

A new genus of unusually modified *Psammodiini* from Christmas Island (Coleoptera: Scarabaeoidea: Aphodiinae)

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Abstract. *Psammorpha lawrencei* gen.n., sp.n. from Christmas Isl. (Indian Ocean) is described, three other species are recorded. Notes on the affinities of the new genus based on the morphology of related taxa are provided.

Key words: Coleoptera, Scarabaeoidea, *Psammodiini*, Christmas Isl., new genus.

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INTRODUCTION

The material of *Aphodiinae* collected by members of the staff of the Australian National Insect Collection in Canberra, includes the small series of specimens coming from Christmas Island (Settlement of Singapore) in the Indian Ocean. Among these specimens, the tribe *Eupariini* is represented by largely distributed species *Saprosites pygmaeus* HAROLD and *Ataenius orbicularis* A. SCHMIDT, the tribe *Psammodiini* by *Rhyssemus inscitus* (WALKER) and by member of the new genus described herein.

No species of *Aphodiinae* was hitherto reported from Christmas Isl. and relatively little is known about the fauna of other archipelagos, particularly of the smaller islands varying in size and isolation. A number of species were recently recorded and described from Leyte Isl. in the Philippine archipelago (STEBNICKA 1993). Probably most of the species now found in these islands have been introduced by man, however, some species are undoubtedly endemic, descendents of long extinct emigrant progenitors.

The genus described below has a number of the character states that are open to various interpretations. A brief analysis of some of the characters follows the descriptive section. This analysis includes a comparison with four genera of *Psammodiini*: *Aphodopsammobius* ENDRÖDI, *Tesarius* RAKOVIČ, *Rhyssemus* MULSANT (sensu lato) and *Diastictus* MULSANT (sensu PITTINO & MARIANI, 1986).

A comparative material on which this study is based including yet undescribed species of *Psammodiini*, is deposited in the Australian National Insect Collection, Canberra (ANIC), in the Museum of Victoria, Melbourne (MV), and in the Institute of Systematics and Evolution of Animals, Kraków (ISEA).

A c k n o w l e d g e m e n t s . I wish to thank Dr. Tom A. WEIR (ANIC) for first recognizing the peculiar characters of the new genus and for his generosity in allowing me to revise all collections of the *Aphodiinae* held in his care.

SYSTEMATICS

Psammorpha gen. nov.

T y p e s p e c i e s *Psammorpha lawrencei* sp. nov.

D i a g n o s i s . Head nearly as long as wide. Eye invisible from above, vestigial. Antenna 9-segmented, club ovoid, 3-segmented. Mouthparts adapted to soft saprophagy. Clypeus denticulate each side of deep median emargination, sides short, slightly reflexed, nearly straight toward triangular excavation of extremely small, setaceous gena; clypeal surface granulate from side to side except reflexed lateral margins, frons and vertex evenly convex with scattered fine to moderate punctures.

P r o n o t u m transverse, convex medially; anterior angles protruding in front, rounded and reflexed laterally with group of large, irregular granules at crenate margins; posterior angles obtuse; base and posterior angles with strongly grooved marginal line; pronotal surface shining except concavity near anterior angles and vestiges of lateral furrow that are scabrously punctate and opaque; pronotal sides irregularly granulate, disc with transverse, slightly irregular rows of punctures.

S c u t e l l u m very small, narrowly triangular.

E l y t r a convex, base strongly margined, humeri doubly denticulate, humeral umbone absent; striae fine with moderate punctures slightly crenating margins of intervals; intervals nearly flat, very slightly convex apically, surface impunctate.

V e n t e r shining. Prosternum with suboval process. Mesosternum declivous, longitudinally rugose. Middle coxae separated, space between coxae nearly equal to width of middle femur with shining, triangularly enlarged mesometasternal carina between. Metasternum short, strongly convex, midline indistinct, metasternal triangle marked by narrow transverse furrow. Abdominal sterna glabrous, finely fluted along margins; pygidium with arcuate transverse carina, in apical half slightly concave and longitudinally rugose, apical lip with 6 fine setae.

