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## A Revision of the Tribe Deporaini (Coleoptera, Attelabidae) of Japan

### II. Systematics

#### 1. Redefinitions of the Tribe and Genera<sup>1)</sup>

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**Abstract** This paper treats the reclassification of Japanese Deporaini based on the comparative morphology of the mouthparts, legs, abdomens and alimentary organs. The tribe Deporaini are characterized by having labial palpi not more than 2-segmented, alimentary canal looping clockwise, rectum situated at the right side of the genital chamber and the spiculum gastrale directed sinistro-anteriorly. The subtribes Eugnamptina and Chonostropheina are placed in the tribe Rhynchitini and Deporaini, respectively.

The genera of the tribe are redefined and a key to them is given. *Rhynchites apertus* SHARP which was assigned to *Depasophilus* by Voss (1938) is transferred to the genus *Involvulus* (*Cartorhynchites*) of the tribe Rhynchitini.

### Introduction

Voss (1930–'69) classified the subfamily Rhynchitinae into 8 tribes, and gave the definition to the tribe Deporaini for the first time mainly based on the relative length of elytra to the abdomen.

Voss' system was modified by TER-MINASSIAN (1950). She transferred the genus-group Eugnamptina of the tribe Rhynchitini to the tribe Deporaini. This modification was supported by MORIMOTO (1962) who studied on Japanese materials. According to the definition by MORIMOTO, the tribe Deporaini are composed of 3 subtribes; the Deporaini include about 150 species mainly distributed in the Oriental and Palearctic Regions, the Chonostropheina are composed of 5 species from the Palearctic Region, and the Eugnamptina include about 120 species from the Nearctic, Neotropical, Palearctic and Oriental Regions.

The Japanese Deporaini have been studied by ROELOFS (1874), FAUST (1882, '87), SHARP (1889), SCHILSKY (1903, '06), VOSS (1920, '29, '30, '37, '56, '57), KÔNO (1927, '28, '28, '30, '77), TER-MINASSIAN (1950), NAKANE (1963), MORIMOTO (1983) and SAWADA and LEE (1986), and are known at present from 21 species belonging

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1) Contribution from the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka (Ser. 3, No. 248).

to *Deporaus* LEACH, 1819, *Depasophilus* VOSS, 1922, *Chokkirius* KÔNO, 1929, *Paradeporaus* KÔNO, 1928, *Chonostropheus* PRELL, 1924, *Eugnamptus* SCHOENHERR, 1839, and *Aderorhinus* SHARP, 1889.

However, the classification of this tribe is far from completion. There are two opposite opinions about subtribal composition of the tribe. Several genera or subgenera have been defined unclearly. Moreover, some species are confused owing to the interspecific similarity, and some of the others are incorrectly discriminated by the sexual dimorphism.

The tribe Deporaini are in my opinion, characterized by the alimentary canal and mouth parts. I also recognize the systematic importance of the segmentation of the labial palpus and the tergal wing folding spicules of the abdomen for separating genera.

HAMILTON (1979) emphasized the taxonomic importance of the endophallic structures of the male genitalia for the North American Attelabidae. I agree with him on their importance for distinguishing species of the Japanese Deporaini.

This is the first part of the systematic series of my revisional study on the Japanese Deporaini including the redefinitions of the tribe and genera. The descriptions of the genera and species will appear in the series I of this title.

Before going further I wish to express my hearty thanks to Prof. Y. HIRASHIMA of the Entomological Laboratory, Faculty of Agriculture, Kyushu University, for his constant guidance. I am also indebted to Assoc. Prof. K. MORIMOTO for helpful discussions and valuable advice. The specimens examined in this paper were collected by the following entomologists to whom I am much indebted: Messrs. K. ÔHARA, H. TAKEMOTO, N. TSUBOI, Y. FUKUI and Y. ABE.

