

**CERAMBYCIDAE
OF
NORTHERN
ASIA**

VOLUME 3

LAMIINAE

PART III

A I CHEREPANOV

This monograph is the sixth and concluding book on cerambycid beetles of northern Asia. It contains the latest data on the morphology, geography and biology of 51 species of cerambycids belonging to 12 genera and four tribes (Saperdini, Gleneini, Phytoeciini, Tetraopini) constituting the subfamily Lamiinae (family Cerambycidae). Keys to genera and species based on adults, larvae, and pupae are given. This book, like the five preceding it, is the result of many years of research. The six books together provide information on the biology and geographic distribution of 386 species of Cerambycidae inhabiting northern Asia.

This book is intended for entomologists, general ecologists, plant-protection workers, and forestry specialists.

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Cerambycidae of Northern Asia

Volume 3, Part III

CERAMBYCIDAE OF NORTHERN ASIA

VOLUME 3

LAMIINAE

Part III

A.I. CHEREPANOV

Part Editor

V.K. Stroganova

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Reviewers

E.L. GUR'EVA AND L.G. GRISHINA

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FOREWORD

With the publication of this book, our investigations of the species composition, geography, morphology, and biology of cerambycid beetles (Cerambycidae) of northern Asia are fairly well completed. The results of these studies have been published in a monograph entitled *Usachi Severnoi Azii* (Cerambycidae of Northern Asia) brought out in six books. The first book pertains to the subfamilies Prioninae, Disteniinae, Lepturinae, and Aseminae and was published in 1979. The second and third books comprise the subfamily Cerambycinae, with the tribes Hesperophanini–Callidiini described in the second (1981) and Clytini, Stenaspini in the third (1982). The subfamily Lamiinae is covered in the fourth to sixth books: cerambycid beetles of the tribes Dorcadionini–Apodasyini are presented in the fourth book (1983), tribes Pterycoptini–Agapanthiini in the fifth book (1984), and tribes Saperdini–Tetraopini in the sixth book (1985).

The research involved in the first five books was conducted in the Biological Institute of the Siberian Division of the Academy of Sciences, USSR, while that of the sixth book, due to the author being posted elsewhere, was completed in the A.N. Severtsev Institute of Evolutionary Morphology and Ecology of Animals of the Academy of Sciences, USSR. This book is the conclusion of a multiyear study of the cerambycid beetles inhabiting northern Asia. The biology of some species rarely found in northern Asia was studied using material collected in northern Caucasus, the Baltic region, and southern Kazakhstan. During 1982–1983, additional research was conducted in the Ussuri-Primor'e region, Trans-Baikal, the southern Trans-Urals, and the riparian forests of Ili region. This research resolved the interstadeal development of a series of species of *Oberea* Muls., *Phytoecia* Muls., and *Tetrops* Steph., which provided a more comprehensive idea of the common features of the bionomics of some species that were earlier not well known.

Once again, let me express my deep gratitude to N.E. Cherepanova who, over a period of many years, has been my primary assistant, actively participating in field and experimental laboratory investigations, painstakingly performing the tedious work of selection of data from diaries, and compiling/collating collections of larvae and pupae. All the illustrations in these six books are original and were drawn by the artist A.Z. Ermolenko.

SYSTEMATIC LIST OF CERAMBYCID BEETLES

Family CERAMBYCIDAE

VI. Subfamily LAMIINAE

41. Tribe SAPERDINI

1. Genus *Saperda* F.

1. <i>S. scalaris</i> (L.)	12
2. <i>S. interrupta</i> Gebl.	18
3. <i>S. perforata</i> (Pall.)	23
4. <i>S. alberti</i> Plav.	30
5. <i>S. octomaculata</i> Bless.	37
6. <i>S. populnea</i> (L.)	43
7. <i>S. balsamifera</i> Motsch.	50
8. <i>S. carcharias</i> (L.)	57
9. <i>S. similis</i> Laich.	63

2. Genus *Eutetrappa* Bat.

1. <i>E. sedecimpunctata</i> (Motsch.)	71
2. <i>E. metallescens</i> (Motsch.)	78
3. <i>E. chrysochloris</i> Bat.	85

3. Genus *Cagosima* Thoms.

1. <i>C. sanguinolenta</i> Thoms.	92
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4. Genus *Thyestilla* Auriv.

1. <i>T. gebleri</i> (Fald.)	98
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5. Genus *Menesia* Muls.

1. <i>M. sulphurata</i> (Gebl.)	107
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2. <i>M. flavotecta</i> Heyd.	113
3. <i>M. bipunctata</i> (Zoubk.)	118
4. <i>M. albifrons</i> Heyd.	124

6. Genus *Paramenesia* Breun.

1. <i>P. theaphia</i> (Bat.)	130
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7. Genus *Eumecocera* Sols.

1. <i>E. impustulata</i> (Motsch.)	138
2. <i>E. callosicollis</i> (Breun.)	144

42. Tribe GLENEINI

1. Genus *Glenea* New.

1. <i>G. relictata</i> Pasc.	150
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43. Tribe PHYTOECIINI

1. Genus *Nupserha* Thoms.

1. <i>N. alexandrovi</i> (Plav.)	158
2. <i>N. marginella</i> (Bat.)	160

2. Genus *Oberea* Muls.

1. <i>O. oculata</i> (L.)	168
2. <i>O. depressa</i> (Gehl.)	175
3. <i>O. inclusa</i> Pasc.	181
4. <i>O. herzi</i> Ganglb.	189
5. <i>O. japonica</i> (Thun.)	194
6. <i>O. transbaicalica</i> Suv.	196
7. <i>O. linearis</i> (L.)	202
8. <i>O. morio</i> Kr.	208
9. <i>O. chinensis</i> Tsher.	213
10. <i>O. euphorbiae</i> (Germ.)	220
11. <i>O. erythrocephala</i> (Schr.)	224
12. <i>O. donceeli</i> Pic	231

3. Genus *Phytoecia* Muls.

1. <i>P. affinis</i> (Harr.)	239
2. <i>P. volgensis</i> Kr.	245
3. <i>P. rufiventris</i> Gaut.	251
4. <i>P. pustulata</i> (Schr.)	257
5. <i>P. virgula</i> (Charp.)	262
6. <i>P. nigricornis</i> (F.)	266
7. <i>P. cylindrica</i> (L.)	272
8. <i>P. icterica</i> (Schall.)	279
9. <i>P. cinctipennis</i> Mannh.	285
10. <i>P. sareptana</i> Ganglb.	291
11. <i>P. coerulescens</i> (Scop.)	297

44. Tribe TETRAOPINI

1. Genus *Tetrops* Steph.

1. <i>T. praeusta</i> (L.)	305
2. <i>T. gilvipes</i> Fald.	311
3. <i>T. rosarum</i> Tsher.	316
4. <i>T. elaeagni</i> Plav.	320

SPECIAL PART

IV. Subfamily Lamiinae (continued)

41. Tribe SAPERDINI

6 *Adults*: Body moderately elongate, cylindrical, comparatively large (*Saperda*, *Cagosima*) or small (*Menesia* and others). Head short, distinctly wider (*Menesia*, *Eumecocera*, and others) or not wider (*Saperda*, *Thyestilla*, and others) than pronotum, with wide-set more (*Saperda*) or less (*Menesia*, *Paramenesia*, and others) projecting antennal tubercles. Eyes broadly and deeply emarginate, finely faceted, in males more, in females less bulging. Lower ocular lobe markedly (male) or barely (female) longer than gena. Antennae shorter or slightly longer than body. Pronotum parallel-sided, transverse (female) or length not more than width, rarely slightly oblong (male). Elytra elongate, parallel-sided (female) or very slightly tapering toward apex (male), individually rounded apically (*Cagosima*, *Thyestilla*, *Eumecocera*, and others), with spiniformly extended inner (*Saperda carcharias* (L.)) or with extended outer (*Eutetrappa chrysochloris* Bat.) angle, laterally rounded, without humeral ridge (*Saperda*, *Cagosima*, *Eumecocera*, and others) or with sharply developed humeral ridge (*Eutetrappa*). Legs moderately long, femora slightly thickened, not clavate, Midtibiae on outer margin with distal notch. Claws simple, only in *Eumecocera* basally bifurcate. Pubescence double, comprising sparse erect and dense adherent simple (*Saperda*, *Thyestilla*, and others) or scaly (*Eutetrappa chrysochloris* Bat., *Eumecocera impustulata* Gebl., and others) hairs, which form monochromatic dark grayish (some *Saperda*, *Eumecocera*, part of population of *Thyestilla*, and others) or most often variegated, spotted (*Paramenesia*, *Saperda*, *Eutetrappa*, and others) background either matte (*Saperda*, *Menesia*, and others) or with metallic sheen (some *Eutetrappa*, *Eumecocera*).

Larvae: Distinguished from the larvae of all other tribes by structure of pronotum and locomotory ampullae of abdomen and presence of sclerotized spinules on ventral side of thorax. Head half or less retracted

into prothorax. Epistoma demarcated laterally by distinct frontal sutures (some *Saperda*, *Thyestilla*, and others) or more often fuses with background of temporo-parietal lobes, frontal sutures indistinct or faint (some *Saperda*, *Menesia*, and others). Antennae whitish, rarely with brownish tinge, apices barely projecting from antennal sockets. Ocelli below antennae, small, ampullaceous, often with translucent pigmented black spot. Pronotum on disk and laterally lustrous, in anterior half with yellowish or rusty tinge, at anterior margin whitish, coriaceous (*Saperda*, *Eutetrappa*, and others) or matte, sclerotized (*Paramenesia*). Pronotal shield with specklike dense, distinctly separate (*Saperda* s. str.) or large round, backwardly directed, transversely extended spinules (some *Saperda*, *Eutetrappa*, *Cagosima*, and others), at anterior angles of spinous field broadly, sometimes obliquely (*Saperda* s. str., *Menesia*, *Paramenesia*, some *Eumecocera*) or often saccately (*Eutetrappa*, *Cagosima*, *Thyestilla*, *Eumecocera*, some *Saperda*) emarginate. Meso- and metanota with minute spinules. Metanotum on disk with transverse groove in middle of spinous field. Prothoracic presternum with rusty dense or sparse hairs, laterally always with glabrous lustrous yellowish squarish spot. Eusternum at posterior margin with spinules (*Cagosima*, *Thyestilla*, *Eutetrappa*, some *Saperda*) or without spinules (*Eumecocera*, *Menesia*, some *Saperda*). Base of prosternum (basisternum s. sternellum) in anterior half always with spinules which, in some insects (*Cagosima*, *Eutetrappa*, and others), are comparatively large acute or transversely extended and apically rounded (*Cagosima*, *Thyestilla*, and others). In others (*Menesia*, *Paramenesia*, and others), these spinules minute, dense, forming transverse uniform or medially constricted yellowish band. Dorsal locomotory ampullae developed on abdominal tergites I–VII, moderately enlarged, covered with acute, often separate, large (*Saperda*, *Eutetrappa*, *Cagosima*, *Thyestilla*, *Eumecocera*) or small (*Menesia*, *Paramenesia*) spinules, divided medially by common longitudinal and two transverse grooves uniting laterally, and thus demarcating a transverse oval ridge from anterior and posterior folds. Only in some representatives (*Saperda scalaris* (L.), *Paramenesia theaphia* Bat.) are the dorsal locomotory ampullae divided on each side into two spatulate ridges deflected outward with their ends projecting mediad. Ventral locomotory ampullae developed on abdominal sternites I–VII, covered with minute or large acute spinules, divided medially by common longitudinal groove, in posterior half by deep transverse groove. Anal pore triradiate.

Pupae: Body comparatively large (*Saperda*, *Cagosima*, and others) or small (*Menesia*, *Paramenesia*, *Eumecocera*). Head short (*Thyestilla*, *Menesia*, and others) or not very long (*Saperda* and others), frontally

with long bristles, with wide-set antennal tubercles distinctly raised (*Saperda*) or almost flat (*Thyestilla* and others). Frons convex, broad (*Menesia*, *Thyestilla*, and others), sometimes medially with longitudinal groove. Antennae flexed laterad, in second half bent ventrad, here usually curved semicircularly, their apices adjoining foretibiae or sides of head, rarely curved annularly toward their own base. Pronotum parallel-sided, disk convex, basally with narrow transverse groove, with recurved (*Menesia* and others) or straight, not recurved (*Thyestilla*) posterior angles, with numerous setigerous spinules (*Eutetrappa*, *Cagosima*, *Thyestilla*, *Menesia*, *Paramenesia*, several *Saperda*) or without spinules, with long bristles (*Eumecocera*, some *Saperda*). Meso- and metanota with solitary or numerous setigerous spinules. Metanotum in posterior half more or less laterally compressed. Abdominal tergites uniformly (*Menesia*, *Eumecocera*, and others) or in posterior half sharply (*Cagosima*) convex, at posterior margin with a few spinules in transverse row (*Menesia*, *Paramenesia*, and others) or with numerous (*Cagosima*, *Thyestilla*, several *Saperda*) acute straight spinules forming transverse band. Tip of abdomen (in ventral view) obtuse, bound by U-shaped ridge covered with dense hairs (*Thyestilla*, some *Saperda*, and others) or more often with acute minute or large setigerous spinules (many *Saperda*, *Eutetrappa*, *Cagosima*, *Menesia*, and others). Urogomphi absent at tip of abdomen. Femora with separate (one–three) apical bristles on outer side (*Eumecocera* and others) or without them (*Menesia*, *Paramenesia*).

In the fauna of northern Asia, seven genera are included in the tribe Saperdini: *Saperda* L. with nine species, *Eutetrappa* Bat.—three, *Cagosima* Thoms.—one, *Thyestilla* Auriv.—one, *Menesia* Muls.—four, *Paramenesia* Breun.—one, and *Eumecocera* Sols.—two.

8 Considering the structure of the claws in adult insects, the genus *Eumecocera* Sols. is close to the tribe Phytoeciini but based on morphological characters of the larvae and pupae as well as the niche occupied by them in nature, it is much closer to the tribe Saperdini. It may be assumed that in the historical development of the fauna, it occupies an intermediate position between the tribes Saperdini and Phytoeciini. An absolute majority of species of the tribe Saperdini (19) develop on deciduous plants and one species (*Saperda interrupta* Gebl.) on conifers. Another species (*Thyestilla gebleri* (Fald.)) is ecologically associated with herbaceous plants. Some species (*Cagosima*, most species of *Saperda*, and others) infest viable growing trees, others (some *Saperda*, *Eutetrappa*, and others) drying trees. Some (*Saperda carcharias* (L.)) infest the root zone, others (*S. alberti* Flav., *S. perforata* (Pall.), *Eutetrappa sedecimpunctata* Motsch., and others) the

trunks, and still others (*S. populnea* (L.), *Cagosima sanguinolenta* Thoms., and others) the thin shoots in the tree crown. Species of the genus *Saperda* F. (*S. carcharias* (L.), *S. populnea* (L.)) cause considerable damage to plants in forest protection belts.

KEY TO GENERA

Adults

- 1 (8). Head not broader than pronotum, body comparatively large, length not less than 10 mm, rarely less (*Saperda interrupta* Gebl.).
- 2 (5). Pubescence on elytra gray or with yellowish tone, or metallic green and black or yellow pilose spots appear on this background (*Saperda populnea* (L.), *S. balsamifera* Motsch.).
- 3 (4). Elytra without longitudinal humeral ridge laterally, here round, without metallic blue tone. 1. **Saperda** F.
- 4 (3). Elytra with sharply distinct longitudinal humeral ridge laterally, sometimes with metallic green pubescence. 2. **Eutetrappa** Bat.
- 5 (2). Pubescence on elytra blackish-brown, sometimes with grayish tone.
- 6 (7). Elytra along suture and laterally with grayish-golden fringe 3. **Cagosima** Thoms.
- 7 (6). Elytra along suture and laterally from humeral tubercle up to hind clivus with white pilose fringe or monochromatic, dark, without white pilose fringe. 4. **Thyestilla** Auriv.
- 8 (1). Head markedly broader than pronotum. Body comparatively small, length less than 10 mm, rarely slightly more.
- 9 (12). Elytra with yellow or white pilose spots, rarely without spots (*Menesia albifrons* Heyd.).
- 10 (11). Elytra without yellow pilose humeral bands laterally. 5. **Menesia** Muls.
- 11 (10). Elytra with sharply distinct yellow pilose humeral band laterally, curved apically at an acute angle, forming transverse band at hind clivus. 6. **Paramenesia** Breun.
- 12 (9). Elytra without spots, with monochromatic grayish or greenish-blue pubescence. 7. **Eumecocera** Sols.

Larvae

- 1 (8). Body of larvae of last instar comparatively large, length more than 18 mm.

- 2 (3). Pronotal shield at anterior angles of spinous field with rectangular (*Saperda* s. str.) or saccate (*Campsidia* Muls., *Amilia* Muls.) groove. Spinules on locomotory ampullae of abdomen along transverse grooves not larger than remaining spinules..... 1. **Saperda** L.
- 3 (2). Pronotal shield at anterior angles of spinous field with deep saccate groove. Spinules on locomotory ampullae along transverse grooves notably larger (*Eutetrappa*, *Cagosima*) or, rarely, not larger (*Thyestilla*) than remaining spinules.
- 4 (7). Spinules on locomotory ampullae of abdomen along transverse grooves distinctly larger than remaining spinules.
- 5 (6). Spinules on mesonotum small, specklike, not transversely extended 2. **Eutetrappa** Bat.
- 6 (5). Spinules on mesonotum not specklike, large, distinctly transversely extended. 3. **Cagosima** Thoms.
- 7 (4). Spinules on locomotory ampullae of abdomen along transverse grooves not larger than remaining spinules. Locomotory ampullae entirely with uniform acute spinules. 4. **Thyestilla** Auriv.
- 8 (1). Body of larvae of last instar comparatively small, length less than 18 mm.
- 9 (12). Pronotal shield at anterior angles rectangularly or entirely emarginate or sloping; spinous field of shield at anterior angles not extending beyond anterior margin of transverse depression. Mesonotum and base of prosternum (basisternum) with minute, barely perceptible spinules.
- 10 (11). Pronotum at anterior margin coriaceous, not sclerotized. Pronotal shield at anterior angles distinctly emarginate..... 5. **Menesia** Muls.
- 11 (10). Pronotum at anterior margin sclerotized, with very minute spinules imparting dull tone. Pronotal shield sloping at anterior angles of depression 6. **Paramenesia** Breun.
- 12 (9). Pronotal shield at anterior angles saccate, emarginate; spinous field of shield at anterior angles extending beyond anterior margin of transverse depression. Mesonotum and base of prosternum with large, transversely extended spinules. 7. **Eumecocera** Sols.

Pupae

- 1 (8). Body large, massive, length more than 17 mm, only in *S.*

interrupta Gebl. not less than* 10 mm. Pronotum generally with setigerous spinules, rarely (*Saperda populnea* (L.)) with thin bristles.

- 2 (3). Pronotum with minute setigerous spinules or without spinules, only with thin bristles (*S. populnea* (L.), *S. balsamifera* Motsch.) 1. **Saperda** F.
- 3 (2). Pronotum with large acute setigerous spinules.
- 4 (5). Pronotum sharply compressed laterally at base, at posterior margin with raised tubercle medially. Abdominal tip (in ventral view) with large setigerous spinules. Tergites of abdomen in posterior half slightly convex, with setigerous spinules forming transverse row (10 spinules). 2. **Eutetrapha** Bat.
- 5 (4). Pronotum poorly compressed laterally at base, at posterior margin without tubercle medially. Abdominal tip without spinules, with large dense, basally sclerotized bristles. Tergites of abdomen in posterior half notably or very sharply bulging carinately, here with large spinules forming transverse band.
- 6 (7). Femora without apical bristles on outer side. Tergites of abdomen in posterior half sharply bulging carinately, here with numerous large setigerous spinules forming narrow transverse band. 3. **Cagosima** Thoms.
- 10 7 (6). Femora with minute apical bristles (one–three) on outer side, visible under high magnification. Tergites of abdomen in posterior half less sharply bulging (convexity manifest as small transverse intumescence), here with short setigerous spinules forming transverse row or narrow transverse band. 4. **Thyestilla** Thoms.
- 8 (1). Body small, length less than 12 mm. Pronotum with acute setigerous spinules or with bristles on projecting coriaceous base.
- 9 (12). Pronotum with acute setigerous spinules. Hind femora without apical bristles on outer side.
- 10 (11). Labrum and mandibles without bristles on outer side 5. **Menesia** Muls.
- 11 (10). Labrum on disk and mandibles with bristles on outer side. 6. **Paramenesia** Breun.
- 12 (9). Pronotum without spinules, with long bristles on projecting coriaceous base. Hind femora with apical bristles or spinules. 7. **Eumecocera** Sols.

*So given in Russian original but obviously incorrect. Compare p. 22. Should read "not more than"—General Editor.

1. Genus *Saperda* F.

Fabricius, 1775. *Syst. Entom.*, 184; — *Anaerea* Mulsant, 1839. *Col. France, Longic.*, 182, 184; — *Compsidia* Mulsant, 1839. *Col. France, Longic.*, 182; — *Amilia* Mulsant, 1863. *Col. France, Longic.*, ed. 2: 376; — *Argalia* Mulsant, 1863. *Col. France, Longic.*, ed. 2: 381; Reitter, 1913. *Fauna Germ.*, 4: 63; Plavil'schchikov, 1932. *Zhukidrovoseki vrediteli drevesiny*, 150; Gressit, 1951. *Longic. Beetles of China*, 2: 549–550; Podany, 1963. *Bull. Soc. Entomol. Mulh.*, Sept., 70–77; Mamaev and Danilevskii, 1975. *Lichinki zhukov-drovosekov*, 249; Breuning, 1952. *Ent. Arb. Mus. Cg. Frey*, 3: 141.

Adult: Characterized by elongate, carinate body. Head not broader or barely broader than pronotum, flat frontally. Antennae shorter (female) or not shorter (male) than body. Lower ocular lobe not longer (female) or twice longer (male) than gena. Pronotum parallel-sided, not wider or barely wider than long or slightly oblong. Elytra parallel-sided or slightly tapering toward apex, basally insignificantly broader than pronotum, individually rounded apically (*Saperda* s. str.) or acute (subgenus *Amilia* Muls.), or here spiniformly extended (subgenus *Anaerea* Muls.) or jointly narrowly rounded (subgenus *Compsidia* Muls.), disk with monochromatic pubescence, large black punctures (*Amilia*, *Anaerea*) and black (*Saperda* s. str.) or yellow pilose (*Compsidia* Muls.) spots, or with broad irregular bright pilose band along suture (*S. scalaris* (L.), *S. interrupta* Gebl.).

Larva: Body white, comparatively large (*S. carcharias* (L.)) or small (*S. interrupta* Gebl.). Head barely retracted into prothorax. Epistoma rounded apically, laterally demarcated by more (*S. interrupta* Gebl.) or less (*S. alberti* Plav.) distinct frontal sutures. In some species (*S. octomaculata* Bless.), frontal sutures almost imperceptible; epistoma fusing with temporo-parietal lobes. Pronotal shield covered with spinules forming common continuous field demarcated at anterior angles by deep transverse depressions or impressions. In some species (subgenus *Saperda* s. str.), spinous field not extending forward beyond transverse depressions, in other species (subgenera *Compsidia* Muls., *Anaerea* Muls., *Amilia* Muls.) distinctly extending forward and hence transverse lateral depressions acquire a saccate notch. Eusternum at posterior margin glabrous, without spinules (*Saperda* s. str. except for *S. octomaculata* Bless.) or with spinules forming transverse band (*Anaerea* Muls., *Compsidia* Muls.) or two triangular clusters with their apices projecting forward (*Amilia* Muls.). Basisternum in anterior half with large (*Amilia* Muls. and others) or small (some species of *Saperda* s. str.) spinules forming transverse sclerotized band. Locomotory

ampullae of abdomen with large (*Amilia* Muls., and others) or very minute spinules (some species of *Saperda* s. str.).

Pupa: Body comparatively elongate. Head with long thick or thin bristles frontally. Antennae in second half curved annularly. Pronotum parallel-sided, disk convex, with spinules (*Saperda* s. str., *Anaerea* Muls., *Amilia* Muls.) or thin bristles (*Compsidia* Muls.). Abdomen gradually tapering toward tip. Abdominal tergites with well-developed acute (*Saperda* s. str., *Anaerea* Muls., *Amilia* Muls.) spinules at posterior margin. Abdominal tip without urogomphi, bound by U-shaped ridge (in ventral view) set with large spinules (*Saperda* s. str.) or covered with dense gray bristles (*Compsidia* Muls., and others).

In the fauna of northern Asia, there are nine species of the genus *Saperda* F. All of them are well defined in geographic distribution and ecological characteristics. Of them, five species (*S. scalaris* (L.), *S. populnea* (L.), *S. carcharias* (L.), and others) occupy the area between the western and eastern boundaries of the Palearctic. Three species (*S. interrupta* Gebl., and others) are of Siberian origin and distributed from Altai to the Pacific Ocean coasts. One species inhabits the forests of eastern Asia. Eight species are ecologically associated with deciduous plantations and only one species (*S. interrupta* Gebl.) infests conifers.

The species *Saperda motschulskyi* Plav. (= *S. duodecimpunctata* Motsch.) and *S. mandchukuoensis* Breun., referred to in the literature, are not accepted by us. The first is nothing more than an aberrant form of *Eutetrappa sedecimpunctata* Motsch. and the second—an extreme variant of *Saperda octomaculata* Bat.

Type species: *Cerambyx scalaris* Linnaeus, 1758.

KEY TO SPECIES

Adults

- 1 (10). Elytra apically individually rounded or slightly obtuse (*Saperda* s. str.).
- 2 (5). Elytra along suture with bright (grayish, yellowish, or greenish) pilose band, with lateral projections and spots.
- 3 (4). Pronotal disk with large black spot. Body length 11–19 mm. Europe, Siberia (from the Urals to coasts of seas of Okhotsk and Japan), northeast China, Korean peninsula.1. *S. scalaris* (L.)
- 4 (3). Pronotal disk with four black spots. Body length 7–10 mm. Western and eastern Siberia, Sakhalin and Kunashir islands, northeast China, Korean peninsula, Japan.

- 2. **S. interrupta** Gebl.
- 5 (2). Elytra along suture and on remaining part with uniform grayish or golden-yellow pubescence, medially with black spots.
- 6 (9). Elytra with longitudinal black humeral band laterally.
- 7 (8). Black humeral band short, extending up to middle of elytra, in second half bent toward spinal side at end, generally expanded. Europe, western and eastern Siberia
- 3. **S. perforata** (Pall.)
- 8 (7). Black humeral band long, extending almost up to apex of elytra, straight, not bent toward spinal side. Siberia (from Altai, Ob', to Pacific Ocean coasts), northern Mongolia, northeast China. Korean peninsula, Japan . . . 4. **S. alberti** Flav.
- 9 (6). Elytra without longitudinal humeral band laterally. Ussuri-Primor'e region, Sakhalin, Kunashir, northeast China, Korean peninsula, Japan. 5. **S. octomaculata** Bless.
- 10 (1). Elytra apically acute or extended spiniformly.
- 11 (14). Elytra on disk with yellowish pilose spots (*Compsidia* Muls.).
- 12 (13). Occiput with sparse hairs, almost glabrous. Elytra with sparse pubescence not masking punctation and sparse erect hairs. Europe, entire northern Asia (from the Urals to Pacific Ocean coasts. 6. **S. populnea** (L.)
- 13 (12). Occiput with dense adherent pubescence. Elytra with dense adherent pubescence, mostly masking punctation, and dense erect hairs. Siberia (from Ob' to coasts of seas of Okhotsk and Japan), northeast China, northern part of Korean peninsula, Japan
- 7. **S. balsamifera** Motsch.
- 14 (11). Elytra on disk without yellowish pilose spots, with uniform grayish or grayish-yellow pubescence and large black punctures.
- 15 (16). Apex of elytra spiniformly extended, here as if with acute spinule (*Anaerea* Muls.). Europe, northern Asia (up to coasts of seas of Okhotsk and Japan), northeast China, Korean peninsula
- 8. **S. carcharias** (L.)
- 16 (15). Apex of elytra acute, here without extended spinule (*Amilia* Muls.). Europe, northern Asia from the Urals to Ussuri-Primor'e region inclusive. Northern Mongolia, northeast China, Korean peninsula. 9. **S. similis** Laich.

Larvae

- 1 (10). Spinous field of pronotum not extending forward beyond anterior margin of transverse depressions in notch at anterior

angles of shield (*Saperda* s. str.). Eusternum at posterior margin without spinules, rarely (*S. octomaculata* Bless.) with spinules.

- 2 (3). Dorsal locomotory ampullae of abdomen divided medially by longitudinal groove and two white paramedial arcuate grooves on each side not fusing with each other; ampullae appear to comprise lunular folds (carinae) with their ends projecting mediad. Mainly on birch, rarely on other deciduous species 1. ***S. scalaris*** (L.)
- 3 (2). Dorsal locomotory ampullae of abdomen divided medially by longitudinal groove and two transverse white grooves uniting with each other laterally, forming transverse carinae and two transverse folds.
- 4 (9). Eusternum at posterior margin without spinules, glabrous.
- 5 (8). Spinules on locomotory ampullae very minute, forming continuous sclerotized field.
- 6 (7). Spinous field at anterior angles of pronotal shield barely emarginate, as if deflected laterally. Body length 18–20 mm. On shoots of spruce, fir, and other conifers 2. ***S. interrupta*** Gebl.
- 7 (6). Spinous field at anterior angles of pronotal shield sharply emarginate. Body length 28–30 mm. Mainly on aspen, rarely on other deciduous plants 3. ***S. perforata*** (Pall.)
- 13 8 (5). Spinules on locomotory ampullae of abdomen distinct, dispersed, specklike. On woody willow species, mainly on poplar and willow 4. ***S. alberti*** Plav.
- 9 (4). Eusternum at posterior margin with spinules forming up to four transverse interlacing rows. On elm and other plants. 5. ***S. octomaculata*** Bless.
- 10 (1). Spinous field of pronotum extending forward beyond anterior margin of lateral transverse depressions, which shift from sides into spinous field as a saccate notch. Eusternum at posterior margin with spinules.
- 11 (16). Spinules on locomotory ampullae saccate, not very large; spinules at posterior margin of eusternum forming uniform transverse band.
- 12 (15). Body not large; length of last instar larvae 16–22 mm. Spinules on ventral locomotory ampullae in front of transverse groove form up to three, behind it one–two transverse rows (subgenus *Compsidia* Muls.).
- 13 (14). Spiracles on sides of abdomen transversely oval. On thin shoots of poplar, willow, aspen. Galllike warts form at sites

- of infestation 6. **S. populnea** (L.)
- 14 (13). Spiracles on sides of abdomen round, not transversely oval. On shoots of willow. Bore long longitudinal galleries with ventilation holes. 7. **S. balsamifera** Motsch.
- 15 (12). Body large; length of last instar larvae 38–46 mm. Spinules on ventral locomotory ampullae in front of transverse groove form not less than five–six, behind it up to three–four transverse interlacing rows (subgenus *Anaerea* Muls.) 8. **S. carcharias** (L.)
- 16 (11). Spinules on locomotory ampullae large, acicular. Spinules on posterior margin of eusternum forming two triangles with their apices projecting forward (subgenus *Amilia* Muls.). Spinous field of pronotum at anterior angles in front of saccate notch with smooth area and large bristle in center of it. On shoots of willow. Bore long galleries. 9. **S. similis** Laich.

Pupae

- 1 (10). Tip of abdomen with large spinules (*Saperda* s. str.).
- 2 (5). Labrum apically emarginate, rounded, laterally without bristles or with short, barely perceptible ones.
- 3 (4). Body length 17–19 mm. Metanotum broadly rounded basally, on disk in posterior half with distinct minute acute spinules. 1. **S. scalaris** (L.)
- 4 (3). Body length up to 10 mm. Metanotum directly truncate basally, on disk in posterior half with minute, barely distinguishable, setigerous spinules. 2. **S. interrupta** Gebl.
- 5 (2). Labrum narrowly rounded apically, with long bristles laterally.
- 6 (9). Body length 15–20 mm. Head with long thick bristles frontally.
- 7 (8). Labrum laterally with numerous bristles forming cluster on each side. Tip of abdomen with a few large spinules 3. **S. perforata** (Pall.)
- 8 (7). Labrum laterally with two bristles (two on each side) forming transverse row. Tip of abdomen with numerous setigerous spinules 4. **S. alberti** Plav.
- 9 (6). Body length 12–16 mm. Head with thin piliform bristles frontally. 5. **S. octomaculata** Bless.
- 10 (1). Tip of abdomen with long dense grayish bristles.
- 11 (14). Body length 12–15 mm. Pronotum with bright thin bristles (*Compsidia* Muls.).

- 12 (13). Tergites of abdomen with barely perceptible, specklike setigerous spinules forming transverse row at posterior margin. 6. **S. populnea** (L.)
- 13 (12). Tergites of abdomen with distinct minute setigerous spinules forming transverse interlacing row or transverse band at posterior margin. 7. **S. balsamifera** Motsch.
- 14 (11). Body length 18–30 mm. Pronotum with acute setigerous spinules.
- 15 (16). Tip of abdomen with numerous grayish, basally sclerotized bristles. Labrum with two bristles laterally (*Anaerea* Muls.). 8. **S. carcharias** (L.)
- 16 (15). Tip of abdomen with numerous bright grayish bristles having diminutive acute spinule at base. Labrum without bristles (*Amilia* Muls.). 9. **S. similis** Laich.

1. *Saperda scalaris* (L.)

Linnaeus, 1758. *Syst. Nat.*, ed. 10: 394 (*Cerambyx*); — ab. *hieroglyphica* Pallas, 1773. *Reise Russ. Reich.*, 2: 723 (*Cerambyx*); — *variegata* Goeze, 1777. *Ent. Beytr.*, 1: 506; — *varia* Gmelin, 1790. In Linnaeus: *Syst. Nat.*, ed. 13, 1, 4: 1875; — ab. *estellae* Mulsant, 1839. *Col. France, Longic.*, 188; Aurivillius, 1923. In Junk: *Coleopt. Catalog.*, 73: 478–480; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 152, 156, 157, 167; Saalas, 1936. *Ann. Zool. Soc. Zool.-Botan. Fennice*, 4: 159; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 544; Panin and Savulescu, 1960. *Fauna Rep. Popul. Romine*, 10, 5: 467; Il'inskii, 1962. *Opredelitel' vredit. lesa*, 326; Podany, 1963. *Bull. Soc. Entomol. Mulh.*, Sept., 69–73; Demelt, 1966. *Die Tierwelt Deutschl.*, 52: 100; Kaszab, 1971. *Cincérek-Ceramb., Coleopt.*, 4, 5: 259–261; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 30–32; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovykh lesov Sibiri*, 171–174.

Adult (Fig. 1): Readily recognized by the characteristic pattern on elytra. Body elongate. Head with minute irregular punctation, with gray, not very dense adherent and brownish erect hairs, occiput glabrous, rarely pubescent. Frons flat, transverse. Antennal tubercles barely projecting. Genae distinctly (male) or slightly (female) shorter than lower ocular lobe. Antennae shorter (female) or slightly longer (male) than body, basally (3rd–11th segments) with adherent white, apically with blackish-brown short hairs, on inner side sparsely setaceous. First antennal segment shorter than 4th, equal to 5th. Third segment notably longer than 4th, slightly shorter than 5th and 6th segments together. Eyes deeply emarginate, sharply and minutely faceted; lower ocular lobe at

anterior margin broadly rounded (male) or transversely truncate (female).

Pronotum transverse (female) or width not more than length (male), in anterior third with wide depression, in posterior third with narrow transverse groove, laterally with dense grayish-blue adherent hairs and small round spot, disk with large longitudinal glabrous black spot, entire surface with erect setiform black or blackish-brown hairs. Pronotal shield flat, compressed in center of depression, at posterior margin broadly rounded, with sparse adherent hairs.