L e g s slender. All femora shining with coarse punctures bearing very short, pale setae; anterior femur moderate in width, sinuate and strongly grooved anteriorly; middle and hind femora nearly equal in width. Anterior tibia with three small teeth equal in size; middle and hind tibiae slender, scarcely setaceous without traces of transverse ridges; apex of metatibia fringed with very short setae, spurs slender, acutely pointed, located close together below tarsal insertion. Claws very small, hornlike.

***Psammorpha lawrencei* sp. nov.**

(Figs 1-2)

H o l o t y p e ♀: Christmas Island, 10.30S, 105.35-36E, East-West Park Track, 13-28 April, 1989, berlesed from leaf and log litter, J. F. LAWRENCE. Coll: ANIC *Coleoptera*, voucher No. 87-0252.

Length 3.8 mm, greatest width 1.6 mm. Body (Fig. 1) short oval, convex, glabrous; colour shining black, sides of clypeus and anterior median area of pronotum reddish. Elytra widest at apical third, about two and one-third times as long as pronotum. Ventral sclerites glabrous. Sixth abdominal sternite deeply grooved anteriorly, third sternite longest with median row of punctures. Metatibia slightly sinuate; metatarsus shorter than tibia, segments slightly triangularly widened, basal segment nearly equal in length to upper tibial spur and to three following tarsal segments combined. The remained characters as in generic description. Epipharynx as in Fig. 2.

M a l e unknown.

R e m a r k s. The characters mentioned in the generic description also distinguish the species, since the genus, at present, is monotypic.

R e l a t i o n s h i p. One of the most important morphological characters used for the identification of *Psammodiini* species has been shown to be the sculpturing of the

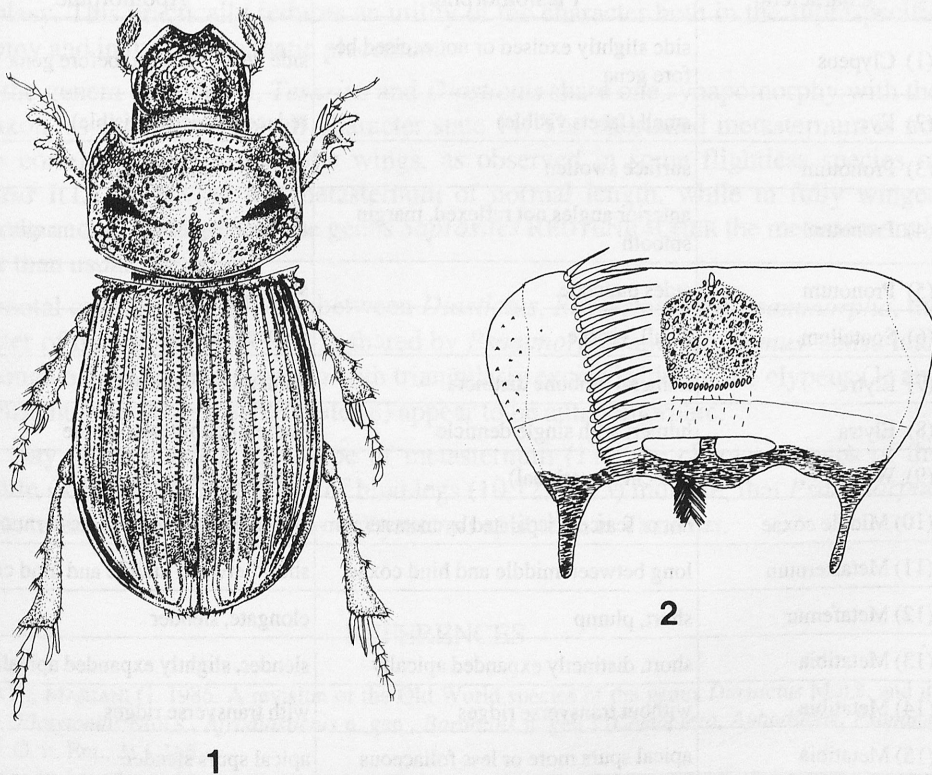


Fig. 1-2. *Psammorpha lawrencei* g.n., sp.n.: 1 – habitus; 2 – epipharynx.

pronotum. However, these characters are more or less remarkably manifested in the various genera and species of that tribe. After examining a number of the Southern Hemisphere genera as examples of all of the currently recognized tribes of the *Aphodiinae* I conclude, that numerous characters on which taxonomy is based are too plastic to be useful and show possible parallelism (homoplasy). This is particularly true considering the difficulties that previous authors have encountered in determining the relationships and affiliation of some genera and species.