### Subtribal Composition of the Tribe Deporaini

There are two opinions about subtribal composition of the tribe Deporaini (Table 1). Voss (1931, '38, '41) attributed the genus-group *Eugnamptina* to the tribe Rhynchitini and the genus *Chonostropheus* to the tribe Deporaini. His system is based on the relative length of elytra to the abdomen (character 1). On the other hand, TER-MINASSIAN (1950) included the subtribe *Eugnamptina* in the Deporaini on the basis of the constricted head (character 2).<sup>2)</sup> MORIMOTO (1962) agreed with TER-MINASSIAN, and found out the systematic importance of the characters of ovipositors (characters 4, 5), lateral sclerites of the abdominal terga (character 6) and the scutellar striae (character 3). Then, he recognized 3 subdivisions of the tribe, i.e. Deporaina, *Eugnamptina* and *Chonostropheina*.

The subtribe *Eugnamptina* are allied to the Rhynchitina in character 1, but to

2) The biological similarity of the two groups stressed by TER-MINASSIAN is not universal. Though she regarded the genus *Eugnamptus* as leaf-rollers on the basis of the observation of *E. amurensis* by KURENZOVA, *E. collaris* oviposits in dead leaves without rolling behaviors (HAMILTON, 1980).

Table 1. Subtribal composition of the tribe Deporaini.

genus	Voss (1931, 38, 41)		Ter-Minassian (1950)	
	tribe	genus-group (subtribe)	tribe	subtribe
<i>Auletobius</i>	Auletini		Auletini	
<i>Byctiscus</i>	Byctiscini		Byctiscini	
<i>Rhynchites</i> <i>Involvulus</i> <i>Lasiorrhynchites</i>	Rhynchitini	Rhynchitina	Rhynchitini	
<i>Eugnamptus</i> <i>Aderorhinus</i>		Eugnamptina		Eugnamptina
<i>Chonostropheus</i>	Deporaini		Deporaini	Chonostropheina
<i>Deporaus</i> <i>Chokkirius</i> <i>Depasophilus</i>				Deporaina

the Deporaina in character 2 (Table 2). When the character 4 is emphasized, the Chonostropheina are rather similar to the Rhynchitina.

To decide the systematic positions of the Eugnamptina and Chonostropheina, I made a comparative study of the genera based on other morphological characters. As the result, diversity of the mouth parts (character 7) and that of the alimentary canals (character 8) are discovered among the tribes and subtribes of the subfamily Rhynchitinae as follows:

1) In the genera of the tribes Auletini and Byctiscini and the subtribes Rhynchitina and Eugnamptina: Labium with ligula dorsal to the level of mentum; labial palpi 3-segmented, exceeding the both apices of postmentum (Fig. 3 A); tubular part of the mid-gut looping anti-clockwise in dorsal view (Fig. 1 F-H); rectum situated at the left side of the genital chamber; spiculum gastrale directed dextroanteriorly (Fig. 2 D-I).

2) In the genera of the subtribes Deporaina and Chonostropheina: Labium with ligula on the level of mentum; labial palpi 2- (or 1-) segmented, not exceeding the apices of postmentum (Fig. 3 B-C); tubular part of the mid-gut looping clockwise (Fig. 1 A-E); rectum situated at the right side of the genital chamber, spiculum gastrale directed sinistro-anteriorly (Fig. 2 A-C).

Asymmetry of the internal organs such as the looping formula of the alimentary canal (clockwise or anti-clockwise; character 8) seems to be more reliable than the other characters because the change of character state, i.e. clockwise to anti-clockwise or *vice versa*, seems improbable to occur. Consequently, this character is adopted to distinguish the tribes, and the subtribes Eugnamptina and Chonostropheina are attributed to the tribes Rhynchitini and Deporaini, respectively.

## Tribe Deporaini Voss, 1931

Deporaini Voss, 1931, Ent. Blätt., 27: 162; Voss, 1938, Stett. ent. Ztg., 99: 59.

Deporaini: TER-MINASSIAN, 1950, Fauna SSSR., 27(2): 142-160; MORIMOTO, 1962, J. Fac. Agr., Kyushu Univ., 12: 26-30 (in part).

This tribe belongs to the Rhynchitinae, the characters of which are described by MORIMOTO (1962).

Head constricted at base, or sometimes scarcely constricted; rostrum more or less dilated anteriorly and flattened, or sometimes slender.

