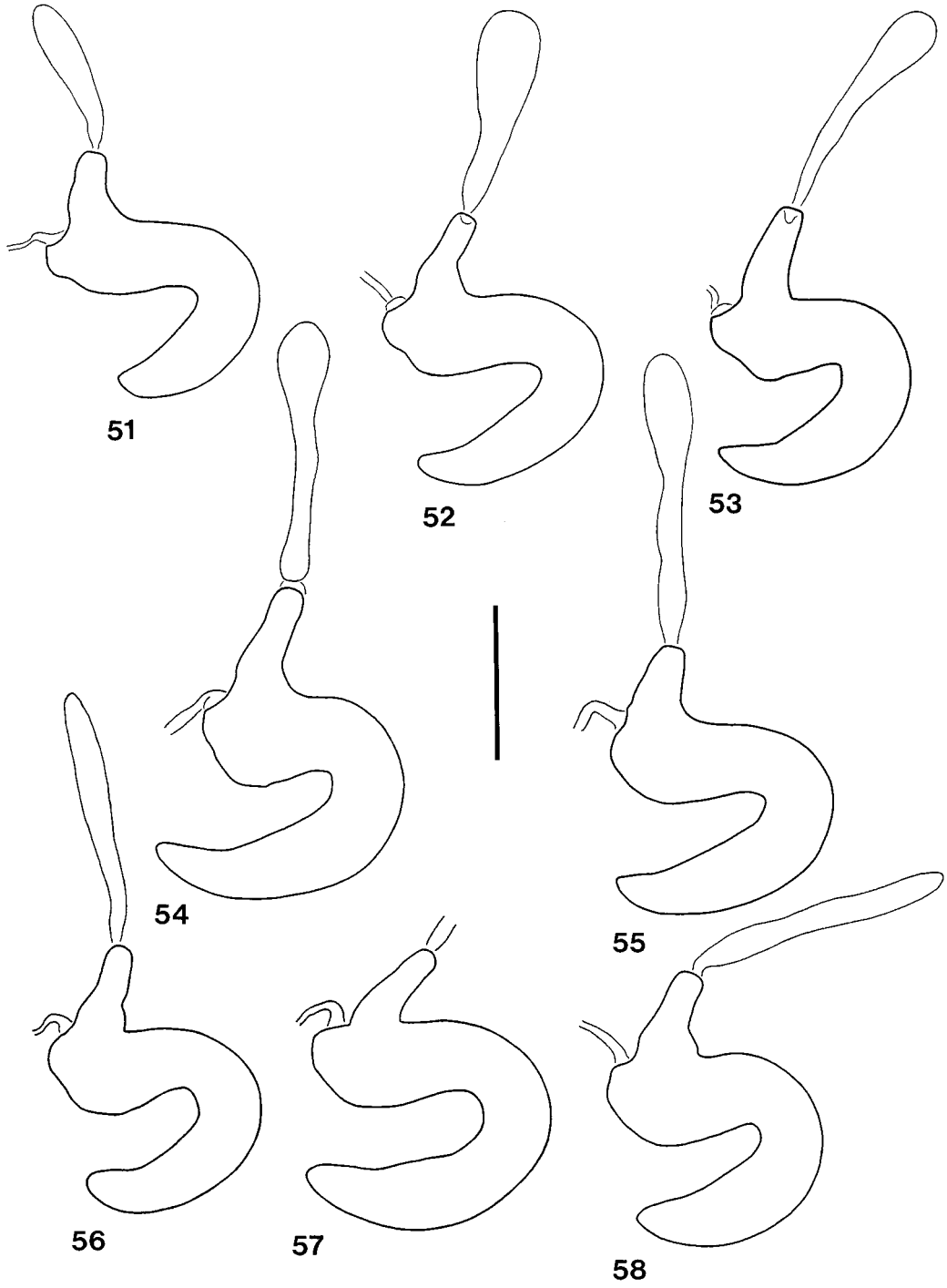
FIGURES 35–38. Sternite 8 of female of *Procas armillatus* from (35) Canary Is, (36) Algeria, (37) Tunisia, Teboursouk, (38) Algeria, Setif. Scale-bar = 0.2 mm.