To assess the proper placement of the new taxon I considered here a number of the character states separating *Psammorpha* from *Diastictus* and *Tesarius* by using primarily the related genera *Aphodopsammobius* and *Rhyssemus* as outgroups. The character states listed in Table I are plotted in Table II. These results indicate, that the affinities of *Psammorpha* are closer with *Tesarius* than with any other of the genera compared. However, some shared apomorphic states of both genera include reductions, such as: (2) reduction of eyes, (6) reduction in size of scutellum, (9) reduction of flight wings and (7) reduction of humeral umbone. The latter character state is usually correlated to atrophy of the wings. The above reductions with resultant morphological changes appear in the

Table I

Selected characters found in *Psammorpha* nov. and related genera

Characters	Plesiomorphic	Apomorphic
(1) Clypeus	side slightly excised or not excised before gena	side deeply excised before gena
(2) Eye	small (facets visible)	reduced (facets invisible)
(3) Pronotum	surface swollen	surface evenly convex
(4) Pronotum	anterior angles not reflexed, margin smooth	anterior angles reflexed, margin crenate
(5) Pronotum	sides punctate	sides granulate
(6) Scutellum	small, visible	reduced, invisible
(7) Elytra	humeral umbone distinct	humeral umbone absent
(8) Elytra	humeri with single denticle	humeri doubly denticulate
(9) Wings	present (functional)	reduced (not functional)
(10) Middle coxae	not or scarcely separated by metasternum	widely separated by metasternum
(11) Metasternum	long between middle and hind coxae	short between middle and hind coxae
(12) Metafemur	short, plump	elongate, slender
(13) Metatibia	short, distinctly expanded apically	slender, slightly expanded apically
(14) Metatibia	without transverse ridges	with transverse ridges
(15) Metatibia	apical spurs more or less foliaceous	apical spurs slender

Table II

Genera and characters considered (symbols as follows: –, plesiomorphic; +, apomorphic; #, intermediate or transitional)

	Character states														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Aphodopsammobius</i>	–	–	+	–	–	–	–	–	–	–	–	–	#	–	–
<i>Rhyssemus</i>	–	–	–	#	#	–	–	–	–	#	–	+	+	–	+
<i>Diastictus</i>	–	–	–	+	–	–	–	–	–	–	+	#	#	–	–
<i>Tesarius</i>	–	+	–	–	–	+	+	–	+	–	+	–	–	+	–
<i>Psammorpha</i> nov.	+	+	–	+	+	+	+	+	+	+	+	+	+	–	+

unrelated taxa of various tribes of *Aphodiinae*, mostly in the high-mountainous endemic species or in the species restricted to the sandy beaches and are obvious adaptations caused by the environmental factors. A further polarity problem in determining generic relationships within *Aphodiinae* involves the characters of the tibia. The presence or absence of the tibial transverse ridges (character state 14) with intermediate character states are widespread in the *Aphodiinae*, not uncommon in the unrelated taxa and show evidence of homoplasy. This practically reduces an utility of the character both in the supraspecific taxonomy and in the phylogenetic placement.

Of the genera considered, *Tesarius* and *Diastictus* share one synapomorphy with the new taxon, as shown in Table II character state 11. The shortened metasternum is not always correlated with loss of the wings, as observed in some flightless species of *Aphodius* ILLIGER having the metasternum of normal length, while in fully winged *Diastictus* and some species of the genus *Saprosites* REDTENBACHER the metasternum is shorter than usual.

Pronotal characters (4,5) vary between *Diastictus*, *Rhyssemus* and *Psammorpha*, the character of metatibial spurs (15) is shared by *Psammorpha* and *Rhyssemus* sensu lato. The elongate head of *Psammorpha* with triangularly excised sides of the clypeus (1) and the elytral humeri doubly denticulate (8) appear to be autapomorphic.

As may be concluded, the shape of metasternum (11), the character states of the pronotum (4,5) and the characters of hind legs (10,12,13,15) indicate, that *Psammorpha* is closer to the ancestral *Diastictus* - *Rhyssemus* split than is *Tesarius*.

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