

## Ecological Studies on the Subfamily Apioninae Injurious to Leguminous Crops in Japan

### 1. Discrimination of some Apioninae (Col. Curculionidae) species inhabiting grasses in Hokkaido

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(May, 1983)

#### Introduction

Sixteen species of the subfamily Apioninae (Col. Curculionidae) have been recorded in Japan.<sup>3)</sup> *Apion collare* Schilsky and *A. abruptum* (Oxystoma) are especially serious pests of leguminous crops in Hokkaido.<sup>2,5)</sup>

For the purpose of controlling pests it is necessary to be able to distinguish between species. In the past some confusion has arisen and misidentification has occurred.

The five species of the subfamily Apioninae, inhabiting grasses in Hokkaido, were examined with a microscope and the main features, which can be used to identify each species, were described in detail. What is specially noteworthy is that setae on elytra of five species were examined by means of a scanning electron microscope.

#### Description

*Apion abruptum* (Sharp) 1891, Fujimame hosokuchi-zomushi  
*Oxystoma abruptum* Sharp, Trans. Ent. Soc. London 1891: 293, 1891 (Sapporo).

Body lucid black and covered with whitish filiform scales. Rostrum ampule-shaped dorsally. Its apical third slightly smooth with whitish hairs sparsely, its width is about one-seventh of the total length. Basal part somewhat elliptical, perforations with whitish, hair-like scales. Its width is a quarter of the total length. Antennal scrobes situated at the central parts of both sides and formed deep grooves with caves at the bases. Antennal scape and funicula-I succineous and other funiculus and club, black. Scape bare and funiculus and club with short, whitish hairs. Eyes broadly oval,

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protruding beyond the outline of the head (Fig. 3-A) and ornamented with numerous whitish hair-like scales at the surroundings of apical and ventral margins. Head with four longitudinal grooves indeterminate. Basal quarter of head smooth and apical part perforations with whitish filiform scales. Prothoracic shield perforations whitish long filiform scales. Basal half of central part with a shallow mesal groove. The lateral margins arcuated and without distinct emargination. Legs with whitish hairs sparsely. The hairs of femora longer than those of the tibiae. Apical part of hind tibia with somewhat brownish short setae. Trochanter long and one-sixth of femur. Pulvillus with brownish erion. Hind coxae relatively separate.

Elytra with nine longitudinal stria. Each sulcus with series of whitish filiform scales and each ridge with short whitish hairs (Fig. 3, 4, 5-A).

Length : 2.5~3.0 mm.

Food plant : Vetch (*Vicia sativa* L.), Hairy vetch (*V. villosa* Roth.).

Habitat : Japan (Hokkaido, Honshu).

***Apion collare* (Schilsky) 1906**, Mame hosokuchi-zoumushi

*Pseudopiezotrachelus collare* Schilsky, Kust. Kraatz. Kaf. Eur. **43**: 58, 1906.

Body lucid black and without any distinct vestiture. Rostrum slender, slightly elongated and arcuated. Width is about one-seventh of the length. Basal two-thirds fine notuled and with short, whitish hairs sparsely. Apical Third smooth with short, whitish hairs very sparsely, Antennal scrobes situated at the central parts of both sides and formed only short and shallow grooves. Antennal scape, funiculus and club all blackish succineous. Scape bare, funiculus with short whitish, hairs sparsely and club with numerous short, whitish hairs. Eyes broadly oval, slightly protruding beyond the outline of the head. The surroundings of the margin without any scales. Head with two longitudinal grooves clearly and basal quarter smooth. Apical part perforative Prothoracic shield puncture. Basal three quarters of central part with a shallow mesal groove. Lateral margins arcuated with emarginates at fourth part apical. Legs with short, whitish hairs faint. Trochanter long and one-sixth to one-seventh of femur. Tarsi with short whitish hairs burly. Pulvillus with brownish erion. Apical part of tibia with short brownish hairs. Both hind coxae comparative contiguous. Elytra strongly tumid with nine longitudinal stria. Each stria with a series of granular and without any scales. Each ridge lines aciculate and crispus (Fig. 3, 4, & plate I-B).

Length : 2.2~2.6 mm.

Food plant : Some pulse crops especially azuki bean (*Phaseolus radiatus* L.)

Habitat : Throughout Japan

***Apion ervi* Kirby, 1808** Betti hosokuchi-zoumushi

*Apion ervi* Kirby, Trans. Linn. Soc. London. 9 : 23, 1808.