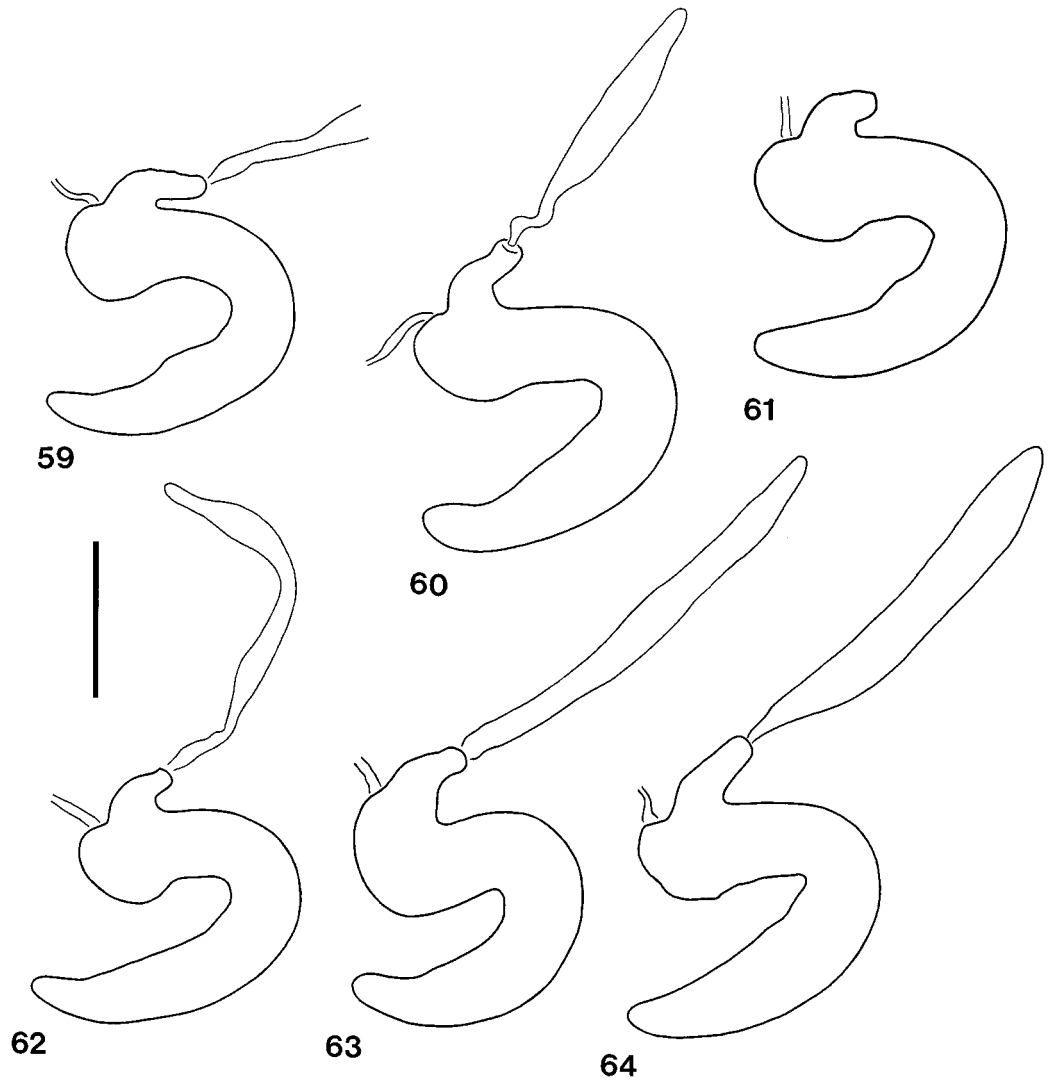
FIGURES 39–43. Sternite 8 of female of *Procas biguttatus* from (39) Russian Far East, Bikin River, (40) Russian Far East, Evseevka; *P. lecontei* from (41) USA, Colorado, La Vita Pass, (42) Canada, Quebec, Duparquet, (43) Canada, North West Territories, Lake Exmouth. Scale-bar = 0.2 mm.