Elytra parallel-sided or slightly tapering posteriorly, individually broadly rounded apically, disk moderately convex, humeri insigni-
 15 significantly projecting or straight, with bright grayish-blue or pale blue hairs forming longitudinal band on suture (with five transverse

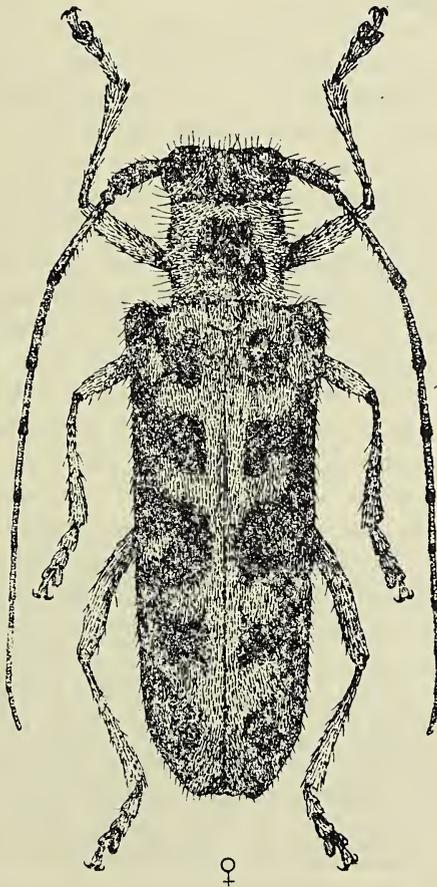


Fig. 1. *Saperda scalaris* (L.).

branches arising from it) and up to five spots of uniform configuration laterally (f. *typica*). Sometimes transverse branches split into separate spots (ab. *maculosa* Fald.) or lateral spots faint (ab. *hieroglyphica* Pall.). The pattern is quite variable, with up to 68 aberrations known, but in every case the presutural longitudinal band is usually present, being absent only in ab. *estellae* Muls. Body ventrally with minute, compactly recumbent, grayish-blue and semierect long bright hairs. Abdominal sternite V convex, medially with narrow longitudinal groove, apically broadly rounded, almost truncate (female), or slightly bulging, without longitudinal groove, and narrowly emarginate apically. Body, elytra, antennae, and legs black. Body length 11–19 mm.

Egg: White, elongate, slightly tapering toward poles, rounded at poles. Chorion with fine sculpture, semitransparent, slightly matte. Length 3.1 mm, width 0.8 mm.

Larva (Fig. 2): Well distinguished from the larvae of other species in structure of locomotory ampullae on abdominal tergites. Body elongate, white. Head parallel-sided, slightly tapering basally, slightly retracted into prothorax. Epistoma slightly bulging, in anterior half rusty, at anterior margin with narrow dark brown fringe, in posterior half bright yellow, longitudinally divided by median suture, laterally demarcated by distinct whitish frontal sutures, in anterior third with long sparse setiform hairs forming transverse row. Hypostoma rusty, distinctly tapering toward base, at anterior angles narrowly rounded, anteromedially with minute bright pores forming transverse, generally irregular row. Temporo-parietal lobes yellowish, at anterior margin with dark brown fringe covering antennal zone, behind it with long bright rust setiform hairs. Antennae with rusty tinge, slightly projecting from antennal sockets. Ocelli at base of antennae not discernible. Clypeus trapezoid, white toward apex, with rusty tinge toward base. Labrum transversely oval, at anterior margin broadly rounded, white, with dense bristles, sharply tapering toward base, here with rusty tinge. Mandibles black, basally dark red, apically obliquely truncate, with barely extending ventral and hardly projecting dorsal denticles.

Pronotum transverse, laterally rounded, at anterior margin with broad white fringe, behind it on disk and laterally with glabrous lustrous yellow square, in front of it with dense rusty hairs forming transverse cluster laterally, medially with faint whitish longitudinal mark, with
 16 short hairs anterior to shield. Pronotal shield with minute dense (basally very minute) spinules (at anterior margin spinous field directly truncate), laterally demarcated by longitudinal folds, at anterior angles broadly emarginate, here with deep transverse notch or depression, with whitish punctures and sparse short hairs. Alar lobes with rusty hairs,

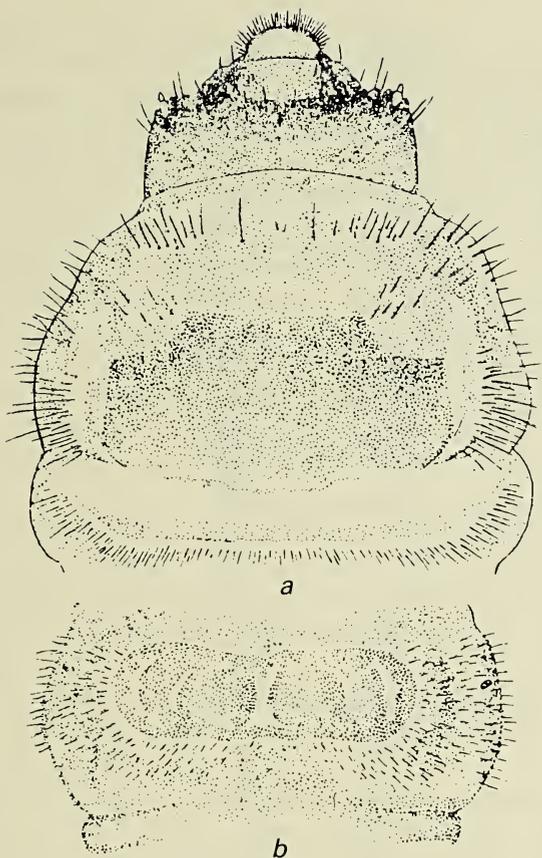


Fig. 2. Larva of *Saperda scalaris* (L.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

without spinules. Mesonotum with short hairs forming transverse row on disk and transversely extending extensive cluster on sides. Metanotum on disk with very minute, dense spinules forming transverse field divided medially by narrow transverse groove, laterally with dense hairs. Prothoracic presternum laterally with longitudinally oval, yellow glabrous lustrous spot, on disk with short rusty hairs. Eusternum at posterior margin and base of prosternum (basisternum) in anterior half with minute dense sclerotized spinules forming common transverse yellowish band. Meso- and metasterna on disk with transverse yellowish band (of minute spinules), divided medially by transverse groove.

Abdomen elongate, laterally with short bright hairs. Dorsal locomotory ampullae moderately bulging, with minute dense spinules,

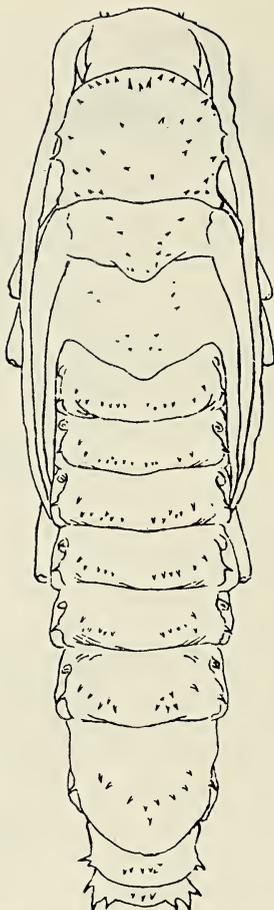


Fig. 3. Pupa of *Saperda scalaris* (L.).

medially divided by common longitudinal groove, with two short paramedial longitudinal grooves on each side deflected outward (hence dorsal ampullae appear to comprise lunular folds with their ends curved medially). Ventral locomotory ampullae with very minute spinules, divided by transverse groove slightly curved backward and fusing laterally with short longitudinal grooves. Body length 28–30 mm, width of head up to 3.0 mm.

Pupa (Fig. 3): Characterized by large acute spinules at anterior margin of pronotum. Body moderately elongate. Head from base of antennae insignificantly tapering anteriorly, frontally flat, parietals with short setigerous spinules forming interlacing longitudinal row, at anterior margin with six bristles arranged in pairs. Labrum apically convex, not round, without setae. Antennae in second half curved

semicircularly with apex flexed toward foretibiae.

Pronotum slightly transverse at base, with faint transverse groove and insignificantly projecting posterior angles, at anterior margin with large acute setigerous spinules forming an irregular transverse row, on disk and laterally on hind clivus with minute dispersed spinules. Mesonotum convex, at posterior margin with extended shield, along sides with acute spinules forming two interlacing longitudinal rows diverging anteriorly. Metanotum broad, slightly convex, at posterior margin squarishly rounded, with narrow median longitudinal groove, with minute acute spinules forming cluster in anterior half.

Abdomen elongate, parallel-sided or markedly tapering posteriorly. Abdominal tergites medially with common narrow longitudinal groove, at posterior margin with acute spinules forming uniform or slightly interlacing transverse row. Abdominal tergite VII convex, lustrous, apically rounded, in posterior half with acute, not large spinules forming transverse recurved row. Tergite VIII broadly rounded posteriorly, disk hyaline, with minute spinules forming transverse row. Tip of abdomen (in ventral view) laterally bound by faint ridge bearing three-four large setigerous spinules. Body length 17–19 mm, width of abdomen 3.6 mm.

Material: Collected in Altai, Tuva, and Ussuri-Primor'e region. Adults 137, larvae 234, pupae 2 males, exuviae of larvae and pupae with beetles from cells 5.

Distribution: Northern Europe, the Caucasus, northern Asia (including Tuva), Ussuri-Primor'e region, northeast China.

Biology: Inhabits deciduous forest plantations. More often found in southern regions. Ecologically associated mainly with birch. Beetles appear at May-end and are found up to first few days of August. Maximum beetles observed June-end and in first half of July. For example, over several seasons we caught 100 beetles—1 in last days of May, 32 in June, 62 in July, and 5 at beginning of August. Beetles lead a cryptic mode of life and are found on trees infested by them. They require supplementary feeding and gnaw green leaves. During this period their intestinal tract fills with green mass. After mating,

Table 1. Development of *Saperda scalaris* (L.)

Year	April	May	June	July	August	September
1st	L	LPA	LP AE	AEL	AEL	L
2nd	L	L	L	L	L	L
3rd	L	LPA	LP AE	AEL	AEL	L

Key: A — adult; E — egg; L — larva; P — pupa.

females lay eggs in trunks of drying, rooted, and freshly felled trees. Freshly prepared timber often infested. Some idea of fecundity was obtained through dissection of females caught in nature on July 8th; their ovaries contained 30 mature eggs. After hatching, larvae initially make a gallery under bark, fill it with fine frass, before the second hibernation bore into the pith and there in the upper layer excavate a gallery longitudinal to the stem, generally from below upward, and pack it with fine frass. They then prepare a pupal cell at end of gallery, longitudinal to the stem, and pupate. A layer of wood up to 9.0 mm remains between the pupal cell and bark. Length of pupal cell up to 30 mm, width 8.0 mm. Pupation of larvae commences after the second hibernation in May and ends in last ten days of June. Developed beetles nibble a large flight opening on the stem surface and exit the wood through it. Emergence of beetles from wood is concluded by June-end or early July. Generation—two-year cycle (Table 1).

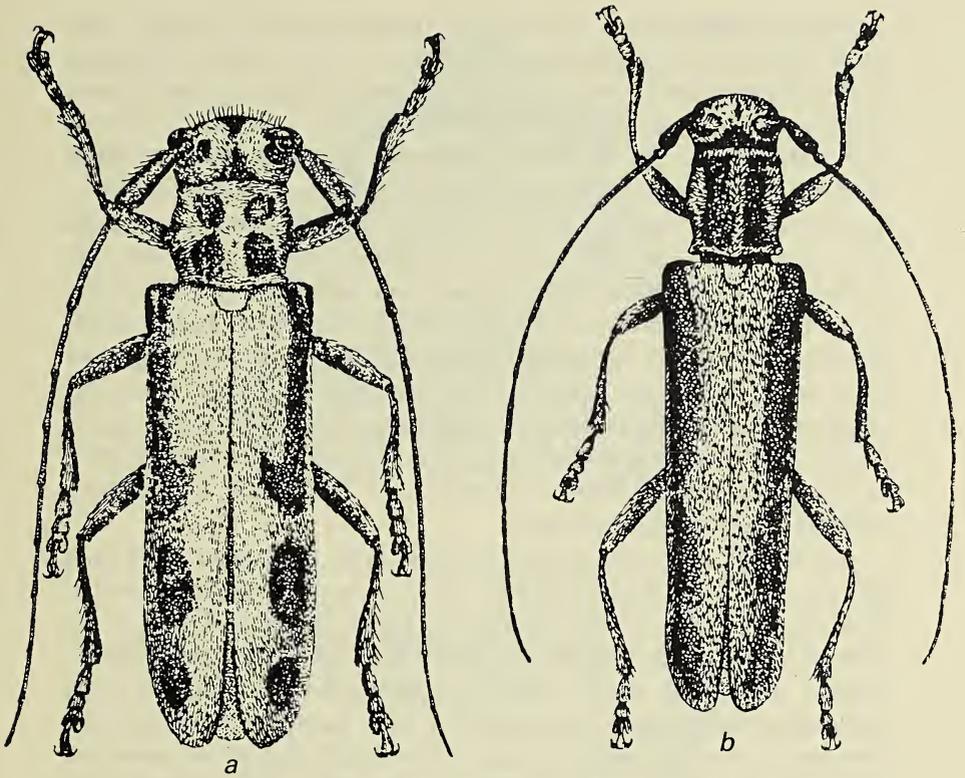
Based on six insects, larvae before pupation weigh 125–214 mg (156.7 ± 14.2), pupae 94.0–194.5 mg (132.4 ± 15.4), young beetles before emergence from wood 77–154 mg (105.9 ± 11.9).

Saperda scalaris (L.) infests birch, rowan, bird cherry, willow, elm, and other deciduous woody species, but is most often found on birch. Beetles were raised from larvae on birch, bird cherry, alder, and rowan. They infested stems up to 12 cm diameter or more. During forest inspections we collected 289 specimens (larvae, pupae, beetles) — 236 from birch, 26 rowan, 17 willow, 8 bird cherry, 1 alder, and 1 from elm.

2. *Saperda interrupta* Gebl.

Gebler, 1825. In Hummel: *Ess.*, 4: 52; — ab. *laterimaculata* Motschulsky, 1860. *Schrenk's Reisen Amurl. Coleopt.*, 2: 151; Plavil'shchikov, 1932. *Zhukidrovoseki vrediteli drevesiny*, 194; Kurentsov, 1950. *Tr. Dal'.-Vost. fil. AN SSSR, zool.*, 1, 4: 191–192; Gressit, 1951. *Longic. Beetles of China*, 2: 552; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 543; Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 69, 209; Podany, 1963. *Bull. Soc. Ent. Mulh.*, 5: 73; Kojima and Hayashi, 1969. *Insectis' Life in Japan*, 1: 153; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 34–38.

Adult (Fig. 4): Distinguished from other species by characteristic pattern on elytra consisting of continuous pilose greenish band on disk and black, often fusing spots on sides. Head short, broad, slightly broader than pronotum, with adherent greenish pubescence, dense erect brownish hairs, glabrous black spot in middle of frons and much larger black spot at posterior margin of occiput; sometimes these spots fuse



19

Fig. 4. *Saperda interrupta* Gebl.a—forma typica; b—ab. *laterimaculata* Motsch.

in middle of black longitudinal band. Frons, sinciput, and occiput (in lateral view) rounded together. Eyes convex, finely faceted; lower ocular lobe 1.5 times (female) or more than twice (male) longer than gena. Antennal tubercles extended, equal in size to ocular socket. Antennae with short sparse hairs, on inner side with semierect sparse setae, reaching apex of elytra by 11th segment (female) or slightly extending beyond it (male). Fourth antennal segment shorter than 3rd, notably longer than 5th.

Pronotum slightly, or not longer than wide, parallel-sided, basally with narrow transverse groove and arched posterior margin, with dense punctation, compact adherent greenish pubescence, with bright erect hairs, on disk with four large glabrous black spots, laterally with one black spot (f. typica). Sometimes spots on disk of pronotum fuse into one common black spot (ab. *biexcisa* Plav.). Pronotal shield almost parallel-sided, apically broadly rounded, with dense, closely adherent, greenish hairs.

Elytra parallel-sided, individually rounded apically, basally with small projecting humeral tubercle, inward to it with faint depression, disk uniformly convex, with dense punctation and dense greenish pubescence, with erect or semierect dark brown hairs, laterally in anterior half with glabrous black band, in posterior half with glabrous black spots (f. *typica*), rarely the pubescence whitish (ab. *subcandida* Plav.). Sometimes black spots on sides of elytra fuse into common irregular band of greenish (ab. *laterimaculata* Motsch.), rarely grayish tone (ab. *victori* Plav.). Sometimes longitudinal black band in anterior half has a transverse pilose lacertus (ab. *transversefasciata* Plav.). Body ventrally with dense grayish or greenish adherent pubescence, with bright thin erect hairs. Abdominal sternite V highly convex, medially with longitudinal groove, apically insignificantly emarginate (female) or slightly convex, without longitudinal groove, at apex of notch round, slightly downcurved (male). Body, antennae, and legs black, pubescence greenish. Body length 7–10 mm.

Larva (Fig. 5): Characterized by small body and minute, indistinct spinules on locomotory ampullae. Body moderately elongate, white. Head poorly retracted into prothorax, parallel-sided, bright rust, at anterior margin with dark brown fringe. Epistoma flat, longitudinally divided by median suture, laterally demarcated by narrow whitish (sometimes well or barely noticeable) frontal sutures, apically broadly rounded, at anterior margin in region of brownish fringe with short thin hairs forming transverse row. Hypostoma parallel-sided, at anterior and posterior margins broadly emarginate, poorly convex. Temporo-parietal lobes bright rust, at anterior margin with narrow brownish fringe, behind it with faint hairs in anterior row. Antennae whitish, thin, their apices barely projecting from antennal sockets. Clypeus large, trapezoid, whitish, basally rusty. Labrum convex, whitish, with dense rusty bristles, at base highly tapering, glabrous, with rusty fringe. Mandibles black, basally with reddish-rust sheen, apically with extended ventral and barely projecting dorsal denticles.

20 Pronotum sloping toward head, markedly narrowing anteriorly from base, at posterior margin of depression rounded, on disk anterior to shield yellowish, glabrous, medially with narrow white longitudinal band, at anterior margin along sides with whitish fringe bearing long rusty hairs forming interlacing transverse row or transverse band. Pronotal shield uniformly covered with spinules (gradually reducing in size toward base) anterior angles emarginate, here with deep triangular transverse depression, laterally demarcated by deep longitudinal grooves, at anterior margin of spinous field truncate, along sides anterior to depression with long, distinctly raised bristle, among translucent whitish

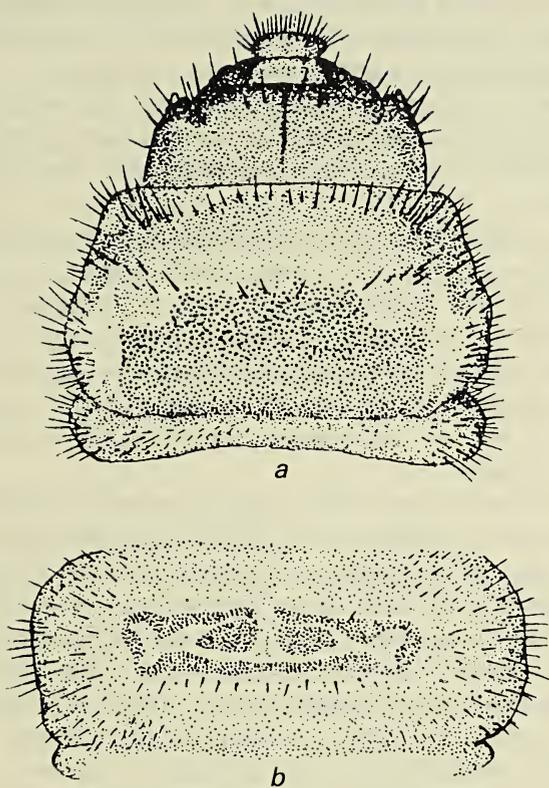


Fig. 5. Larva of *Saperda interrupta* Gebl.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

punctures. Alar lobes sclerotized outward to longitudinal grooves, with very minute spinules, laterally with rusty hairs forming cluster. Pronotum in anterior half with very minute spinules (visible under high magnification) forming continuous transverse field; behind this field with minute rusty hairs forming transverse row. Metanotum on disk with minute spinules forming transverse band divided medially by transverse whitish groove. Prothoracic presternum with short sparse hairs, laterally with yellowish glabrous square. Eusternum glabrous, whitish, without spinules. Basisternum in anterior half with very minute dense spinules forming transverse band expanding laterally. Meso- and metasterna similar to abdominal sternites in sclerotization.

Abdomen elongate, gradually tapering toward tip, laterally with very thin bright hairs. Dorsal locomotory ampullae with minute dense spinules, common longitudinal troughlike groove medially divided by two whitish transverse grooves uniting with each other and with lateral

short grooves on sides. Ventral locomotory ampullae with minute specklike spinules, medially divided by whitish deep transverse groove. Body length 18–20 mm, width of head up to 1.5 mm.

Pupa: Body elongate. Head short, comparatively broad, frons convex, sloping toward occiput (on the same plane with sinciput). Antennae in second half curved annularly (on ventral side), their apices flexed to forefemora.

Pronotum slightly transverse, parallel-sided, disk convex, near base with indistinct, narrow transverse groove, with minute, singly dispersed spinules. Mesonotum insignificantly convex, at posterior margin with extended, slightly raised shield, laterally with two adherent, on shield 21 eight acicular spinules. Metanotum moderately convex, medially with longitudinal groove, laterally in anterior half with two acute spinules forming transverse row, at posterior margin slightly rounded, almost transversely truncate.

Abdomen elongate, gradually tapering posteriorly. Abdominal tergites I–VI convex, medially with indistinct longitudinal groove, at posterior margin with minute acute spinules forming transverse row (three–four spinules on each side of longitudinal groove). Tergite VII convex, lustrous, in posterior third with acute spinules forming interlacing transverse row. Tergite VIII short, on disk with three, laterally with one spinule in common transverse row. Abdominal tip demarcated by U-shaped ridge with three ventral and four dorsal setigerous spinules. Body length 10 mm, width of abdomen 2.0 mm.

Material: Collected in Altai, Tuva, and Ussuri-Primor'e region. Adults 94, larvae 138, pupae 2, larval exuviae with beetles from cells 8.

Distribution: Siberia, from Altai, Ob' as far as the Pacific Ocean coast, northeast China (Manchuria), Korean peninsula, Japan.

Biology: Ecologically associated with coniferous plantations. Found in large numbers in foothill and montane forests. Flight of beetles begins in first half of June and continues to July-end. Beetles feed on bark of thin shoots of spruce and other woody conifers and mate on them. Physiologically weakened and drying trees infested. Females lay eggs in crevices under the bark, aligning them longitudinally throughout the trunk and on knots. Larvae live under bark, bore sinuous, often squarish expanding galleries longitudinal to the trunk, and pack them with coarse fibrous frass. Larvae hibernate the first time under bark. Before the second hibernation, they bore into wood leaving entry holes (3 mm × 4 mm) on its surface. In wood at a depth of 1.8 cm they excavate a gallery up to 2.4 cm in length longitudinal to the trunk and make a pupal cell in it. Entry hole plugged with frass. Pupation occurs after second hibernation. Pupae lie in cells with head toward entry hole.

Length of gallery under bark up to 14 cm, width 0.5–3.5 cm. Total area of gallery 7.6–9.8 cm² (average 8.6 ± 1.2 cm²). Length of pupal cell 12–15 mm, width up to 4.0 mm. Pupation of larvae begins May-end and is completed in last ten days of June. Under laboratory conditions, at $t = 20^{\circ}\text{C}$, pupae developed in 12 days. In nature, the pupal stage lasts not less than two weeks. Developed beetles scrape frass from the entry hole, nibble a round flight opening (3.0–3.5 mm diameter) on bark surface, and emerge from the cell. Emergence of beetles from wood commences in first half of June and is completed in early July. Generation—two-year cycle.

During metamorphosis insect weight reduces from 22.5 to 45%. Based on 17 specimens, larvae before pupation weigh 15.0–57.2 mg (average 39.4 ± 2.7), pupae 13–45 mg (34.0 ± 2.1), beetles before emergence from cell 11–38 mg (26.5 ± 1.7).

Saperda interrupta Gebl. infests mainly spruce, fir, pine, and other coniferous plantations. Growing as well as mature trees are subject to attack. Density of infestation is high. For example, in a top branch 1.41 m long and 2.2–3.3 cm diameter cut from a growing tree (spruce), 29 midinstar larvae were found, i.e., more than 20 larvae per meter of stem. In another instance, in the stem of a tree (spruce) 15 cm diameter at chest height, 50 larvae were found, which occurred almost uniformly from the butt to the top of the stem having a diameter up to 2.0 cm; there were four–six larvae per meter length of stem. Knots were also infested and contained one–four larvae. We generally found the following species coexisting with this one: *Semanotus undatus* (L.)—178 specimens, *Monochamus saltuarius* Gebl.—25, *Rhagium inquisitor* (L.)—21, *Pronocera brevicollis* (Gebl.)—6, *Clytus arietoides* Reitt.—4, *Tetropium castaneum* (L.)—1, and others (Cherepanov and Cherepanova, 1971). Several beetles were raised from larvae collected in nature from spruce (*Picea obovata*), Siberian cedar (*Pinus sibiricus*), and pine (*Pinus funebris*). During forest inspections we additionally found 145 specimens (larvae, pupae, beetles),—104 on spruce, 24 fir, 16 Siberian cedar, and 1 on pine. According to Japanese scientists, it also infests spruce (*P. koraiensis*), fir (*Abies nephrolepis*), and larch (*Larix olgensis*).

3. *Saperda perforata* (Pall.)

Pallas. 1773. *Reise Russ. Reich.*, 2: 723 (*Cerambyx*); — *decempunctata* Goeze, 1777. *Entom. Beytr.*, 1: 506 — *duodecimpunctata* Brahm. 1790. *Ins.-Kal.*, 1: 176; — *seydli* Frölih, 1793. *Naturforscher*, 27: 135; — *rudolphi* Cederhjelm, 1798. *Fauna ingr. Prodr.*, 92; — *punctata* Paykull, 1800. *Fauna Suec.*, 3: 76; — *seydli* Fabricius, 1801.

Syst. Eleuth., 2: 328; — ab. *algerica* Pic, 1903. *Longic.*, 4, 2: 8; — *pallidipes*, Pic, 1904. *Longic.*, 5, 1: 9; — ab. *mesmini* Pic, 1910. *Longic.*, 7, 2: 13; — ab. *deficiens* Reineck, 1913. *Deutsch. Entom. Zeitschr.*, 300; Kemner, 1922. *Entom. Tidskr.*, 43, 2: 127–129, 138; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 152; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 543; Panin and Savulescu, 1960. *Fauna Republ. Pop. Romine. Insecta*, 10, 5: 470–471; Il'inskii, 1962. *Opredelitel' vredit. lesa*, 326; Grechkin and Vorontsov, 1962. *Vrediteli i bolezni topolei*, 70; Podany, 1963. *Bull. Soc. Entom. Mulh.*, Aug.-Sept., 63–64; Demelt, 1966. *Die Tierwelt Deutschl.*, 52, 100–101; Kaszab, 1971. *Cincérek-Ceramb., Col.*, 4, 5: 261; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 32–34; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 201, 203; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovykh lesov Sibiri*, 178–182.

Adult (Fig. 6): Well distinguished from other species of the genus *Saperda* F. by elytra with reduced black humeral band, which generally broadens at the end. Body comparatively thick, ridgelike. Head very steep frontally, with dense adherent ash-gray (with greenish tinge) pubescence, with minute black punctures, erect blackish-brown hairs on occiput and bright hairs on temples. Frons broad, flat, laterally emarginate, medially with narrow longitudinal groove, antennal tubercles highly produced laterally. Eyes finely and sharply faceted. Lower ocular lobes large, lower margin rounded, length more than width; upper ocular lobes projecting markedly mediad, distance between them distinctly less than between base of antennal tubercles. Antennae shorter than body, apices extending beyond hind clivus (female) or almost reaching apex of elytra (male); antennal segments basally with minute gray adherent and apically black hairs, inner side sparsely setaceous; 4th antennal segment shorter than 3rd, longer than 1st.

Pronotum parallel-sided, with slightly recurved posterior margin, with dense gray compact adherent and sparse bright erect hairs, with black spots—four in anterior and four in posterior half, forming correspondingly two transverse rows, medially with short black mark. Pronotal shield tapering toward apex, posteriorly narrowly rounded, with dense adherent hairs.

Elytra parallel-sided or slightly tapering posteriorly, individually rounded apically, with dense adherent ash-gray (often with yellowish tinge) pubescence, throughout surface with numerous erect brownish hairs (in lateral view), with large black spots—five on disk forming longitudinal row and one laterally in anterior third, with black incurved lateral band extending posteriorly from humeral tubercle to the middle.

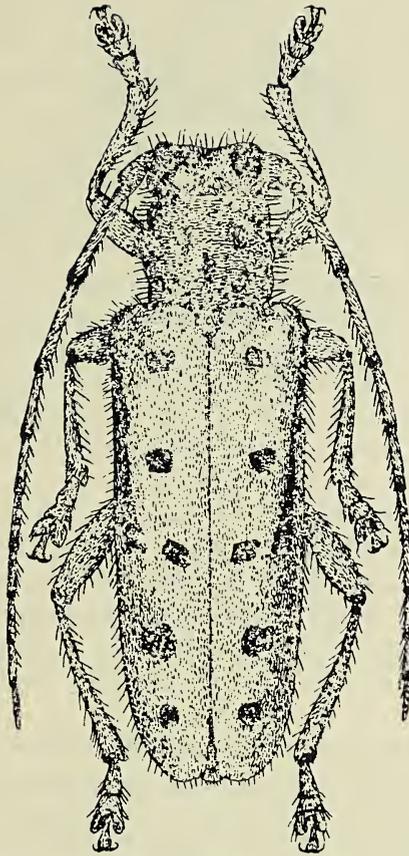


Fig. 6. *Saperda perforata* (Pall.).

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Spots large, rarely minute, dotlike, more often round, rarely oval or transversely elongate; fourth spot (in front of fore clivus) lunular, often anteriorly emarginate. Body ventrally with dense adherent gray pubescence and long bright erect hairs. Abdominal sternite V convex, medially with narrow longitudinal groove (female) or mildly convex, without groove (male). Body, antennae, elytra and legs black. Pubescence ash-gray, sometimes with yellowish or greenish tinge. Body length 12–18 mm.

Egg: White, elongate, tapering more toward one pole, less toward the other, rounded at poles. Chorion matte, with fine noncellular sculpture. Length 3.5 mm, width 1.0 mm.

Larva (Fig. 7): Resembles the larva of *Saperda scalaris* (L.) in spinous field on pronotal shield. Well distinguished from it in structure of dorsal locomotory ampullae. Body moderately elongate, laterally

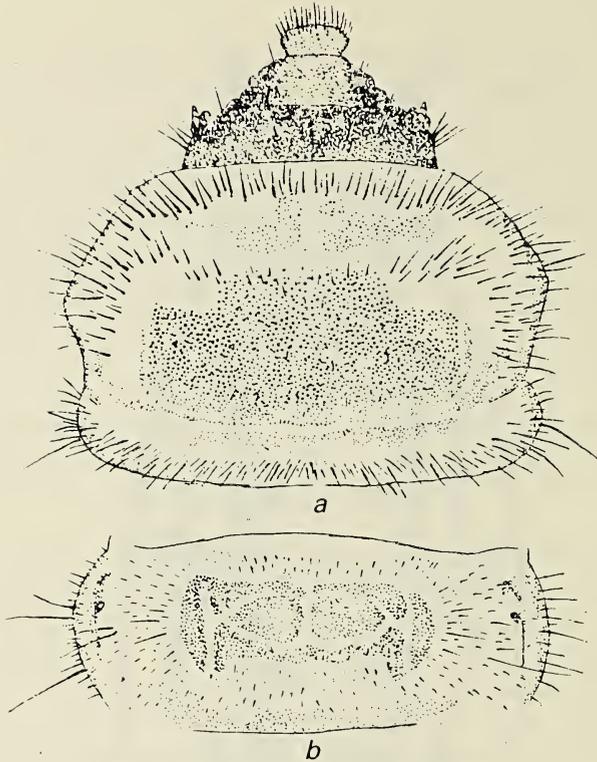


Fig. 7. Larva of *Saperda perforata* (Pall.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

with numerous rusty hairs. Head half retracted into prothorax. Epistoma mildly convex, longitudinally divided by median suture, laterally with barely perceptible (faint) frontal sutures, at anterior margin with broad dark brown uniform fringe with rusty setae in transverse row. Hypostoma parallel-sided, at anterior angles narrowly rounded, dark rust, near posterior angles much brighter. Temporo-parietal lobes bright rust, at anterior margin with dark brown fringe, at posterior margin short, with bristles in transverse row. Antennae whitish, short, slightly projecting from antennal socket. Ocelli not noticeable. Clypeus large, trapezoid, whitish, basally rusty, laterally with two–three bristles. Labrum transversely oval, in anterior half with dense bristles, basally glabrous. Mandibles black, apically transversely or slightly obliquely truncate.

Pronotum slightly wider than long, insignificantly sloping toward head, at anterior margin with broad whitish fringe, at posterior margin short, with rusty hairs forming transverse dense band (laterally) or transverse row (on disk); in front of shield and laterally with glabrous

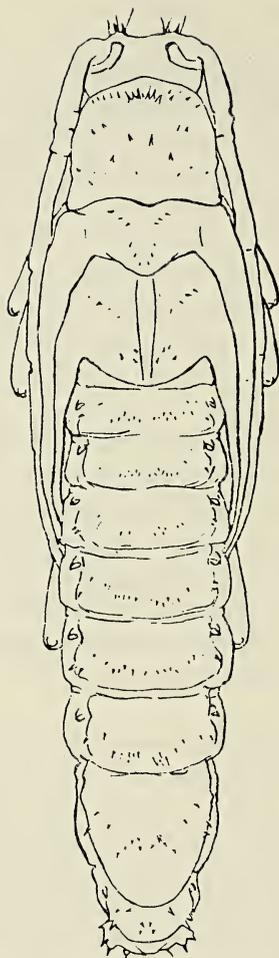
lustrous rusty square. Pronotal shield with minute dense spinules, laterally demarcated by short longitudinal folds, anterior angles emarginate, here with transverse depression, disk with minute uniform hairs. Alar lobes with long dense hairs forming extensive cluster passing inward to posterior margin of square on pronotal shield. Mesonotum in anterior half, metanotum on disk with minute dense spinules forming transverse yellowish field, behind it and on sides with short dense rusty hairs. Metanotum in middle with spinous field divided by narrow transverse groove. Prothoracic presternum with short hairs on disk, laterally with much longer hairs. Eusternum at posterior margin and basisternum in anterior half with minute spinules forming extensive yellow transverse band. Meso- and metasterna sclerotized on disk (with minute dense spinules), medially with narrow transverse groove.

Abdomen gradually tapering posteriorly, laterally with short rusty hairs, with transversely elongate spiracles having dark rust peritremes. Dorsal locomotory ampullae with very minute spinules, medially divided by longitudinal groove and two transverse grooves uniting with each other laterally by common short groove with lateral longitudinal folds. Ventral locomotory ampullae sclerotized, at anterior margin emarginate, in posterior half with transverse groove uniting on sides with lateral longitudinal folds. Body length 28–30 mm, width of head up to 3.0 mm.

Pupa (Fig. 8): Body moderately elongate. Head flat frontally, here along sides with long coarse bristles forming on each side a longitudinal band, at anterior margin with six bristles (two close-set laterally and two posteriorly transversely spaced by medial projection). Labrum apically acute, lustrous, medially with coarse bristles forming interlacing transverse row or two clusters (on sides). Antennae in second half curved semicircularly, their apices flexed toward base of forefemora.

Pronotum transverse, slightly narrowing in anterior fourth, posterior angles slightly elongate, with acute setigerous spinules forming rarefied or comparatively dense transverse row at anterior margin, transverse interlacing row anteromedially, and dispersed field laterally on hind clivus. Mesonotum convex, at posterior margin with slightly elongate shield, with minute setigerous spinules forming two narrow bands diverging from shield toward base of elytra. Metanotum posteriorly broadly rounded, mildly convex, medially with narrow longitudinal groove, in posterior third on disk with minute acute spinules forming small cluster, in anterior third laterally at alar base with paired setigerous spinules.

Abdomen elongate, gradually tapering toward tip. Abdominal tergites medially with narrow longitudinal groove, in posterior half with



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Fig. 8. Pupa of *Saperda perforata* (Pall.).

minute acute setigerous spinules forming transverse band or interlacing transverse row. Tergite VII markedly elongate, tapering posteriorly, narrowly or broadly rounded apically, disk convex, lustrous, with acute setigerous spinules forming transverse band posteromedially. Tergite VIII broadly rounded posteriorly, with minute acute or large setigerous spinules forming transverse row or randomly dispersed. Tip of abdomen (in ventral view) laterally bound by ridge bearing four setigerous spinules. Valvifers of female almost conical, contiguous. Body length 15–20 mm, width of abdomen 3.5–4.5 mm.