Body lucid black with whitish filiform scales. Rostrum slender and slightly elongated and arcuated. Its apical two-third smooth with whitish fine short hairs very sparsely and its width is one-seventh of the total length. The basal third of the rostrum perforated with short hair-like whitish scales ; its width one-fifth of the total length. Antennal scrobes situated at the apical three-quarters, and formed only short and shallow grooves. Antennal scape, funiculus and club all blackish. Scape bare and funiculus and club with short, whitish hairs. Eyes broadly oval, protruding beyond the outline of the head and ornamented with numerous whitish, hair-like scales at the margins. Head with four longitudinal grooves clearly, its basal quarter smooth and apical part punctured with whitish filiform scales. Prothoracic shield perforated with whitish filiform scales. Its basal three-fourth of the central part with a mesal groove clearly. Lateral margins arcuated with feeble emarginates at one-fifth of the basal part. Legs with short, whitish hairs. Trochanter long and one-sixth of length of femur. Apical part of hind tibia with brownish short setae. Pulvillus with brownish erion. Hind coxae comparative contiguous. Elytra strongly tumid with nine longitudinal stria. Each stria and ridges with series of whitish filiform scales. Each ridge lines aciculate (Fig. 3, 4, & plate I-C).

Length : 2.0~2.4 mm.

Food plant : Vetch (*Vicia sativa* L.), Field pea (*Pisum arvense*), Yellow pea (*Thermopsis lupinoides* Link.), Lentil (*Lens esculenta* Moench.).

Habitat : Japan (Nagano, Hokkaido) New record, Palearctic region.

***Apion pachyrrhynchum* Gemminger, 1871**, Sakibuto hosokuchi-zoumushi

*Apion pachyrrhynchum* Gemminger, Col. Heft 8 : 123, 1871 (Amur.).

Body lucid black with whitish, filiform scales. Rostrum palethraceae dorsally and with small projections at the apical one-sixth.

Its apical one-third with fine short hairs very sparsely and its width is one-third of the total length. Basal part especially basal quarter with short, whitish hairs burly, its width one-fifth of the total length. Antennal scrobe situated at the apical three-fifth, and formed only short and shallow grooves. Antennal scape, funiculus and club all dark succineous. Scape bare, funiculus and club with short hairs. Eyes broadly oval, slightly protruding beyond the outline of the head and ornamented with whitish, hair-like scales at the margins.

Head with four longitudinal grooves clearly (Fig. 3-D). The basal quarter smooth, and the apical part punctured with whitish, filiform scales. Punctures of vertex selebrosely. Prothoracic shield scrobiculated with whitish

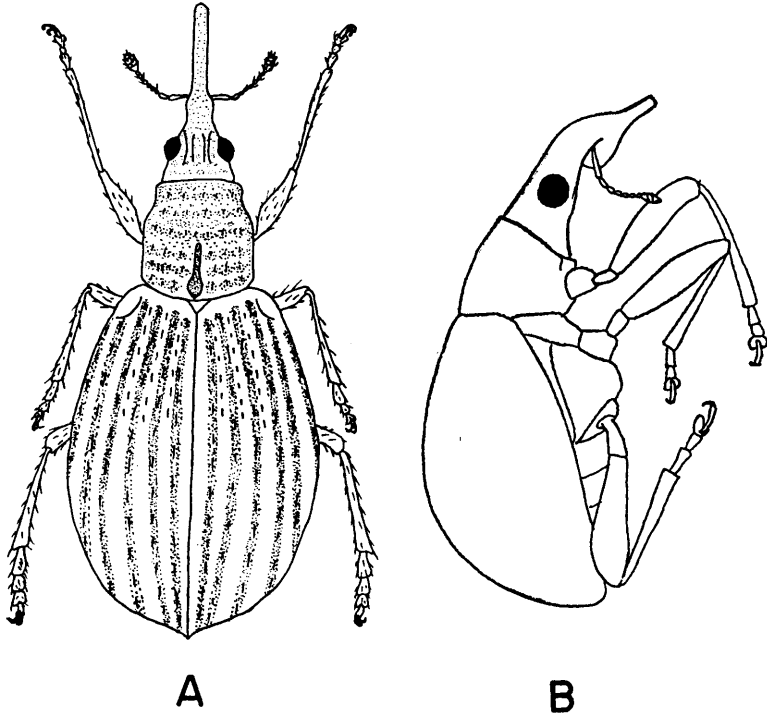


Fig. 1. Dorsal view of *Apion viciae* (A) and lateral view of *Apion abruptum* (B).

filiform scales. Basal half of the central part with a mesal groove and its apical part shallow and indeterminate and its basal part deep and determinate. Legs with short, whitish hairs. Trochanter, long and one-seventh of length of femur. Apical part of hind tibia with brownish erion. Elytra with nine longitudinal stria and a series of granulum. Each stria with striated perforations. Each stria and ridges with sparse whitish, filiform short scales (Fig. 3, 4, & Plate I-D).