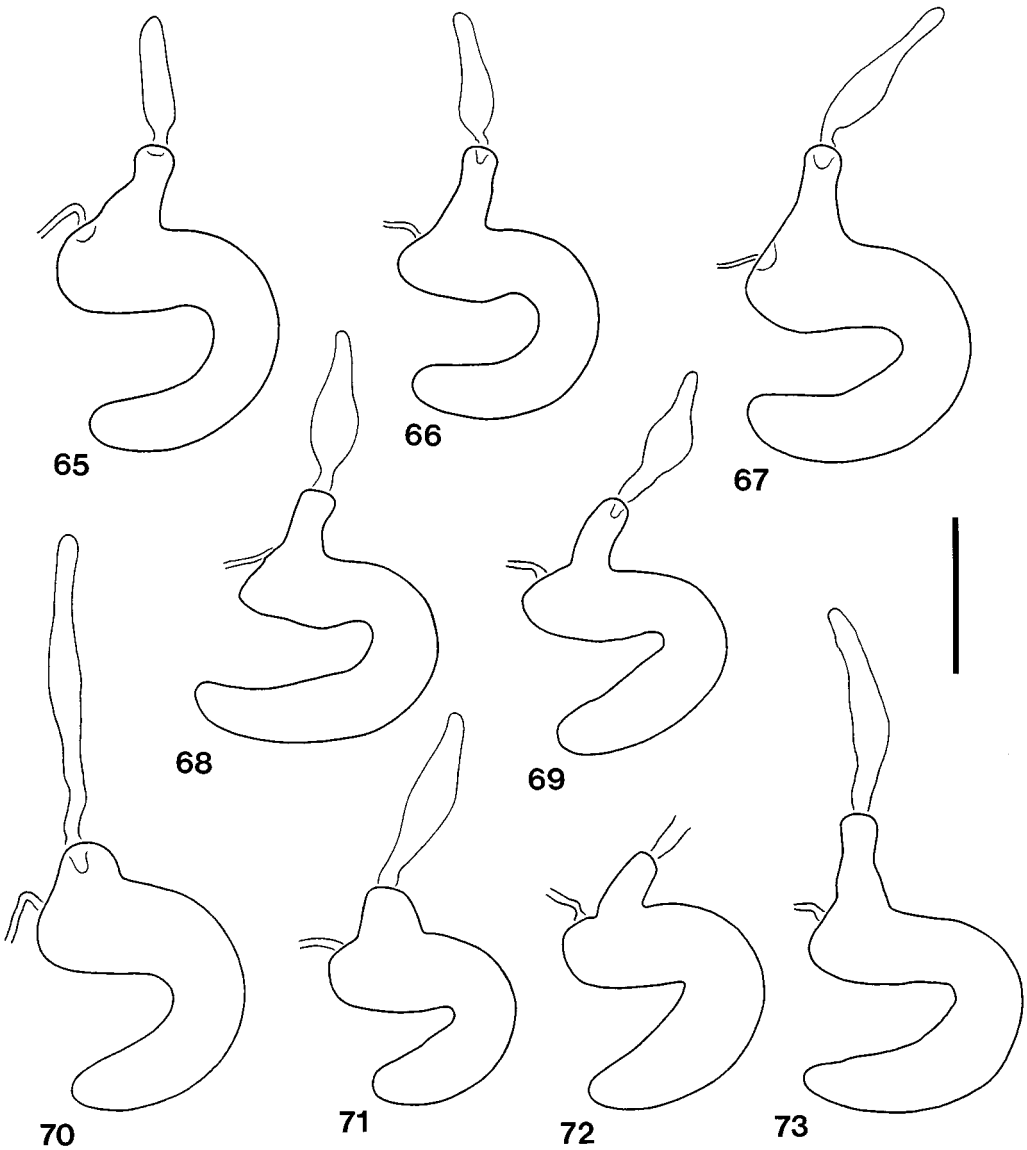
FIGURES 44–50. Spermatheca of *Procas granulicollis*, (44) 'shaggy' form from Spain, Cangas, (45–47) normal form from (45) Wales, Carn Gefallt, (46) Spain, (47) England, Carlisle; (48) *P. michaelis* from Spain, Puente, (49) *P. picipes levantinus* from Israel, Jerusalem, (50) ditto, from Jordan, Amman). Scale-bar = 0.2 mm.