Material: Collected in northern Kazakhstan, western Siberia, Tuva, Ussuri-Primor'e region. Adults 90, larvae 249, pupae 6 (males and

females), larval exuviae from cells 6.

Distribution: Western and eastern Europe (from Sweden, Finland, and Karelia to the Mediterranean Sea), northern Asia (from the Urals to coasts of seas of Okhotsk and Japan) including northern Kazakhstan, Altai, Baikal region, Ussuri-Primor'e region.

Biology: Inhabits deciduous plantations. Sporadically found, mainly in the southern regions of Siberia. Ecologically associated with aspen and other deciduous woody plants. Flight of beetles commences in second half of June and is concluded in August. For example, over a period of several seasons we caught 66 beetles—24 (36.4%) in second half of June, 41 (62.1%) in July, and 1 (1.5%) in August. Beetles feed on tissues of green leaves and thin shoots of aspen. After mating, the female makes a cavity up to 3.0 mm long on a stem and lays an egg through it under the bark. One egg is laid in each cavity. Weakened, wind-broken, and freshly felled trees are infested. We found 13 eggs in the ovaries of one female caught in nature.

With time, laid eggs turn yellowish. At an atmospheric temperature of 16.3°C larvae hatch from eggs 20 days after oviposition. Appearance of young larva commences in first half of July and is completed by August-end or early September. Developed larvae break through the chorion and immediately begin to feed on phloem. Larvae live under bark, make galleries outside the wood and pack them with coarse frass. Larvae of the last instar, before the second hibernation or after it, bore into wood and there excavate a pupal cell in the upper layer at a depth up to 22 mm longitudinal to the stem, then plug the entry hole with fibrous frass. Length of pupal cells 21–27 mm, width 5–10 mm. Width of entry hole into cell up to 9.0 mm. Larvae pupate with head toward entry hole.

Pupation commences in last ten days of May (we found the first larvae on May 28th) and is completed in second half of June. In nature, pupae take two–three weeks to develop. Under laboratory conditions, at $t = 20.0\text{--}21.5^\circ\text{C}$, a beetle emerged after 14 days and another, at $19.5\text{--}20.5^\circ\text{C}$, after 17 days of pupation. Young beetles remain in the cell up to seven days. They then scrape frass from entry hole, nibble a large round opening up to 6.0 mm diameter on the bark surface, and emerge. Emergence of beetles from wood commences in second half of June and is completed in second half of July. Generation—two-year cycle.

Change in weight indices during metamorphosis can be judged from one specimen: larva before pupation weighed 190 mg (100%), the pupa developed from it 172.5 mg (90.7%), the beetle that emerged from this pupa 158 mg (80.2%). Weight indices vary significantly in populations

(as per weight records of 15 insects): larvae before pupation 113–236 mg (166.1 ± 10.8), pupae 103.5–210.0 mg (150.9 ± 10.1), young beetles 83.0–175.2 mg (120.7 ± 9.0).

Saperda perforata (Pall.) damages mainly thick-stemmed trees 18–35 cm diameter or more. It more often attacks aspen, rarely poplar, willow, and rowan. In 1968–1969, in Salair, large numbers were seen on piles of freshly prepared logs of aspen left in the forest.

4. *Saperda alberti* Plav.

Plavilstshikov [Plavil'shchikov], 1918. *Russk. entom. obozr.*, 15, 1: 80 (= *Saperda decempunctata* Gebl.); — *decempunctata* Gebler (nec Goeze), 1830. *Ledebour. Reise*, 2: 186; Winkler, 1928. *Catal. Col. Regions Palaearct.*, 8: 1215; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 152; Gressit. 1951. *Longic. Beetles of China*, 2: 551; Plavil'shchikov, 1955. *Vrediteli lesa. Spravochnik*, 2: 542; Grechkin and Vorontsov, 1962. *Vrediteli i bolezni topolya*, 70–71; Podany, 1963. *Bull. Soc. Entom. Mulh.*, Sept., 64–65; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 152; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 43–44; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovykh lesov Sibiri*, 182–187; — *m. latemaculata* Breuning, 1952. *Entom. Arb. aus dem. Museum Cg. Frey*, 3:186.

Adult (Fig. 9): Very similar to *Saperda perforata* (Pall.). Well distinguished from it by the long straight black band on elytra extending from humeral tubercle to hind clivus. Body comparatively thick. Head flat, steeply sloping anteriorly, with gray or yellowish (easily rubbed off) dense recumbent pubescence, long erect brownish hairs, and not very dense punctation, medially with narrow longitudinal groove passing over from frons to occiput; occiput generally with black glabrous longitudinal band. Eyes sharply and finely faceted; lower ocular lobes not less or even longer than genae. Antennae shorter than body, barely reaching or not reaching apex of elytra; 1st antennal segment insignificantly thick, shorter than 5th, equal to 6th; 3rd segment largest, equal to 6th and 7th together.

Pronotum parallel-sided, length not more (female) or slightly more (male) than width, medially with narrow longitudinal streaklike black groove, with compact adherent grayish or grayish-yellow pubescence directed from sides mediad, long erect brownish hairs, large black spots forming two transverse rows—four in anterior one and four at base. Pronotal shield narrowly or broadly rounded apically, longitudinally compressed medially, here with bright dense adherent hairs, laterally glabrous.

Elytra parallel-sided, disk mildly convex or almost flat, individually broadly rounded apically, in some insects slightly obtuse, humeri markedly expanded, with projecting humeral tubercle. Inward to tubercle insignificantly compressed basally, with dense adherent gray or yellowish-green pubescence, throughout surface (in lateral view) with black erect hairs, on disk with five black round, oval, or more often angular spots forming longitudinal row, punctuation deep, often distinct, laterally with long black band extending from humeral tubercle to hind clivus, lateral to it with marginal longitudinal bands. These bands terminate at apex independently (f. *typica*) or unite (ab. *conjugata* nov.) Sometimes black spots in posterior half of elytra discontinuous, appearing as small streaks (ab. *multivittata* nov.) or the second spot enlarges so much that it fuses with the humeral spot (m. *latemaculata* Breun.). Body ventrally

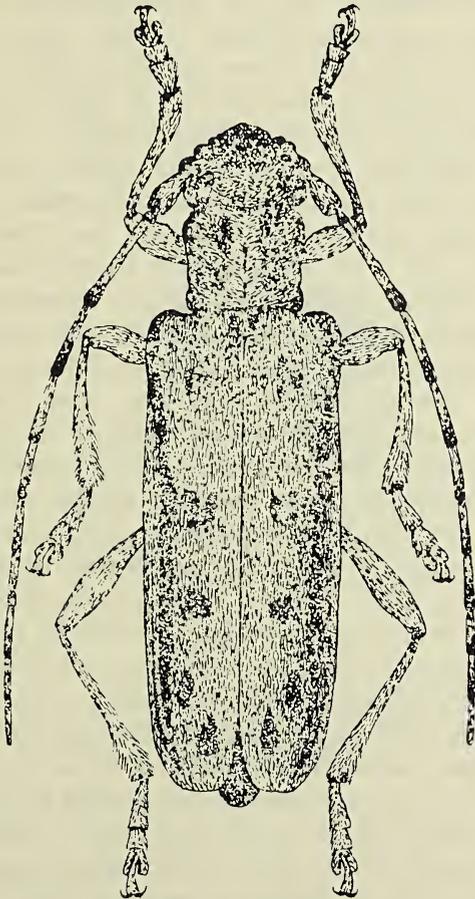


Fig. 9. *Saperda alberti* Plav.

with dense compact adherent pubescence and long semierect bright hairs. Abdominal sternite V with median longitudinal groove (female) or without it (male). Mid- and hind tibiae without distal notch at outer margin, with brush of short brownish bristles. Body, elytra, antennae, and legs black, pubescence ash-gray or yellowish-green. Body length 13–24 mm.

Egg: White, elongate, narrowing toward poles, at cranial pole fully, at caudal pole acutely rounded. Chorion with very fine uniform cellular sculpture. Length up to 3.0 mm, width up to 1.0 mm.

Larva (Fig. 10): Well distinguished from *Saperda perforata* (Pall.) by much larger spinules on metanotum, dorsal and ventral locomotory ampullae of abdomen, and basisternum, and absence of spinules at posterior margin of eusternum. Body comparatively thick. Head slightly retracted into prothorax, rusty, at anterior margin black or dark brown. Epistoma laterally demarcated by faint frontal sutures, longitudinally divided by median suture, apically broadly rounded, here with pair of minute lustrous brownish spots on sides of median suture, at anterior margin with dark brown fringe, behind it with deep setigerous pores in transverse row. Hypostoma convex, at anterior angles rounded, near posterior angles whitish, anteromedially with more or less prominent setigerous pores in transverse row. Temporo-parietal lobes in anterior half with setiform hairs forming transverse row. Antennae short, whitish, barely projecting from antennal sockets. Clypeus large, trapezoid, slightly whitish, laterally with short, barely perceptible bright bristles, basally rusty. Labrum poorly convex, at anterior margin broadly rounded, whitish, with short rusty bristles, basally glabrous, slightly rusty. Mandibles black, apically obliquely truncate, with slightly extending ventral and obtuse dorsal denticles.

Pronotum slightly transverse, markedly sloping toward head, in anterior half on disk with lustrous glabrous square, along its anterior margin with a few hairs in transverse row; in front of shield laterally with dispersed rusty hairs. Pronotal shield convex posteriorly (as if raised), laterally demarcated by oblique longitudinal grooves uniting anteriorly with transverse triangular depression, with large (at anterior margin sometimes dispersed), basally with minute dense spinules. Mesonotum in anterior half with minute spinules, posteriorly in spinous field with rusty hairs forming transverse band. Metanotum on disk with
28 numerous spinules forming transverse field divided medially by transverse groove. Behind this field with rusty hairs forming transverse band. Prothoracic presternum convex, with rusty, not very dense hairs. Eusternum basally glabrous, whitish. Prosternum basally (basisternum) at anterior margin with large spinules in two rows.

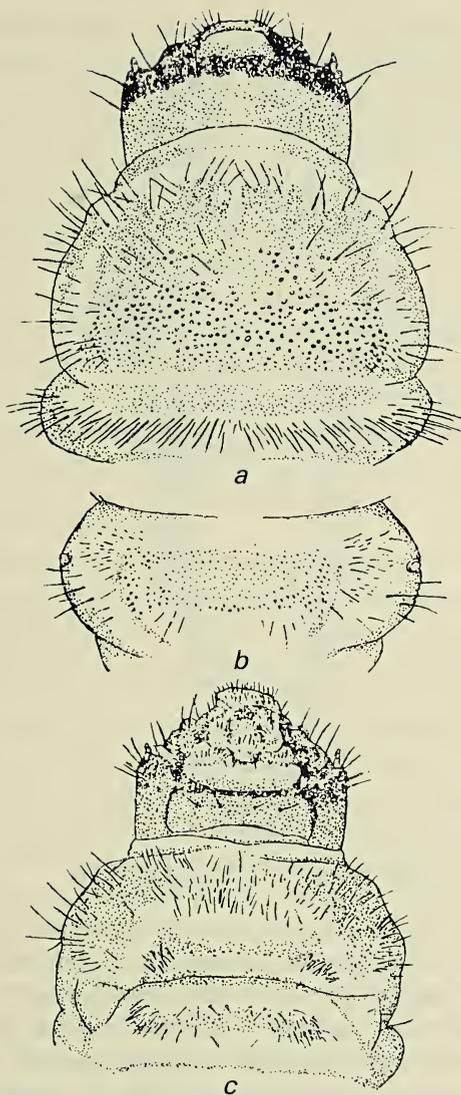


Fig. 10. Larva of *Saperda alberti* Plav.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—head and thorax (ventral view).

Abdomen with sparse rusty setiform hairs laterally. Spiracles with contrasting rusty shade, ovals elongate. Dorsal locomotory ampullae convex, medially divided by dorsal groove, two transverse grooves uniting laterally with unpaired transverse groove, which in turn fuses with short longitudinal fold, with large, uniformly distributed acute

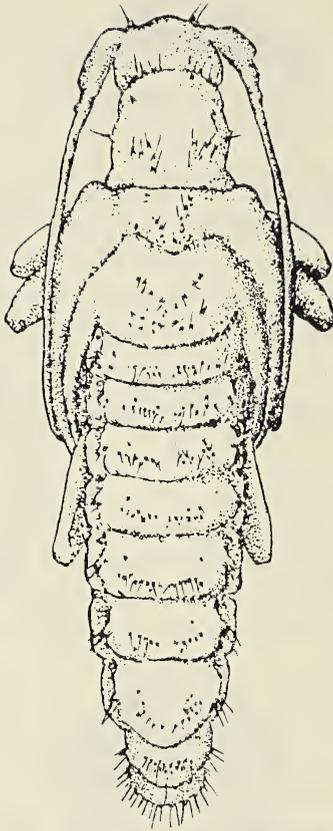


Fig. 11. Pupa of *Saperda alberti* Plav.

spinules, among which between transverse grooves up to eight indistinct rows discernible in front of anterior groove and up to one–two interlacing rows behind posterior transverse groove. Ventral locomotory ampullae divided medially by longitudinal troughlike groove, in posterior half by transverse groove uniting laterally with short longitudinal fold, anterior margin emarginate, with uniformly dispersed acute spinules forming in front of transverse groove up to seven, behind it up to two–three interlacing rows. Abdominal tergites VIII–IX in posterior half with sparse setiform hairs. Body length 28–35 mm, width of head 3.5–4.0 mm.

- 29 *Pupa* (Fig. 11): Characterized by large acute setigerous spinules on dorsal side of body. Body elongate. Head moderately projecting, frontally flat or slightly convex, laterally round, basally spiniformly extended, here with long thick dark rust bristles, on sinciput laterally behind antennae with one–two close-set bristles (with acute spinules at

base), on frons three–four lateral bristles, on anterior margin (near clypeus) four bristles each (forming tuft on each side). Labrum apically convex, narrowly rounded, laterally with one, more often two long bristles in transverse row. Mandibles laterally with three, rarely two bristles. Antennae in second half curved annularly or semicircularly, their apices flexed ventrad toward forefemora.

Pronotum slightly oblong, gently tapering anteriorly, basally with narrow transverse groove, disk moderately convex, with acute setigerous spinules forming transverse (often backwardly directed) cluster in posterior half and transverse row at anterior margin. Mesonotum medially depressed saddlelike, posteriorly with extended raised shield, laterally with large, at apex of shield minute solitary or numerous setigerous spinules. Metanotum poorly convex, medially with barely perceptible longitudinal groove, at posterior margin widely rounded, with setigerous spinules forming two diverging rows anteromedially and cluster near posterior margin.

Abdomen elongate, gradually tapering posteriorly. Abdominal tergites in posterior half more convex, medially with common longitudinal groove, in posterior third with acute setigerous, backwardly directed spinules forming interlacing or almost uniform transverse row (up to 8–10 spinules on each side of longitudinal groove). Abdominal tergite VII convex, broadly rounded posteriorly, in posterior half with acute setigerous spinules forming transverse cluster directed backward. Tergite VIII transverse, at posterior margin broadly rounded, here with numerous large setiform spinules. Tip of abdomen obtuse, bound by U-shaped ridge bearing numerous or solitary setigerous spinules. Valvifers of female small, hemispherical, contiguous. Body length 17–25 mm, width of abdomen up to 4.0 mm.

Material: Collected in Altai, central Ob' region, the Yenisey, Tuva, Ussuri-Primor'e region. Adults 79, larvae 257, pupae 7 (males and females), larval exuviae with beetles and pupae from cells 12.

Distribution: Western and eastern Siberia, Ussuri-Primor'e, northern Mongolia, northern China, Korean peninsula, Japan. Found in large numbers in Altai, Tuva, Ussuri-Primor'e region, and northward up to Magadan.

Biology: Inhabits deciduous plantations. Ecologically associated with woody willow species (Salicaceae). Beetles appear early June and disappear toward mid-August. Maximum beetles found in first half of July. They feed on tissues of green leaves and bark of young shoots, nibbling isolated squares on them. Do not appear on flowers. Lead a cryptic mode of life. Beetles mate after maturation of gonads and females oviposit on stems of poplar, aspen, willow and *Chosenia*

having a comparatively thick bark. The female always first searches for an appropriate site for oviposition (usually crevice in bark), makes an abrasion or cavity in the bark using its mandibles, inserts its ovipositor into it, and lays an egg under the bark on the inner surface of phloem. Fecundity relatively high. In the ovaries of a female caught in nature, we found 22 eggs and in another, 20 mature eggs. Females infest drying, physiologically decaying and freshly windfelled trees. Larvae develop from oviposited eggs after three–four weeks.

Developed larvae rupture the chorion, nibble an extensive area in the phloem, then make galleries under the bark, and pack them with frass. Larvae of the last instar bore into wood before the second hibernation, make a cell longitudinal to the stem, plug the entry hole with frass, turn their head toward it, and pupate. Entry hole 6 mm × 8 mm to 7 mm × 10 mm. Length of pupal cell 25–30 mm, width 6–10 mm. Sometimes (especially on thick-barked trees) larvae pupate in bark. In this case, the cells are also longitudinal to the stem; an exit is made at the upper end of the cell toward the bark surface, then plugged with frass. Larvae pupate with head toward exit (upward). Pupation begins by May-end and is completed by June-end. Pupae maximum mid-July. Under laboratory conditions, at $t = 22^{\circ}\text{C}$, the pupal stage lasted for 14 days. In nature, it continues up to three weeks. Developed beetles remain in cells up to seven days, then nibble a round flight opening (6–8 mm diameter) on the bark surface, and emerge from the cell. Up to this time they remain sexually immature and require supplementary feeding for maturation of gonads. One–two weeks after additional feeding, they begin to reproduce. Emergence of beetles from wood is completed in first half of July. Generation—two-year cycle (see Table 2).

During metamorphosis the weight of larvae before pupation reduces by 36% or more. Based on 39 specimens, larvae before pupation weigh 94.5–379.0 mg (221.7 ± 11.7), pupae 75–345 mg (183 ± 10.0), young beetles before emergence from wood 51–253 mg (144 ± 8.2).

Saperda alberti Plav. infests trees with intact and not dry phloem. They infest trees only once. Secondary infestation of trees is observed only if the intact phloem remains. Local infestation is often observed

Table 2. Development of *Saperda alberti* Plav.

Year	April	May	June	July	August	September	October
1st	L	LP	LPA	PAE	AEL	EL	L
2nd	L	L	L	L	L	L	L
3rd	L	LP	LPA	PAE	AEL	EL	L

on thick-stemmed trees. In this case, the larvae destroy small areas of phloem, causing dry rolls with the formation of calluses. They infest mainly poplar and willow, which is confirmed by the fact that from the larvae collected in nature, 46 beetles were raised—30 on poplar, 14 on willow, and 2 on aspen. Moreover, during forest inspections 211 specimens were collected (larvae, pupae, beetles)—134 from poplar, 76 from willow, and 1 from *Chosenia*. Density of infestation is comparatively high. For example, on poplar (stem diameter at chest height 25 cm, height 13 m) we found 66 larvae, but on a willow stub left after strong winds had broken the tree (height 4.3 m, diameter up to 20 cm) only 24 larvae. The following species coinfect the same trees with this species: *Xylotrechus rusticus* (L.), *Acanthoderes clavipes* Schr., *Saperda perforata* (Pall.), and others (Cherepanov and Cherepanova, 1975).

5. *Saperda octomaculata* Bless.

Blessig, 1873. *Horae Soc. Ent. Ross.*, 9: 221–223; — var. *incana* Plavilstshikov, 1931. *Ent. Nachricht.* Bl., 5: 67; Tamanuki, 1933. *Ins. Mats.*, 8: 82; — *mandschukoensis* Breuning, 1943. *Misc. Ent.*, 40: 104; Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 89; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 152; Mamaev and Danilevskii, 1975. *Lichinski zhukov drovosekov*, 251; — *subobliterata* Pic, 1910. *Longic.*, 7, 2: 13.

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Adult (Fig. 12): In contrast to other species of the genus *Saperda* F., four black spots present on each elytron, two large spots on disk, and one comparatively small black spotlet on sides of pronotum. Head steep, with dense adherent grayish-green or yellowish hairs, with numerous deep piliferous pores (brownish erect hairs emerging from each pore), frontally flat, with slightly raised antennal tubercles. Antennae with closely adherent, gray or greenish hairs, on inner side with sparse solitary setae, extending beyond apex of elytra by 10th (male) or 11th (female) segment. Eyes large, black, sharply faceted, deeply emarginate, their lobes covering antennal base from above and below. Lower ocular lobe not longer (female) or twice longer (male) than gena.

Pronotum slightly transverse or square (female) or slightly oblong (male), near apex and basally with barely perceptible gentle flange, disk convex, with compact or not very compact punctuation, with adherent gray, greenish or yellowish pubescence, erect setiform dark brown hairs (appearing densely spinous under high magnification), with two large, generally longitudinal, black spots on disk and one small black spotlet on sides (f. *typica*). Rarely, spots on disk small, barely discernible (ab. *subobliterata* Pic), sometimes black spots on sides absent.

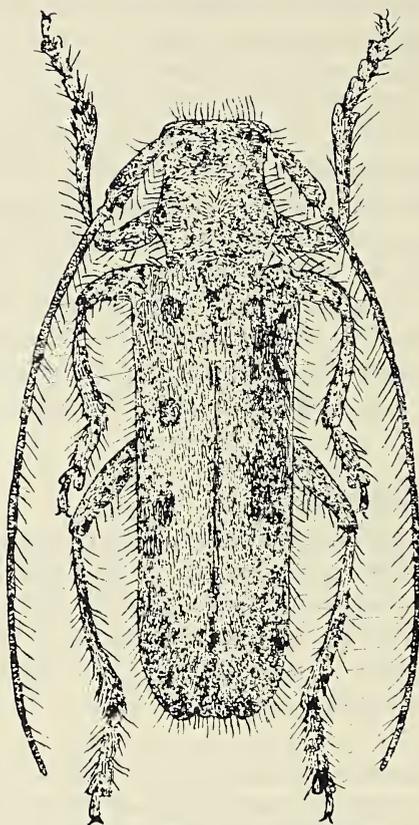


Fig. 12. *Saperda octomaculata* Bless.

Individuals are known in which the black spot is distinct on one side of the pronotum and absent on the other. Pronotal shield triangular, apically narrowly rounded, with closely adherent hairs.

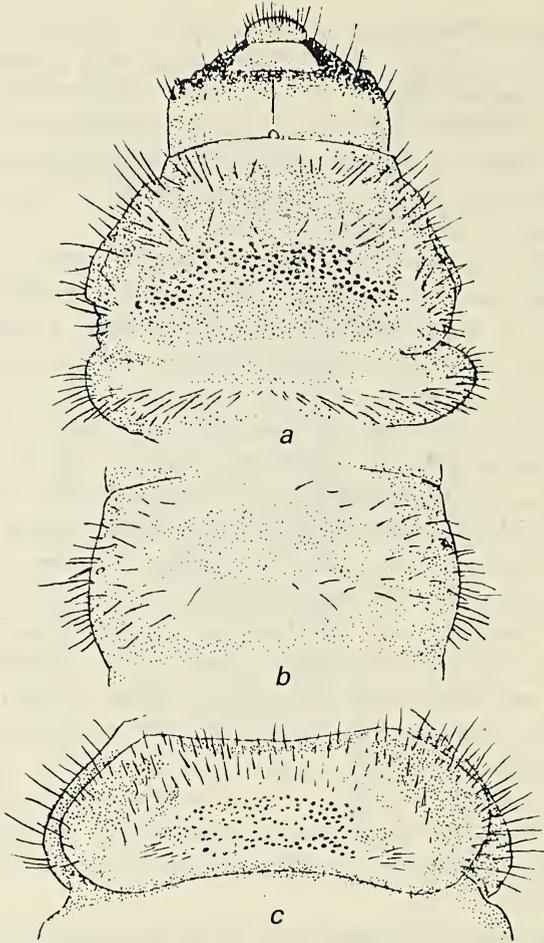
Elytra parallel-sided (female) or slightly tapering posteriorly (male), jointly or individually rounded apically, disk convex, basally with projecting humeral tubercle, laterally without humeral ridge, here more rounded, with fine, not very dense punctation, with compact adherent pubescence, with short erect dark brown hairs, with four black spots in longitudinal row. Hind femora reaching (male) or definitely not reaching (female) level of posterior spots on elytra, midtibiae on outer margin with indistinct distal notch. First segment of hind tarsus longer (male) or not longer (female) than next two together. Body ventrally with dense compact adherent pubescence and sparse semierect bright hairs. Abdominal sternite V of female more convex, medially with narrow longitudinal groove, apically slightly or distinctly truncate,

in males without longitudinal groove, apically with decurved margin. Body, antennae, and legs black. Pubescence gray, greenish or with bronze-golden iridescence (f. *typica*), only rarely whitish-gray (var. *incana* Plav.). Abdominal sternites I–III with broad distinct black spots laterally (f. *typica*) or without them, with dense compact pubescence, or these spots quite distinct on sternites I–II and IV (ab. *mandschu-kuoensis* Breun.). Body length 9–15 mm.

Egg: White, moderately elongate, at one pole widely, at the other narrowly rounded. Chorion matte, with fine thin cellular sculpture imparting silvery tinge. Length 2.1 mm, width up to 1.0 mm.

Larva (Fig. 13): Readily recognized by large spinules on eusternum, bright yellowish spiracles, and other characters. Body white, highly elongate. Head barely retracted into prothorax, parallel-sided, bright rust, at anterior margin with dark brown or dark rust fringe. Epistoma mildly convex, medially divided by distinct longitudinal (median) suture, laterally fusing with temporo-parietal lobes (frontal sutures not perceptible), at posterior margin of rusty fringe with long solitary hairs forming transverse row. Hypostoma mildly convex, parallel-sided, 3.5 times wider than long, with straight anterior angles, in anterior half generally with four piliferous pores in transverse row. Temporo-parietal lobes bright rust, in anterior half, behind brownish fringe, with long bright hairs in transverse row. Antennae whitish, their apices projecting from antennal sockets. Clypeus large, trapezoid, whitish. Labrum transversely oval, whitish, with short bright bristles, basally glabrous with rusty tinge. Mandibles black, basally reddish-rust, apically obliquely truncate, with insignificantly produced ventral and barely projecting dorsal denticles.

33 Pronotum twice wider than long, moderately sloping toward head, at anterior margin with broad lateral and narrow medial white fringe, behind it rusty, lustrous, at posterior margin of white fringe with numerous rusty hairs in transverse row. Pronotal shield convex, laterally demarcated by deep longitudinal grooves uniting anteriorly with rusty triangular transverse depression, in anterior half with large uniform, in posterior half minute (gradually reducing toward base) spinules, basally with minute bright bristles. Alar lobes with very minute spinules or without them and bright rust hairs. Mesonotum in anterior half and metanotum on disk with very minute spinules forming transverse band, behind it with long, much denser hairs laterally. Prothoracic presternum convex, with dense rusty hairs, laterally with extensive rusty glabrous spot. Eusternum in posterior half and basisternum in anterior half with large spinules forming two transverse spinous fields divided by narrow transverse groove; anterior field with four-



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Fig. 13. Larva of *Saperda octomaculata* Bless.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—prothorax (ventral view).

five, posterior field three transverse rows of spinules. Meso- and metasterna on disk with dense minute spinules forming transverse band divided medially by transverse groove.

Abdomen elongate, laterally with bright thin hairs. Spiracles bright yellowish, barely distinguishable from general background of body. Dorsal locomotory ampullae moderately convex, medially with narrow longitudinal troughlike groove, divided by two transverse grooves uniting laterally with common unpaired transverse groove joined with short lateral longitudinal folds, with minute, specklike, but often distinct spinules; moreover, spinules adjacent to transverse grooves slightly

larger than remaining ones. Ventral locomotory ampullae with minute spinules, in posterior half divided by deep transverse groove uniting laterally with anterior margin of short oblong groove. Tip of abdomen with dense bright rusty hairs. Body length of last instar larvae up to 20–24 mm, width of head up to 2.5–3.0 mm.

Pupa (Fig. 14): Body moderately elongate. Head broad, frontally in region of frons convex, with raised antennal tubercles, behind them on inner side with pair of acute, long or short, barely discernible setigerous spinules, on sides near eyes with four bristles in longitudinal row, on sides near anterior margin before clypeus with three–four bristles. Labrum lustrous, semihyaline, with four bristles in transverse row. Antennae flexed laterad, in second half curved annularly, their apices adjoining forefemora.

Pronotum transverse (female) or slightly oblong (male), parallel-sided, with slightly curved posterior angles, disk uniformly convex, lustrous, with minute acute setigerous spinules forming transverse row at anterior margin, and randomly dispersed spinules in remaining part.

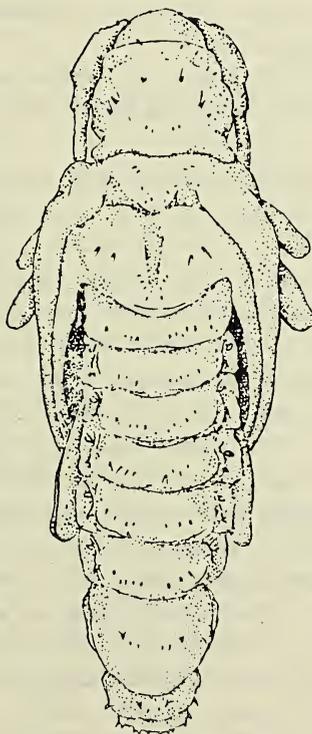


Fig. 14. Pupa of *Saperda octomaculata* Bless.

Mesonotum with more or less raised shield, on sides and on shield with minute solitary setigerous spinules. Metanotum convex, lustrous, at posterior margin angularly rounded, medially with longitudinal groove, with isolated minute setigerous spinules forming two rows diverging from base toward anterior angles.

Abdomen gradually tapering toward tip, in some individuals inflated in region of segments III–IV. Abdominal tergites uniformly convex, medially with indistinct longitudinal groove, in posterior half with acute setigerous spinules forming uniform or interlacing transverse row (four–six spinules on each side of longitudinal groove). Tergite 34 VII convex, posteriorly broadly rounded, with six–eight acute setigerous spinules forming transverse row in middle or slightly beyond middle. Tergite VIII with six–eight acute spinules in transverse row. Tip of abdomen bound by U-shaped ridge bearing on each side six–seven acute setigerous spinules. Valvifers of female small, lustrous, slightly separated. Body length 12–16 mm, width of abdomen up to 3.0 mm.

Material: Collected in Ussuri-Primor'e region and on Kunashir. Adults 52, larvae 220, pupae 2 males and 2 females, larval and pupal exuviae with beetles from cells 11.

Distribution: Ussuri-Primor'e region within limits of broad-leaved forests. Sakhalin, Kunashir, northeast China, Korean peninsula, Japan (Hokkaido, Honshu).

Biology: Inhabits broad-leaved forests of varied composition. Ecologically associated with bird cherry (*Padus*), elm (*Ulmus*), apricot (*Armenica*), apple (*Malus*), and other woody plants. Beetles appear mid-June and are found up to early August. They emerge from wood with underdeveloped gonads and require supplementary feeding. They remain on host trees and feed on bark of thin shoots. Following sexual maturation, they mate and the females begin to oviposit. For this purpose, the female makes a cavity (4–5 mm) in bark up to the wood, introduces its ovipositor into it, and lays an egg under bark (on wood). Sometimes two eggs are laid at one site, one each at opposite ends of the cavity. A female can lay more than 20 eggs during its life span. In a female caught in nature, there were 26 mature eggs in the ovaries.

Egg development lasts for two–three weeks. According to observations made in 1971, in a forest near Ussuriisk sanctuary, larvae began hatching 14 days, 17 days, and 20 days after oviposition. The atmospheric temperature during this period varied from 4.6°C in the morning to 30°C later in the day (average $17.6 \pm 0.75^\circ\text{C}$). Hatched larvae live under bark, make straight or meandering galleries and pack them with frass. Larvae of the last instar bore into wood, leaving an entry hole

(6 mm × 7 mm) on the surface, make a cell longitudinal to the stem at a depth up to 14 mm, plug the entry hole with fibrous frass, and pupate. Pupae lie in cells with head toward the entry hole. Sometimes larvae pupate in cells made in bark. Length of cell 13–25 mm, width 4–13 mm. Length of gallery under bark up to 17 cm or more, width 6–20 mm. At places, the gallery becomes squarish.

Pupation commences in the last ten days of May and is completed June-end. In nature, pupae develop over a period of slightly more than two weeks. In 1971, at an average diurnal temperature of $18.7 \pm 1.2^\circ\text{C}$, beetles in two instances developed after 16 days of pupation. Developed beetles scrape frass from the entry hole, nibble a round flight opening (diameter 5–7 mm) in the bark and emerge through it. Generation—two-year cycle. Initially larvae of younger instars hibernate, subsequently larvae of last instar. Larvae before pupation (based on 19 specimens) weigh 43–149 mg (89.2 ± 7.2), pupae 39–136 mg (80.9 ± 6.6), beetles before emergence from cells 32–110 mg (65.5 ± 5.4).

Saperda octomaculata Bless. infests the stems of drying trees (diameter 6–12 cm or more), and often infests knots 1.5–4.0 cm thick. From the larvae collected in nature, 48 beetles were raised—16 on elm, 13 common bird cherry (*Padus asiatica*) and Maack bird cherry (*P. maackii*), 12 apricot, 6 apple, and 1 on maple. During forest inspections in Ussuri-Primor'e region and on Kunashir 227 specimens (larvae, pupae, beetles) were collected—114 from bird cherry, 50 elm, 25 lilac (*Syringa*), 21 maple, 7 oak, 4 pear, 2 apricot, and 1 each from birch, ash, plum, and mountain ash.

35 6. *Saperda populnea* (L.)

Linnaeus, 1758. *Syst. Nat.*, ed. 10: 394 (*Cerambyx*); — *decempunctata* De Geer, 1775. *Mem. Ins.*, 5: 78; — *betulina* Geoffroy, 1785. In Fourerov: *Ent. Paris*, 1: 78; ab. *salicis* Zetterstedt, 1818. *Vet. Acad. Handl.*, 2, 39: 258; Gyllenhal, 1827. *Ins. Suec.*, 1, 4: 107; Zetterstedt, 1840. *Insect. Lapponica descr.*, 203; — *populi* Dumeril, 1860. *Mem. Ac. sc. Inst. imp. France*, 31: 607; Scheidter, 1917. *Naturw. Zeitschr. für Forst und Landwirtsch.*, 15: 113; — ab. *bickhardti* Sattler, 1918. *Ent. Blätter*, 14: 200; Escherich, 1923. *Forstins. Mitteleur*, 2: 260; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 155, 168, 177; Saalas, 1936. *Annal. Zool. Soc. Zool.-Botan. Fennice*, 4: 159; Schlotke, 1945. *Zool. Jahrb.*, 61: 101–104; Grechkin, 1951. *Ocherki po biol. vredit. lesa*, 118; Cherepanov, 1952. *Vrediteli polezashchitnykh lesnykh polos*, 82–85; Duffy, 1953. *Monogr. Immat. Stag. Brit. and Import. Timb. Beetl., Ceramb.*, 285–287; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 543–544; Funke, 1957. *Zool. Jahrbüch.*, 85: 74–176;

Il'inskii, 1962. *Opredelitel' vredit. lesa*, 326; Grechkin and Vorontsov, 1962. *Vredit. i bolezni topolei*, 67-69; Demelt, 1966. *Die Tierwelt Deutschl.*, 52-99; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 40-41; Cherepanov and Cherepanova, 1975. *Zhukidrovoseki ivovykh lesov*, 174-178.

Adult (Fig. 15): Readily recognized by five yellow pilose specklike spots having characteristic location on elytra. Body elongate. Head short, frontally and on temples with dense, on occiput with sparse adherent and erect hairs, with compact punctation. Genae half (male) or almost half (female) size of lower ocular lobe. Antennae barely (male) or distinctly not (female) reaching apex of elytra; 3rd-11th antennal segments basally with broad white pilose ring, inner side with isolated setae; 1st antennal segment thick, steeply or gently tapering toward base, with compact coarse punctation, two-thirds length of 3rd segment, which is distinctly longer than 4th. Eyes highly convex, very finely faceted, highly emarginate; lower ocular lobe significantly longer than wide, upper lobe narrow, bandlike.