Labial palpi 2- or 1-segmented, not exceeding the apices of ligula (Fig. 3 B-C). Abdominal lobe not reaching metasternum. Tibiae truncate vertically and completely fringed with setae at tips, without spurs (Fig. 3 E-F), while in most species of the tribe Rhynchitini, the tibiae have spurs at least on one pair of legs (Fig. 3 D); claws free, each claw bifid. Elytra separately rounded at apex. First to 8th abdominal tergites complete; 1st entirely sclerotized, neither divided by membrane nor broadly membranous; spiracular sclerite of 1st abdominal segment incorporated into the metathoracic dorsal sclerotized region, spiracles of 2nd to 6th segments located each on the lateral region of median sclerite. The 2nd to 6th abdominal segments with lateral sclerites; lateral sclerites of 2nd and 3rd segments fused longitudinally into a single plate; pygidium not costate (Fig. 3 G-H), while in some species of the tribe Rhynchitini, the pygidium is costate along the posterior margins of elytra (Fig. 5 B); alimentary canal with tubular part of the mid-gut looping clockwise, rectum situated at the right side of the genital chamber (in both the sexes); spiculum gastrale directed sinistro-anteriorly (in both the sexes).

Tegmen of male genitalia with cap-piece caudate apically and clothed with a few setae on the apical margin; dorsal plate of penis rather broad.

Note on the Controversial Genus *Depasophilus*

The genus *Depasophilus* was established by Voss (1922) on the basis of one Bornean species *D. bakeri* Voss, 1922, which has a depressed short rostrum, rather strongly constricted head, long elytra which largely cover the propygidium, equally bent tibiae and milled dorsal ridges of the tibiae and apical halves of femora. Though Voss (1938) treated this genus as a member of the Deporaini, he regarded it as an intermediate between the Rhynchitini and the Deporaini, and included 9 more species which are much diversified. Therefore, this genus became highly heterogeneous. After his monograph, five species were described in this genus by Voss (1942, '58) and TER-MINASSIAN (1950). Then, one species was transferred to other genus by MORIMOTO (1983) as mentioned below.

In this paper, *Depasophilus* is recognized according to Voss (1922), and it is tentatively included in the Deporaini after Voss (1938).

As for the three Japanese species included in the genus *Depasophilus* by Voss (1938), *pacatoides*, *illibatus* and *apertus* are here to be considered. The first of