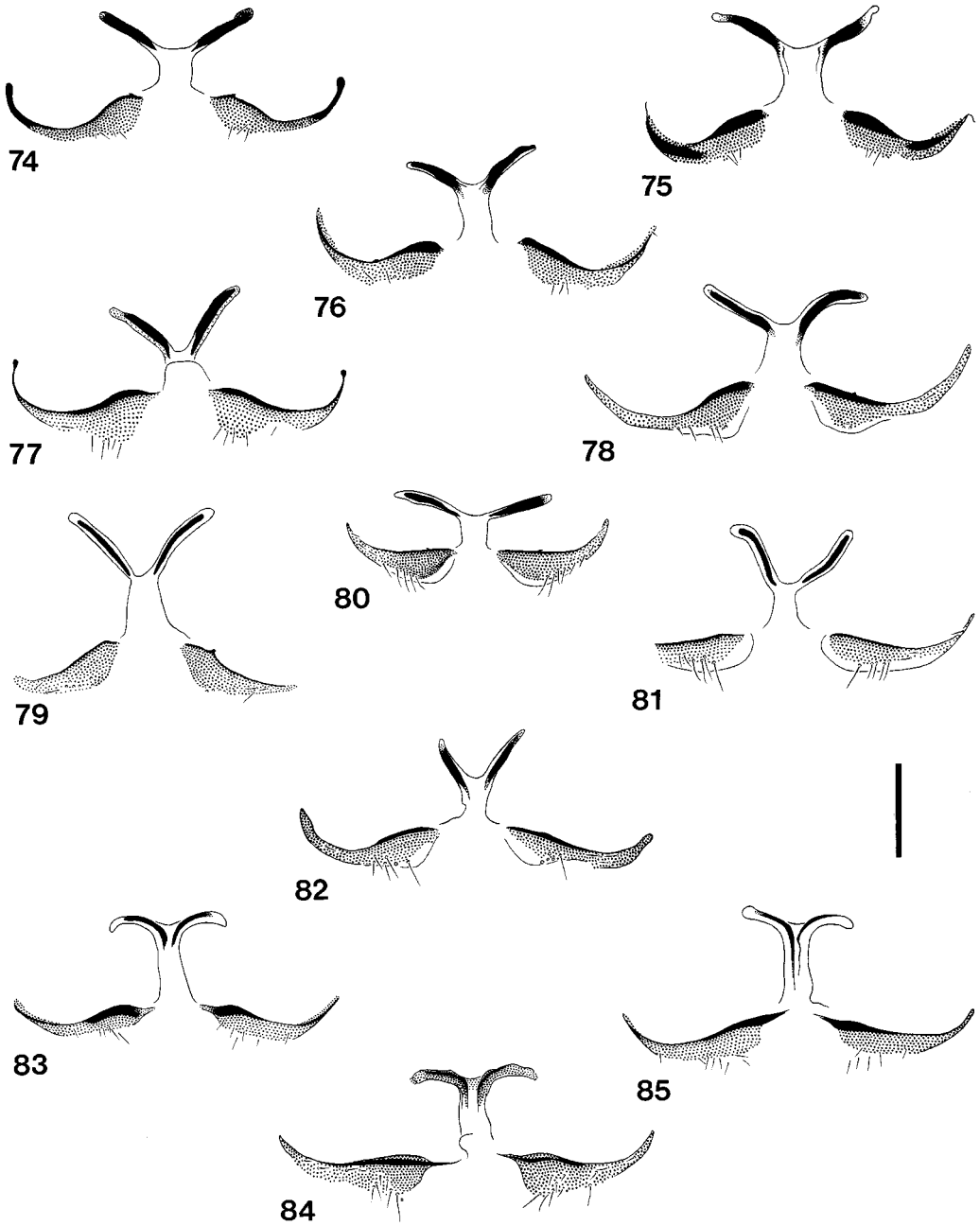
FIGURES 51–58. Spermatheca of *P. p. picipes* from (51, 52) England, Brighton, (53) France, Marseille, (54) Germany, Duben, (55) Italy, Lucera; *P. p. steveni* from (56) Ukraine, Kharkov, (57) Russia, Rostov, (58) Azerbaijan. Scale-bar = 0.2 mm.