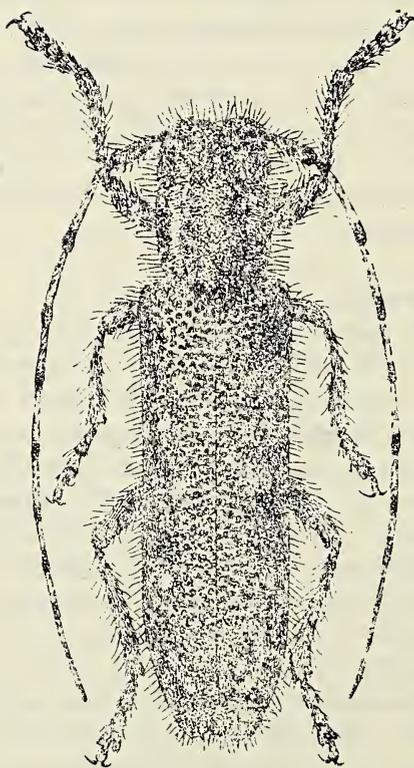


Fig. 15. *Saperda populnea* (L.).

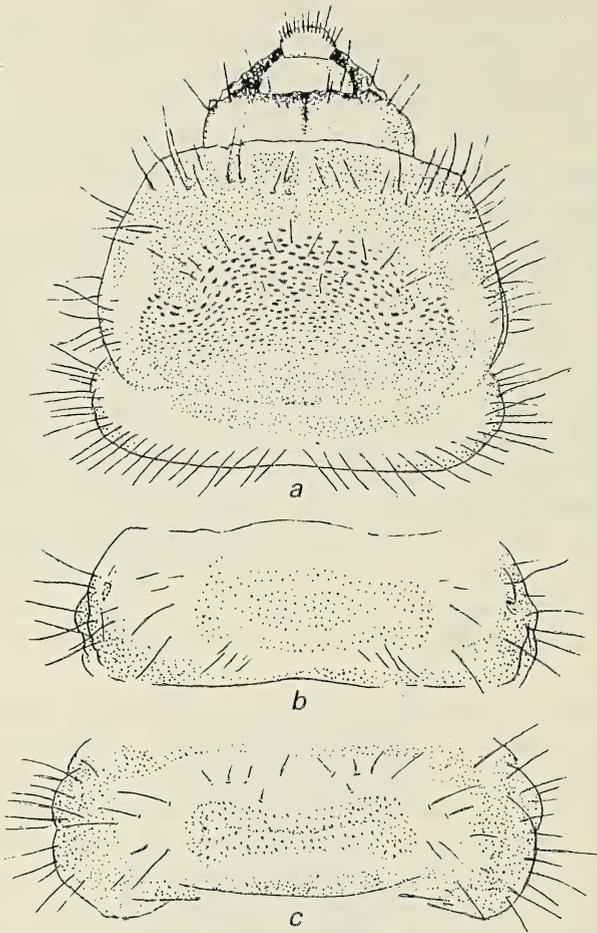
Pronotum parallel-sided, not longer or even less than width, basally and apically with barely perceptible transverse groove, disk uniformly convex, with compact punctation, medially with narrow longitudinal smooth, sometimes discontinuous line or without it, with thin erect brownish hairs, laterally with yellowish or grayish pilose longitudinal band. Pronotal shield transverse, posteriorly broadly rounded, with sparse adherent hairs.

Elytra parallel-sided, uniformly convex, individually rounded apically, with compact coarse deep punctation (distance between punctures smaller than punctures), with sparse semierect or erect setiform and minute gray adherent hairs not forming continuous pubescence. Each elytron with five yellowish spots, of which the first (starting from base), third, and fifth spots slightly shifted toward suture, the second and fourth shifted laterad. Fifth spot (on hind clivus) oblong, third spot transversely elongate, sometimes round, remaining spots usually round. All spots more or less distinct. Mid- and hind tibiae on outer margin with compact distal brush of brownish bristles. First segment of hind tarsus slightly longer than next two together. Body ventrally with not very dense, gray adherent and bright semierect hairs. Body, elytra, antennae, and legs black. Pubescence grayish or yellowish. Body length 11–14 mm.

Egg: White, elongate, narrowly rounded at poles. Chorion matte, semihyaline, with fine sculpture. Length 26 mm, width 0.7 mm.

Larva (Fig. 16): Distinguished from larvae of other species of the genus *Saperda* F. by location of spinules on locomotory ampullae, basisternum, and pronotum. Body very elongate. Head parallel-sided, slightly bent ventrad. Epistoma mildly convex, almost flat, with very distinct median longitudinal suture, laterally with barely perceptible frontal sutures, at anterior margin with dark brown, laterally broad, medially tapering fringe, at posterior margin with three lateral bristles in transverse row. Hypostoma markedly convex, anterior angles rounded, laterally with slightly bent sutures, rusty posterior angles whitish. Temporo-parietal lobes bright rust, in anterior third reddish-rust, with bristles forming transverse row. Antennae whitish, barely projecting from antennal sockets. Clypeus large, trapezoid, whitish or rusty. Labrum whitish, convex, anterior margin broadly rounded, with bright bristles, basally glabrous, with brownish lustrous tone. Mandibles apically black, obliquely truncate, basally reddish-rust.

Pronotum slightly shorter than basal width, at anterior margin with broad whitish fringe, behind it with rusty lustrous square bordered anteriorly with rusty setiform hairs forming transverse band (hairs basally with sclerotized ringlet), medially with narrow white longi-



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Fig. 16. Larva of *Saperda populnea* (L.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—abdominal sternite with ventral locomotory ampulla.

tudinal interspace. Pronotal shield with large, toward base much smaller spinules. Anterior angles with deep, oblique, pitlike depression joining at a sharp angle with lateral longitudinal folds. Alar lobes lustrous, with a few long hairs forming small cluster. Meso- and metanota in anterior half with minute dense acute spinules forming extensive transverse field, behind it with short hairs in uniform transverse row. Prothoracic presternum convex, disk with short sparse hairs, laterally with large glabrous lustrous yellowish-rust spot. Eusternum in anterior half with short rusty hairs, in front of transverse groove basally with minute

spinules in narrow transverse band. Basisternum at anterior margin of transverse groove with spinules forming second (posterior) transverse band. Meso- and metasterna on disk with minute spinules forming transverse field, in front of it with short setiform hairs in uniform transverse row.

Abdomen elongate, parallel-sided, laterally with short sparse hairs. Dorsal locomotory ampullae with minute spinules, medially with common indistinct longitudinal groove, divided by two transverse grooves uniting laterally to form single transverse groove, which extends up to lateral longitudinal fold. Behind posterior transverse and in front of anterior transverse groove two–three interlacing rows of spinules discernible. Ventral locomotory ampullae moderately convex, with minute acute spinules forming transverse field divided in posterior half by deep transverse groove, in front of which up to three, behind it up to two interlacing rows of spinules discernible. Body length 15–24 mm, width of head up to 1.8 mm.

- 37 *Pupa* (Fig. 17): Well distinguished from other species by thin bristles on pronotum, minute spinules on abdominal tergites, and combination of other characters. Body moderately elongate. Head tapering anteriorly from base of antennae, between antennae flat, without longitudinal groove, antennal tubercles level, not projecting, inward to them with one, in front of lower ocular lobe on inner side with two–three, at anterolateral margin in front of clypeus with three bristles. Labrum lustrous, apically narrowly rounded, laterally on each side with two short bristles in transverse row. Antennae curved semicircularly, their apices flexed toward forelegs.

Pronotum squarish, width not more than length (male) or distinctly transverse, width more than length in ratio of 6:5 (female), disk convex, lustrous, with rusty bristles (basally edged by sclerotized ringlet) forming extensive cluster in anterior third and laterally on hind clivus and transverse row medially. Sometimes these bristles highly dispersed. Mesonotum convex, at posterior margin with extended round shield, laterally near base of elytra with minute rusty bristles forming small cluster. Metanotum convex, lustrous, at posterior margin angularly rounded, medially with smooth longitudinal groove, laterally with minute bristles basally edged by faint sclerotized ringlet.

- 38 Abdomen elongate, parallel-sided. Abdominal tergites convex, medially with common longitudinal groove, in posterior half raised more, here with minute setigerous, sometimes faint (especially in male) spinules forming interlacing or markedly distinct transverse row. Tergite VII slightly tapering toward base, apically broadly rounded, disk convex, lustrous, posteromedially with minute specklike setigerous

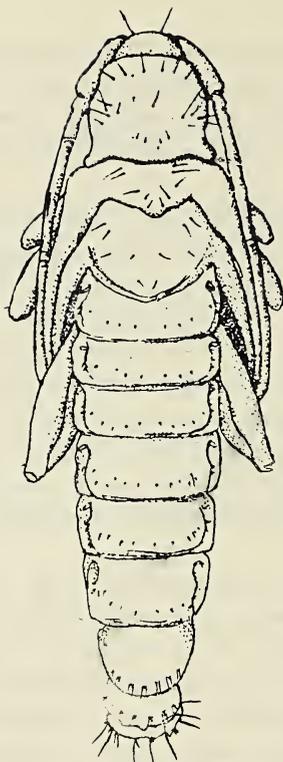


Fig. 17. Pupa of *Saperda populnea* (L.).

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spinules forming rarefied transverse extensive cluster or markedly distinct transverse row. Tergite VIII transverse, disk convex, lustrous, with minute bright, barely perceptible setae forming transverse row. Tip of abdomen (in ventral view) laterally bound by broad prominent, densely setigerous ridge. Valvifers of female small, slightly tapering toward base, apically broadly rounded, here rusty, lustrous. Body length 12–15 mm, width of abdomen 3.0–3.5 mm.

Material: Collected in Ob' region, Yenisey and Lensk forest-tundra, Altai, Tuva, Trans-Baikal, and Ussuri-Primor'e region. Adults 54, larvae 51, pupae 2 males and 3 females, larval and pupal exuviae from cells 3.

Distribution: Eurasia, from the Atlantic Ocean to the seas of Okhotsk and Japan, from Karelia, Finland, Sweden to the Mediterranean, from the Trans-Polar range (Snezhnogorsk, Zhigansk) to Central Asia, Altai, Tuva, and Amur region inclusive. North America.

Biology: Inhabits deciduous plantations. Ecologically associated with willow, poplar, and aspen. Flight of beetles commences in last days of May and is concluded July-end or early August. Maximum

beetles found in second half of June and early July. Young beetles require supplementary feeding. They remain on growing trees and feed on tissues of green leaves and bark of young shoots. Their gonads mature during this period. After mating, the females oviposit on the growing thin shoots of thick-stemmed as well as mature thin-stemmed trees. They often infest shoots of seedlings and growing young undergrowth. In every case, the female selects a site for oviposition on the smooth shoot surface, excavates a cavity in the bark by means of its mandibles and, rupturing the phloem, makes a U-shaped abrasion left and right of the cavity, does a half turn, introduces its ovipositor through the cavity under the bark, and lays eggs. After withdrawing its ovipositor, the female then flies to another shoot. According to our observations, more than 30 minutes are spent in making the U-shaped abrasion and ovipositing, but according to other authors (Funke, 1957), 14–27 minutes. A female can lay up to 50 eggs during her life span. She lays one–five eggs per day. Oviposition continues for 18–30 days. Beetles live for three–four weeks but some individuals up to 35 days. They resume vigorous feeding several times and are most active in clear warm weather. During this period, they often fly from one tree to another, sometimes covering a distance of up to one kilometer or more. They settle on shoots 0.9–3.0 cm diameter. One, sometimes up to three eggs are laid at a small distance from each other on each shoot.

Eggs laid by the female under bark are 5–10 mm away from the cavity, at the site ripped off from the phloem, in the U-shaped abrasion. The tissues of the shoot around the egg darken and become necrotic due to the effect of the exudate secreted with the egg (Funke, 1957).

At 20°C larvae hatch from eggs 14–16 days after oviposition. Hatching of larvae begins in June and is completed in August. Larvae of the first instar remain near the U-shaped abrasion and feed on phloem and the emergent callus excrescence. Then they bore into wood up to the pith and there make a longitudinal gallery downward or upward from the entry hole. Of the infestations examined by us, in eight instances the galleries were made upward from the entry hole and in seven, downward. Larvae discard frass and the gallery remains hollow. On dissection of the larvae, such enzymes as proteinase, dipeptidase, lipase, amylase, lichenase and cellulase were found in the intestines. It was established that amylase is of paramount importance, being 40 times stronger than proteinase and 1.3 times stronger than lichenase. During feeding on wood, the lichenase content increases in the digestive juices (Schlotke, 1945; Funke, 1957).

After the second hibernation, larvae make a pupal cell, enclose it with frass, and pupate. Length of larval gallery in shoot 6–10 cm, width

3–5 mm. Length of pupal cell up to 16 mm, width 4–5 mm. Pupation begins in first half of May and is completed by June-end. Pupal stage lasts two–three weeks. In the laboratory, at 14.8–19.6°C (average 17.3°C), young beetles emerged in one instance after 16 days, in another at 12.6–19.6°C (average 16.1°C) after 24 days pupation. Beetles remain in cells for five–seven days, then nibble a round opening (diameter up to 4–5 mm) and exit the cell through it. Flight openings are nibbled on the gall surface and around it. Sometimes two–three beetles develop close by in the selfsame shoot. In this case, the distance between flight openings is 2.5–5.0 cm. Emergence of beetles from cells commences May-end and is completed in July. Generation—two-year cycle (Table 3).

Reduction in insect weight during metamorphosis reaches 29.8%. For example, nine larvae before pupation weighed 844 mg (100%), pupae 715 mg (84.7%), beetles before emergence from cell 592.5 mg (70.2%). Based on 31 specimens, larvae before pupation weigh 38.0–155.5 mg (86.5 ± 5.9), pupae 31.0–107 mg (73.2 ± 4.3), beetles before emergence from cell 30–87 mg (58.9 ± 3.5).

Saperda populnea (L.) infests young thin shoots of willow, aspen, and poplar almost equally. Shoots damaged by the larvae are irregularly deformed and generally wither. Highly illuminated rarefied plantations are infested more often. Trees at the forest edge are attacked to a greater extent.

7. *Saperda balsamifera* Motsch.

Motschulskyi, 1860. *Schrenk's Reisen Amurl. Coleopt.*, 2:151; Sol-sky, 1870. *Horae Soc. Ent. Ross.*, 7: 390; Motschulskyi, 1875. *Bull. Soc. Nat. Mosc.*, 49, 1, 2: 151; — *populnea* Ganglbauer, 1887. *Horae Soc. Ent. Ross.*, 20: 132; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 152; Tamanuki, 1933. *Ins. Mats.*, 8: 82; Gressit, 1951. *Longic. Beetles of China*, 2: 551; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 542; Kojima and Okabe, 1960; *Food Plants of Japan, Ceramb.*, 237; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 153; Cherepanov and Cherepanova, 1980. *Nov. i maloizv. vidy fauny Sibiri*, 161–163.

Table 3. Development of *Saperda populnea* (L.)

Year	April	May	June	July	August	September
1st	L	LPA	LPAEL	AEL	AEL	L
2nd	L	L	L	L	L	L
3rd	L	LPA	LPAEL	AEL	AEL	L

Adult (Fig. 18): In general habits and location of spots on elytra, similar to *Saperda populnea* (L.). Distinguished from it by much denser pubescence, long erect hairs on elytra, less distinct, easily rubbed off elytral spots and dense tomentose occiput. Head short, with continuous dense grayish compact adherent pubescence, with numerous long dark brown erect hairs. Occiput not glabrous, densely pilose. Antennal tubercles slightly deflected. Genae distinctly shorter than lower ocular lobe. Eyes finely faceted; lower ocular lobe oblong, upper insignificantly inflated, slightly broader than interspace between them. Antennae shorter than body, just reaching hind clivus (female) or extending beyond it (male); from 3rd segment with dense bright gray adherent pubescence, only at apex of segments glabrous, black, lustrous, without hairs, on inner side with solitary bright setae; 1st segment slightly tapering toward apex, with dense setiform dark brown hairs, shorter than 3rd but equal to 4th segment.

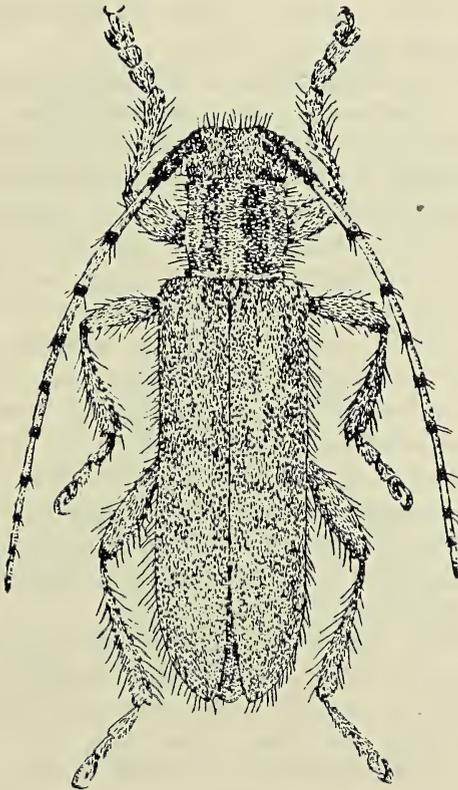


Fig. 18. *Saperda balsamifera* Motsch.

Pronotum parallel-sided, not longer than wide, with dense punctation, dense yellowish-gray pubescence directed mediad and forming at seam a narrow medial band, on sides with one broad lateral longitudinal band, with numerous dark brown erect hairs.

Elytra parallel-sided, jointly narrowly rounded apically, disk uniformly convex, with dense, not very large punctures (distance between punctures slightly less or even more than size of punctures), with dense adherent yellowish-gray pubescence mostly masking punctation, yellowish tomentose spots—first in anterior half, second anteromedial, third medial, fourth in front of hind clivus. Spots in some individuals more, in others less developed, sometimes fuse with general background of pubescence. Elytra throughout surface with dark brown setiform erect hairs, appearing densely setigerous (seen in lateral view under medium magnification). Body ventrally with very dense, grayish-yellow adherent pubescence and bright long erect hairs. Mid- and hind tibiae on outer margin with short brownish-rust bristles forming compact distal brush. Body, antennae, elytra, and legs black. Pubescence grayish-yellow. Body length 12–13 mm.

Larva (Fig. 19): Distinguished from the larva of *Saperda populnea* (L.) by location of spinules at base of eusternum, less elongate rusty spiracles, location of hairs at posterior margin of abdominal sternite IX, and by other characters. Body elongate. Head parallel-sided, insignificantly bent ventrad. Epistoma mildly convex, medially divided by sharp longitudinal suture, laterally fusing with temporo-parietal lobes (frontal sutures not discernible), at anterior margin with dark brownish fringe, behind it with short bristles forming transverse row. Hypostoma laterally rounded (with curved sutures), at posterior margin more, anterior margin less emarginate, mildly convex, rusty. Temporo-parietal lobes bright, whitish, at anterior margin with broad rusty fringe covering ocular-antennal zone. Antennae very short, whitish, not projecting from antennal sockets. Clypeus trapezoid, large, basally whitish with rusty tinge. Labrum at anterior margin broadly rounded, slightly tapering posteriorly, in upper half whitish, with short thick, basally edged bristles, in posterior half contrastingly rusty, glabrous. Mandibles
41 black, basally red, apically obliquely truncate.

Pronotum slightly transverse, markedly sloping toward head, at anterior margin with narrow whitish fringe, behind it on disk and laterally rusty, glabrous, medially with narrow longitudinal white interspace, in anterior third with basally edged rusty hairs forming transverse row, behind which on disk and laterally in front of shield with individual setiform hairs. Pronotal shield laterally demarcated by short longitudinal folds uniting anteriorly with oblique depressions extending

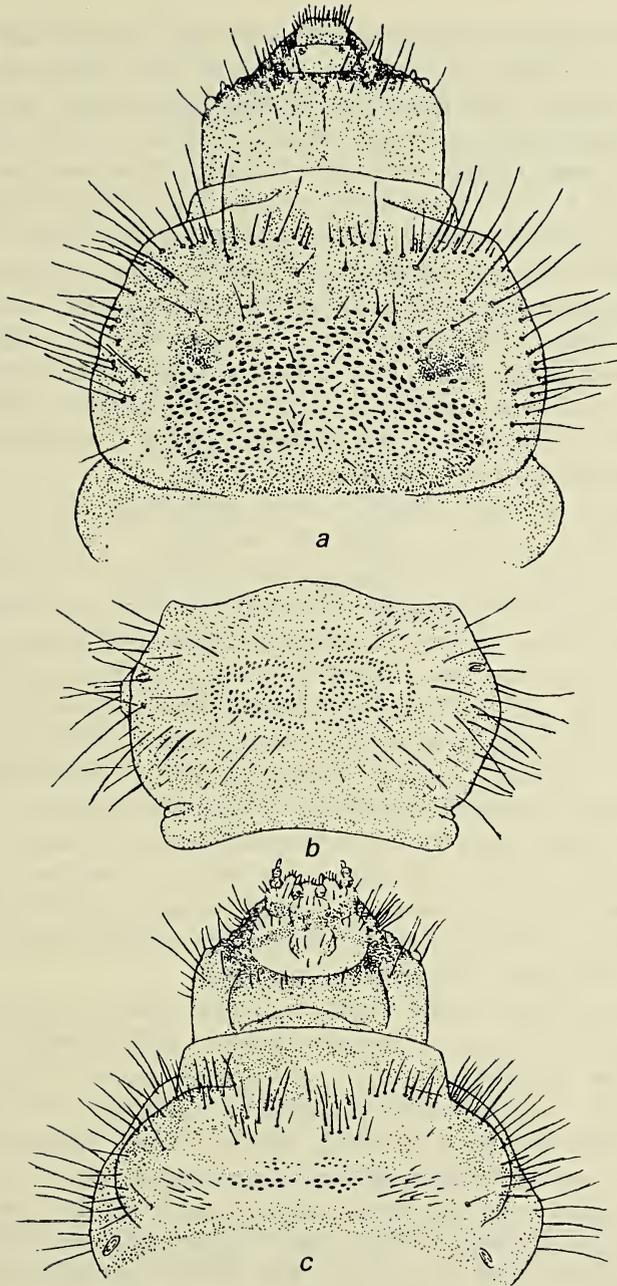


Fig. 19. Larva of *Saperda balsamifera* Motsch.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—head and prothorax (ventral view).

inward and backward, in anterior half with large, posterior half minute, basally very minute spinules. Alar lobes on inner side with minute spinules, laterally with rusty hairs forming small cluster. Mesonotum in anterior half with very minute, specklike spinules forming transverse
 42 continuous band, behind which short bristles in transverse row. Metanotum on disk with minute spinules forming transverse field divided by narrow transverse groove. Prothoracic presternum convex, laterally with extensive lustrous yellowish-rust square, on disk with short rusty hairs. Eusternum apically with minute dense hairs, basally with minute specklike spinules forming transverse field in which up to three rows of spinules distinguishable. Basisternum in anterior half with minute spinules forming transverse band, laterally with rusty hairs. Meso- and metasterna on disk with minute spinules forming transverse field divided medially by transverse groove.

Abdomen elongate, laterally with sparse rusty hairs. Spiracles round, slightly extended, reddish-rust, not bright. Dorsal and ventral locomotory ampullae with minute spinules, in structure not distinguishable from locomotory ampullae of the larva of *Saperda populnea* (L.). Abdominal sternite IX short, at posterior margin with bristles in interlacing transverse row. Body length 20–22 mm, width of head 1.8 mm.

Pupa (Fig. 20): Distinguished from the pupa of *Saperda populnea* (L.) by location of hairs on pronotum and spinules on abdominal tergite VII. Body moderately elongate. Head insignificantly tapering anteriorly, flat frontally, laterally with wholly level antennal tubercles, ventral to them with four short bristles in longitudinal row, at anterior margin in front of clypeal base with three lateral bristles in uniform transverse row. Labrum convex, transverse, apically broadly rounded, disk with six bristles in transverse row. Antennae in second half curved semicircularly, their apices flexed toward foretibiae.

Pronotum parallel-sided, slightly transverse, ratio of width to length 5 : 4, basally with narrow transverse groove, with extended posterior angles, disk uniformly convex, lustrous, with minute, basally edged rusty bristles forming compact interlacing transverse row at anterior margin, transverse band medially, rarefied cluster laterally on hind clivus. Mesonotum convex, lustrous, at posterior margin with broad rounded shield, near alar base with two small bristles. Metanotum convex, lustrous, medially with narrow longitudinal groove, at posterior margin broadly rounded, in anterior half with two transversely placed, barely perceptible bristles.

Abdomen parallel-sided, medially with longitudinal groove. Abdominal tergites at posterior margin convex, here with minute specklike spinules in one or two adjoining transverse interlacing rows. Tergite

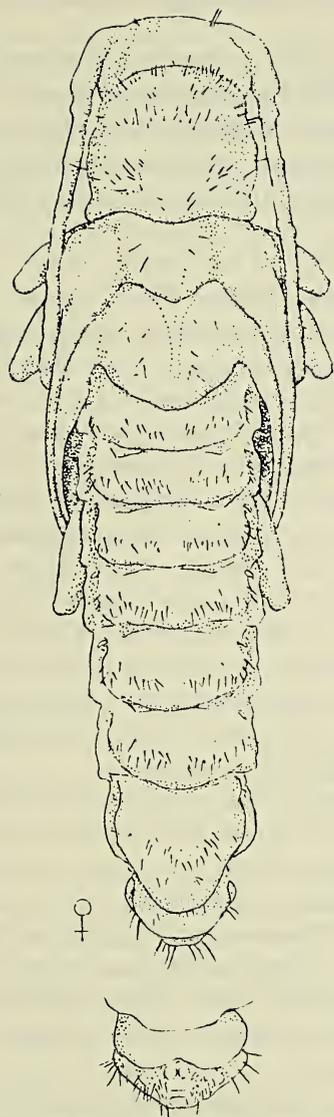


Fig. 20. Pupa of *Saperda balsamifera* Motsch.

VII slightly tapering toward base, apically narrowly rounded, disk uniformly convex, medially with minute spinules forming transverse recurved spinous field. Tergite VIII transverse, hyaline, at posterior margin with very minute bright bristles in transverse row. Tip of abdomen (in ventral view) laterally bound by narrow setigerous ridge (in *S. populnea* (L.) ridge much broader). Valvifers of female small,

hemispherical, contiguous. Body length 14 mm, width of abdomen 3.5 mm.

Material: Collected in Ob' region near Novosibirsk. Adults three, larva one, pupa one female, larval and pupal exuviae with beetles from cells three each. A series of beetles was also examined from the collections of the Zoological Museum, Moscow State University, Moscow and the Zoological Institute, Academy of Sciences, USSR, Leningrad.

Distribution: From Ob' to the Pacific Ocean, including Ussuri-Primor'e region. Mongolia, northern China, Japan.

- 43 *Biology:* Inhabits deciduous plantations mainly in the southern regions of northern Asia. Ecologically associated with willow forests (Salicaceae). Flight of beetles commences early July and ends in August. Females oviposit on apex of thin shoots of growing willow up to 5 mm diameter. One egg is laid on each shoot. The developed larva bores into the shoot up to the pith and there makes a longitudinal gallery from the top downward and, as it moves along, makes ventilation holes through which fine frass is discarded. The frass accumulates in small heaps on lower shoots and such heaps serve as a symptom in determining infestation of willow shoots by these larvae. Gallery remains hollow throughout its length and the larva moves freely in it from one end to the other. Via the thin adventitious shoots, the larva penetrates much thicker shoots or the stem and there continues to make a longitudinal gallery in the pith or upper layer of wood.

Larvae hibernate twice. After the second hibernation, the larva of the last instar makes a pupal cell at the lower end of the gallery and demarcates it from the upper side by a plug made of fibrous frass. At the upper end of the cell an exit is nibbled almost up to the bark, leaving a layer of wood up to 2.0 mm thick. Pupae lie with head toward the exit. Length of gallery in thin adventitious shoot up to 5–10 cm or more, main shoot (stem) 10–12 cm. Width of gallery in front of cell up to 6.0 mm. Length of cell 20 mm, width 6–7 mm. Diameter of main shoots (stems) 1.5–3.0 cm.

Pupation of larvae is completed in June. Pupal stage lasts about three weeks. Under laboratory conditions, a beetle emerged on December 17th from a pupa formed on November 26th. The atmospheric temperature during this period was 14.3–17.0°C. Young beetles appear June-end and in first half of July; they nibble a round flight opening on the shoot surface and emerge through it. Generation—two-year cycle. Insect weight notably reduces during periods of preparation for pupation and metamorphosis. For example, a larva weighed 140 mg (100%) prior to preparation for pupation, before pupation 102.5 mg

(73.2%). Another larva before pupation weighed 92.5 mg (100%), the pupa developed from it 81.5 mg (88.1%), and the resultant beetle before emergence from cell 68 mg (73.5%), i.e., during metamorphosis insect weight reduced by 26.5% (Cherepanov and Cherepanova, 1980).

Saperda balsamifera Motsch. was only found on willow. According to reports by Plavil'shchikov (1955), it develops on balsam poplar (*Populus balsamifera*) and, according to other reports (Kojima and Okabe, 1960), on aspen (*P. tremula*). However, we could not find it on these trees.

8. *Saperda carcharias* (L.)

Linnaeus, 1758. *Syst. Nat.*, ed. 10: 394 (*Cerambyx*); Fabricius, 1775. *Syst. Ent.*, 184; — *carcharias* Petagna, 1792. *Instit. Entom.*, 1: 236; — *carchadelrias** Herbst, 1784. In Borowski: *Naturg.*, 6: 128; — *punctata* De Geer. 1775. *Mém. Ins.*, 5: 73 (*Cerambyx*); — *ab. grisescens* Mulsant, 1839 *Col. France, Longic.*, 134; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 151, 153–155; Panin and Savulescu, 1960. *Fauna Rep. Popul. Romine Insect.*, 10, 5: 460–462; Saalas, 1936. *Ann. Zool. Soc. Zool.-Botan., Fennice*, 4: 159; Demelt, 1966. *Die Tierwelt. Deutschl.*, 52: 97; Petrova, 1959. *Entom. obozr.*, 38, 1: 117–128; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 38–40; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovykh lesov Sibiri*, 163–167; Cherepanov, 1952. *Vredn. nasekom. polezashchitnykh lesnykh polos*, 79–82; Grechkin and Vorontsov, 1962. *Vredit. i bolezni topolei*, 63–66; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 542–543; Il'inskii, 1962. *Opredel. vredit. lesa*, 320; Duffy, 1953. *Monogr. Immat. Stag. Brit. and Import. Timb. Beetl., Ceramb.*, 281–285; Gressit, 1951. *Longic. Beetles of China*, 2: 551.

- 44 *Adult* (Fig. 21): Distinguished from other species of the genus by much larger body, grayish or grayish-yellow regular pubescence with large punctures in between, and elytra with acute apex. Head steep anteriorly, with compact adherent dense pubescence, semiadherent brownish bristles, and not very dense, round black punctures. Frons flat, laterally slightly oblong, anteriorly with transverse, medially with longitudinal groove passing over to parietals. Eyes very large, finely faceted, highly convex, more (male) or less (female) close to base of mandibles. Genae one-third (male) or half (female) size of lower ocular lobe. Antennae gradually thinning toward apex and extending beyond apex of elytra by 10th–11th segments (male) or definitely not reaching

*Spelled "*carchaderias*" in Index—General Editor.

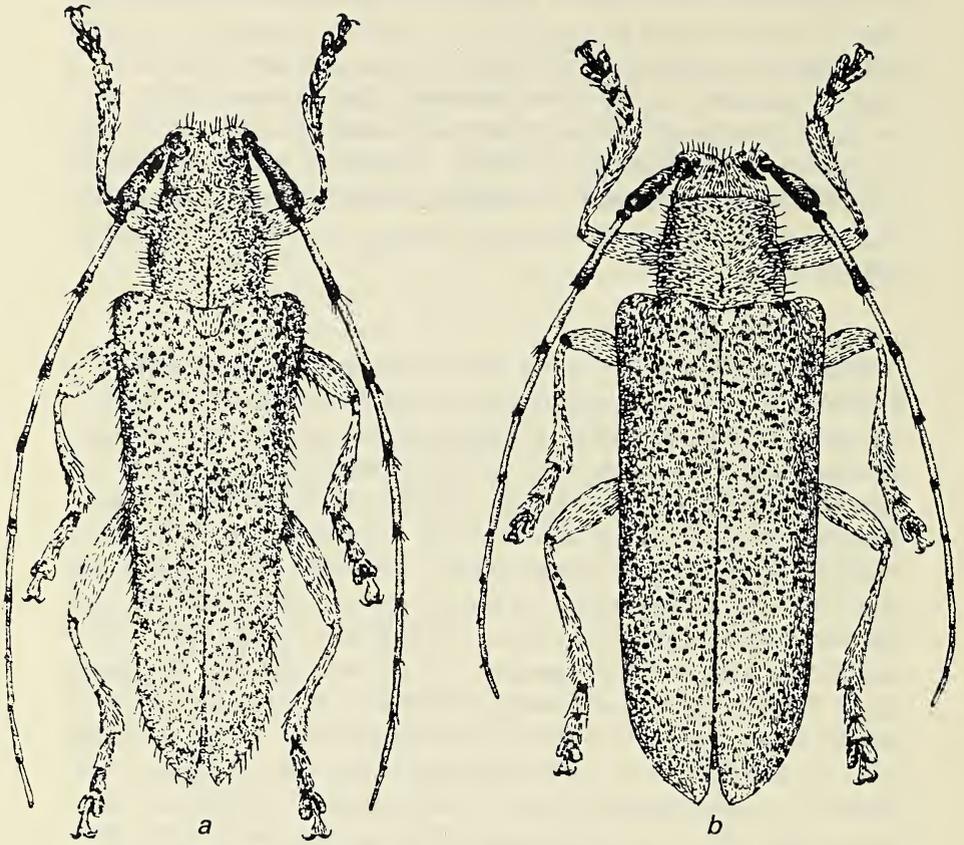


Fig. 21. *Saperda carcharias* (L.).

a—male; b—female.

elytral apex (female), with gray compact adherent pubescence that is black only at apices of 3rd–8th segments, on inner side with solitary, very short setiform hairs.

Pronotum transverse (female) or basally not wider than long (male), with dense gray adherent pubescence and erect setiform brownish hairs, medially with raised (sometimes glabrous) longitudinal band, with large black punctures. Pronotal shield flat, slightly concave, apically broadly rounded, with compact adherent pubescence.

Elytra parallel-sided (female) or from humeri gradually tapering toward apex (male), uniformly convex, individually acute (as if spiniformly extended) apically, with dense compact adherent pubescence, beyond middle with faint, much denser, pilose transverse band, with dark large (in anterior half much larger) dense punctures. Body ventral-

ly with compact adherent pubescence and numerous long erect hairs. Abdomen with minute dotlike black specks. Pubescence grayish or yellowish (f. *typica*) or ash-gray (ab. *grisescens* Muls.). Legs with compact adherent gray pubescence and erect setiform hairs. Body length 19–27 mm.

Egg: White, oval, rounded at poles. Chorion matte, with fine sculpture. Length 3.5–4.0 mm, width 1.2–1.5 mm.

Larva (Fig. 22): Readily recognized by location of spinules on locomotory ampullae of abdomen and on pronotum. Body large, comparatively thick. Head parallel-sided, highly retracted into prothorax. Epistoma flat, medially divided by longitudinal suture, at anterior

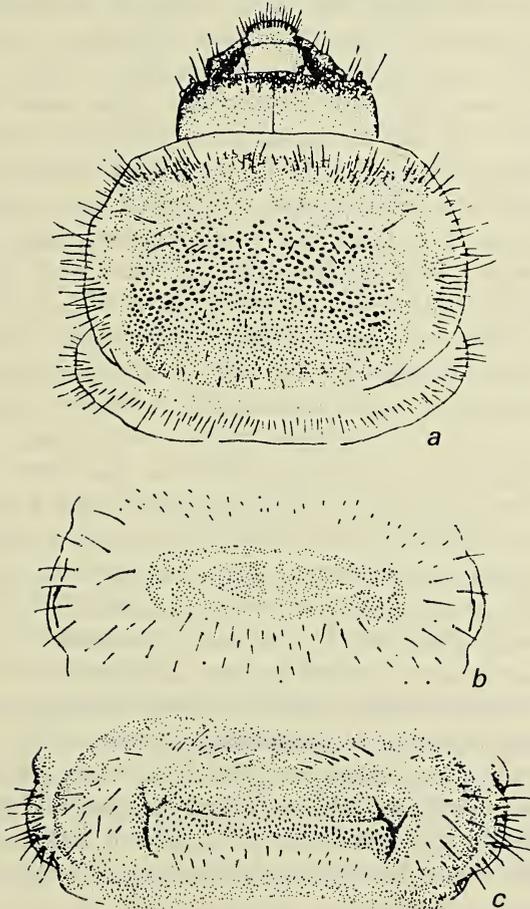


Fig. 22. Larva of *Saperda carcharias* (L.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—abdominal sternite with ventral locomotory ampulla.

margin with blackish-brown fringe, behind it with eight long bristles in transverse row, laterally fusing with temporo-parietal lobes. Frontal sutures faint. Hypostoma slightly convex, at anterior margin in region of gular band and lateral sutures dark rust, almost black, medially on sides of gular band rusty-red. Temporo-parietal lobes bright rust, at anterior margin with broad dark brown fringe, here with long bristles in transverse row. Clypeus large, trapezoid, rusty. Labrum on disk slightly convex, ginger colored, at anterior margin broadly rounded, with dense rusty bristles, basally glabrous. Mandibles massive, black, apically obliquely truncate, with extended ventral and slightly projecting dorsal denticle, on inner side with acute ridge extending from ventral denticle obliquely toward upper margin of mandible.