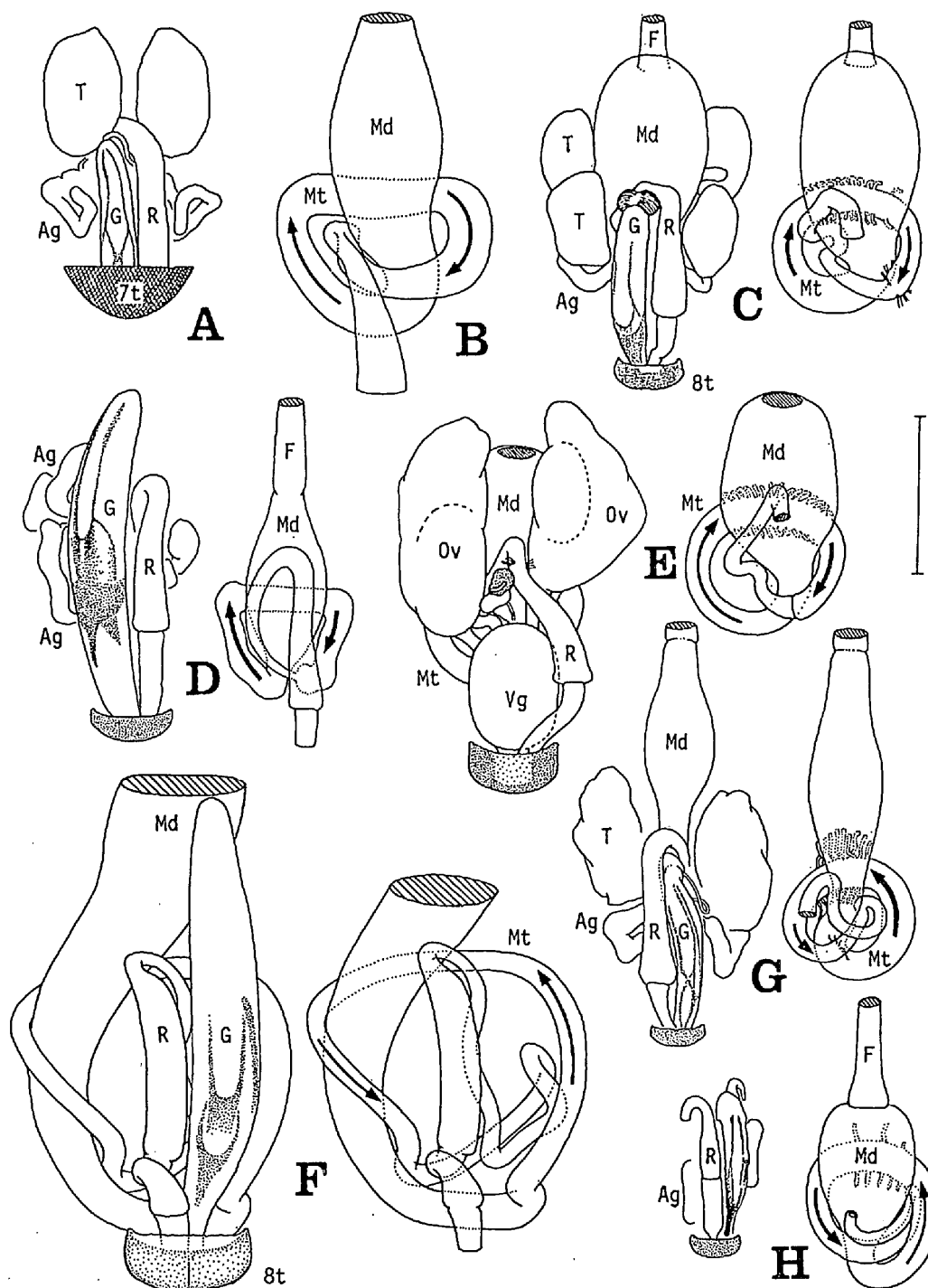


Fig. 1. Internal structures of some species of the Rhynchitinae in dorsal view, showing looping formula of mid-gut and/or relative situation of the rectum to the genital chamber, some structures omitted. — A, *Deporaus unicolor* (ROELOFS, 1874) [Deporaini], male; B, *Deporaus betulae* (LINNAEUS, 1758) [Deporaini], female; C, *Eusproda proxima* (FAUST, 1882) [Deporaini], male; D, *Chonostropheus chujoi* Voss, 1956 [Chonostropheina], male; E, Same, female; F, *Aderorhinus crioceroides* (ROELOFS, 1874) [Eugnamptina], male; G, *Lasiorhynchites brevirostris* (ROELOFS, 1874) [Rhynchitina], male; H, *Auletobius okinawaensis* Voss, 1971 [Auletini], male; Ag, accessory gland; F, fore-gut; G, male genital chamber; Md, distended part of mid-gut; Mt, tubular part of mid-gut; Ov, ovary; R, rectum; Vg, vagina; 7t, tergite of 7th abdominal segment (pygidium); 8t, tergite of 8th abdominal segment; scale, 1 mm.