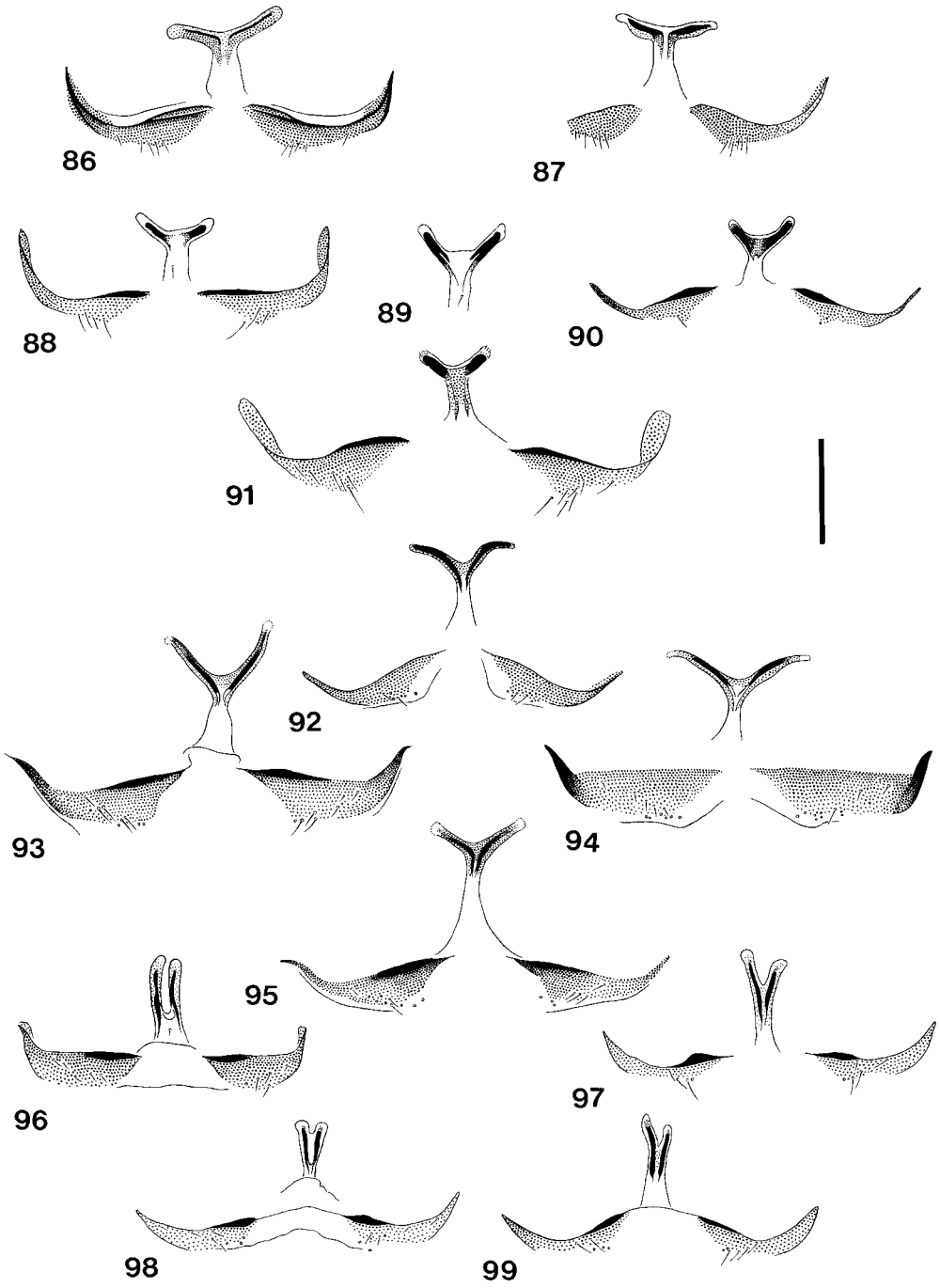
FIGURES 59–64. Spermatheca of *Procas armillatus* from (59) Canary Is, (60) Tunisia, Teboursouk, (61) Algeria, (62) Algeria, Setif, (63) Morocco, Jebel Tazekka, (64) Sardinia, Asinara I. Scale-bar = 0.2 mm.



FIGURES 65–73. Spermatheca of *Procas biguttatus* from (65) Russian Far East, Bikin River, (66) Japan, Gifu, (67) Russian Far East, Evseevka; *P. lecontei* from (68) USA, Colorado, La Vita Pass, (69) Canada, Manitoba, Aweme, (70) Canada, Quebec, Duparquet, (71) Canada, North West Territories, Exmouth, (72) Canada, Eastern Ontario, (73) Canada, Ontario, Wilson I. Scale-bar = 0.2 mm.



FIGURES 74–85. Sternite 8 of male of *Procas p. picipes* from (74, 75) England, Brighton, (76) France, Marseille, (77) Italy, Lucera, (78) Italy, Mastro Marco; *P. p. steveni* from (79, 80) Azerbaijan, (81) Ukraine, Odessa; *P. p. levantinus* from (82) Israel, Jerusalem; *P. granulicollis* from (83, 84) Wales, (85) Spain. Scale-bar = 0.2 mm.