46 Pronotum transverse, markedly sloping anteriorly, at anterior margin with whitish fringe, behind it on disk and laterally with rusty lustrous square, medially with longitudinal white band, at anterior margin of square with lateral lunular white depression bearing dense rusty hairs forming transverse band. Pronotal shield demarcated laterally by longitudinal groove terminating in front of inner side of smooth saccular depression, in anterior half with numerous large, in posterior half minute spinules, with sparsely dispersed short hairs. Alar lobes in anterior half glabrous, lustrous, in posterior half with minute spinules, lateral to them with thick hairs forming small cluster. Mesonotum in anterior half and metanotum on disk with very minute dense spinules. Prothoracic presternum convex, disk whitish, with short hairs, laterally contrastingly rusty, here in anterior half with long hairs. Eusternum triangular, demarcated by groove, in anterior half with short hairs, basally with minute spinules forming transverse band. Basisternum in anterior half with minute spinules, laterally with dense hairs.

Abdomen mildly tapering toward tip, laterally with sparse hairs. Dorsal locomotory ampullae on abdominal tergites I–VII convex, with dense minute spinules, medially divided by common longitudinal groove, disk with two transverse grooves uniting lateral to common groove with short longitudinal folds. Ventral locomotory ampullae on meso- and metasterna and on abdominal sternites I–VII with dense minute spinules forming extensive field, divided in posterior half by transverse groove uniting laterally with short longitudinal fold. Spinules in front of transverse groove in five–six, behind it three–four interlacing transverse rows. Body length of last instar larvae 38–46 mm, width of head 3.5–4.2 mm.

Pupa (Fig. 23): Distinguished from other species of the genus by comparatively large body and numerous minute spinules dorsally on abdomen and pronotum. Head highly projecting. Frons flat, with in-

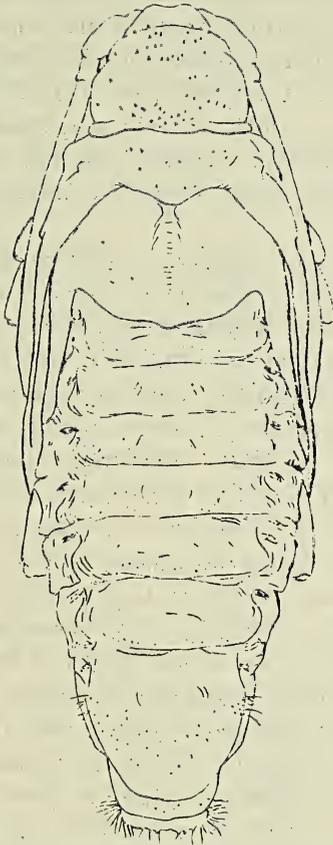


Fig. 23. Pupa of *Saperda carcharias* (L.).

dividual coarse bristles or with short setigerous spinules forming oblique row laterally in some insects. Sinciput near base of antennae with pair of adjacent bristles. Labrum glabrous, apically narrowly rounded. Antennae flexed laterad, behind midfemora arcuately curved forward.

Pronotum convex, tapering more anteriorly, basal width not more than length, with minute setigerous spinules, much denser on disk in anterior and posterior half and sparse laterally. Mesonotum angularly extending posteriorly, disk mildly convex, medially with longitudinal transverse groovelike band, with minute dispersed spinules. Metanotum broad, mildly convex, medially with longitudinal groove flaring transversely, at posterior margin broadly rounded, in posterior half with minute dispersed spinules.

Abdomen broad, tapering slightly toward base, more so toward tip. Abdominal tergites insignificantly convex, at posterior margin with

minute spinules forming transverse row. Tergite VII moderately tapering posteriorly, apically broadly rounded, disk convex, in posterior half with minute sparse spinules and short bristles. Tergite VIII at posterior margin with spinules in transverse row. Tip of abdomen (in ventral view) laterally bound by thick, densely setigerous ridge. Valvifers of female small, hemispherical, slightly wide-set, space between them smaller than lobes per se. Body length 28–30 mm, width of abdomen up to 10–11 mm.

Material: Collected in western and eastern Siberia, the Far East, and in the Urals. Adults 421, larvae 84, pupae 3 males and females.

Distribution: From the Atlantic to the Pacific Ocean, from Sweden, Finland to the Mediterranean, northern China and North Korea. In northern Asia (southern regions) found in large numbers at places.

47 *Biology:* Infests plantations of aspen, poplar, and willow. Found in large numbers in the southern forest-steppe and steppe regions of western Siberia. Flight of beetles commences in second week of June and ends in first half of September. Beetles maximum in July. In systematic collections during the season, 308 beetles were caught in Kulunda—32.1% in June, 52.3% in July, 15.3% in August, and 0.3% early September; in Novosibirsk territory (somewhat north of Kulunda), 58 beetles were caught—3.4% in June, 67.3% in July, 27.6% in August, and 1.7% early September. Young beetles require supplementary feeding. After emergence from breeding sites, they fly to trees of aspen, poplar, rarely willow. They feed on green tissues of leaves, leaving injuries generally resembling oval, more or less elongate holes. They often inflict injuries on bark of young shoots in the form of hastate cuts, near which calluses form later. During the day beetles feed and rest on trees; in the evening they mate, oviposit, and often fly from one tree to another. After mating, the female uses its mandibles to excavate a cavity on the basal part of the stem or on exposed roots, introduces its ovipositor into it, and lays eggs under the bark. One egg is laid in each cavity. Egg stage lasts for three–four weeks. Hatching of larvae commences in July and ends in September. Young larvae maximum in August. Eggs laid in September overwinter. Once we found eggs in October in Kulunda.

Larvae of the first instar live under bark and nibble broad squarish, irregular galleries. Larvae hatching in July–early August bore into wood the same summer, while larvae hatching later overwinter under bark and penetrate deeper into wood only in the following spring. In wood, larvae make longitudinal galleries (up to 25–40 cm long and up to 12 mm wide), generally from below upward. Often the gallery is made longitudinal to the root and basal zone of the stem. A small

ventilation hole is made in the upper part of the gallery and coarse fibrous frass discarded through it, which accumulates near the base of the column in separate heaps. The presence of such heaps of frass serves as a symptom in determining infestation of trees by the larvae of older instars.

Larvae hibernate two–three times. After the last hibernation, May–end or June (or even early July), they make a pupal cell in the basal zone of the stem and isolate it from the lower part of the gallery by a plug of fibrous frass. Length of cell up to 4.0 cm, width up to 1.5 cm. Pupation of larvae commences in middle or third week of May and is completed early July. Maximum pupae observed in second half of June. Pupae lie in cells with head downward.

The pupal stage lasts two–three weeks. Emergence of young beetles continues from first ten days of June to mid–July. The first beetles in cells (Kulunda) were found on June 4th and the last around mid–July. Mass emergence of beetles occurred in last ten days of June. Developed beetles remain in cells for seven–eight days, then make flight openings and escape through them. Generation—two-year cycle but, according to some reports (Petrova, 1959; Duffy, 1953), extends up to four years. During metamorphosis insect weight indices vary markedly. For example, based on nine insects, larvae before pupation weigh 518–1,656 mg (994.3 ± 121.0), pupae 480–1,450 mg (889.1 ± 107.6), young beetles before emergence from wood 262–1,160 mg (722.9 ± 96.3).

Saperda carcharias (L.) infests aspen and poplar timber stands in large numbers and is found on willow plantations to a lesser extent. It attacks growing young trees with a stem diameter at root collar up to 3.0 cm and mature trees with a stem diameter up to 30 cm or more. 48 Trees damaged by the larvae are attacked by fungi and eventually die. Considerable damage is done to poplar plantations and forest protection belts around fields. During 1950–1954, in individual regions of Kulunda, damage to poplar ranged from 3–93% and to aspen timber 18–30% at places.

9. *Saperda similis* Laich.

Laicharting, 1781. *Tyrol. Ins.*, 2: 31; — *phoca* Frölich, 1793. *Naturforscher*, 27: 139; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 151; Il'inskii, 1948. *Opredelitel' vredit. lesa*, 326–327; Grechkin, 1951. *Ocherki po biologii vredit. lesa*, 117; Plavil'shchikov, 1955. *Vrediteli lesa. Spravochnik*, 2: 544; Demelt, 1966. *Tierwelt Deutschl.*, 52: 97–99; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 41–42; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovyykh lesov*, 167–171.

Adult (Fig. 24): In general habits similar to *Saperda carcharias* (L.). Distinguished from it by more elongate thin body and absence of transverse pilose band and apical spiniform formation on elytra. Head slightly broader than pronotum, with dense compact adherent pubescence, short black bristles emerging from minute black punctures, deflected antennal tubercles, medially with narrow groove extending from anterior margin of frons to occiput. Genae not shorter (female) or distinctly shorter (male) than lower ocular lobe. Eyes deeply emarginate, black, finely and sharply faceted. Antennae barely extending beyond apex of elytra (male) or not reaching it (female), with compact adherent, apically blackish-brown and basally gray (variegated) pubescence, on inner side with short sparse setae. First antennal segment thick, shorter than 3rd but equal to 4th.

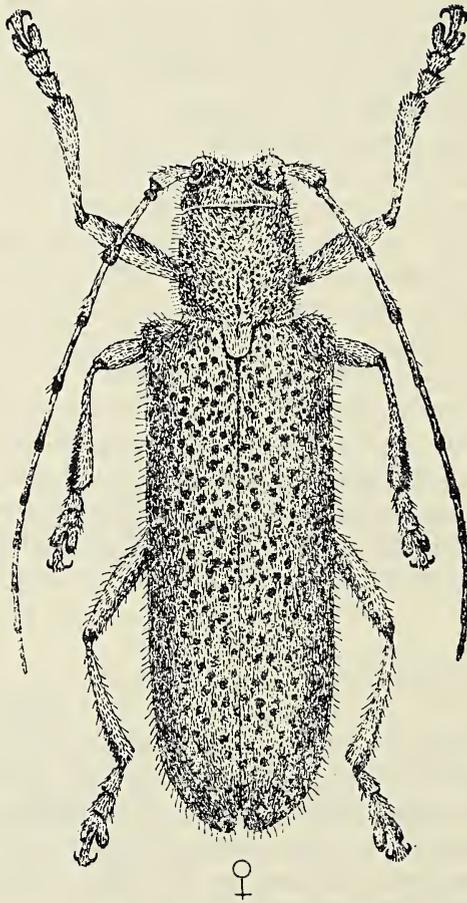


Fig. 24. *Saperda similis* Laich.

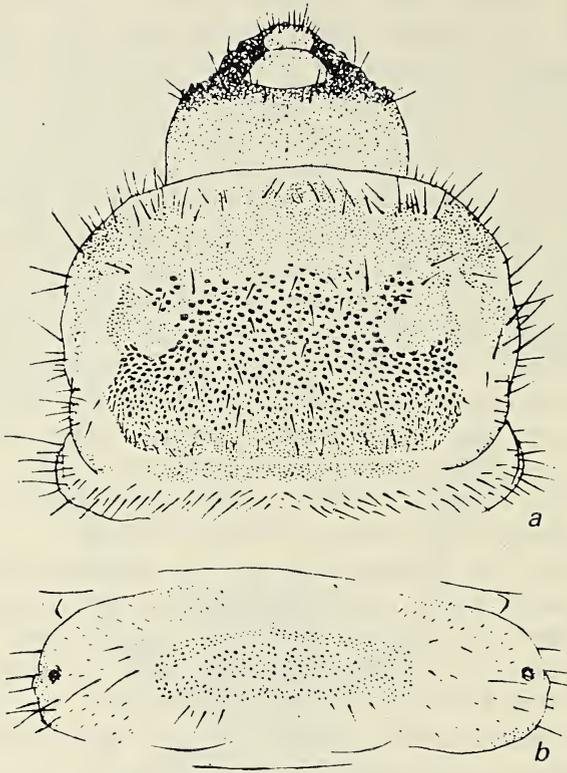
Pronotum parallel-sided, not longer than wide, uniformly convex (cylindrical), with compact adherent gray pubescence combed from sides mediad, here in posterior half with longitudinal black band, throughout surface with specklike black round punctures with thin erect brownish hairs. Pronotal shield flat, medially with longitudinal trough, apically gently rounded, with dense compact adherent gray pubescence.

Elytra elongate, parallel-sided, almost individually rounded apically, here not extended spiniformly, humeri slightly projecting, disk uniformly convex, with uniform adherent gray pubescence, throughout surface with thin erect brownish hairs, with dense black round bold punctures. Body ventrally with dense compact adherent gray pubescence (tomentose), with semierect (especially on abdominal sternites) bright hairs and minute black punctures. Mid- and hind tibiae on outer side with tough rusty-brown bristles forming compact distal brush appearing as a longitudinal band. Body length 16–23 mm.

Egg: White, elongate, rounded at poles. Chorion matte, with fine sculpture. Length up to 2.5 mm, width up to 0.8 mm.

Larva (Fig. 25): Characterized by more elongate body, isolated bristles at anterior angles of pronotal shield, and other characters. Body elongate, white. Head moderately retracted into prothorax. Epistoma medially divided by streaklike longitudinal suture, at anterior margin with narrow dark brown fringe, laterally fusing with temporo-parietal lobes, frontal sutures almost imperceptible. Hypostoma mildly convex, with emarginate, rounded anterior angles with brownish tinge, only basally near posterior angles bleached, disk with two transversely set setigerous pores. Temporo-parietal lobes bright, yellowish, at anterior margin with rusty-ginger fringe. Antennae very short, warty, whitish. Ocelli below antennae, pigmented. Clypeus broad, whitish, trapezoid. Labrum distinctly narrower than clypeus, transversely oval, in anterior half with dense rusty bristles, basally glabrous. Mandibles apically black, obliquely or angularly truncate, on inner side with ridge extending arcuately from ventral to dorsal denticle.

Pronotum half long as wide, slightly tapering anteriorly, at anterior margin with whitish fringe, behind it (in front of shield) on disk and laterally with lustrous glabrous rusty square bearing on anterior edge and sides setiform hairs forming irregular transverse band. Pronotal shield demarcated laterally by deep, slightly curved fold terminating anteriorly in smooth saccular depression directed obliquely inward and backward, in anterior half with large, in posterior half small and at base with minute spinules, at anterior angles with one bristle in center of glabrous square. Alar lobes without spinules, lustrous, laterally with long hairs forming small cluster. Prothoracic presternum with short



50

Fig. 25. Larva of *Saperda similis* Laich.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

uniform rusty hairs, laterally with large yellow glabrous square. Euster-num with numerous rusty hairs directed anteromedially, basally with minute spinules forming two triangles with their apices projecting forward. Basisternum at anterior margin with two interlacing transverse rows of spinules, laterally with short bright hairs.

Abdomen elongate. Dorsal locomotory ampullae on tergites I–VII moderately convex, with minute sclerotized spinules, medially with common longitudinal groove, two glabrous white transverse grooves uniting lateral to common transverse groove with lateral longitudinal folds (in *S. carcharias* (L.) grooves with spinules). Ventral locomotory ampullae developed on meso- and metasterna and on abdominal sternites I–VII, entirely covered with minute acute spinules, in posterior half divided by transverse groove uniting laterally with short longitudinal fold. Body length 25–34 mm, width of head 2.1–3.0 mm.

Pupa (Fig. 26): Body elongate. Head moderately bent, with erect

antennal tubercles, behind and in front of them with paired longitudinally slightly wide-set bristles, at base of clypeus laterally with paired adjacent bristles. Antennae skirting midfemora, curved semicircularly ventrad.

Pronotum parallel-sided (female) or slightly tapering anteriorly (male), disk uniformly convex, lustrous, with large setigerous spinules forming extensive field having on hind clivus a characteristic triangular prominence thrusting with its apex into posterior margin of pronotum.
 50 Mesonotum posteriorly with extended, slightly raised shield bearing minute setigerous spinules forming two bands diverging from apex of shield toward alar base. Metanotum moderately convex, at posterior margin broadly rounded or angularly extended, medially with narrow transverse groove, with minute setigerous spinules forming two distinct or interlacing rows diverging anteriorly.

Abdomen elongate. Abdominal tergites convex, medially with common longitudinal groove, in posterior half with minute setigerous spinules forming transverse row. Tergite VII apically broadly rounded, at posterior margin with large setigerous spinules forming transverse

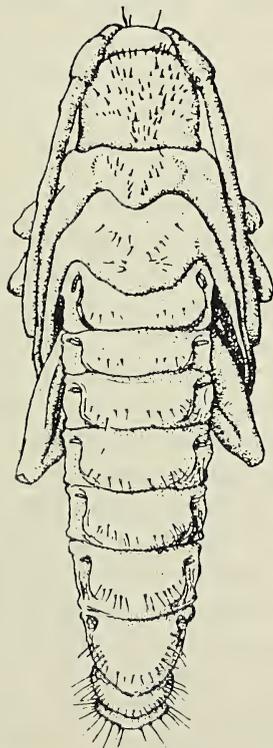


Fig. 26. Pupa of *Saperda similis* Laich.

recurved row. Tergite VIII convex, with setigerous spinules forming transverse row. Tip of abdomen (in ventral view) laterally bound by semicircular ridge covered with dense bright rust hairs and bearing diminutive basal spinule. Valvifers of female small, hemispherical, wide-set; distance between them not less than their own width. Body length 18–25 mm, width of abdomen 5–6 mm.

Material: Collected in Altai, Tuva, Ussuri-Primor'e region. Adults 24, larvae 74, pupae 8 (males and females), exuviae with beetles and pupae from cells 8.

Distribution: Europe, northern Asia (including the Urals, western and eastern Siberia, Ussuri-Primor'e region). Northern Mongolia, northern China, and North Korea.

Biology: Ecologically associated with willow. Often found in flood-plain forests of valleys and montane rivers. Flight of beetles commences in last part of June and continues up to early August. Beetles feed on green tissues of leaves and bark of young shoots of willow. They are found on undergrowth and maturing thin-stemmed trees. They lead a cryptic mode of life. After mating, the female makes an abrasion
51 (cavity) on thin-barked stems of growing willow, inserts its ovipositor into it, and lays eggs under bark (5–10 mm away from cavity). Tissue of heartwood around eggs develops brownish necrotic tinge. After laying eggs on one shoot, the female flies to another. Shoots 3–9 cm diameter or more at a height of 1–2 m are infested. Larvae hatch in July–August, initially live under bark, nibble small squares, and later bore into wood; there, in region of pith or in upper layers, they make longitudinal galleries directed upward and pack them with frass. Length of gallery in shoot up to 11–18 cm. Larvae make pupal cells at end of gallery before second hibernation or the following spring. Length of cell 2.8–6.0 cm, width up to 10 mm. A layer of wood 4–35 mm thick remains between the cell and the bark. Sometimes the larva nibbles an exit from the cell almost up to the bark. Pupation begins after the second hibernation at May-end and is completed in second half of June. Pupae complete development in three–four weeks. For example, the beetle emerged on July 5th from a pupa collected in nature (Salair) on June 14th. Young beetles appear in last week of June and in July. Once, at Salair, a beetle was found in wood on July 27th. Developed beetles nibble a round flight opening on the bark surface and exit the cell through it. Generation—two-year cycle, but may extend up to three years. During metamorphosis insect weight reduces by 33–40%. Larvae having prepared for pupation (based on nine insects) weigh 132–558 mg, pupae 120–508 mg, beetles before emergence from cell 102–407 mg.

Saperda similis Laich. causes considerable damage to willow plantations in the forests of Salair, Gornaya Shoriya, central Altai, and Ussuri-Primor'e region. Crack willow (*Salix caprea*) in particular is damaged. Generally (especially in June) an exudate seeps from freshly damaged shoots, which later wither and often break at the sites of injury. According to reports in literature (Plavil'shchikov, 1955), it sometimes infests poplar. However, we did not find it on this tree.

2. Genus *Eutetrappa* Bat.

Bates, 1884. *Journ. Linn. Soc. Lond., Zool.*, 18: 256; Gressitt, 1951. *Longic. Beetles of China*, 2: 555; Plavil'shchikov, 1932. *Zhuki-droveseki vrediteli drevesiny*, 194; Breuning, 1951. *Ent. Arb. aus dem Museum Cg. Frey*, 3: 131.

Adult: Characterized by moderately elongate body. Head frontally flat, medially with narrow longitudinal groove. Eyes sharply faceted, in males larger, highly convex, lower ocular lobe much longer than genae; in females less convex, lower ocular lobe not longer or just slightly longer than gena. Entire body with compact adherent simple (*E. sedecimpunctata* (Motsch.)) or scaly (*E. metallescens* (Motsch.), *E. chrysochloris* Bat.) pubescence. In the last case, hairs flat, scaly, imbricate. Elytra laterally with three longitudinal ridges (marginal, humeral, and intermediate in between), apically rounded or obtuse (*E. sedecimpunctata* (Motsch.), *E. metallescens* (Motsch.)) or with spiniform, extended outer angle (*E. chrysochloris* Bat.).

Larva: Similar to the larvae of the genus *Saperda* F. Distinguished from them by structure of locomotory ampullae of abdomen and combination of other characters. Head with small ampullaceous ocelli below antennal bases. Pronotal shield in anterior half with large, transversely extended, apically rounded, recurved spinules, gradually reducing in posterior half. Base of prosternum (basisternum s. sternellum) and eusternum at posterior margin with large spinules forming correspondingly two transverse bands (*E. metallescens* (Motsch.), *E. chrysochloris* Bat.) or without spinules on eusternum (*E. sedecimpunctata* (Motsch.)). Dorsal locomotory ampullae of abdomen with two transverse grooves uniting laterally and with two short lateral longitudinal grooves, with specklike more (*E. chrysochloris* Bat.) or less (*E. sedecimpunctata* (Motsch.)) distinct spinules, of which those adjacent to transverse grooves distinctly larger than remainder.

Pupa: Distinguished by large acute setigerous spinules dorsad on body. Head frontally with large bristles. Lower ocular lobe at anterior margin with narrow rusty band (*E. chrysochloris* Bat., *E. metallescens*

(Motsch.) or without it (*E. sedecimpunctata* (Motsch.)). Antennae in second half annularly curved, their apices adjoining sides of head or their own base. Pronotum basally with erect tubercle (covered with spinules), along its sides with broad transverse, more (*E. chrysochloris* Bat.) or less (*E. metallescens* (Motsch.)) distinct depression. Tip of abdomen (in ventral view) bound by U-shaped ridge set with large acute setigerous spinules.

In the fauna of northern Asia, three species belong to the genus *Eutetrappa* Bat., two of which are distributed mainly on the continent and one (*E. chrysochloris* Bat.) on islands. The earlier described *Saperda duodecimpunctata* Motsch. (= *S. motschulskyi* Plav.) included in the group of Far Eastern relicts, based on longitudinal ridges laterally on elytra, is closer to the genus *Eutetrappa* Bat., but in color of pubescence and location of spots may be considered an aberrant form of *E. sedecimpunctata* (Motsch.).

Type species: Saperda carinata Blessig, 1873 (= *S. sedecimpunctata* (Motsch.)).

KEY TO SPECIES

Adults

- 1 (4). Elytra apically rounded or obtuse.
- 2 (3). Pubescence simple, gray, often with bronze iridescence. Eastern Asia 1. ***E. sedecimpunctata*** (Motsch.)
- 3 (2). Pubescence scaly, bluish, with greenish, bronze, or yellowish-golden metallic iridescence. Eastern Asia 2. ***E. metallescens*** (Motsch.)
- 4 (1). Elytra apically with spiniformly extended outer angle. Pubescence scaly, bright green, with bronze or yellowish-green iridescence. Islands of the Pacific Ocean. 3. ***E. chrysochloris*** Bat.

Larvae

- 1 (2). Eusternum at posterior margin without spinules, basisternum in anterior half with spinules forming one transverse band. Mainly on basswood. 1. ***E. sedecimpunctata*** (Motsch.)
- 2 (1). Eusternum at posterior margin and base of basisternum in anterior half with spinules forming accordingly two transverse bands.

- 3 (4). Locomotory ampullae of abdomen with very minute spinules imparting matte tone. Mainly on maple. 2. **E. metallescens** (Motsch.)
- 4 (3). Locomotory ampullae with minute but fully distinguishable spinules imparting general speckled background. On deciduous woody species 3. **E. chrysochloris** Bat.

Pupae

- 53 1 (2). Eyes frontally anterior to base of antennae not demarcated by rusty longitudinal band. . . . 1. **E. sedecimpunctata** (Motsch.)
- 2 (1). Eyes frontally anterior to base of antennae demarcated by sharply projecting, rusty longitudinal band bent steeply at anterior end toward temples.
- 3 (4). Tubercle at base of pronotum mildly convex, depressions lateral to it barely distinguishable. 2. **E. metallescens** (Motsch.)
- 4 (3). Tubercle at base of pronotum highly convex, depressions lateral to it sharply distinct. 3. **E. chrysochloris** Bat.

1. **Eutetrappa sedecimpunctata** (Motsch.)

Motschulskyi, 1860. *Schrenk's Reisen Amurl. Coleopt.*, 2: 151 (*Saperda*); — *duodecimpunctata* Motschulskyi, 1860. *Ibid.*, 151 (*Saperda*); — *carinata* Blessig, 1873. *Horae Soc. Entom. Ross.*, 9: 219 (*Saperda*); — ab. *rosinae* Pic, 1904. *Longic.*, 5, 1: 17; — *variicornis* Bates, 1884. *Journ. Linn. Soc. Lond., Zool.*, 8: 256; — ab. *quatuordecimpunctata* Heyrovskyi, 1955. *Bull. Soc. Entom. Mulh.*, 2; — ab. *reductemaculata* Breuning, 1957. *Ent. Arb. Mus. Frey.*, 8: 278; — *motschulskyi* Plavilstshikov, 1915. *Russk. entomol. obozr.*, 15: 80 (— *Saperda duodecimpunctata* Motsch.); — ab. *infrequens* Plavilstshikov, 1927. *Ent. Blatt.*, 23: 100; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 194; Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 69, 209; Podany, 1963. *Bull. Soc. Entom. Mulh.*, Sept., 69 (+ *S. motschulskyi* Plav.); Kojima and Hayaishi, 1969. *Insects' Life in Japan*, 1: 156.

Adult (Fig. 27): Characterized by dense adherent yellowish-golden or grayish simple (not scaly) pubescence, black minute spots dorsad on body, and sharply distinct (on sides of elytra) ridge extending from humeral tubercle to apex. Body elongate, ridgelike. Head with broad flat frons, deep punctures, adherent pubescence, numerous erect dark brown hairs, medially with narrow longitudinal line extending from anterior margin of frons to occiput, antennal tubercles projecting, equal in size to ocular socket. Eyes finely and sharply faceted, in male large,

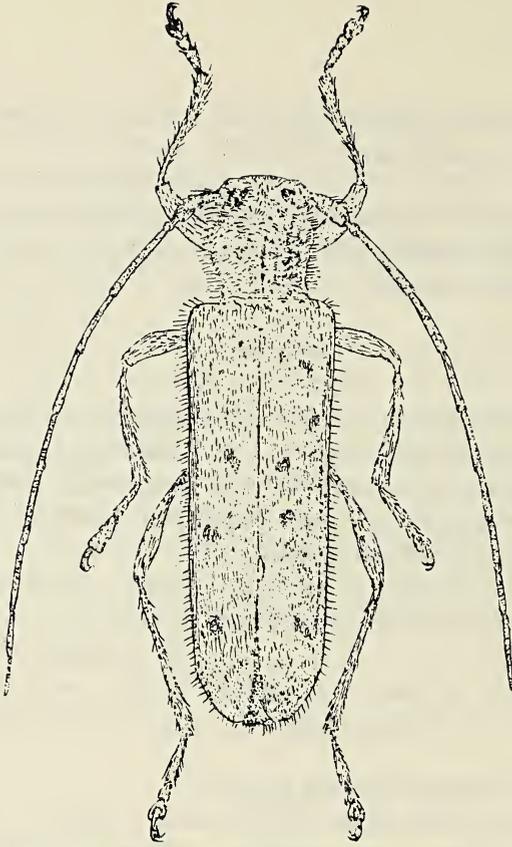


Fig. 27. *Eutetrappa sedecimpunctata* (Motsch.).

very convex (lower ocular lobe four times longer than gena), in female less convex (lower ocular lobe barely longer than gena). Antennae reaching or even not reaching apex of elytra (female) or extending beyond it by 10th segment (male), with minute adherent hairs, on inner side with individual setae. Fourth antennal segment slightly longer than 1st, equal to 5th, notably shorter than 3rd segment; 1st segment uniformly thickened, on outer side with long semierect hairs.

Pronotum not longer (female) or slightly longer (male) than wide, parallel-sided, basally with narrow transverse groove, with dense pubescence extending from sides mediad, here at seam often with narrow longitudinal mark, throughout surface with erect brown hairs, disk with four small black spots (of which the anterior two convex and slightly more wide-set), laterally with narrow longitudinal black mark. Pronotal shield slightly constricted posteriorly, apically rounded, or almost truncate, often with longitudinal groove, with raised edges in posterior half, with dense adherent hairs.

Elytra parallel-sided (female) or markedly tapering posteriorly (male), with projecting humeri, laterally with one or two sharply manifest, ad-

54 jacent humeral ridges extending from humeral tubercle to hind clivus, in anterior half with distinct, in posterior half evanescent punctation, with compact adherent pubescence, throughout surface with thin erect brownish hairs, with minute black spots (five–eight spots on each elytron)—one anterior on shield, second slightly pushed backward with projection toward lateral margin, third and fourth in transverse row anteromedially, fifth almost in middle close to suture, six at same distance posteromedially, seventh pushed back with projection toward lateral margin, and eighth in front of hind clivus close to suture (f. typica). In some individuals, up to six (ab. *duodecimpunctata* Motsch. = *S. motschulskyi* Plav.) or even five spots present on each elytron. In some individuals, four spots distinct on elytra (f. typica), in others barely perceptible, specklike (ab. *infrequens* Plav.). Legs thin, long (male) or not very long (female), with adherent pubescence, with erect or semierect bright setiform hairs. Body ventrally with dense or not very dense adherent pubescence, with semierect bright hairs. Abdominal sternite V thick, medially with longitudinal groove, apically transversely truncate (female) or mildly convex, without medial longitudinal groove, apically broadly emarginate, with extended posterior angles (male). Body, antennae, and legs black. Pubescence yellowish- or rusty-golden, or grayish-green, or grayish with steel tinge. Body length 18–22 mm. It is essential to note that the descriptions of *Saperda sedecimpunctata* and *S. duodecimpunctata* given by Motschulsky (1860) are identical and reflect only individual variability within limits of the species.

Egg: White, moderately elongate, almost uniformly gently rounded at poles. Chorion matte, with fine sculpture imparting silvery tinge. Length 2.3 mm, width 0.8 mm.

Larva (Fig. 28): Recognized by elongate white body with distinct specklike spinules on basisternum and characteristic location of spinules on pronotum and locomotory ampullae of abdomen. Head parallel-sided, half retracted into prothorax. Epistoma mildly convex, medially divided by sharply distinct longitudinal suture, laterally fusing with temporo-parietal lobes (frontal sutures barely perceptible), in posterior half bright, yellowish, in anterior half rusty-brown, here with eight bristles in transverse row. Hypostoma rusty, convex, slightly tapering toward base, its width almost four times length, at anterior margin directly truncate, at posterior margin broadly emarginate, in anterior half with four bright piliferous pores in transverse row. Temporo-parietal lobes in posterior half bright yellowish, in anterior half reddish-rust, with minute bright piliferous pores in two transverse rows. Antennae whitish, their apices projecting from antennal sockets. Ocelli

behind antennae, sometimes with pigmented spot. Clypeus large, trapezoid, whitish, basally rusty. Labrum transversely oval, in anterior half whitish, with bright short bristles, posteriorly tapering, glabrous, rusty-brown. Mandibles black, apically sloping, with acute ventral and insignificantly projecting dorsal denticles, on inner side with sharply projecting ridge extending dorsad from ventral denticle.

Pronotum twice wider than long, moderately sloping toward head, at anterior margin with narrow white fringe, having two projections on

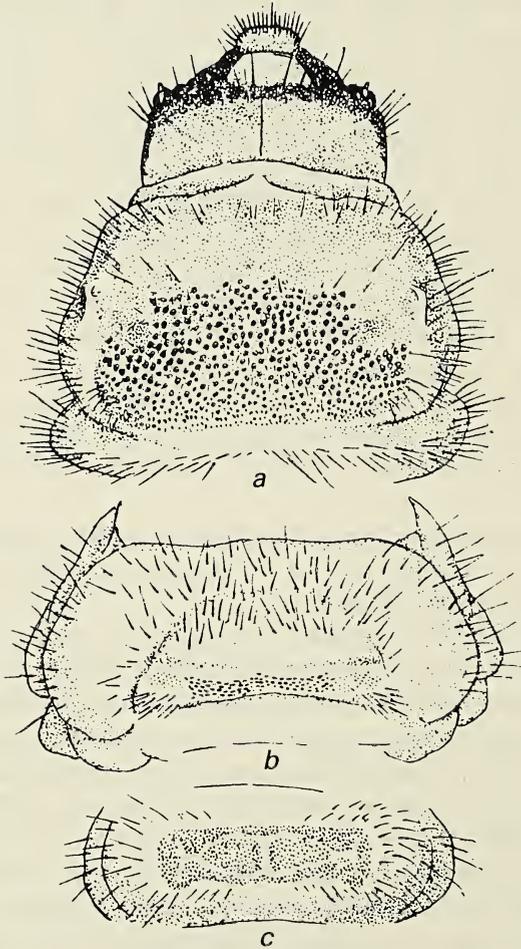


Fig. 28. Larva of *Eutetrappa sedecimpunctata* (Motsch.).

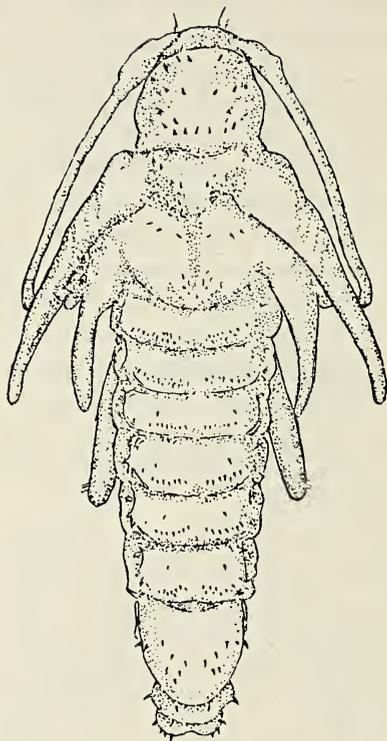
a—head and pronotum; b—prothorax (ventral view); c—abdominal tergite with dorsal locomotory ampulla.

each side (posteriorly). Behind this fringe lies extensive yellowish-rust square bearing on its anterior margin short thin hairs forming transverse band. Pronotal shield raised at base, laterally demarcated by deep longitudinal grooves, at anterior angles emarginate, here with deep transverse depression, throughout surface with dense flat, apically round, recurved spinules, with sparse short hairs. Spinous field at anterior margin between transverse depressions broadly rounded. Alar lobes whitish, with long rusty hairs. Mesonotum in anterior half matte, mildly sclerotized, medially with hairs forming transverse band. Metanotum on disk sclerotized medially with transverse whitish groove, behind it dense or sparse hairs. Prothoracic presternum uniformly convex, with rusty hairs, laterally with large lustrous yellowish spot. Eusternum in anterior half with short hairs, in posterior half glabrous, without hairs and without spinules. Basisternum with rusty specklike, sharply projecting spinules forming three transverse rows, laterally with short dense hairs. Meso- and metasterna on disk with very minute spinules, medially with transverse groove.