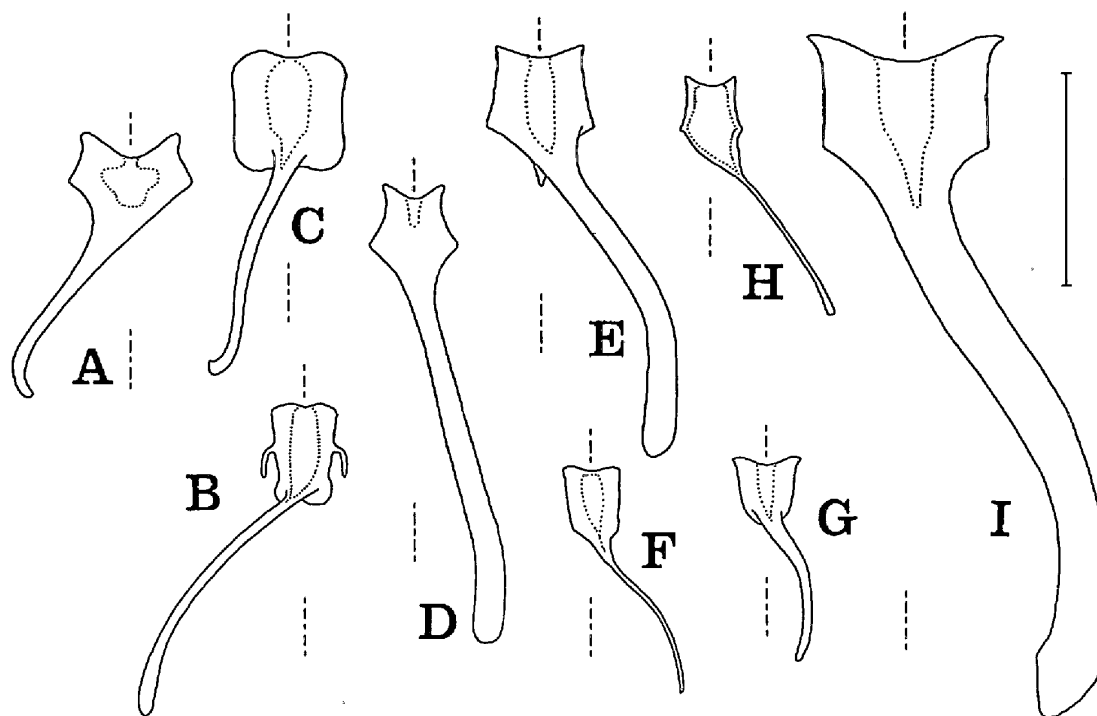


Fig. 2. Ninth sternites of the male with spiculum gastrale, in ventral view. — A, *Deporaus betulae* [Deporaina]; B, *Eusproda proxima* [Deporaina]; C, *Chonostropheus chujoi* [Chonostropheina]; D, *Eugnamptus amurensis* (FAUST, 1882) [Eugnamptina]; E, *Involvulus pilosus* (ROELOFS, 1874) [Rhynchitina]; F, *Lasiorrhynchites brevisrostris* [Rhynchitina]; G, *Neocoenorrhinus assimilis* (ROELOFS, 1874) [Rhynchitina]; H, *Auletobius okinawaensis* [Auletini]; I, *Byctiscus venustus* (PASCOE, 1875) [Byctiscini]; Scale, 0.5 mm.

Table 2. Diagnostic characters for separating tribes and subtribes.

character subtribe genus	(1) tergite of 6th abdominal segment	(2) basal constriction of head	(3) scutellar stria of elytra	(4) styli of ovipositor	(5) coxites of ovipositor	(6) lateral sclerites of terga	(7) segmentation of labial palpi	(8) looping of tubler part of mid-gut
Rhynchitina								
<i>Involvulus</i>	concealed	absent	absent	absent	simple	present	3-seg.	anti-clock
<i>Lasiorrhynchites</i>	concealed	absent	present	absent	simple	absent	3-seg.	anti-clock
Eugnamptina								
<i>Aderorrhinus</i>	concealed	distinct	present	developed	simple	absent	3-seg.	anti-clock
Chonostropheina								
<i>Chonostropheus</i>	exposed	distinct	present	absent	simple	present	2-seg.	clockwise
Deporaina								
<i>Deporaus</i>	exposed	distinct	absent	developed	divided	present	2-seg.	clockwise
<i>Eusproda</i>	exposed	indistinct	absent	developed	divided	present	2-seg.	clockwise
<i>Chokkirius</i>	exposed	distinct	absent	developed	divided	present	1-seg.	clockwise

them was synonymized with *Deporaus minimus* by MORIMOTO (1983), for the reason that the syntype of *pacatoides* is nothing but a teneral individual of *minimus*. The second is a true member of the tribe Deporaini in my opinion, but is not a species of the genus *Depasophilus* because of its scarcely constricted head, elongate and not

depressed rostrum and straight tibiae. The last one is a species of the tribe Rhynchitini, as stated in the appendix of this paper.

### Generic Classification

Voss (1938) assigned three foreign genera, *Scolocnemus* KIRSCH, 1875, *Neodeporaus* KÔNO, 1928, and *Philorectus* Voss, 1924, to his tribe Deporaini. I agree with Voss so far as *Scolocnemus* and *Neodeporaus* are concerned, based on my examination of *S. pilosiusculus* Voss, 1922, and *N. femoralis* KÔNO, 1928. I have been unable to examine *Philorectus* which is known by one species from India.