FIGURES 86–99. Sternite 8 of male of *Procas michaelis* from (86) Spain, Santa Lucia, (87) Spain, Tablas de Daimiel; *P. armillatus* from (88) Corsica, Bonifacio, (89) Algeria, Oran, (90) Libya, Benghazi, (91) Azores, São Miguel I, Livramento; *P. biguttatus* from (92) Russian Far East, Evseevka, (93) China, 'Erdzendjancy,' (94) Russian Far East, Vladivostok, (95) Japan, Hokkaido; *P. lecontei* from (96) Canada, Yukon, Dawson, (97) USA, Colorado, La Vita Pass, (98) Canada, Quebec, Duparquet, (99) Canada, Ontario, Pearson Point. Scale-bar = 0.2 mm.

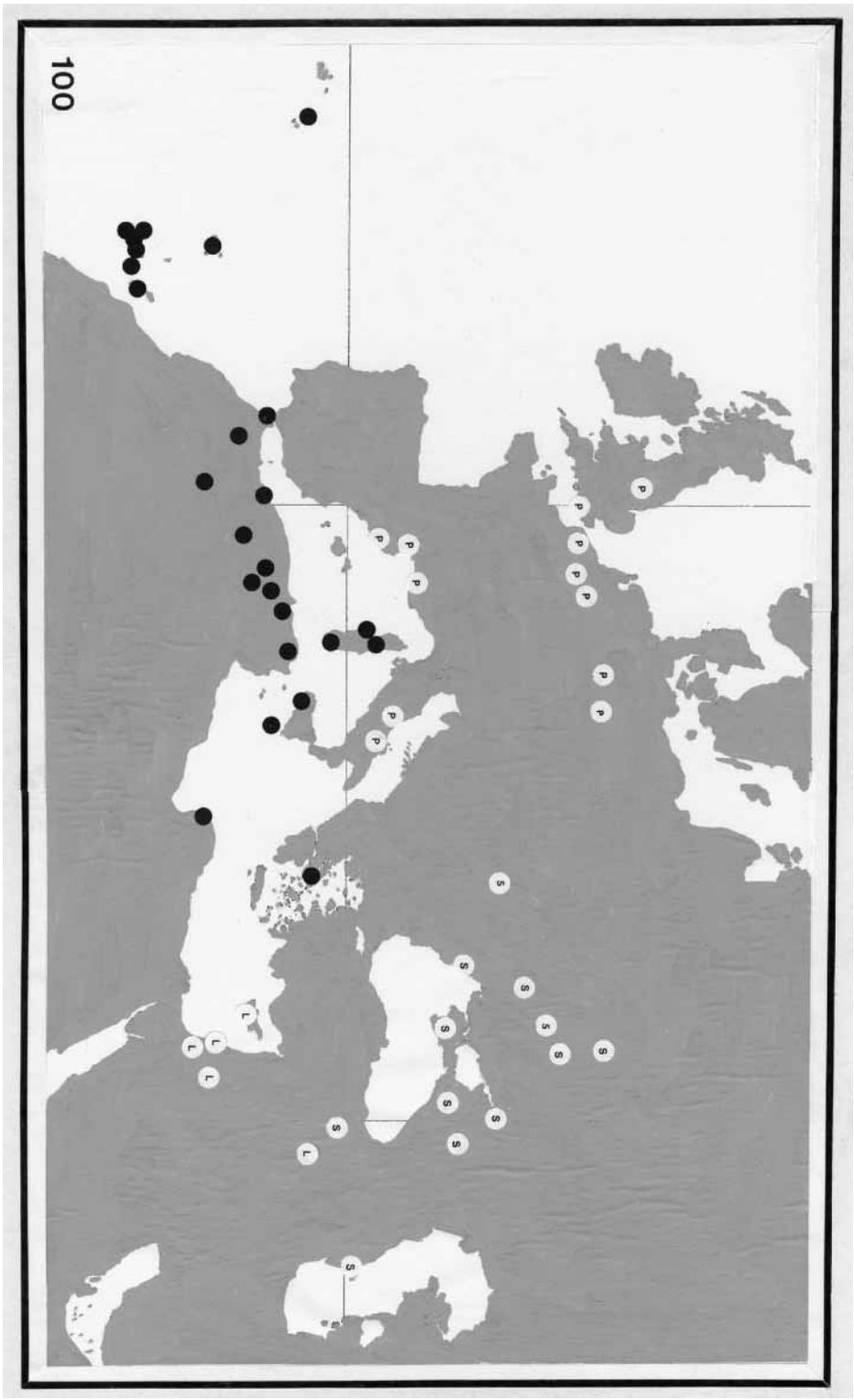
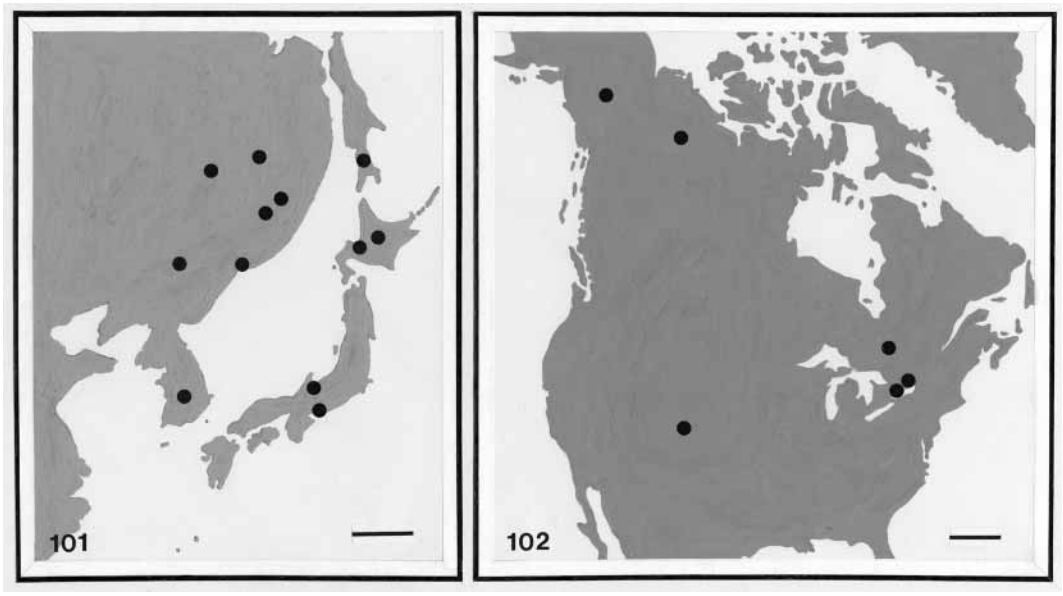


FIGURE 100. Map showing confirmed localities for *Procas armillatus* (black dots) and *P.picipes* (white dots); P = *p. picipes*, S = *p. steveni*, L = *p. levantinus*.



FIGURES 101, 102. Maps showing confirmed localities for (101) *Procas biguttatus*, (102) *P. lecontei*. Scale–bars = 500 km.