- 56 Abdomen elongate, laterally with short, not very dense hairs, between spiracles and pleural tubercles with broad yellowish longitudinal band. Dorsal locomotory ampullae very convex, medially divided by common longitudinal troughlike groove; two spinules, in addition to those adjacent to transverse grooves, markedly larger than others. Ventral locomotory ampullae having minute spinules divided by transverse groove. Spinules adjacent to groove distinguished by much larger size and form two transverse rows. Body length 25–34 mm, width of head up to 4.0 mm. In first instar larvae, frontal sutures in form of narrow white bands readily discernible; spinules at base of prosternum absent.

Pupa (Fig. 29): Body elongate, head slightly convex frontally, labrum apically acute, antennae in second half curved annularly and body with acute setigerous dorsal spinules. Head not broader than pronotum, sinciput round, with antennal tubercles deflected, on sides of sinciput with one (male) or two (female) bristles, sometimes with basal spinule, inner to eye with four long bristles in longitudinal row, laterally at anterior margin with three–four bristles. Antennae in second half curved annularly, their apices adjoining sides of head.

Pronotum moderately convex, basally with narrow transverse groove, with slightly curved posterior angles, with acute, sometimes large, setigerous spinules in transverse row at anterior margin (a transverse row on hind clivus and, in some individuals, an additional transverse row in middle). Mesonotum more or less convex, medially compressed saddlelike, at posterior margin with thick raised shield, with acute spinules



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Fig. 29. Pupa of *Eutetrappa sedecimpunctata* (Motsch.).

in two rows directed from apex of shield toward anterior angles. Metanotum mildly convex, medially with longitudinal groove, at posterior margin broadly rounded, with acute spinules forming small cluster in middle of posterior margin and a recurved transverse row in anterior half.

Abdomen elongate, gradually narrowing posteriorly. Abdominal tergites with median longitudinal groove, in posterior half more convex, here with large (female) or minute (male) acute spinules forming transverse row, laterally behind spiracles with much larger, paired adjacent spinules. Abdominal tergite VII convex, posteriorly broadly rounded, in posterior half or only in middle with dispersed acute spinules (7-14). Tergite VIII short, with sparse acute spinules. Tip of abdomen (in ventral view) bound by U-shaped ridge bearing eight (male) to twelve (female) acute setigerous spinules. Valvifers of female small, hemispherical, wide-set (space between them almost equal to their width). Body length 15-23 mm, width of abdomen 3.5-4.5 mm.

Material: Collected in Ussuri-Primor'e region. Adults 114, larvae 302, pupae 10 (males and females), pupal exuviae with beetles from cells 22.

Distribution: Amur region, Ussuri-Primor'e, Sakhalin, Kunashir, Japan (Hokkaido, Honshu), northeast China, Korean peninsula.

Biology: Inhabits broad-leaved forests of eastern Asia. Ecologically associated mainly with linden (*Tilia*), elm, and walnut (*Juglans*). Beetles appear in last days of May, rarely early June, and are found up to August. Maximum beetles fly in June. Beetles infest drying, rooted, and freshly felled trees, often attack prepared logs in felling areas. In one experiment, freshly prepared logs of linden, maple, alder, bird cherry, Amur chokecherry, elm, and lilac were piled in a forest glade. Two days later beetles of this species appeared on them. They laid eggs on the logs of linden and did not infest the logs of other species. During infestation the female makes a cavity in the bark and through it lays an egg under the bark. Up to 30 minutes are spent in this operation. Not more than one egg is laid per cavity. A female can lay up to 24 eggs during its life span. In the ovaries of a female caught in nature, 16 mature eggs were found.

Under natural conditions in one experiment at 8–32°C (average temperature 18.5 ± 1.0), larvae hatched after 17 days, in another experiment at 12.2–35.2°C (average 22.5 ± 0.8 °C) after 15 days of oviposition. Developed larvae rupture the chorion and immediately begin to make a gallery, filling it with fine frass behind them. Larvae live under bark and before the second hibernation penetrate the wood up to a depth of 3.0 cm, here make a gallery longitudinal to the stem, fashion a cell in it, and pupate. Some larvae make a cell under or in bark. Length of cell 26–35 mm, width 5–6 mm. Pupation commences in May and ends around June 20th. Mass pupation is over by May-end or early June. Pupae maximum in mid-June. Duration of pupal stage under natural conditions 15–20 days (as per observations on three pupae). Emergence of beetles from pupae commences in first ten days of June (rarely May-end) and is completed in last days of this month. After about one week, developed beetles nibble a round flight opening (4–5 mm diameter) on the bark surface and exit the cell through it. Emergence of beetles from cells commences in last days of May (more often early June) and is concluded by June-end or early July. Beetles emerge from wood with underdeveloped gonads and require supplementary feeding. Generation—two-year cycle (Table 4).

Weight indices of insects vary markedly. For example, records of 60 individuals indicate that larvae before pupation weigh 63–383 mg (160.2 ± 8.8), pupae 57–355 mg (146.3 ± 8.1), beetles before emergence

Table 4. Development of *Eutetrappa sedecimpunctata* (Motsch.)

Year	April	May	June	July	August	September
1st	L	LPA	LPAE	AEL	AEL	L
2nd	L	L	L	L	L	L
3rd	L	LPA	LPAE	AEL	AEL	L

from cell 47–284 mg (120.5 ± 7.1), individual larvae before preparation for pupation up to 482 mg.

Eutetrappa sedecimpunctata (Motsch.) develops on stems 13–42 cm diameter. From the larvae collected in nature, 61 beetles were raised—58 on linden and 3 on hornbeam (*Carpinus cordata*). During forest inspections 294 specimens (larvae, pupae, adult insects) were collected—199 from linden, 58 from elm, and 37 from Manchurian walnut (*Juglans manshurica*).

2. *Eutetrappa metallescens* (Motsch.)

Motschulskyi, 1860. *Schrenk's Reisen Amurl. Coleopt.*, 2: 150 (*Saperda*); Blessig, 1873. *Horae Soc. Entom. Ross.*, 9: 223 (*Saperda*); Bates, 1884. *Journ. Linn. Soc. Lond., Zool.*, 18: 256; Yakobson, 1911. *Zhuki Rossii* (atlas), tabl. 71, fig. 4; Cherepanov and Cherepanova, 1975. *Zhuki-droveseki ivovykh lesov Sibiri*, 190–195.

58 *Adult* (Fig. 30): In general habits and color of pubescence, close to *Eutetrappa chrysochloris* Bat. Well distinguished from it by absence of apical spiniform extension of elytra and other characteristics. Body with compact adherent tomentose scaly blue pubescence, head on occiput with longitudinal, at posterior margin beyond eyes with triangularly projecting, biapical transverse black band of brownish erect hairs, punctures deep, not very large, with insignificantly raised antennal tubercles, medially with longitudinal deep groove, and projecting temples. Eyes sharply faceted, in male highly convex, markedly shifted toward anterior margin of head (genae two-sevenths length of lower ocular lobe), in female less bulging, considerably away from anterior margin of head (genae two-thirds length of lower ocular lobe). Antennae thin, extending beyond apex of elytra by 9th (male) or 10th (female) segment, with minute adherent brown (on 1st segment blue) hairs, on inner side with sparse setae. First antennal segment elongate, equal to 4th, shorter than 3rd.

Pronotum barely wider (female) or not wider (male) than long, with compact adherent bluish or greenish scaly pubescence, deep gaping punctures and erect bright brown hairs, disk convex, medially in posterior half with tuberculate convexity, basally with narrow transverse

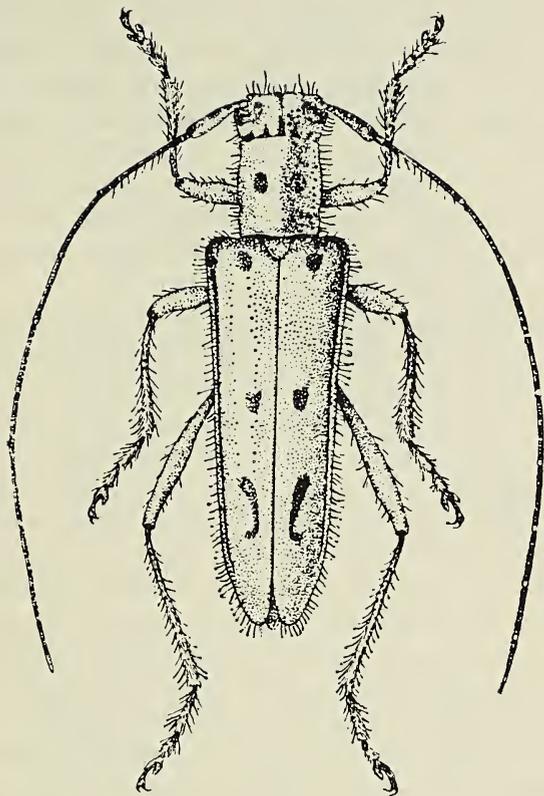


Fig. 30. *Eutetrappa metallescens* (Motsch.).

groove, on disk with two round or slightly longitudinally extended black paramedial spots, medially often with narrow longitudinal black band. Pronotal shield considerably tapering posteriorly, apically broadly rounded or truncate, with compact adherent bluish scaly pubescence.

Elytra parallel-sided (female) or markedly narrowing posteriorly (male), basally with tapering humeral tubercle, apically rounded or obtuse (with wide round outer and narrow round inner angles), laterally with distinct black humeral and less developed intermediate longitudinal ridges, with compact adherent scaly blue, sometimes greenish pubescence, with erect bright brown hairs and fine deep punctation, with three black spots— anterior spot beyond shield, median spot anteromedially, and posterior, longitudinally spatulate spot in front of hind clivus. Two anterior spots round, rectangular, or lunular, the third sometimes appears as a posteriorly narrowing punctate band, rarely

reduced to a small round spot. Body ventrally with dense adherent scaly tomentose blue, greenish, or golden-bronze pubescence, with semierect bright hairs. Abdominal sternite V of female elongate, uniformly convex, medially with longitudinal groove, apically deeply incised, with lobularly projecting posterior angles, in male short, thick, apically gently rounded, with dense golden hairs. Tergite V with golden trans-fusing spots. Legs comparatively long, thin; femora with scaly and simple pubescence. Body, legs, and antennae black. Scaly tomentose pubescence blue or greenish with metallic luster, sometimes with bronze-golden tinge. Body length 11–18 mm.

Egg: White, elongate, slightly tapering toward poles, uniformly rounded at poles. Chorion with fine cellular sculpture, alveoli flat, septa between them narrow. Length 1.9–2.0 mm, width 0.7 mm.

Larva (Fig. 31): Quite similar to the larva of *Eutetrappa chrysochloris* Bat. Distinguished from it by much smaller spinules on locomotory ampullae imparting matte tone. Body white, elongate. Head parallel-sided, half retracted into prothorax. Epistoma mildly convex, lustrous, in anterior third rusty, at anterior margin with blackish-brown fringe, behind it on each side of suture with three setigerous pores in transverse row, in posterior half yellowish, laterally fusing with temporo-parietal lobes (frontal sutures not discernible), medially divided by sharp median longitudinal suture. Hypostoma at anterior margin directly truncate, basally broadly emarginate, parallel-sided or slightly narrowing toward base, convex, rusty, only at posterior angles lustrous, whitish, in anterior third with two whitish setigerous pores in transverse row. Temporo-parietal lobes in anterior half rusty, with large setigerous pores in transverse row, in posterior half much brighter, yellowish. Antennae whitish, slightly projecting from antennal sockets. Ocelli at base of antennae (on lower side) with small translucent pigmented spot. Clypeus transverse, trapezoid, basally rusty-ginger, in anterior half whitish. Labrum transverse, at anterior margin broadly rounded, whitish, in anterior half with bright rusty bristles. Mandibles black, basally reddish-rust, apically obliquely truncate.

Pronotum sloping toward head, length half width, in anterior half rusty, lustrous, at anterior margin generally with whitish fringe, in anterior third with long setiform hairs forming medially a rarefied, laterally much denser interlacing row, in front of shield and on sides with rarefied (solitary) rusty hairs. Pronotal shield with large, transversely extended (terminally rounded) spinules, basally with minute spinules, laterally demarcated by deep longitudinal grooves, at anterior angles with oblique depression appearing as a saccular notch. Alar lobes whitish, without spinules. Mesonotum in anterior half with very

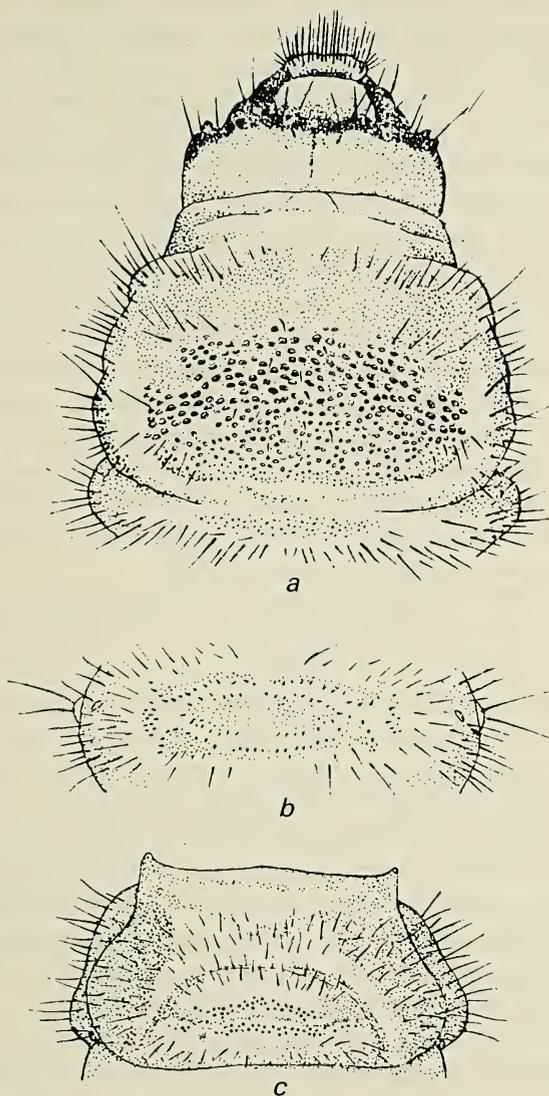


Fig. 31. Larva of *Eutetrappa metallescens* (Motsch.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—prothorax (ventral view).

minute, barely perceptible spinules forming transverse matte band. Metanotum medially divided by transverse whitish groove, with two parallel uniform sclerotized bands in front and behind transverse groove. Prothoracic presternum convex, with short rusty hairs, laterally

with longitudinally extending, glabrous lustrous rusty spot. Eusternum at posterior margin with minute specklike spinules forming transverse band narrowing laterad. Basisternum in anterior half with similar spinules forming second, much longer, transverse band. Meso- and metasterna on disk sclerotized, with very minute spinules forming transverse matte band, divided medially by transverse whitish groove.

Abdomen elongate, laterally with short rusty, not very dense hairs. Dorsal locomotory ampullae moderately convex, divided by two transverse whitish grooves uniting laterally and by short longitudinal lateral grooves, with minute spinules imparting matte tone. Spinules adjacent to transverse grooves slightly larger, distinguished from remaining spinules by arrangement in transverse edged row. Ventral locomotory ampullae sclerotized, matte, with very minute spinules, divided by deep transverse groove uniting laterally with excurved longitudinal groove-like fold, with specklike, very distinct spinules forming two transverse rows edging transverse groove in front and behind. Sclerotized field in front of transverse groove almost twice broader than one behind. Body length 25–28 mm, width of head 3.0–3.2 mm.

Pupa (Fig. 32): Distinguished from the pupa of *Eutetrappa chrysochloris* Bat. by less bulging tubercle at base of pronotum, from *E. sedecimpunctata* (Motsch.) by highly convex frons and yellow narrow band at anterior edge of lower ocular lobe. Body elongate. Head short, laterally rounded, in region of frons highly convex, medially with faint longitudinal trough, frontally along sides and at anterior margin with numerous long rusty bristles, sinciput inner to base of antennae with long acute setigerous paired adjacent spinules. Labrum lustrous, rusty-ginger, apically broadly rounded, lateromedially with two–three bristles in transverse row. Mandibles laterally with three bristles. Lower ocular lobe anteriorly bordered by narrow rusty band extending from base of antennae and terminally curved posteriorly. Antennae in second half curved annularly, their apices adjoining sides of head.

Pronotum barely wider than long, disk uniformly convex, basally with insignificantly bulging tubercle in middle, lateral to it with transverse depression, with slightly curved posterior angles, with numerous large acicular acute setigerous spinules forming transverse row at anterior margin, transverse row in middle, cluster on bulging tubercle basally, and transverse cluster laterally in front of hind clivus. Mesonotum laterally at base of elytra with small depression, at posterior margin with highly extended and raised shield, anteromedially on sides with pair of adjacent setigerous spinules, on shield laterally with acute spinules forming recurved row. Metanotum medially with narrow groove, at posterior margin angularly rounded, with acute spinules

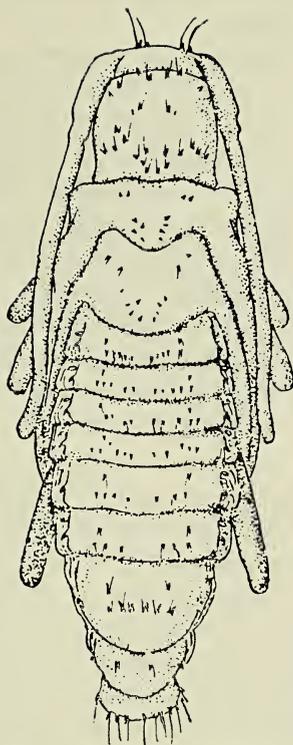


Fig. 32. Pupa of *Eutetrappa metallescens* (Motsch.).

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forming two clusters extending from middle of posterior margin toward anterior angles.

Abdomen elongate, in region of segment IV slightly expanded, mildly tapering toward base, slightly toward tip. Abdominal tergites in posterior half less convex, medially with narrow longitudinal groove and acute setigerous spinules forming uniform transverse row, anteromedially on sides with one large spinule. Spinules on tergites I–V apically recurved, on tergite VI erect. Tergite VII convex, lustrous, apically broadly rounded, with acute setigerous spinules—four postero-medially in transverse row, six in second transverse row at apex. Tergite VIII narrowly rounded posteriorly, lustrous, with four large spinules in transverse row. Tip of abdomen (in ventral view) bound by U-shaped ridge bearing on each side eight setigerous spinules. Body length up to 15 mm, width of abdomen 3.0 mm.

Material: Collected in Ussuri-Primor'e region (Ussuriisk sanctuary, Khasan, Khanka, southern spurs of Sikhote-Alin'). Adults 269, larvae 30, pupa 1 male, larval and pupal exuviae with beetles from cells 4.

Distribution: Amur region, Ussuri-Primor'e region, Sakhalin, north-east China, Korean peninsula.

Biology: Inhabits deciduous and mixed plantations. Ecologically associated with different deciduous woody species. Beetles appear in second half of June, are maximum mid-July, and disappear early September. They remain on host trees and rarely appear on flowers. After mating, the female prepares for oviposition. For this, after finding a proper site, the insect makes a fine puncture in the bark, introduces its ovipositor into it, and lays an egg. One egg is laid in each cavity. In nature, egg development continues up to three weeks. According to observations made in forests of Ussuriisk sanctuary, larvae hatched 16–20 days after oviposition. The atmospheric temperature during this period varied from 11.4°C in the morning to 32.5°C later in the day, with an average diurnal temperature of 20.2°C ± 1.0°C.

Larvae of younger instars live in bark and pack galleries with fine frass. Larvae of older instars penetrate under the bark, make meandering galleries longitudinal, sometimes transverse to the stem, outside the sapwood. They hibernate twice. After the second hibernation, they make pupal cells in or under the bark. If the bark is thin, the pupal cell is deeply impressed in wood. Length of cell 20–25 mm, width 5–8 mm. Pupation of larvae commences in second half of May and is completed June-end. Maximum pupae observed in second half of June. Pupal stage lasts about three weeks. In one experiment, a larva pupated on June 1st and the beetle emerged from it on June 20th. The atmospheric temperature varied from 3.0°C in the morning to 26.4°C later in the day (average 15.1°C). Emergence of beetles from pupae commences in first ten days of June and is completed in July. Young beetles remain in cell up to seven days, then nibble a round flight opening (diameter up to 5.0 mm) on the bark surface, and exit the cell through it. Mass emergence of beetles from cells is concluded by June-end-early July. Young beetles require supplementary feeding. Generation—two-year cycle (Table 5).

During metamorphosis the insects lose more than half their weight. Maximum weight loss observed in the period of preparation for pupation and formation of adult. One larva before preparation for pupation weighed

Table 5. Development of *Eutetrappa metallescens* (Motsch.)

Year	April	May	June	July	August	September	October
1st	L	LP	LPA	PAEL	AEL	EL	L
2nd	L	L	L	L	L	L	L
3rd	L	LP	LPA	PAEL	AEL	EL	L

141.1 mg (100%), the pupa developed from it 98.8 mg (70%), and the beetle emerging from this pupa 67.4 mg (47.7%). Weight indices of insects vary markedly. Based on 27 individuals, larvae before pupation weigh 63–229 mg (130.8 ± 9.0), pupae 57–209 mg (113.3 ± 7.8), young beetles before emergence from cells 39–175 mg (89.5 ± 6.3).

Eutetrappa metallescens (Motsch.) infests many deciduous woody species. From the larvae collected in nature, 244 beetles were raised in the laboratory—110 on maple, 45 hornbeam, 39 linden, 11 willow, 10 Japanese alder, 8 lilac, 7 ash, 6 oak, 3 birch, 3 bird cherry, and 2 on elm. During forest inspections 35 specimens were collected—14 from maple, 12 hornbeam, 5 linden, 3 bird cherry, and 1 from oak. In any case, they preferably infest maple. *Mesosa myops* Dalm., *Leiopus stillatus* Bat. and others coinfect the same trees with this species. *Palimna liturata* Bat. was found on hornbeam.

3. *Eutetrappa chrysochloris* Bat.

Bates, 1879. *Ann. Mag. Nat. Hist.*, 5, 4: 467 (*Paraglenea*); Bates, 1884. *Journ. Linn. Soc. Lond., Zool.*, 18: 256 (*Paraglenea*); Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 156; Krivolutskaya, 1973. *Entomofauna Kuril' skikh ostrovov*, 110; Danilevskii and Kompantsev, 1979. *Nasekomye—razurshchiteli drevesiny i ikh entomofagi*, 233–234; — *omissa* Pic, 1953. *Echange*, 69: 9; — *m. podany** Pic, 1953. *Echange* 69: 9; — *m. breuningi* Pic, 1952. *Echange*, 68: 13; — *piciella* Breuning, 1956. *Entom. Arb. Mus. Cg. Frey*, 7, 1: 17.

Adult (Fig. 33): Distinguished from other species of the genus *Eutetrappa* Bat. by spiniform curved outer angle at apex of elytra. Body moderately elongate. Head not broader or even narrower than pronotum, with adherent greenish scaly tomentose pubescence and black erect hairs, with minute black punctation, frontally with longitudinal groove extending from anterior margin of frons to occiput, antennal tubercles extending laterally, at posterior margin with black fringe, occiput with black longitudinal spot. Eyes in male large, highly convex, in female less convex. Lower ocular lobe 2.5 (male) or 1.5 (female) times longer than gena. Antennae thin, extending beyond apex of elytra by 10th (female) or 9th (male) segment, on 1st–2nd segments with brownish hairs, on inner side of 1st–7th segments with sparse short setae. First antennal segment 63 uniformly convex, with minute punctures, on outer side with solitary erect hairs; 4th segment slightly longer or even not longer than 5th, markedly shorter than 3rd.

Pronotum parallel-sided, length not more (male) or slightly less

* Spelled "*podani*" in Index—General Editor.

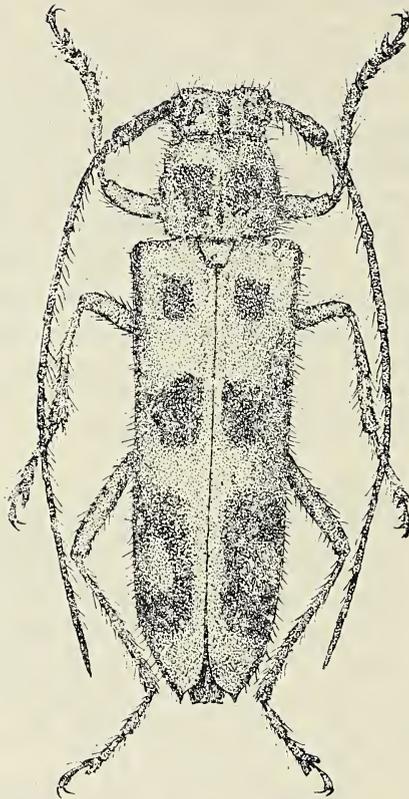


Fig. 33. *Eutetrappa chrysochloris* Bat.

(female) than width, basally with sharply manifest, narrow transverse, at anterior margin with barely perceptible, gently sloping transverse groove, medially in posterior half with longitudinal ridgelike prominence, with compact adherent greenish scaly tomentose pubescence and erect hairs, on disk with pair of large longitudinal black spots, laterally with black lunular (basally round) spot. Pronotal shield slightly tapering posteriorly, apically gently rounded or truncate, compressed troughlike, with fine green scaly tomentose pubescence.

Elytra parallel-sided (female) or tapering from base to apex (male), humeri markedly broader than pronotum, with projecting humeral tubercle, apically with rounded inner and spiniform, extended outer angle, laterally with longitudinal, sharply projecting, black ridge extending from humeral tubercle to hind clivus (between humeral and parietal ridges in posterior half lies an intermediate ridge almost reaching apex), with compact adherent scaly greenish pubescence, erect

brownish hairs, and fine punctation; three large black pilose spots on each elytron—anterior spot, situated beyond shield, rectangular with acute, anteriorly extending outer corner, medial spot (anteromedial) rectangular with round or straight corners, and posterior spot, situated in front of hind clivus, longitudinally elongate, spatulate, bent toward suture with its ends thrust into humeral ridge. Legs thin, with green dense adherent scaly pubescence and bright erect hairs. Body ventrally with continuous compact adherent greenish or grayish pubescence and bright erect hairs. Sternite V of female convex, medially with longitudinal groove, apically broadly incised or directly truncate, in male short, medially without longitudinal groove, apically broadly rounded. Body, antennae, and legs black. Color of compact adherent scaly tomentose pubescence variable—from bright green metallic lustrous to yellowish-golden. Body length 12–18 mm.

Larva (Fig. 34): Distinguished from the larva of *Eutetrappa metallescens* (Motsch.) by markedly much larger spinules on locomotory ampullae, and from *E. sedecimpunctata* (Motsch.) by spinules at

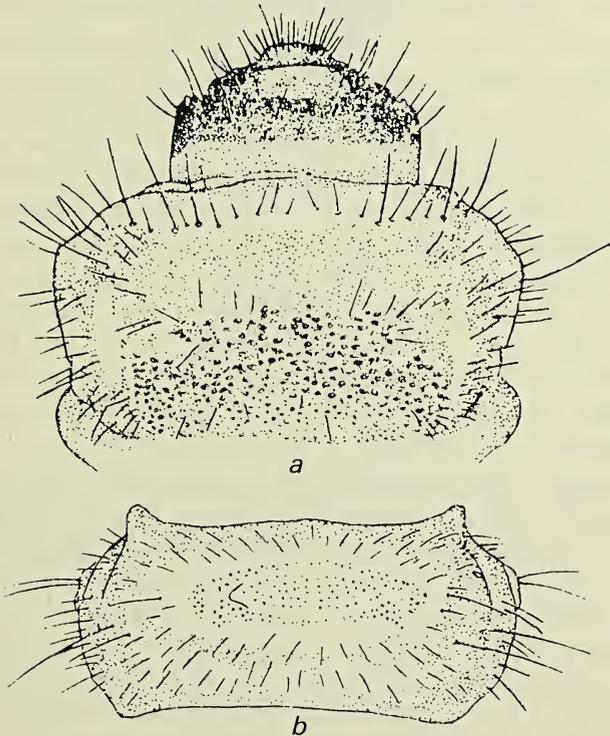


Fig. 34. Larva of *Eutetrappa chrysochloris* Bat.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

posterior margin of eusternum. Body white, elongate, head half retracted into prothorax. Epistoma mildly convex, in anterior half rusty-brown, in posterior half bright, yellowish, laterally fusing with temporo-parietal lobes (frontal sutures faint), in anterior third with three deep setigerous pores, medially divided by longitudinal suture. Hypostoma convex, four times wider than long, at anterior margin directly truncate, at posterior margin broadly emarginate, in anterior half with two setigerous pores. Temporo-parietal lobes in anterior half rusty, in posterior half bright, yellowish, at anterior angles of hypostoma with one, laterally with two bristles. Antennae whitish, their apices projecting from antennal sockets. Ocelli small, ampullaceous, situated at base of antennae. Clypeus trapezoid, with posterior angles deflected, basally tubercular, in anterior half slightly whitish. Labrum transversely oval, rounded laterally, rusty, in anterior half with sparse bristles. Mandibles black, basally reddish, apically truncate, on inner side with ridge extending from ventral denticle to dorsal margin.

64 Pronotum in anterior half on disk yellowish, lustrous, at anterior margin with whitish fringe, in anterior third with rusty hairs forming transverse row, in front of shield and laterally with solitary dispersed hairs. Pronotal shield in anterior half with large, basally with minute spinules, laterally demarcated by longitudinal grooves, at anterior angles with oblique depressions. Spinous field at anterior margin expanded, extending beyond lateral transverse depressions, the latter thus appearing as deep notches. Mesonotum in anterior half with minute specklike dispersed spinules. Metanotum on disk with minute spinules forming two rows or two transverse bands divided by transverse groove. Prothoracic presternum convex, with sparse rusty hairs, laterally with lustrous yellow spot. Eusternum at posterior margin and basisternum in anterior half with large spinules forming correspondingly two transverse bands. Meso- and metasterna with minute spinules forming transversely extended spinous field, divided medially by transverse groove.

65 Abdomen elongate, laterally with very sparse hairs. Dorsal locomotory ampullae moderately convex, medially divided by common longitudinal groove and two transverse grooves uniting laterally, covered with distinctly manifest specklike spinules forming four–five interlacing transverse rows between grooves, one–two rows in front and behind each groove. Ventral locomotory ampullae divided by deep transverse groove, with distinct spinules forming behind groove one–two, in front of groove two–three transverse rows. Body length 20–28 mm, width of head up to 3.0 mm.

Pupa (Fig. 35): Characterized by tubercle at base of pronotum and location of spinules at posterior margin of abdominal tergites. Body stocky, comparatively thick. Head tapering slightly anterior to anten-

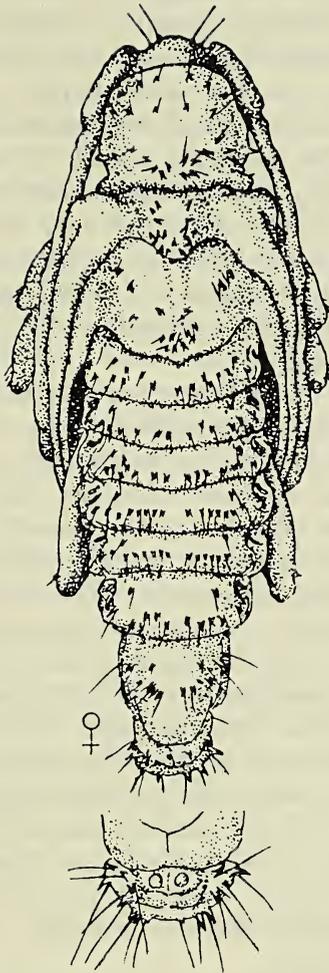


Fig. 35. Pupa of *Eutetrappa chrysochloris* Bat.

nae, almost parallel-sided, antennal tubercles slightly raised, beyond them on inner side with pair of adjacent bristles having an acute basal spinules, frontally with four–five lateral bristles forming transverse row, at anterior margin on each side with two setae in transverse row, two bristles slightly behind them in longitudinal row, laterally with long yellow (or rusty) decurved band bordering lower ocular lobe (in *E. sedecimpunctata* (Motsch.) this band absent). Labrum apically broadly rounded, medially with four (female) or seven–eight (male) bristles forming transverse row interrupted medially. Antennae flexed toward sides, in second half bent ventrad, here curved annularly toward sides of head.

Pronotum not longer or even slightly less than wide, disk moderately convex, basally with sharply projecting tubercle in center, lateral to it with broad transverse depression, with large acute setigerous spinules forming first transverse row at anterior margin, second row medially, and third row at base. Sometimes third row represented by three clusters—two on sides and one on projecting tubercle. Mesonotum at posterior margin with tubercularly bulging shield, with acute setigerous spinules—two at base of elytra and up to 8–12 on shield. Metanotum mildly convex, medially with indistinct longitudinal groove, at posterior margin broadly rounded, with solitary or, more often, numerous spinules in cluster medially in posterior half, and two rows diverging from this cluster toward anterior angles.

Abdomen tapering posteriorly from segment V, its tip slightly curved ventrad. Spiracles narrow, slitlike. Abdominal tergites medially with indistinct longitudinal groove, at posterior margin convex, here with large acute setigerous spinules forming uniform transverse row, laterally beyond middle with one recurved spinule. Tergite VII more (female) or less (male) elongate, posteriorly gently rounded, disk moderately convex, medially (female) or posteromedially (male) with acute (projecting straight or curved anteriorly or slightly posteriorly) setigerous spinules forming transversely extending cluster. Tergite VIII transverse, broadly rounded posteriorly, medially with spinules forming interlacing transverse row. Tip of abdomen bound by U-shaped ridge deflected at ends. Each side of this ridge with six–eight setigerous spinules. Valvifers of female small, hemispherical, separated by small space. Body length 13–19 mm, width of abdomen 5–6 mm.

Material: Collected on Kunashir Island. Adults 66, larvae 174, pupae 33 (males and females), larval and pupal exuviae from cells 27.

Distribution: Islands of the Pacific Ocean—Sakhalin, Kunashir, Japan (Hokkaido, Honshu).

Biology: Inhabits broad-leaved forests. Ecologically associated with
 66 several deciduous woody species. According to our observations on Kunashir Island, beetles appear in the first half of July and are found almost up to mid-September. Mass flight of beetles ends in August. Beetles remain on host trees. Females lay eggs on knots 3–7 cm thick and on stems of trees up to 25 cm diameter or more. Larvae live under bark, make galleries longitudinal to the stem, and pack them with fine frass. Galleries are deeply impressed on inner side of bark and slightly touch the wood. Length of gallery under bark up to 10.5 cm, width up to 14 mm, at places increasing to 20 mm. A cell is made at end of gallery. Length of cell 16–22 mm, width 4–9 mm. In thick-barked stems, the cells are generally made in or under bark and impressed in

the upper layer of wood. In thin-barked stems, the larvae bore into wood and there make a cell longitudinal to the stem. A layer of wood up to 2.0 mm remains between the bark and the cell. Width of entry hole up to 10 mm.

Larvae pupate after second hibernation, in last ten days of May, June, and early July. In 1974, pupae were found from May 22nd to July 25th. Mass pupation was observed in June. Pupae take 20 to 36 days to develop (six specimens under observation). During this period the atmospheric temperature varied from 8°C in the morning to 23°C later in the day. The first beetles in cells were found on July 2nd and the last on August 18th. Maximum beetles observed in second half of July. Developed beetles nibble a round flight opening (diameter 4–6 mm) on the stem surface and emerge through it. Emergence of beetles from cells commences in first half of July and ends mid-August. Beetles emerge with underdeveloped gonads and require supplementary feeding. Generation—two-year cycle.

Larvae before pupation weigh 63–213 mg (134.3 ± 7.7), pupae 57.0–186.5 mg (122.1 ± 6.9), beetles before emergence from cells 40–148 mg (94.2 ± 5.5). In all, 37 specimens were weighed.

Eutetrappa chrysochloris Bat. infests standing, drying, as well as freshly felled trees. From larvae collected in nature, we raised 61 beetles—16 on maple, 14 alder (*Alnus hirsuta*, *A. japonica*), 8 elm, 7 rowan (*Sorbus commixta*), 6 willow, 5 oak, 3 bird cherry (*Padus ssiiori*), and 2 on Amur cork tree (*Phellodendron sachalinense*). During forest inspections 212 specimens were collected—56 from willow, 43 maple, 37 elm, 28 rowan, 17 oak, 8 alder, 6 each dimorphant and Amur cork tree, 4 each birch and bird cherry, and 3 from cherry.

3. Genus *Cagosima* Thoms.

Thomson, 1864. *Syst. Ceramb.*, 116 (398); Gressitt, 1951. *Longic. Beetles of China*, 2: 559; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 253.