The genus *Chonostropheus* can be distinguished from the other genera of the tribe Deporaini by its scutellar striae on the elytra and the simple ovipositor without styli.

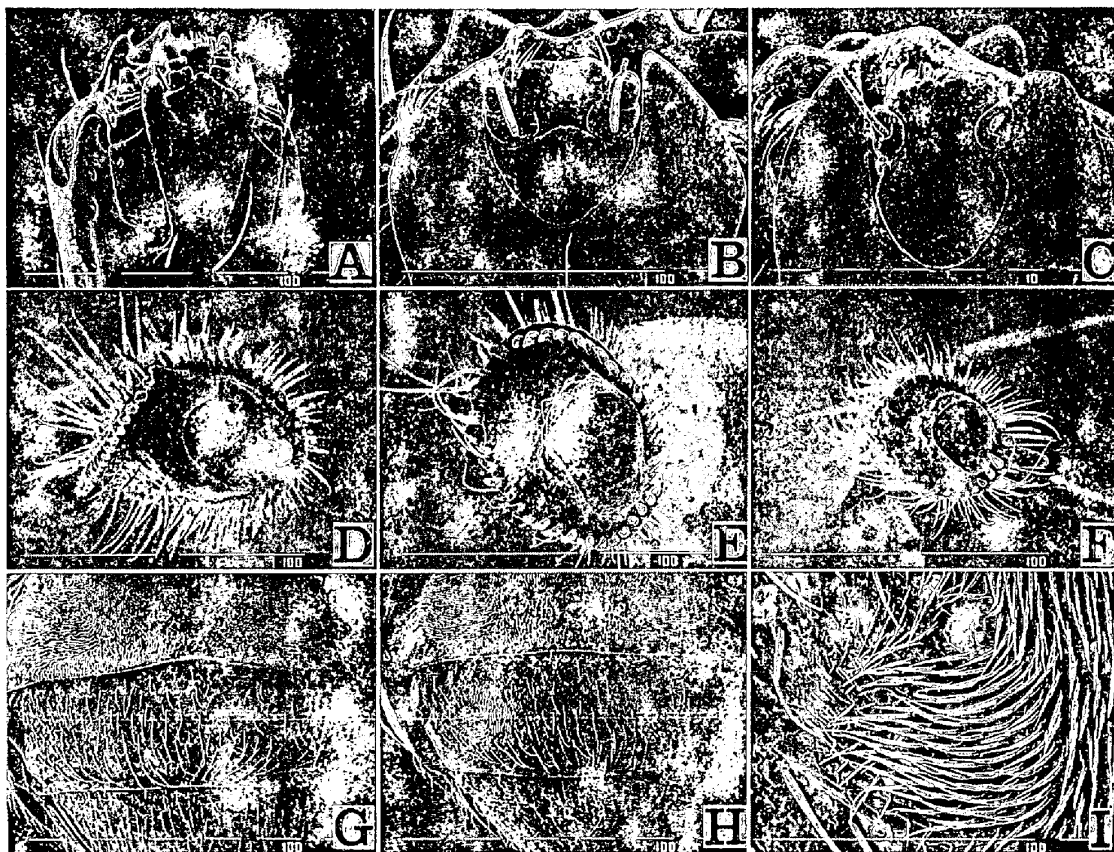


Fig. 3. A-C, Mouth parts in ventral view. — A, *Involvulus pilosus* [tribe Rhynchitini]; B, *Paradeporaus depressus*; C, *Chokkirius truncatus*. D-F, Apices of tibiae, tarsi removed. — D, Male hind tibia of *Involvulus pilosus* [tribe Rhynchitini], with spur; E, male fore tibia of *Chokkirius truncatus*, not mucronate; F, ditto, *Paradeporaus depressus*, mucronate. G-I, Sculpture of abdominal tergites. — G, 5th tergite, propygidium and pygidium of *Paradeporaus depressus*, showing propygidium without spicule patches; H, ditto, *Chokkirius truncatus*, propygidium with spicule patches; I, spicule patch on propygidium of *Chokkirius truncatus*.