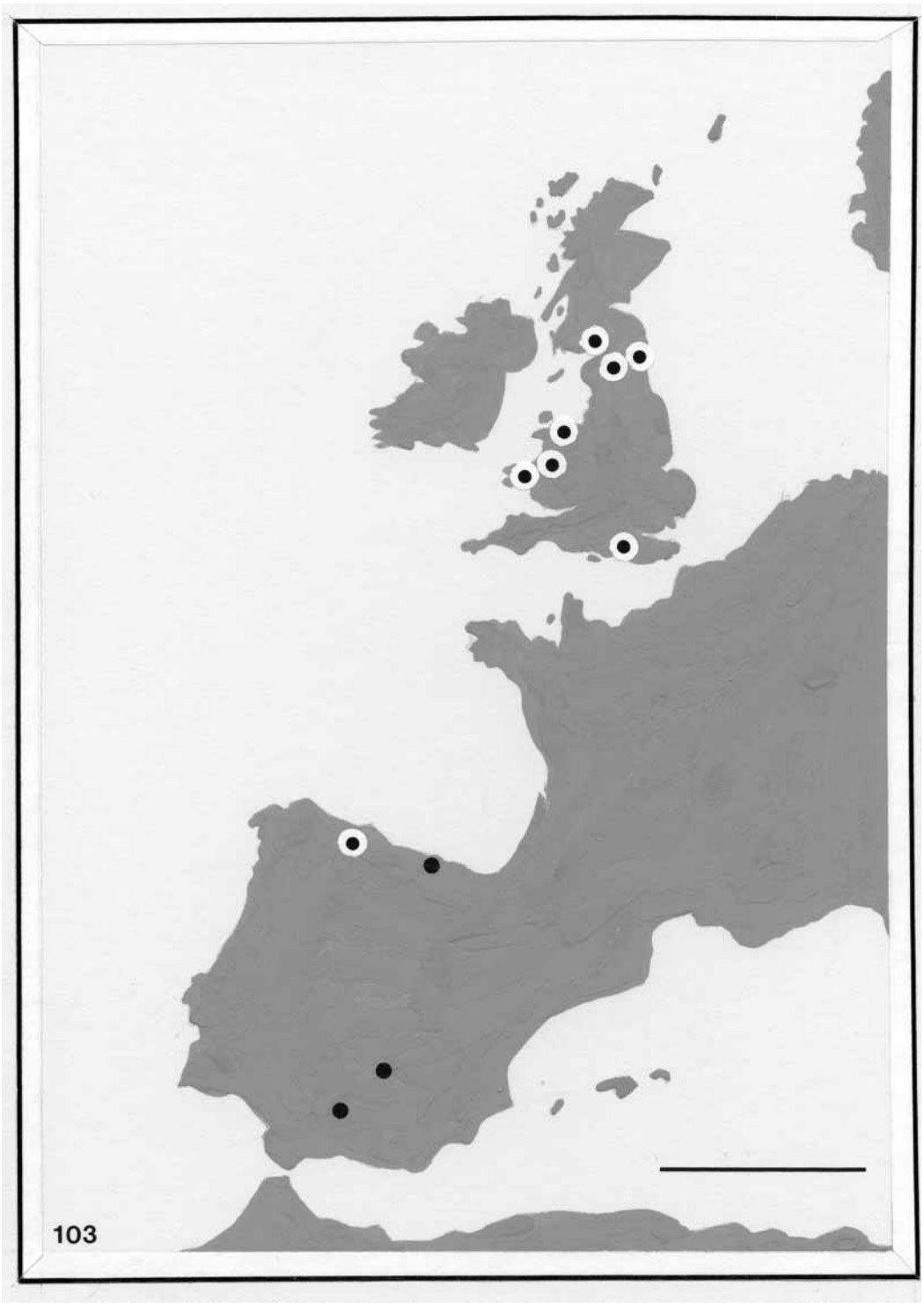


FIGURE 103. Map showing confirmed localities for *P. granulicollis* (white pupillate dots) and *P. michaelis* (black dots). Scale-bar = 500 km.

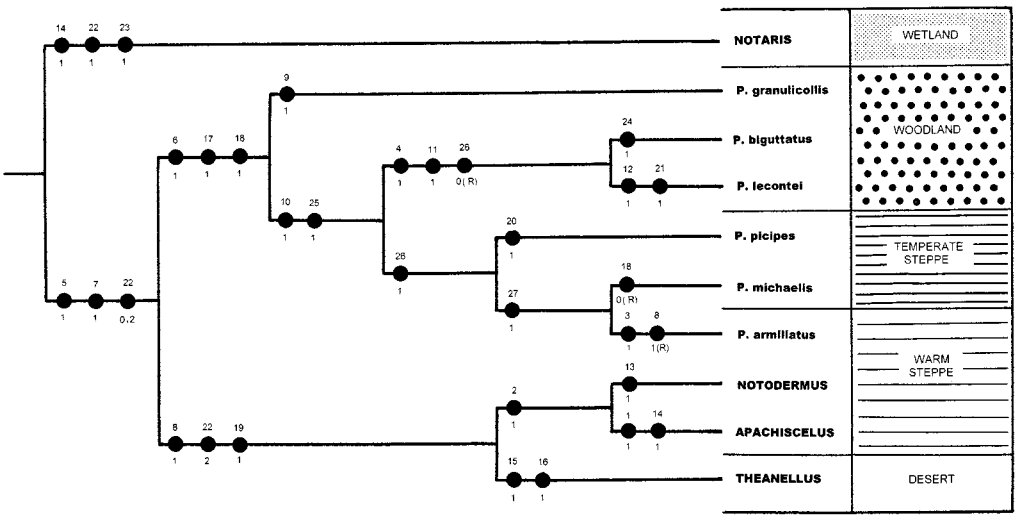


DIAGRAM 1. Dendrogram showing possible phylogeny of species of *Procas* and of related genera in relation to their habitats. Upper numbers = characters (listed in text); lower numbers = character states (0 = primitive, ; 1,2 = derived; R = reversion).