Adult: Body broad. Head short, with rusty-gold pubescence forming X-shaped band bordering lower side of base of antennal tubercles and upper ocular lobe. Antennae shorter than body. Elytra with sutural and parietal fringes having rusty-gold pubescence.

Larva: In structure of pronotal shield, especially presence of scalar depressions at its anterior angles, close to the larvae of the genus *Eutetrappa* Bat. Well distinguished from them by transversely extended spinules on mesonotum and at posterior margin of eusternum.

Pupa: Readily recognized by ridgelike transverse convexity on

abdominal tergites I–VI (in posterior half) set with setigerous spinules in transverse band.

Cagosima Thoms. is a monotypic genus inhabiting Pacific Ocean islands. It is close to the genus *Eutetrappa* Bat., with which it constitutes a single ecological group vitally associated with deciduous plantations.

Type species: Cagosima sanguinolenta Thomson, 1864.

1. *Cagosima sanguinolenta* Thoms.

Thomson, 1864. *Syst. Ceramb.*, 116; — *tetrastigma* Matsumura, 1908. *Ins. Japan*, 3: 135; Kojima, 1929. *J. Coll. Agric. Univ. Tokyo*, 10:115; Gressitt, 1951. *Longic. Beetles of China*, 2: 559; — *ochimanensis* Kano, 1953. *Kontyu*, 4: 287; — *kiushinensis* Ohbayashi, 1956. *Akitu*, 5: 8; Kojima and Watanabe, 1960. *J. Japan. Forestry Soc.*, 42, 10: 359–362; Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 70, 210–212; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 253–254; Krivolutskaya, 1975. *Entomofauna Kuril' skikh ostrovov*, 111.

Adult (Fig. 36): Body large, elongate. Head not broader than prothorax, with sharply bulging antennal tubercles and deep median longitudinal groove between them, with coarse irregular punctation and four erect hairs, with rusty-golden compact adherent pubescence forming an X-shaped band bordering base of antennal tubercles and upper ocular lobes on inner side. Eyes convex, deeply emarginate, very finely faceted. Antennae shorter than body, not reaching hind clivus of elytra (female) or just reaching it (male). First antennal segment short, thick, with fine dense punctation; 4th segment slightly longer than 1st, equal to 5th but markedly shorter than 3rd.

Pronotum transverse, notably wider than long, basally with indistinct transverse groove, with compact large punctation, in posterior half with smooth median longitudinal mark, with sparse erect black hairs, rusty-golden adherent pubescence edging large black spot on disk, and black longitudinal spot laterally. Spot on disk divided on both sides (front and behind) by short rusty-golden longitudinal band. Pronotal shield large, apically broadly rounded, gently compressed, medially with dense rusty-golden adherent pubescence.

Elytra parallel-sided, basally uneven, with anteriorly projecting, round humeral tubercle, apically with steeply sloping outer and round inner angle, disk uniformly convex, with deep uniform (only basally bold, on hind clivus minute) punctation, with very minute brown adherent and semierect hairs not forming continuous pubescence, with sharply distinct sutural and lateral rusty-golden fringe. Legs comparatively short; femora with sparse dispersed punctures, tibiae with dense

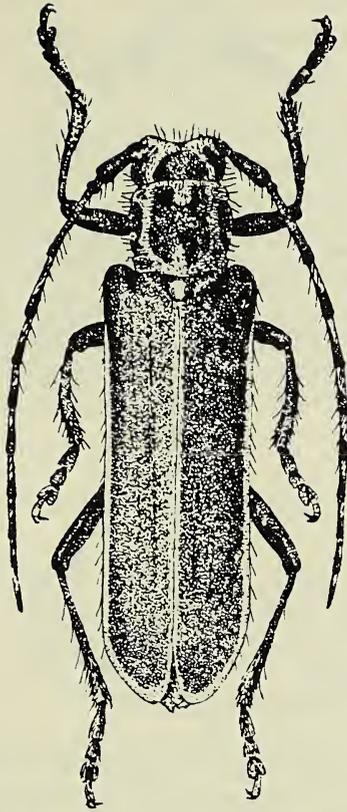


Fig. 36. *Cagosima sanguinolenta* Thoms.

semierect setiform black hairs. Midtibiae at outer margin with deep distal notch. First segment of hind tarsi evidently shorter than next two together. Body ventrally with minute adherent and long semierect blackish-brown hairs not forming continuous pubescence. Metasternum on disk with minute sparse, laterally with dense deep punctation. Abdominal sternites matte, with very sparse, fine punctures. Sternite V in female broad, convex, medially with longitudinal groove, apically slightly broadly emarginate, in male convex, without longitudinal groove, gradually tapering toward apex, at posterior margin sharply but shallowly emarginate. Body and legs black, antennae black; antennal segments basally from 3rd with whitish adherent hairs forming broad white ringlet. Body length 17–20 mm.

Larva (Fig. 37): Body comparatively thick, white. Head parallel-sided, half retracted into prothorax. Epistoma mildly convex, sometimes triangularly compressed, longitudinally divided by median suture, in anterior third with setiform hairs forming transverse recurved row,

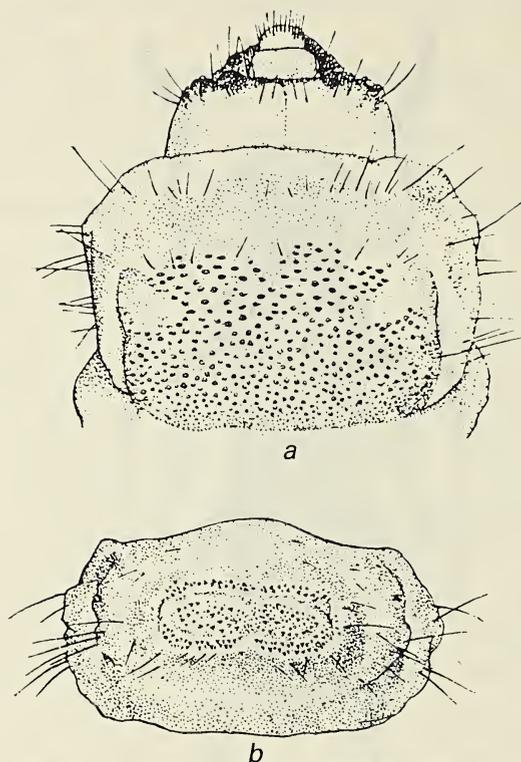


Fig. 37. Larva of *Cagosima sanguinolenta* Thoms.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

68 at anterior margin with brownish-rust fringe, laterally fusing with temporo-parietal lobes (frontal sutures not discernible). Hypostoma slightly expanded posteriorly, mildly convex, rusty, anteromedially with two–four short setiform hairs forming transverse row. Temporo-parietal lobes bright rust, at anterior margin brownish-rust, in anterior half with dense setiform hairs forming transverse row. Antennae whitish, thin, their apices slightly projecting from antennal sockets. Ocelli behind antennae, slightly below them, with dark pigmented spotlet. Clypeus trapezoid, whitish, basally rusty. Labrum rusty or slightly whitish, apically broadly rounded, with dense rusty bristles. Mandibles elongate, black, basally with rusty tinge, apically gently sloping, with extended ventral denticle.

Pronotum twice wider than long, markedly sloping toward head, at anterior margin with whitish coriaceous border, on disk and sides rusty, lustrous, in anterior third with sparse rusty hairs forming interlacing transverse row. Pronotal shield distinctly convex, laterally demarcated by deep longitudinal grooves, in anterior half with large, transversely

extended, and very minute spinules, basally with minute spinules, at anterior angles with saccular notch having deep oblique depression, at anterior margin with long wide-set hairs. Alar lobes coriaceous, without spinules, rarely with individual specklike spinules on outer side of longitudinal grooves. Mesonotum in anterior half with transverse extended spinules forming transverse band, behind it with rusty hairs in transverse row. Metanotum on disk with minute specklike spinules, medially divided by transverse groove, at posterior margin with rusty hairs forming transverse row. Prothoracic presternum moderately convex, with very sparse short hairs, laterally with extensive glabrous lustrous square. Eusternum convex, in anterior half with dense rusty hairs, at posterior margin with transversely extended spinules forming two uniform or interlacing transverse rows. Basisternum in anterior half with minute, transversely extended spinules forming two or three interlacing transverse rows. Meso- and metasterna on disk with minute acute spinules, medially divided by deep transverse, slightly sinuous groove.

Abdomen slightly tapering posteriorly, laterally with sparse hairs. Dorsal locomotory ampullae convex, covered with acute rusty hairs, medially divided by common longitudinal groove and two transverse grooves extending laterally at a sharp angle and uniting here with short lateral longitudinal grooves. Ventral locomotory ampullae covered with minute acute spinules, in posterior half divided by transverse groove.

69 Spinous field in front of this groove twice broader than spinous field behind it. Body length of last instar larvae 25–30 mm, width of head up to 3.0 mm.

Pupa (Fig. 38): Body comparatively massive, moderately elongate. Head short, almost not broader than prothorax, slightly tapering anteriorly, with highly projecting antennal tubercles, between them with deep longitudinal groove, sinciput inner to antennal tubercles with pair of short, on sides of frons with pair of long bristles in longitudinal row, at anterior margin (at base of clypeus) with solitary bristles or without them. Labrum apically narrowly rounded, medially with three–four bristles forming transverse row. Mandibles on outer side with two minute bristles. Antennae curved semicircularly (female) or almost annularly (male), with apices adjoining forelegs.

Pronotum more (female) or less (male) transverse, disk convex, medially in posterior half with indistinct longitudinal trough, basally with narrow transverse (laterally much deeper) groove, projecting posterior angles, numerous acute setigerous spinules forming transversely extended cluster at anterior margin, two diverging clusters on hind clivus and indistinct transverse band in middle. Mesonotum convex, at

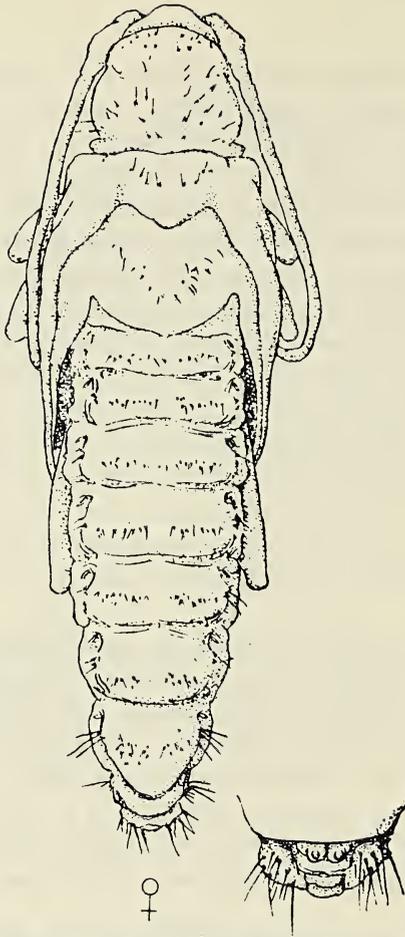


Fig. 38. Pupa of *Cagosima sanguinolenta* Thoms.

posterior margin with obtuse round raised shield, medially with indistinct longitudinal, transversely striate groove laterally bearing minute setigerous spinules. Metanotum at posterior margin angularly rounded
 70 (with highly sloping posterior angles), convex, medially with longitudinal groove laterally bearing setigerous spinules forming in posterior half a cluster diverging from posterior margin toward anterior angles.

Abdomen parallel-sided, insignificantly tapering toward tip from segment V. Abdominal tergites I–VI markedly convex in posterior half (convexity in form of transverse ridge), here with numerous minute setigerous spinules forming narrow transverse band, medially divided by common longitudinal groove. Spiracles transversely highly elongate. Tergite VII convex, posteriorly narrowly or gently rounded, in anterior half glabrous, beyond middle with minute or comparatively compact

cluster. Tergite VIII convex, transverse, posteriorly gently rounded, disk with minute setigerous spinules forming transverse row. Tip of abdomen (in ventral view) bound by U-shaped ridge covered with long rusty bristles. Valvifers of female small, hemispherical, markedly wide-set, apically with rusty lustrous tubercle. Femora apically without bristles. Body length 16–23 mm, width of abdomen 3.5–4.0 mm.

Material: Collected on Sakhalin and Kunashir. Adults 8, larvae 26, pupae 3 males and 5 females, larval and pupal exuviae with beetles from cells 7.

Distribution: Sakhalin, southern Kuril' islands. Japan (Hokkaido, Honshu, Shikoku, Kyushu). Taiwan. Absent on the continent.

Biology: According to our investigations on Kunashir Island, *Cagosima sanguinolenta* Thoms. inhabits mainly floodplain forests (along the banks of rivulets) containing alder. Beetles fly from first half of July to third week of September. They are more often found at July-end and early August. Females infest shoots of growing trees. They make a cavity longitudinal to the shoot (length of cavity 1.5 mm), introduce the ovipositor into it, and lay eggs under the bark. Hatching larvae rupture the chorion and nibble a cavity under the bark, generally longitudinal to the shoot. Length of cavity 2.5–6.5 cm, width 1.5–2.0 cm. A callus forms around the cavity. Larvae next bore into wood, make a gallery from below upward, and discard frass through the ventilation hole. In thin shoots, galleries are made in the heartwood. Before pupation, larvae pack the gallery almost entirely with frass, make a pupal cell in it, and pupate with head downward (toward the entry hole). Length of gallery in wood up to 16 cm, width 9–10 mm. Pupation commences in first half of June and is completed toward mid-July. Maximum pupae observed at June-end.

Pupal stage lasts up to three–four weeks. For example, from two pupae formed on June 21st, one beetle emerged on July 12th and the other on July 18th. The atmospheric temperature during this period varied from 6°C in the morning to 23°C later in the day (average 14°C). Developed beetles nibble a round flight opening (diameter up to 5.0 mm) on the shoot surface and exit the pupal cell through it. Emergence of beetles from wood commences early July and ends early August. Generation—two-year cycle, in some cases up to three years. Weight of larvae before pupation (based on five specimens) 132–554 mg, pupae 120–503 mg, young beetles in cells 100–402 mg.

We found *Cagosima sanguinolenta* Thoms. only on alder (*Alnus maximowiczii*). It infests stems of growing trees 6–10 cm diameter and knots 1.8–3.5 cm thick. The damaged knots wither. In Japan (Kojima and Okabe, 1960; Kojima and Watanabe, 1960), this species attacks

alder (*Alnus hirsuta*, *A. japonica*, *A. pendula*, *A. siboldiana*, and others) and birch (*Betula* sp.).

4. Genus *Thyestilla* Auriv.

Aurivillius, 1923. In Junk: *Coleopt. Catal.*, 74: 491;— *Thyestes* Thompson, 1864. *Syst. Ceramb.*, 116; Plavil'shchikov, 1932. *Zhukidrovoseki vrediteli drevesiny*, 195; Gressit, 1951. *Longic. Beetles of China*, 2: 458.

Adult: Distinguished from other species of Saperdini by stocky, comparatively thick body. Frons wide, convex; antennal tubercles smooth. Antennae shorter than body, variegated, segments basally with white pilose ringlet. Elytra individually rounded apically.

Larva: Pronotum with transversely extended round spinules, at anterior angles with saccular depression. Eusternum and basisternum with spinules forming two transverse bands.

Pupa: Characterized by thick, stocky body. Antennae curved semi-circularly, their apices flexed ventrad toward foretibiae. Labrum generally with four bristles in transverse row; mandibles on outer side with three bristles forming a triangle. Pronotum with bristles forming a cluster at anterior margin and on hind clivus. Abdominal tergites with setigerous spinules forming in posterior half a transverse row or transverse band. Tip of abdomen bound by U-shaped ridge bearing long dense, basally sclerotized bristles.

The genus *Thyestilla* Auriv. has two species. One (*T. coerulea* Breun.) covers all of western China, the other (*T. gebleri* Fald.) the southeastern regions of northern Asia, China, Korean peninsula, and Japan.

Type species: *Saperda gebleri* Faldermann, 1835.

1. *Thyestilla gebleri* (Fald.)

Faldermann, 1835. *Mem. Acad. Petersb.*, 2: 434 (*Saperda*); — *pubescens* Thomson, 1864. *Syst. Ceramb.*, 116; — *funebri* Gahan, 1888. *Ann. Mag. Nat. Hist.*, 6, 2: 67 (*Thyestes*); — *infernalis* Pic, 1904. *Echange*, 19: 17 (*Phytoecia*); Aurivillius, 1923. In Junk: *Coleopt. Catal.*, 74: 491 (+ *T. funebri* Gah.); Plavil'shchikov, 1932. *Zhukidrovoseki vrediteli drevesiny*, 195; Gressit, 1951. *Longic. Beetles of China*, 2: 458; Kojima and Okabe, 1960. *Food Plants of Japan*, *Ceramb.*, 212; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 158; — *kadowakii* Fujimai, 1962. *Kontyu*, 30: 211; — *subuniformis* Breuning, 1952. *Ent. Art. Mus. Cg. Frey*, 3: 195; — *transitiva* Breuning, 1952. *Ibid.*, 195.

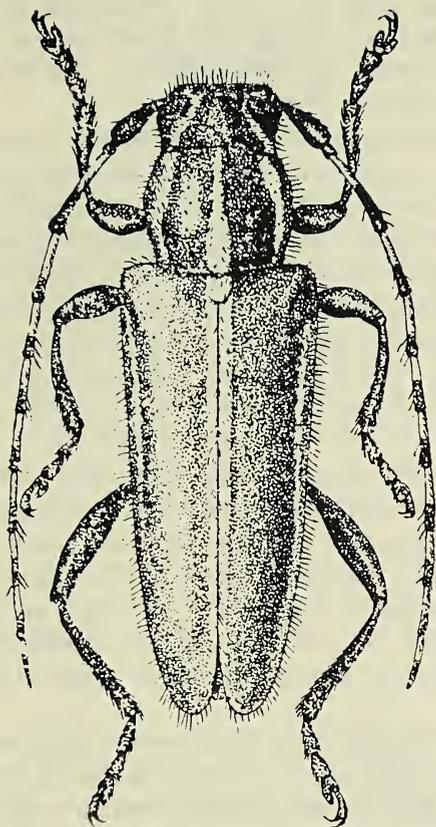


Fig. 39. *Thyestilla gebleri* (Fald.).

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Adult (Fig. 39): Body thick. Head short, not broader than prothorax, frontally in region of frons convex, with wide-set antennal tubercles, with bold, irregular punctation (punctures round), dense erect dark brown setiform hairs, and compact adherent white, on occiput blackish-brown pubescence (in melanic forms pubescence continuously black). Eyes broadly emarginate, finely faceted. Lower ocular lobe in male 1.5 times, in female barely longer than gena. Antennae not extending to apex of elytra (female) or extending slightly beyond it (male), with dense compact adherent dark brown, basally gray hairs forming white ringlet, on inner side of 1st–8th segments with black hairs. First antennal segment thick, longer than 4th, distinctly shorter than 3rd.

Pronotum slightly transverse (female) or not transverse (male), parallel-sided, disk uniformly convex, with fine dispersed punctation, long erect dark brown hairs and dense compact adherent blackish-

brown pubescence, with three white longitudinal pilose bands—one medial and two lateral. Pronotal shield broad, almost transverse, tapering posteriorly, apically narrowly rounded, with dense compact adherent white or brownish pubescence.

Elytra parallel-sided, tapering in posterior fourth, individually rounded apically, basally with projecting humeral tubercle, inward to it with small depression, disk uniformly convex, with compact adherent dense dark brown (sometimes rusty) pubescence and long erect or semierect brownish hairs, with fine punctation masked by pubescence, on suture with white fringe, laterally with white pilose humeral band extending from humeral tubercle to hind clivus. In melanic forms, white bands on pronotum and elytra absent, pubescence entirely dark or dark brown. Such melanic forms constitute half or more than half of the population. Body ventrally with gray or dark brown adherent pubescence and long bright semierect hairs. Legs comparatively thick. Mid-tibiae at outer margin with deep distal notch. First segment of hind tarsi distinctly shorter than next two together. Body length 8.5–15.0 mm.

Egg: White with yellowish tinge, insignificantly elongate, uniformly tapering toward poles, here narrowly rounded, on one side convex, on the other slightly flat. Chorion with fine cellular sculpture, spaces between alveoli smaller than alveoli per se. Length 1.7 mm, width 0.8 mm.

Larva (Fig. 40): Body white. Head parallel-sided, half retracted into prothorax. Epistoma convex, short, posteriorly broadly rounded, medially divided by deep longitudinal suture, laterally demarcated by distinct frontal sutures, in anterior half rusty-brown, here with hairs forming two interlacing transverse rows, in posterior half bright yellowish. Hypostoma convex, rusty, parallel-sided, at anterior angles rounded, anteromedially with pair of setigerous, sometimes whitish pores. Temporo-parietal lobes in anterior half rusty-brown with short hairs forming two interlacing transverse rows. Antennae thin, apices barely projecting from antennal sockets. Ocelli ampullaceous, bright, with translucent pigmented spotlet located on facial projection below antennae. Clypeus trapezoid, broad, whitish, basally rusty. Labrum transverse, apically broadly rounded, basally glabrous, rusty, in second half whitish, with short bright rust bristles. Mandibles black, on outer side anteromedially with fine sculpture forming transverse band, apically obliquely truncate, with extended ventral denticle, on inner side with longitudinal ridge parallel to cultrate edge.

Pronotum twice wider than long, at anterior margin whitish, coriaceous, in front of shield, on disk, and laterally lustrous yellow, in anterior third with rusty hairs forming an interlacing transverse row or

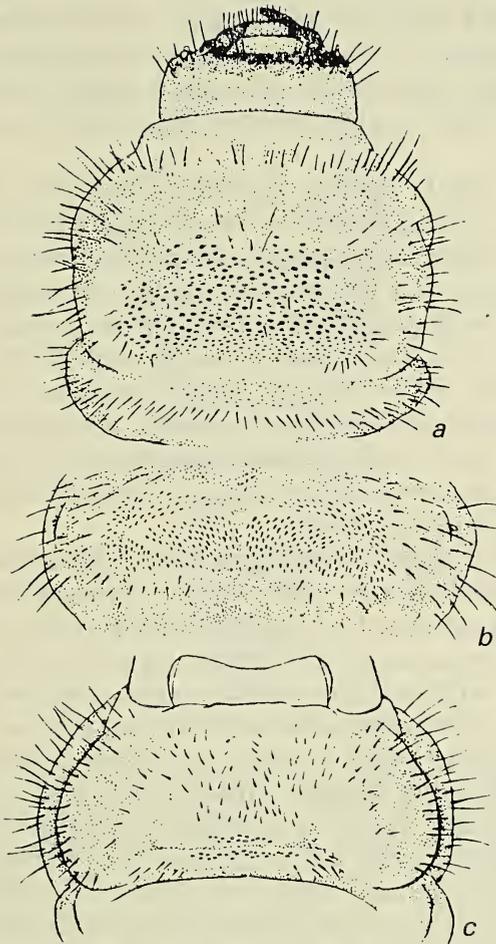


Fig. 40. Larva of *Thyestilla gebleri* (Fald.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—prothorax (ventral view).

narrow transverse band. Pronotal shield convex, laterally demarcated by deep longitudinal grooves, with transversely extended, rounded spinules (rarefied large spinules at anterior margin, much denser and minute basally) and rare rusty hairs, with saccular notch at anterior angles, here with oblique depression. Pro- and mesonota in anterior half with minute specklike spinules, beyond middle with bright rust irregular hairs forming transverse band. Prothoracic presternum and eusternum in anterior half with comparatively dense rusty hairs, laterally with glabrous lustrous yellowish spot. Eusternum at posterior margin

and basisternum in anterior half with transversely extended, apically rounded spinules forming two parallel transverse bands (one at posterior margin of eusternum, the other longer band on basisternum). Meso- and metasterna on disk with minute acute spinules, medially divided by transverse groove, in front of spinous field with short hairs in transverse interlacing row.

Abdomen slightly tapering posteriorly, laterally with irregular bright rust hairs. Dorsal locomotory ampullae sufficiently convex, with uniform minute distinct acute spinules, medially divided by common deep longitudinal groove, with two transverse grooves extending laterally and indistinct short longitudinal lateral grooves. Ventral locomotory ampullae with minute acute uniform spinules, divided medially by longitudinal troughlike groove and in posterior half by transverse whitish groove. Spinous field behind transverse groove narrower, in front broad, at anterior margin sinuate. Body length of older instar larvae 18–23 mm, width of head up to 2.4 mm. Larvae of first instar are distinguished by large head and long hairs on sides of body.

Pupa (Fig. 41): Body comparatively stocky, thick. Head narrowing anteriorly, antennal tubercles barely raised or even not raised, sinciput with pair of adjacent lateral bristles. Frons broad, convex, laterally with short bristles forming longitudinal interlacing row, in front of anterior margin with six–eight bristles grouped in pairs or forming two longitudinal interlacing short rows. Labrum lustrous, apically narrowly rounded, disk with two–four bristles forming transverse row. Mandibles on outer side with three bristles forming a triangle. Antennae in second half curved semicircularly, flexed on ventral side toward mid- and forelegs.

Pronotum parallel-sided, transverse (female) or width not more than length (male), disk convex, basally with indistinct transverse groove or without it, posterior angles not deflected, directed posteriorly, at anterior margin with large or small number of bristles forming transverse row or transversely extended cluster interrupted medially, basally with more or less long bristles forming two clusters on hind clivus. Mesonotum moderately convex, at base of elytra slightly compressed, at posterior margin with extended narrow (angularly) rounded shield, anteromedially on sides with one, on shield with two–three indistinct bristles. Metanotum broad, at posterior margin slightly rounded or almost directly truncate, medially with longitudinal groove, with minute spinules forming two oblique diverging rows extending from middle of posterior margin toward anterior angles.

Abdomen parallel-sided (male) or in region of segment IV enlarged (female) toward tip and tapering toward base. Abdominal tergites in posterior half convex, here with minute acute setigerous spinules form-

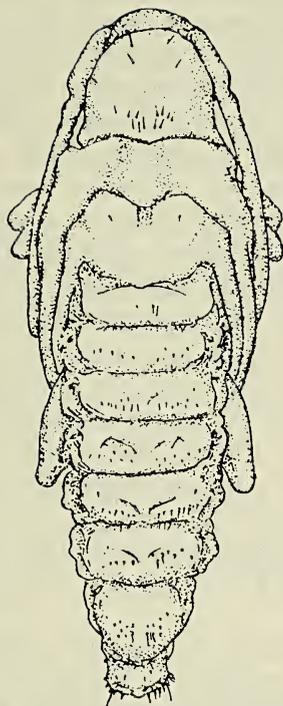


Fig. 41. Pupa of *Thyestilla gebleri* (Fald.).

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ing transverse row or narrow transverse band. Tergite VII convex, steeply sloping posteriorly, posteromedially or almost medially with minute setigerous spinules forming transversely extended cluster. Tergite VIII short, apically broadly rounded, with minute bristles in transverse row. Tip of abdomen bound by U-shaped ridge densely covered with long bristles forming two dense lateral bundles. Bristles on sclerotized base sometimes break and only their sclerotized base remains. Body length 13–17 mm, width of abdomen 3.5–5.0 mm.

Material: Collected in Ussuri-Primor'e region (Ussuriisk sanctuary, southern Sikhote-Alin', and elsewhere). Adults 537, larvae 20, pupae 11 (males and females), larval and pupal exuviae with beetles from cells 10.

Distribution: Amur region, Ussuri-Primor'e region, northeast China, Korean peninsula, Japan.

Biology: Inhabits open forest felling areas, virgin and long-fallow lands, often appearing on cultivated lands. Ecologically associated with wormwood. Flight of beetles observed in June and July. In Ussurii region, 493 beetles were caught during one season—473 (96%) in June and 20 (4%) in July. Beetles disappear by August. After mating, the

females oviposit on stems of wormwood 7–10 mm diameter. For this purpose, using its mandibles, the female first makes a cavity in the form of a transverse, straight, or spatulate band on the stem at a height of 19–45 cm, then introduces its ovipositor into the cavity, and lays an egg under the cork layer in the soft tissues of the stem. We found 15 mature eggs in the ovaries of a female caught in nature of June 27th. Active mating of beetles and oviposition were observed during this period. Egg development lasts about two weeks. From eggs laid on June 23rd, larvae began to hatch on July 9th (11 eggs under observation). In this instance, the egg stage lasted 16 days. The atmospheric temperature varied from 5°C in the morning to 29°C later in the day (average $16.2^{\circ}\text{C} \pm 0.8$). Larvae live in the stem and make galleries in the heartwood. They descend to the root zone with the onset of winter and hibernate twice. After the second hibernation, during May to early June, they make a pupal cell and seal it from the top with a plug of coarse fibrous frass. They pupate with head upward. Length of plug 11–21 mm. Length of cell 17–21 mm, width 5–7 mm. Pupation commences in May and is completed in early June. Only a few unupated larvae remained by June 8th. Pupae were found up to last ten days of June.

The pupal stage lasts about three weeks. Under natural conditions one larva pupated on June 4th and from that pupa the beetle developed on June 23rd. The atmospheric temperature during that period varied from 0.5°C in the morning to 26.4°C later in the day, average $16.1^{\circ}\text{C} \pm 0.8$ (snow occurred on June 14th). Developed beetles remain in cells for six–seven days, then nibble a flight opening (5.0 mm diameter) in the stem and exit cell through it. Emergence of beetles is completed by June-end. Generation—two-year cycle. Weight of larvae before pupation 74–262 mg (160.2 ± 13.5), pupae 67–239 mg (145.1 ± 12.4), beetles before emergence from cells 54–193 mg (108.5 ± 12.7) (13 specimens weighed).

We found *Thyestilla gebleri* (Fald.) only on wormwood. Sixty-eight beetles were raised. Not detected on other plants. May be considered one of the sanitation agents destroying wormwood weeds in fields. However, it is mentioned in the literature that it also develops on hemp (*Cannabis sativa*), Chinese nettle (*Boehmeria nivea*), thistle (*Cirsium*), and cotton (*Gossypium*).

5. Genus *Menesia* Muls.

Mulsant, 1856. *Ann. Soc. Linn. Lyon*, 2, 3: 157; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 203–204; Breuning, 1966. *Catal. Lamiair. (Col., Ceramb.)*, 9: 725.

Adult: Characterized by small size. Head broad, frontally convex, with erect hairs. Antennae slightly longer than body, extending beyond apex of elytra. Pronotum transverse or slightly oblong, parallel-sided, with slightly curved posterior margin. Pronotal shield apically broadly rounded or truncate. Elytra slightly (*M. bipunctata* (Zoubk.)) or considerably elongate (*M. albifrons* Heyd.), laterally rounded, without humeral ridge.

Larva: Distinguished from the larvae of other genera by pronotal shield covered with minute, distinctly separate, uniform spinules and having gently emarginate anterior angles. Alar lobes on inner margin of longitudinal grooves with specklike spinules. Eusternum glabrous, coriaceous. Basisternum with setigerous transverse, comparatively uniform (*M. albifrons* Heyd.), or markedly constricting toward middle (*M. bipunctata* (Zoubk.)) band. Locomotory ampullae of abdomen with minute spinules imparting matte tone.

Pupa: Body moderately elongate. Head short, markedly broader than pronotum, frontally convex, with long bristles forming longitudinal interlacing row laterally and transverse row anteriorly at base of clypeus. Labrum and mandibles on outer side without bristles. Abdominal tergites with more or less developed spinules forming uniform transverse row at posterior margin.

In northern Asia, of the four species belonging to the genus *Menesia* Muls., *M. bipunctata* (Zoubk.) is found in the southern Urals and Europe, *M. sulphurata* (Gebl.) from the Urals to the Pacific Ocean coasts, *M. albifrons* Heyd. mainly in the Amur and Ussuri-Primor'e regions, and *M. flavotecta* Heyd. in Ussuri-Primor'e region and Japan. All these species are ecologically associated with deciduous plantations.

Type species: Saperda bipunctata Zoubkoff, 1829.

KEY TO SPECIES

Adults

- 1 (4). Elytra on disk with greenish-yellow pilose spotlets or dense adherent pubescence, with transverse brownish bands.
- 2 (3). Antennae black or dark brown. Each elytron with four yellow pilose spots. From the Urals to Pacific Ocean coasts.
 1. **M. sulphurata** (Gebl.)
- 3 (2). Antennae bright yellow, 1st segment contrastingly black. Elytra on disk with dense adherent greenish-yellow pubescence, with dark brown transverse bands. Amur and Ussuri-Primor'e regions, Japan. 2. **M. flavotecta** Heyd.

- 4 (1). Elytra on disk entirely black, without spots and without dense greenish-yellow pubescence or with pair of white pilose spots on hind clivus.
- 5 (6). Frons black, without white pubescence. Pronotum laterally without white pilose longitudinal band. Elytra on hind clivus always with two distinct white pilose spots. From Atlantic Ocean coasts to the southern Urals 3. **M. bipunctata** (Zoubk.)
- 6 (5). Frons entirely or partially white, with dense white adherent pubescence. Pronotum laterally with longitudinal white pilose band, rarely without it. Elytra on hind clivus without white spots, rarely with pair of less distinct white pilose spots. Amur and Ussuri-Primor'e regions, Altai. . . 4. **M. albifrons** Heyd.

Larvae

- 1 (4). Transverse grooves on dorsal locomotory ampullae whitish, distinct, laterally uniting together at a marked obtuse angle.
- 2 (3). Spinules on locomotory ampullae very minute, detectable with great difficulty under high magnification, imparting matte tone. Pronotum in anterior third with hairs forming medially a rarefied and laterally a dense transverse row. On many deciduous plants 1. **M. sulphurata** (Geb.)
- 3 (2). Spinules on locomotory ampullae specklike, distinctly projecting. Pronotum in anterior third with hairs laterally forming dense transverse band. Mainly on Manchurian walnut. 2. **M. flavotecta** Heyd.
- 4 (1). Transverse grooves on dorsal locomotory ampullae less distinct, uniting laterally at an acute angle.
- 5 (6). Sclerotized band laterally on basisternum broad, toward middle constricting or even interrupted. Mainly on willow 3. **M. bipunctata** (Zoubk.)
- 6 (5). Sclerotized band laterally on basisternum uniformly broad, not constricting toward middle. Mainly on manchu stripe maple, apricot, and Amur bird cherry 4. **M. albifrons** Heyd.

Pupae

- 1 (4). Head on sinciput, inner to antennae, with pair of adjacent bristles.

- 2 (3). Anterior margin of frons laterally with two bristles in transverse row. 1. **M. sulphurata** (Gebler.)
- 3 (2). Anterior margin of frons laterally with one bristle
. 2. **M. flavotecta** Heyd.
- 77 4 (1). Head on sinciput, inner to antennae, without adjacent bristles.
- 5 (6). Spinules on abdominal tergites small, specklike.
. 3. **M. bipunctata** (Zoubk.)
- 6 (5). Spinules on abdominal tergites VI–VII large, acute, many times larger than spinules on subsequent tergites.
. 4. **M. albifrons** Heyd.

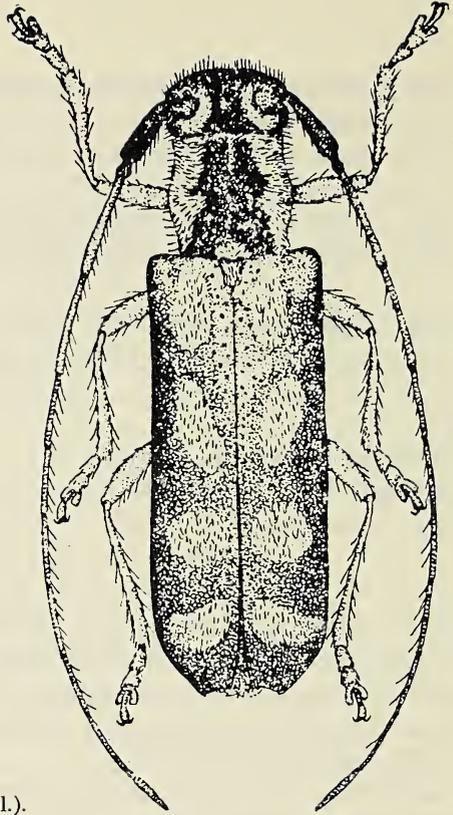
1. **Menesia sulphurata** (Gebler.)

Gebler, 1825. In Hummel: *Ess.*, 4: 52 (*Saperda*); Gebler, 1830. *Ledeb. Reise Amurl.*, 2, 3: 188; — ab. *nigrocincta* Pic, 1915. *Longic.*, 9, 2: 10; — ab. *semivittata* Pic, 1915. *Ibid.*, 10; Samoilov, 1936. *Tr. Gornotaezh. stants. Dal'ne-vost. fil. AN SSSR*, 1: 235; Gressitt, 1951. *Longic. Beetles of China*, 2: 557; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 545; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 154; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 44–46; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovykh lesov Sibiri*, 187–190.