The genera of the subtribe Deporaina have been distinguished by the following key characters: the breadth of the pronotum and the relative length of the elytra, except for two foreign genera *Scolocnemus* and *Neodeporaus*, which are characterized by the modified legs (Fig. 4).

The relative length of the elytra to the abdomen is, however, an ambiguous character. It is not always reliable, because it is variable in the degree of maturity as in the case of *D. pacatoides* stated before, or it appears sexual difference as seen in *C. truncatus* as pointed out by KÔNO (1929).

Instead, the presence or absence of the wing folding spicule patches on the propygidium (tergite of 6th abdominal segment) is a reliable character (Fig. 3 G-I). The spicule patches seem to be functional to fold the hind wings (HAMMOND, 1979), and character states (presence or absence of this structure) are stable against the sexual difference or the degree of maturity as far as I have examined.

The size and shape of the pronotum are not always effective to discriminate the genera owing to sexual dimorphism. From the functional point of view, there are two cases notable to the pronotal broadening. In certain species, pronotum is broadened only in the male, supposedly correlating with the mating function. In the case of cleptoparasitic species, however, it is depressed and broadened in both sexes, presumably adapted to get into a tight space.

The mucrones are developed at the tips of the tibiae in some species (Fig. 3

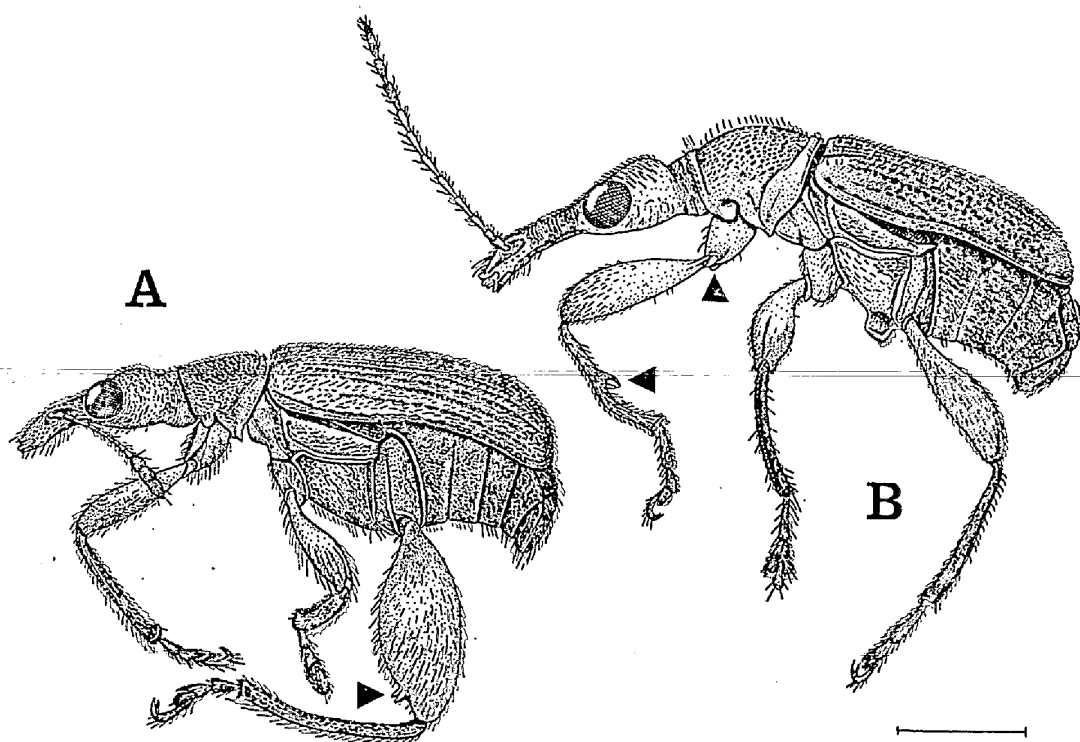


Fig. 4. Habitus of two foreign species in lateral view, showing modifications of legs. — A, *Neodeporaus femoralis* Kôno; B, *Scolocnemus pilosiusculus* Voss; Scale, 1 mm.



F). This structure is observed only in the male, then it seems to be a modification for mating.

The labial palpi are 2-segmented in most species (Fig. 3 B), but 1-segmented in *C. truncatus* (Fig. 3 C).