Length: 2.0~2.4 mm.

Food plant: Vetch (*Vicia sativa* L.),  
Bird vetch (*V. cracca* L. var. *japonica* Miq.).

Habitat: Japan (Hokkaido, Honshu), Amur.

*Apion viciae* (Paykull) 1798, Akaashihosokuchi-zoumushi  
*Curculio viciae* (Paykull). Faun, Suec. 3: 181, 1798 (Sweden). = *Apion*

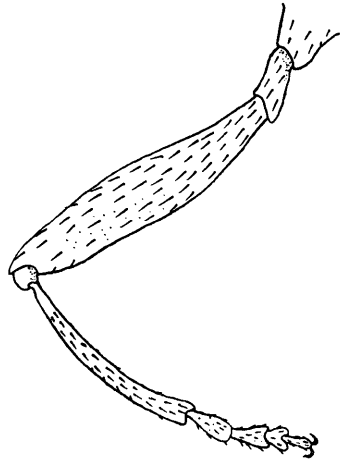


Fig. 2. Fore leg of *Apion viciae*

(*Protapion*) *sapporensis* Kono, Trans, Sapporo Nat. Hist. Soc. 9 : 241, 1927 (Sapporo) Syn. nov.

Body lucid black with whitish, filiform scales and succineous legs (Fig. 1). Rostrum slender, slightly elongated and arcuated. Its apical two-third smooth and basal third fine notuled. Basal quarter more or less flattened dorsally and with short, whitish hairs sparsely. The width is one-seventh

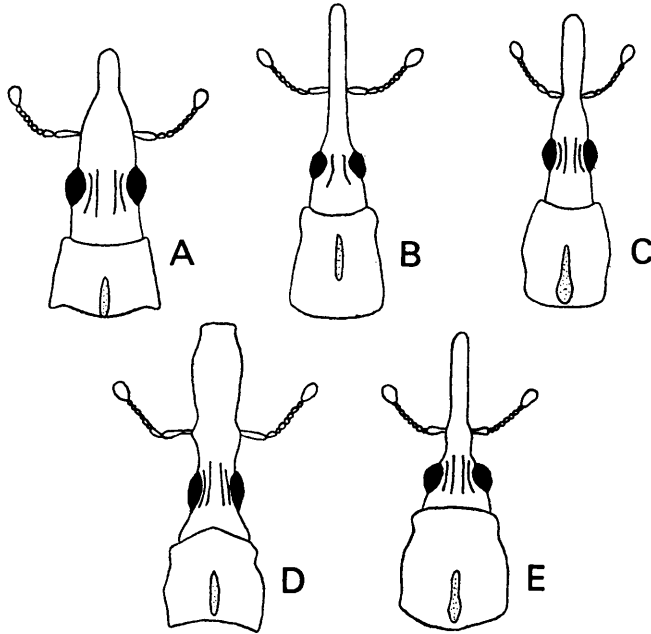


Fig. 3. Dorsal view of head and thorax of the five species of *Apion* from Hokkaido.

A-*Apion abruptum* B-*A. collare*, C-*A. ervi*,  
D-*A. pachyrrynchum*, E-*A. viciae*

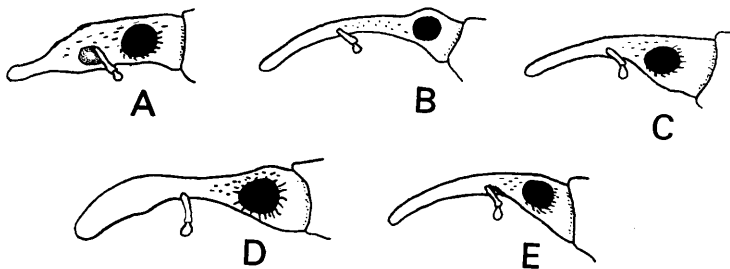


Fig. 4. Lateral view of head and thorax of the five species of *Apion* from Hokkaido.

A-*Apion abruptum*, B-*A. collare*, C-*A. ervi*,  
D-*A. pachyrrynchum*, E-*A. viciae*

to one-eighth of the length (Fig. 1 & Fig. 3-E). Antennal scrobes situated at the apical two-thirds, and formed deep groove. Antennal scape, funiculus and club all auccineous. Apical segments more darker than the basal segments. Scape and funiculus with short, whitish hairs and club with short, whitish hairs burly. Eyes broadly oval, protruding beyond the outline of the head and ornamented with numerous, whitish, hair-like scales at the margins.