Genera of this tribe may be distinguished by the following key (*Depasophilus* and *Philorectus* are not included).

### Key to Genera of the Tribe Deporaini

1. Elytra with scutellar striae; ovipositor without styli; coxites undivided; rostrum short and stout; procoxae without setose sex patch; tibiae not mucronate; propygidium with a pair of wing folding spicule patches.....  
..... *Chonostropheus* PRELL.
- Elytra without scutellar striae; ovipositor with coxites and styli; each coxite subdivided..... 2.
2. Propygidium with a pair of wing folding spicule patches (elytra reaching pygidium in general, propygidium almost hidden by elytra and only median triangular region exposed); tibiae not mucronate..... 3.
- Propygidium entirely rugosely sculptured or weakly imbricate, without wing folding spicule patches (elytra not reaching pygidium in general, posterior margin of the propygidium exposed throughout); male middle tibiae mucronate, mucro sometimes vestigial..... 5.
3. Rostrum depressed; base of rostrum without dense long hairs .....  
..... *Apoderites* SAWADA.
- Rostrum elongate, scarcely depressed; base of rostrum with dense long hairs in the female..... 4.
4. Labial palpi 2-segmented; prothorax not broadened in the male, almost as long as or longer than broad in the two sexes; procoxae with setose sex patches in the male ..... *Eusproda* SAWADA.
- Labial palpi 1-segmented; prothorax broadened laterally in the male, broader than long; procoxae without setose sex patches in both sexes .....  
..... *Chokkirius* KÔNO.
5. The male fore tibiae with hook-shaped internal spines at the middle .....  
..... *Scolocnemus* KIRSCH.
- Fore tibiae without spines ..... 6.
6. Hind femora each with two parallel ventral spines near apex .....  
..... *Neodeporaus* KÔNO.
- Hind femora without spines ..... 7.
7. Body depressed; pygidium twice as broad as long; pronotum strongly emarginated on anterior margin, strongly prominent postero-laterally; each side of the male rostrum with a foliaceous lateral projection below the antennal insertion ..... *Paradeporaus* KÔNO.

- Body not depressed; pygidium at most 1.7 times as broad as long; pronotum not or slightly emarginated on anterior margin, weakly rounded at side; rostrum without lateral projection ..... *Deporaus* LEACH.

### Appendix

As stated before, *Depasophilus apertus* treated by Voss (1938) is transferred to *Involvulus* as follows:

#### *Involvulus (Cartorhynchites) apertus* (SHARP), comb. nov.

*Rhynchites apertus* SHARP, 1889, Trans. ent. Soc. London, 1889: 66.

*Depasophilus apertus*: Voss, 1938, Stett. ent. Ztg., 99: 73, 78–79.

**Diagnosis.** Labial palpi 3-segmented (Fig. 5 A); ovipositor without styli; middle and hind tibiae with spurs; pygidium costate along the margins of elytra (Fig. 5 B); spiculum gastrale directed dextro-anteriorly.

Rostrum robust, shorter than pronotum; eye large, moderately prominent; frons about as broad as rostrum.

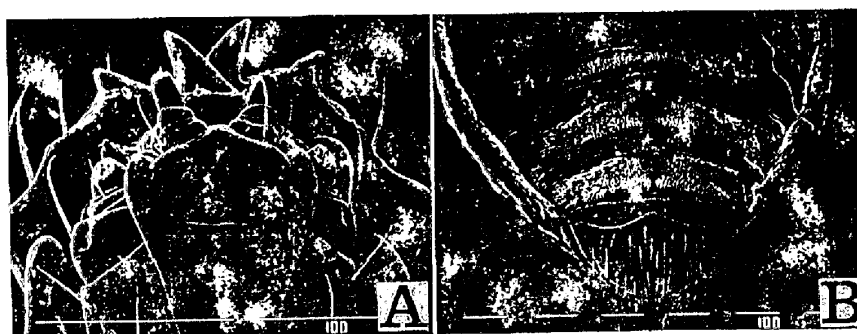


Fig. 5. *Involvulus (Cartorhynchites) apertus* comb. nov. [tribe Rhynchitini]. — A, Mouth parts in ventral view; B, abdominal terga, wings removed to show the pygidium costate along elytral margins.

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