The pelt distinctly at the ventral margin. Head with four longitudinal grooves clearly (Fig. 1 & Fig. 3-E). Its basal sixth bare and smooth, and the apical part fine punctured with whitish, filiform scales. Prothoracic shield selebrously puncture with short, whitish filiform scales. Basal half of the central part with a mesal groove and its apical half shallow and basis deep and broad (Fig. 1). Coxae and trochanters lucid black, fomora and fore tibiae succineous and mid and hind tibiae, tarsi and basal and apical joints of fomora dark succineous. Variation in color darkness distinctly found. Trochanter long, one-sixth of femur (Fig. 2). Femur, tibia and tarsi with short, whitish hairs. Apex of mid and hind tibiae with short, brownish hairs. Pulvillus with brownish erion. Hind coxae relatively separate. Elytra with nine longitudinal stria. Each stria with series of whitish, filiform scales. Ridges with one or two series of short, whitish hairs (Fig. 3, 4, & Plate I-E).

Length: 2.4~2.8 mm.

Food plant: Vetch (*Vicia sativa* L.), Hairy vetch (*V. villosa* Roth.), Lentil (*Lens esculenta* Moench.), Yellow pea (*Thermopsis lupinoides* Link), Melilot (*Melilotus officinalis* L.).

Habitat: Japan, (Hokkaido, Honshu), South Palearctic region.

### Subordinal to Subfamily Characters<sup>1,4)</sup>

Head behind the eyes without gular space; maxillary and labial palpirigid, 3-jointed; labrum obscure. . . . . Suborder Rhynchophora

Rostrum prominent; pharyngeal usually with only one suture; Antennae with clubs at apical segments and geniculated between scape and funicula-I, scape stored in antennal scrobes; elytra with lateral fold or groove (Fig. 1); tarsi with fourth joint obscure, third bilobed, ventral surface of first to third densely closed with fine, velvety hairs, fifth joint with simple claws (Fig. 2)

. . . . . Superfamily Curuculionidea

Antennae straight or linear with a few exceptions; Head often constricted behind eyes (Fig. 1); trochanters long enough to intervene between fomora and coxae (Fig. 2) . . . . . Family Apionidae

Antennae straight or linear: body broadest behind the middle

. . . . . Subfamily Apioninae

### Key to the Species of Apioninae from Hokkaido

1. Each stria on elytra with series of whitish, filiform setae (Fig. 1-A & Plate I) . . . . . 2
- Each stria on elytra without such setae, if sulcus with any vestiture, that are at exceedingly short, thin setae (Plate I) . . . . . 4
2. Rostrum slender, slightly elongated, not robust at base (Fig. 3, 4-B, C, E). . . . . 3
- Rostrum ampullaceous and distinctly robust at base; legs black (Fig. 3, 4-A). . . . . *Apion abruptum*
3. Fomora and fore tibiae succineous and other parts of legs dark succineous; Antennal scrobes deep (Fig. 4-E). . . . . *A. viciae*
- Legs black; Antennal scrobes short and shallow (Fig. 4-C). . . . . *A. ervi*
4. Rostrum burly (Fig. 3-D) and weakly expanded laterally at basal sixth; Eyes surrounded with whitish, hair-like scales (Fig. 4-D); Some striae with short setae. . . . . *A. pachyrrhynchum*
- Rostrum slender and slightly elongated; Eyes not surrounded with scales; Each striae without any setae. . . . . *A. collare*

### Summary

The following five species of the subfamily Apioninae, inhabiting grasses in Hokkaido, were examined with a microscope and the main features, which can be used to identify each species, were described in detail.

What is specially noteworthy is that setae on elytra were examined by means of a scanning electron microscope.

1. *Apion abruptum* (Sharp)
2. *A. collare* (Schilsky)
3. *A. ervi* Kirby
4. *A. pachyrrhynchum* Gemminger
5. *A. viciae* Paykull

### Acknowledgements

We are greatly indebted to Mr. M. Kimura and Miss. Y. Shikaya for their help in collecting the materials. Our thanks are also due to Dr. Katura Morimoto, Entomological Laboratory, Faculty of Agriculture, Kyushu University, for identification of the species and for invaluable advice.

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## 要 約

マメ科作物を加害する *Apion* 亜科のゾウムシ類の生態に関する研究の一環として、北海道の草地に生息する次の5種について検索し、種の識別法を記載した。

- 1) フジマメホソクチゾウムシ
- 2) マメホソクチゾウムシ
- 3) サキブトホソクチゾウムシ
- 4) アカアシホソクチゾウムシ
- 5) ベッチホソクチゾウムシ (新称)

## Explanation of Plates

Scanning electron micrographs of setae on elytra of the five species of Apioninae from Hokkaido.

(A-*Apion abruptum*, B-A. *collare*, C-A. *ervi*, D-A. *pachyrrhynchum*, E-A. *viciae*)