Adult (Fig. 42): Characterized by small body and large yellow pilose spots on elytra. Head short, with antennal tubercles deflected laterally, frontally convex, with bold deep punctation, at anterior margin inner to and beyond eyes with compact adherent yellow or grayish pubescence, throughout surface with erect dark brown hairs. Eyes very convex, very sharply faceted, lower ocular lobe round, almost hemispherical, in male more, in female less close to anterior margin of genae. Antennae comparatively long, extending beyond apex of elytra by 9th or 10th segment, with short sparse brownish hairs, inner side of 1st–7th segments with numerous bristles. First antennal segment with compact striate, successive segments with minute punctation.

Pronotum parallel-sided, almost not longer than wide, disk uniformly convex, basally with slightly curved margin, with minute punctation and compact adherent yellow pubescence forming on common black background one broad longitudinal yellow band on each side, narrow linear yellow longitudinal band in middle, and distinct yellow spot at base in front of shield; entire surface with erect bright brownish hairs. Pronotal shield parallel-sided, slightly oblong, apically slightly compressed, with dense, closely adherent yellow hairs.

Elytra parallel-sided, basally with rounded humeral tubercle, apically truncate, with straight inner angles, disk uniformly convex, with

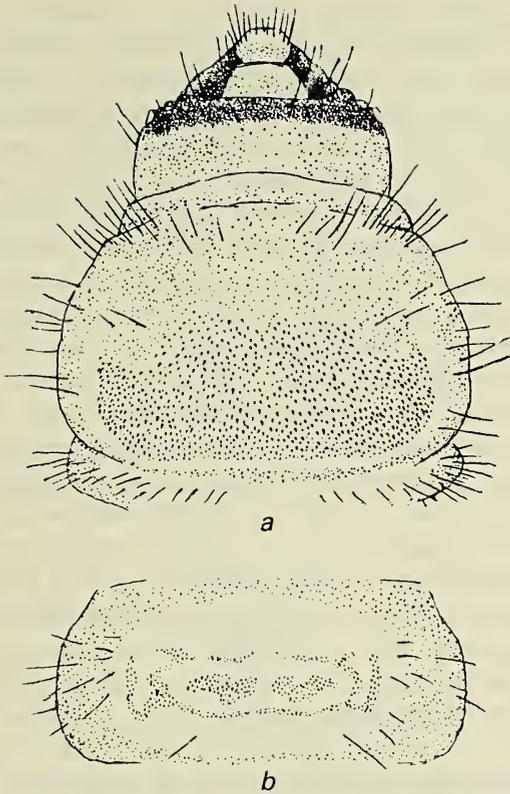


78 Fig. 42. *Menesia sulphurata* (Gebler).

deep, in posterior third more evanescent punctation, with sparse adherent and erect or semierect brownish hairs, with dense adherent yellow pubescence forming four large spots on each elytron. These spots either longitudinally elongate (especially basally) or round (antero- and posteromedially), or angular (in front of hind clivus); in some individuals resemble small dots. Body ventrally with adherent yellow or grayish, laterally with dense, on disk with sparse pubescence. Abdominal sternite V of female thick, at anterior margin with transverse constriction or interception, apically transversely truncate, in male without interception. External genitalia of male characterized by parameres slightly curved on inner side, apically and on outer side more inclined, with long rusty bristles that are slightly shorter than parameres per se. Body black, antennae black or dark brown, their 1st segment black, not contrasting with other segments. Legs bright rust. Body length 6–9 mm.

Egg: White, narrowly rounded at poles. Chorion matte, with minute punctation. Length 1.5 mm, width 0.5 mm.

Larva (Fig. 43): Characterized by very minute spinules on locomotory ampullae of abdomen imparting matte tone. Body white, small.



79 Fig. 43. Larva of *Menesia sulphurata* (Gebl.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

Head half retracted into prothorax. Epistoma flat or mildly convex, in anterior third reddish-rust, at anterior margin with blackish-brown fringe, behind it with barely perceptible setiform hairs forming transverse row, in medial and posterior thirds bright, yellowish, medially divided by narrow longitudinal suture, laterally fusing with common background of temporo-parietal lobes, frontal sutures not detected. Hypostoma gray, convex, parallel-sided, in anterior half with four setigerous pores in transverse row. Temporo-parietal lobes in anterior half rusty, in posterior half much brighter, yellowish, closer to anterior part with two setigerous pores in transverse row. Antennae short, whitish, barely projecting from antennal sockets. Clypeus whitish, lustrous, basally rusty, apically broadly rounded. Labrum whitish, basally rusty, with minute bright bristles. Mandibles basally reddish-rust, apically black, here obliquely truncate, with acute ventral and almost round dorsal denticle.

Pronotum slightly sloping toward head, at anterior margin with whitish fringe, behind it on disk and laterally lustrous, yellow, in anterior third with rusty hairs forming medially a uniform rarefied, laterally interlacing, much denser row. Pronotal shield with dense even spinules, laterally demarcated by short longitudinal grooves uniting anteriorly with transverse depressions. Spinous field at anterior angles of shield gently sinuate, throughout surface with whitish punctures. Alar lobes near longitudinal grooves with minute spinules, laterally with bright rust hairs. Mesonotum in anterior half mildly sclerotized, with minute, barely perceptible spinules, posteromedially with hairs forming transverse row. Metanotum on disk with transverse sclerotized band, divided medially by transverse whitish groove. Prothoracic presternum convex, with sparse irregular rusty hairs, laterally with lustrous rusty spot. Eusternum at posterior margin glabrous, coriaceous, without spinules. Basisternum at anterior margin sclerotized, with very minute spinules forming transverse band. Meso- and metasterna on disk with very minute spinules forming sclerotized transverse band.

Abdomen moderately elongate, gradually tapering posteriorly from thorax, laterally with barely discernible bright hairs. Dorsal locomotory ampullae sclerotized, with very minute dense spinules, divided by common longitudinal groove, two transverse grooves uniting laterally, and short lateral longitudinal straight grooves. Ventral locomotory ampullae with very minute spinules, divided by transverse groove.

79 Terminal segment (X) with numerous long bright rust hairs. Body length of older instar larvae 10–12 mm, width of head 1.1 mm.

Pupa (Fig. 44): Body white. Head broad, short, laterally rounded, frontally convex, laterally with three–four acicular spinules forming uniform or interlacing longitudinal row, sinciput inner to antennae with pair of adjacent bristles, anteriorly at base of clypeus with four bristles (two on each side) forming transverse row. Labrum lustrous, semi-hyaline, apically acute, without bristles. Mandibles laterally without bristles. Antennae thin, long, in second half curved annularly (almost looped), their apices adjoining sides of head or their own base.

Pronotum parallel-sided, not longer or even less than width, lustrous, disk convex, basally with narrow transverse groove, with slightly curved posterior angles, with minute setigerous spinules dispersed randomly or forming three transverse rows—one at anterior margin, second medial, third on hind clivus. Mesonotum mildly convex, at posterior margin with extended, highly raised shield bearing barely perceptible bristles laterally. Metanotum insignificantly convex, medially with longitudinal ridge, at posterior margin broadly rounded, with solitary, very minute bristles.

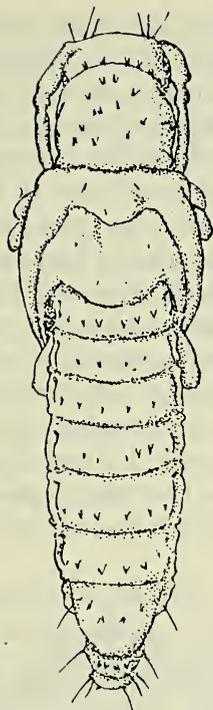


Fig. 44. Pupa of *Menesia sulphurata* (Gehl.).

Abdomen moderately elongate, parallel-sided, tapering from segment VI toward tip. Abdominal tergites medially with indistinct longitudinal groove, in posterior third with very minute, barely perceptible spinules forming transverse row. Spinules on tergite VI slightly larger, erect; on remaining tergites recurved. Tergite VII highly convex, apically broadly rounded, on disk with four spinules forming recurved transverse row. Tergite VIII short, with barely perceptible spinules forming transverse row. Tip of abdomen (in ventral view) obtuse, laterally bound by lustrous ridge bearing minute setigerous, sometimes
80 barely noticeable spinules. Valvifers of female small, hemispherical, slightly wide-set, with narrow space between them. Body length 6–9 mm, width of abdomen up to 1.5 mm.

Material: Collected in Ob' region, Altai, Salair, Tuva, Ussuri-Primor'e region, and on Kunashir Island. Adults 156, larvae 24, pupae 10 (males and females), larval exuviae 8.

Distribution: Eastern Ural region, western Siberia (including Altai, Tuva), Kazakhstan (including Tarbagatai), eastern Siberia, Ussuri-Primor'e region, Sakhalin, Kunashir, northern Mongolia, northeast China, Korean peninsula, Japan (Hokkaido, Honshu).

Biology: Inhabits areas of deciduous plantations. Ecologically associated with different woody species. Flight of beetles continues from June to August. Beetles maximum in first twenty days of July. They feed on green tissues of leaves of woody plants. After their gonads mature, beetles mate and the females prepare for oviposition. They infest knots and stems of growing trees (0.7–6.0 cm diameter, rarely more), mainly linden, walnut, alder, partly willow, and other species. Larvae live in bark, make squarish or longitudinal sinuous galleries not impressed on wood, and pack them with frass. Larvae of last instar bore into wood, make a falcate gallery, prepare a pupal cell and seal the entry hole with fine fibrous frass, turn their head toward the entry hole, and pupate. In thick shoots, pupal cells are situated in the upper layer of wood, in stems (for example, Manchurian walnut) in the heartwood. Width of entry hole 2–3 mm. Length of pupal cell 11–22 mm, width up to 3.0 mm. If during pupation of larvae the bark is removed from the shoot, entry holes plugged with fine frass are visible on the wood surface.

Pupation commences in May and is completed in last week of June. Pupae develop in three weeks. Under natural conditions at a temperature of $19.2 \pm 1.04^\circ\text{C}$, a pupa developed in 22 days; in the laboratory at a temperature of $21.5 \pm 0.6^\circ\text{C}$ in 19 days. Young beetles appear in the last days of May and in June. They nibble a round flight opening (diameter 2.0–2.5 mm) on the bark surface and exit the cell through it. Emergence of beetles from wood is completed early July. Complete development cycle takes one year, but in certain cases is prolonged up to two years. Under laboratory conditions, the development of one generation was completed in nine months. Weight reduction during metamorphosis is demonstrated with one individual; larva before preparation for pupation weighed 22.3 mg (100%), the pupa developed from it 14.8 mg (66.3%), the beetle 11.9 mg (53.3%). Based on 31 insects, larvae before pupation weigh 8–36 mg (19.9 ± 1.5), pupae 7–33 mg (17.8 ± 1.3), young beetles before emergence from cells 5.5–25.0 mg (14.4 ± 1.1).

Menesia sulphurata (Geb.) mainly infests drying trees, but often damages physiologically weakened shoots on growing trees. From larvae collected in nature, 139 beetles were raised—69 on Manchurian walnut, 48 linden, 17 alder, 4 willow, and 1 on oak. During forest inspections 42 specimens were collected (larvae, pupae, beetles)—16 from walnut, 13 willow, 11 alder, 1 linden, and 1 from another species. Density of infestating population is high. In one instance, 30 beetles were found in a linden shoot 95 cm long and 1.3–2.4 mm diameter (June 4th). In another instance, in a willow stub 40 cm long and 6.0 cm

diameter, three pupae and one beetle were found. The following species coinfect trees of Manchurian walnut with this species: *Menesia flavotecta* Heyd., *Mesosa myops* Dalm., *Gaurotes ussuriensis* Bless., *Olenecamptus* Pasc., *Leiopus albovittis* Kr., and others. According to Samoilov (1936), this species also develops on *Fraxinus manshurica*.

81 2. *Menesia flavotecta* Heyd.

Heyden, 1886. *Deutschl. Ent. Zeitschr.*, 30: 276; Aurivillius, 1923. In Junk: *Coleopt. Catal.*, 73: 491 (ab. *flavotecta* Heyd.); Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 210; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 154; Breuning, 1966. *Catalog. Lamiar. (Col., Ceramb.)*, 9: 726 (m. *flavotecta* Heyd.).

Adult (Fig. 45): Close to *Menesia sulphurata* (Gebl.). Distinguished from it by much larger body, dense pubescence, and much brighter color of antennae. Body moderately elongate. Head broader than pron-

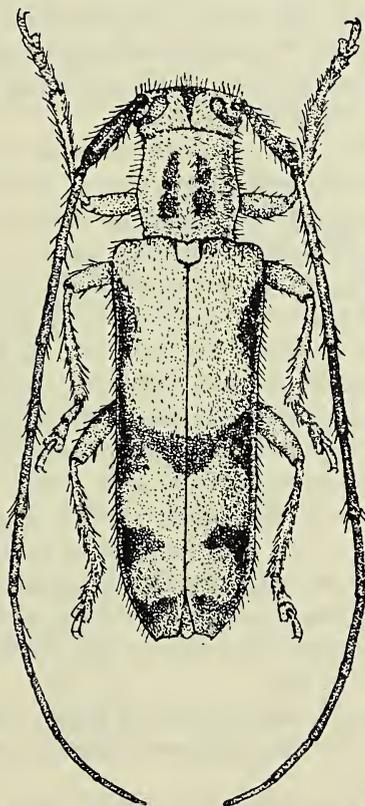


Fig. 45. *Menesia flavotecta* Heyd.

tum, frontally convex, with deep bold punctation, occiput with median longitudinal (narrow) groove, with dense yellow adherent pubescence masking punctation, with short bright erect hairs, with glabrous black spot between antennae, and antennal tubercles deflected. Eyes large, highly convex, sharply faceted. Lower ocular lobe twice (female) or 3.5 times (male) longer than gena. Antennae longer than body, extending beyond apex of elytra by 8th or 9th segment, 1st–7th segments on lower side with sparse bright bristles. First antennal segment gradually thickening toward apex, with compact punctation, shorter than 3rd, equal to 5th.

Pronotum parallel-sided, not longer than wide, disk uniformly convex, apically and basally with barely perceptible transverse groove, with recurved margin, dense compact adherent greenish-yellow pubescence and bright erect hairs, hind clivus with two black longitudinally extending spots separated from each other by yellow pilose interspace. Sometimes these spots extend forward almost up to anterior margin of pronotum or fuse into one black spot. Pronotum laterally without yellow pubescence, black. Pronotal shield parallel-sided, apically truncate or broadly rounded, medially with longitudinal groove, with compact adherent dense yellow pubescence.

Elytra parallel-sided, with rounded humeral tubercle, inner to it with barely perceptible, gently sloping depression, apically obliquely truncate, disk uniformly convex, with minute punctation and dense compact adherent greenish pubescence imparting common greenish-yellow background, laterally glabrous, posteromedially and in front of hind clivus with glabrous transverse black band (f. *typica*). In some individuals, these bands disappear and indistinct black specks remain in their place. Body ventrally on sides with dense, medially on abdomen and metasternum with sparse adherent yellowish pubescence. Abdominal sternite V in female thick, apically broadly rounded, in posterior third with transverse interception, in male mildly convex, apically slightly emarginate, here with dense bristles. Legs thin, with thin solitary adherent hairs. First segment of hind tarsi shorter than next two together. External genitalia of male distinguished from that of *M. sulphurata* (Geb.) by parameres not curved but straight on inner side. Body black. Antennae and legs bright yellow. First antennal segment black. Body length 8–11 mm.

Egg: White, elongate, tapering toward poles, narrowly rounded at poles. Chorion with very fine sculpture imparting matte tone. Length 1.6 mm, width 0.7 mm.

Larva (Fig. 46): Distinguished from the larva of *M. sulphurata* (Geb.) by clearly manifest and contrastingly distinct spinules on

locomotory ampullae and much denser hairs in anterior third of pronotum. Body white. Head half retracted into prothorax. Epistoma in anterior third rusty, with setigerous pores forming transverse row, in middle and posterior third bright yellowish, fusing laterally with temporo-parietal lobes, medially divided by longitudinal suture. Hypostoma parallel-sided, mildly convex, almost flat, rusty, in posterior half slightly whitened, in anterior third with four setigerous pores in transverse row. Temporo-parietal lobes at anterior margin with brownish-rust fringe, behind it with setiform hairs forming transverse row. Antennae whitish, thin, apices barely projecting from antennal sockets. Clypeus whitish, basally rusty, apically broadly rounded. Labrum transversely oval, markedly tapering toward base, laterally narrowly but apically broadly rounded, whitish, in anterior half with short bright bristles. Mandibles basally reddish-rust, apically blackened, obliquely truncate, with extended ventral and projecting dorsal denticle.

Pronotum slightly sloping toward head, anteriorly tapering, length half width, in anterior third with hairs forming transverse row on disk, laterally with dense transverse band, behind it lustrous, yellow. Pronotal shield mildly convex, laterally demarcated by short longitudinal grooves, with dense uniform (only basally with minute) spinules, at

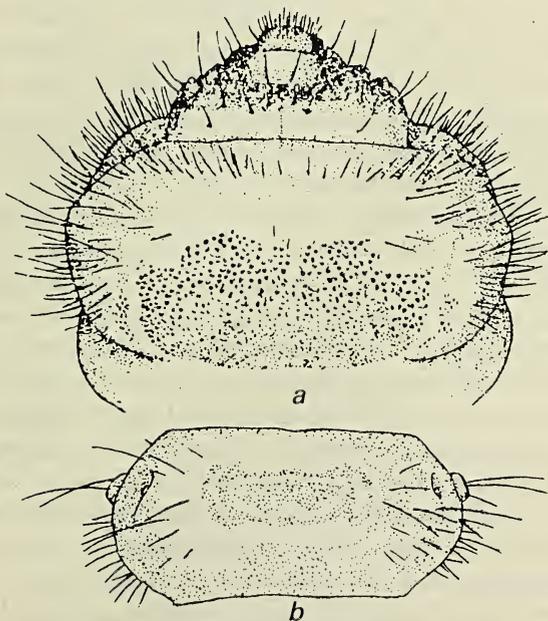


Fig. 46. Larva of *Menesia flavotecta* Heyd.

a — head and pronotum; b — abdominal tergite with dorsal locomotory ampulla.

83 anterior angles sloping, emarginate, here with transverse depressions, at anterior margin with short dispersed hairs, almost throughout surface with numerous whitish, longitudinally extended dots. Alar lobes basally with spinules forming here an isolated cluster, lateral to it with irregular rusty hairs. Mesonotum posteromedially with short hairs forming uniform transverse row, in anterior half with dense minute spinules forming transverse band. Metanotum on disk with minute spinules forming two transverse bands divided by whitish groove. Prothoracic presternum with uniform rusty hairs, laterally with large, longitudinally extending, glabrous yellowish spot. Eusternum in posterior half glabrous, coriaceous, in anterior half with rusty hairs. Basisternum with minute spinules forming transverse band expanding laterally in form of round mark. Meso- and metasterna on disk with distinctly projecting minute spinules.

Abdomen elongate, gradually tapering toward tip, laterally with thin bright hairs. Dorsal locomotory ampullae convex, with minute, distinctly projecting (visible under high magnification), uniform spinules forming uniform spinous field divided by two transverse grooves converging laterally and by two lateral excurved longitudinal grooves (in *M. sulphurata* (Gebl.) these grooves are not curved). Ventral locomotory ampullae on disk with minute spinules divided by transverse and two lateral longitudinal grooves diverging anteriorly. Spinous field in front of transverse groove twice larger than spinous field behind groove (in *M. sulphurata* (Gebl.) lateral spinous field barely larger or not larger than posterior field). Terminal segment of abdomen with long rusty hairs. Body length of late instar larvae 10–14 mm, width of head up to 2.0 mm.

Pupa (Fig. 47): Distinguished from the closely related species (*M. sulphurata* (Gebl.)) by less developed bristles frontally on head, presence of only one bristle laterally at anterior margin of sinciput, and other characters. Head roundly tapering anteriorly, frontally convex or slightly flat, with antennal tubercles slightly extending laterally, inner to them (posteriorly) with two adjacent bristles, anterolateral to them with two bristles in longitudinal row, at anterior margin in front of base of clypeus with one bristle on each side. Labrum hyaline, semitransparent, apically broadly rounded, without bristles. Antennae thin, in second half curved annularly, their apices adjoining sides of head.

Pronotum parallel-sided, basally with narrow transverse groove, with bent posterior angles, disk convex, lustrous, with acute spinules forming interlacing or uniform transverse row at anterior margin, small cluster anteromedially, second cluster medially, and interlacing row on hind clivus. Anterior row sometimes consists of individual solitary spinules. Mesonotum insignificantly convex, in posterior half transver-

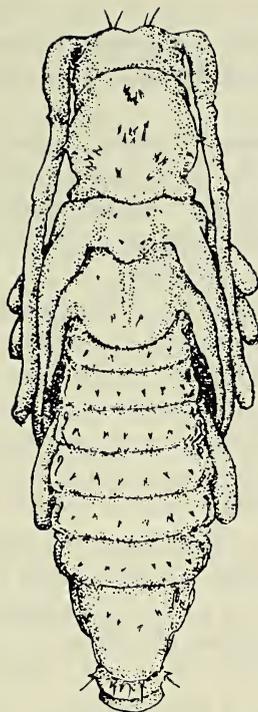


Fig. 47. Pupa of *Menesia flavotecta* Heyd.

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sely compressed, at posterior margin with raised, gently rounded shield, laterally at base of elytra with pair of diminutive spinules or without them, on shield with one or two lateral spinules. Metanotum posteriorly slightly rounded, moderately convex, medially with longitudinal groove, basally on sides of this groove with pair of barely perceptible spinules, at alar base with one spinule.

Abdomen in region of segment IV slightly expanded, tapering toward tip. Abdominal tergites at posterior margin with acute (on tergites I-III minute, on tergites IV-VI large) spinules forming uniform transverse row (six-eight spinules per tergite). Spinules on tergites I-V directed backward, on tergite VI erect or just slightly bent forward. Tergite VII convex, apically broadly rounded, with four-six acute spinules in recurved transverse row. Tergite VIII short, transverse, with barely perceptible solitary spinules. Tip of abdomen (in ventral view) bound by U-shaped hyaline ridge, at lower ends expanded, here with acute setigerous spinules. Valvifers of female small, hemispherical, slightly wide-set, with barely noticeable interspace. Body length 7-12 mm, width of abdomen 2.8 mm.

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Material: Collected from forests in Ussuri-Primor'e region (southern spurs of Sikhote-Alin', Ussuriisk sanctuary, Khasansk region). Adults 45, larvae 38, pupae 8 (males and females), larval exuviae with beetles from cells 14.

Distribution: Within limits of walnut (*Juglans manshurica*, *J. sieboldiana*) zone, almost from the Zeya River in the west to Pacific Ocean coasts, Amur and Ussuri-Primor'e regions, southern regions of Sakhalin, and Kunashir. Japan, possibly northeast China, Korean peninsula. Absent beyond the limits of walnut production.

Biology: Inhabits broad-leaved plantations. Vitally associated with walnut. Beetles appear in June and are found until August. They feed on green tissues of walnut leaves. The females oviposit under the thin outer strip of bark. In females caught in nature, 20 mature eggs were found in the ovaries, which serves as an index of general fecundity. They infest boughs or knots of wood 0.7–3.0 cm diameter. Larvae live under bark, make longitudinal sinuous galleries, and pack them with fine brownish fibrous frass. Galleries are not made on sapwood. Larvae of late instars drill into wood at a right angle or slightly obliquely to a depth of 8–14 mm, make a pupal cell longitudinal to the shoot, plug the entry hole with frass, and pupate. Pupae lie in cell with head toward the entry hole. Length of cell 12–16 mm, width up to 3.0 mm.

Pupation is completed in May and June. Young beetles appear in cells early June and are found almost up to end of this month. They remain in cells for about a week, then nibble a round (rarely oval) opening (2–3 mm diameter) on the wood surface, and emerge through it. Emergence of beetles from cells commences in first ten days of June and is completed in early July. The insects of this species are distinguished from those of *M. sulphurata* (Gehl.) by markedly higher weight indices. Thirty larvae before pupation weighed 9.0–49.2 mg (25.1 ± 1.9), pupae 8–43 mg (22.3 ± 1.7), beetles before emergence from cells 6.5–35.0 mg (17.8 ± 1.4).

We found *Menesia flavotecta* Heyd. only on Manchurian walnut. From larvae captured in nature, 38 beetles were raised. Larvae, pupae, and beetles (61 specimens) were also collected during forest inspections. The species damages thin boughs or knots of desiccated and growing trees. In one instance, we found two pupae, one beetle, and one larva on a shoot 33 cm long, 2.5 cm diameter.

3. *Menesia bipunctata* (Zoubk.)

Zoubkoff, 1829. *Bull. Soc. Nat., Moscou*, 1: 167 (*Saperda*); — *biguttata* Redtenbacher, 1842. *Quaedam Genera*, 26; — *trimaculata* Kugel, 1857. In Lentz: *Verz. Preuss. Käfer*, 145; — *ab. quadripustulata*

Mulsant, 1863. *Col. France, Longic.*, ed. 2: 343; — ab. *perrisi* Mulsant, 1856. *Ann. Soc. Linn. Lyon.*, 3: 158; Reitter, 1913. *Fauna Germ.*, 4: 65; Gusev and Rimskii-Korsakov, 1940. *Opredelitel' povrezhdenii*, 294; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 544; Demelt, 1966. *Die Tierwelt Deutsch. Ceramb.*, 2: 102.

Adult (Fig. 48): Characterized by white spots on apex of elytra, rusty bright color of legs, and black antennae. Body insignificantly elongate. Head barely wider than pronotum, around eyes or throughout surface of sinciput with white compact pubescence, frontally convex, 85 with minute punctation and erect brownish hairs. Eyes sharply faceted, deeply emarginate, large, highly convex; lower ocular lobe three (male) or two (female) times longer than gena. Antennae longer than body, extending beyond apex of elytra by 9th (male) or 10th (female) segment, with minute adherent hairs. First antennal segment with minute punctation and semierect hairs, distinctly shorter than 3rd but equal to 7th segment.

Pronotum slightly transverse (female) or almost not transverse, not wider than long (male), basally and at anterior margin with faint transverse flange, with minute punctation and blackish-brown erect hairs, medially with dense white pilose longitudinal band. Pronotal

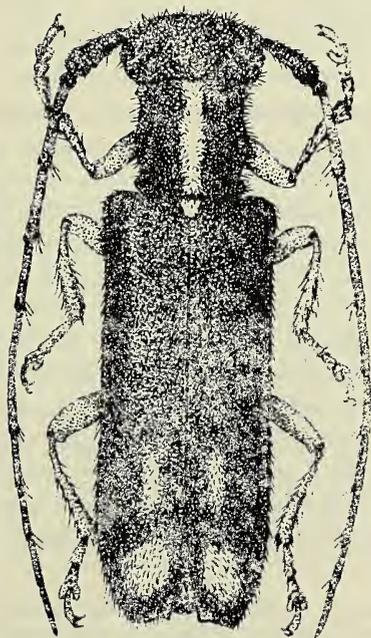


Fig. 48. *Menesia bipunctata* (Zoubk.).

shield oblong, slightly tapering posteriorly, apically truncate or broadly rounded, with longitudinal groove.

Elytra parallel-sided, apically transversely truncate, sometimes with acutely extended inner angle, basally with round humeral tubercle, disk along suture broadly compressed, with coarse dense, in posterior third evanescent punctation (punctures much larger laterally, interspaces distinctly smaller than punctures), throughout surface with semierect black hairs not forming continuous pubescence, on hind clivus with large dense white pilose spots, (f. typica). In some individuals, each elytron with two (ab. *quadripustulata* Muls.) or three white pilose spots, the one on hind clivus large, the others in longitudinal row on disk smaller. Body ventrally with dense white compact pubescence forming white, sharply projecting fringe on abdominal sternites I–IV and continuous white band on sides of thorax. Abdominal sternite V thick, highly convex, medially with longitudinal groove, apically broadly truncate (female) or mildly convex, without longitudinal groove, and apically broadly rounded (male). Legs comparatively short, with sparse rusty semiadherent hairs. First segment of hind tarsi not longer than next two together. Body, antennae, and elytra black. Legs bright rust. Body length 6–8 mm.

Egg: White, elongate, narrowly rounded at poles. Chorion matte, with fine sculpture. Length 1.3 mm, width 0.4 mm.

Larva (Fig. 49): Characterized by small body and sclerotization of basisternum (mainly laterally, not medially). Body white, moderately elongate. Head half retracted into prothorax. Epistoma mildly convex, divided longitudinally by median suture, in anterior third dark rust, here with setigerous pores in transverse row, in middle and posterior third bright yellowish, laterally fusing with temporo-parietal lobes in general background, frontal sutures faint. Hypostoma parallel-sided, mildly convex, at posterior angles much brighter, in anterior half with four whitish setigerous pores forming transverse row. Temporo-parietal lobes in anterior third dark rust, here with individual setiform hairs forming interlacing transverse row. Antennae conical, brownish, apically slightly whitish, barely projecting from antennal sockets. Clypeus trapezoid, with rounded anterior angles, whitish, basally rusty. Labrum transversely oval, highly tapering toward base, whitish, in anterior half with bright bristles. Mandibles black, basally reddish-rust, apically obliquely truncate, with extended ventral and barely projecting dorsal denticle.

Pronotum transverse, moderately sloping toward head, at anterior margin with whitish fringe, disk (in front of shield) bright rust, lustrous, medially with longitudinal whitish narrow mark, at anterior margin with

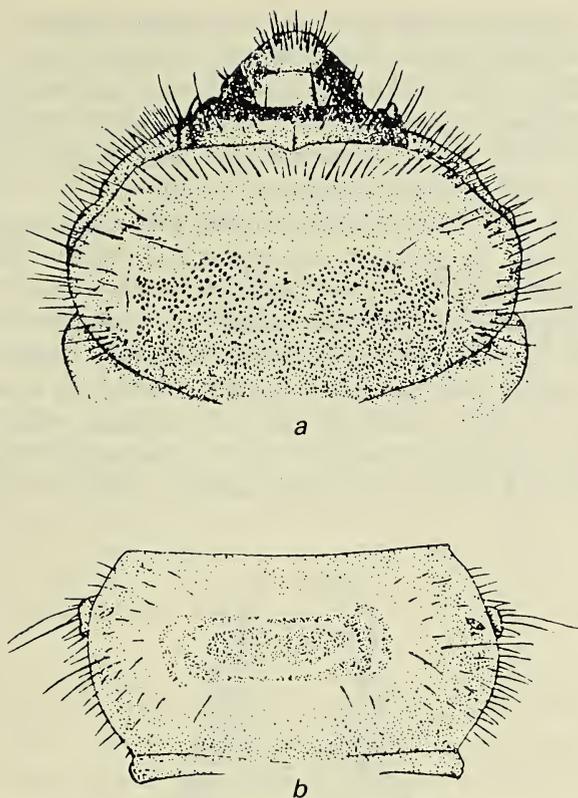


Fig. 49. Larva of *Menesia bipunctata* (Zoubk.).

a — head and pronotum; b — abdominal tergite with dorsal locomotory ampulla.

rusty hairs forming narrow transverse band, laterally with rusty dispersed hairs. Pronotal shield with uniform (dense only basally) specklike, distinctly minute spinules, laterally demarcated by short longitudinal grooves, at anterior angles gently emarginate, here with narrow transverse depressions, with more or less distinct whitish dots. Alar lobes (adjacent to longitudinal grooves) with specklike spinules, lateral to them with bright rusty hairs. Prothoracic presternum convex, with short rusty hairs, laterally with glabrous yellow, longitudinally extended, oval lustrous spot. Eusterium apically with short hairs, basally glabrous, coriaceous, without spinules. Basisternum with minute spinules forming transverse band expanded laterally and constricted toward middle or even interrupted here. Meso- and metasterna on disk with very minute spinules forming transverse sclerotized band divided by transverse whitish groove.

Abdomen parallel-sided or slightly tapering posteriorly from thorax. Dorsal locomotory ampullae moderately convex, with very minute

spinules, medially with common longitudinal groove, with two transverse whitish grooves uniting laterally, generally at an acute angle, and with short lateral excurved grooves. Ventral locomotory ampullae sclerotized, matte, in posterior half divided by transverse groove uniting laterally with short longitudinal fold. Body length of last instar larvae 10–12 mm, width of head up to 1.5 mm.

Pupa (Fig. 50): Characterized by small body, minute, barely perceptible spinules on pronotum and abdominal tergites. Body white, moderately elongate. Head short, frontally convex, medially with faint longitudinal groove, laterally inner to antennae with three–four bristles in uniform or interlacing longitudinal row, anteriorly at base of clypeus with four bristles (two each side). Antennae curved (on ventral side of body) annularly, their apices adjoining sides of head or their own base.

Pronotum transverse (female) or width not more than length (male), convex, laterally distinctly rounded, lustrous, basally with transverse

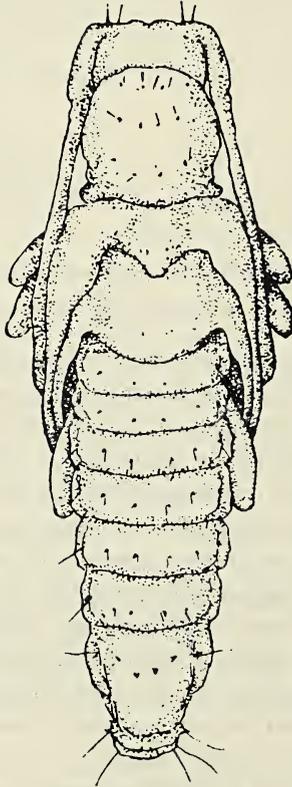


Fig. 50. Pupa of *Menesia bipunctata* (Zoubk.).

groove, with extended posterior angles, with minute solitary, randomly dispersed, in some individuals barely perceptible, setigerous spinules. Mesonotum lustrous, in posterior half transversely compressed, at posterior margin with extended, insignificantly raised, broadly rounded shield bearing one small spinule on each side. Metanotum mildly convex, lustrous, medially with longitudinal groove, at posterior margin rounded, in posterior half, closer to base, with solitary, barely perceptible spinules.

Abdomen parallel-sided, elongate, insignificantly tapering toward tip. Abdominal tergites convex, in posterior third with specklike spinules forming uniform transverse row. These spinules more distinct on tergite VI and barely perceptible on tergites I–III. Tergite VII convex, lustrous, posteriorly broadly rounded, posteromedially with four–six specklike spinules in recurved transverse row. Tergite VIII short, transverse, posteriorly broadly rounded, disk with four minute, barely noticeable spinules forming transverse row. Tip of abdomen (in ventral view) obtuse, bound by U-shaped ridge bearing three–four
87 bristles on each side. Valvifers of female very small, hemispherical, somewhat wide-set. Body length 6–11 mm, width of abdomen up to 2.0 mm.

Material: Collected in floodplain forests of Ural River. Adults 257, larvae 35, pupae 12, larval exuviae with beetles from cells 11.

Distribution: From Atlantic Ocean coasts to the southern Urals, from the central belt of the European part of the USSR to the Mediterranean, including France and Italy.

Biology: Inhabits biotopes of mixed and deciduous forest plantations. In floodplain forests it is ecologically associated mainly with willow. Flight of beetles commences in June and is concluded early August. Beetles feed on green tissues of leaves and bark of young shoots. After maturation of gonads, they begin to reproduce. Females oviposit under the outer surface of bark. They infest thin shoots of willow, aspen, and other deciduous species. Larvae live in bark, make irregular galleries, expanding at places up to 8.0 mm, and pack them with fine fibrous frass. On thin shoots the larvae penetrate under bark and there make galleries insignificantly impressed in wood. Impressions of galleries in wood have smooth edges. Larvae of late instars drill into wood up to a depth of 3.0 mm, make cells longitudinal to the shoot, plug the entry hole with fibrous frass, and pupate with head toward the entry hole. If the bark is removed, contours of entry holes plugged with frass are visible on the wood surface. Width of entry hole up to 2.0–2.5 mm. Length of cell 8–12 mm, width 2.5–4.0 mm.

Pupation commences in May and is concluded in second half of

June. Beetles emerge from pupae after 2.5–3.0 weeks. Under laboratory conditions at a temperature of 17.0–21.6°C (average 19.2°C), the pupal stage lasted for 17–18 days, but at 8.0–18.5°C (average 16.4°C) was prolonged up to 20 days (on average, 18.8). In the first instance, there were two and in the second, six pupae under observation. Developed beetles nibble a round flight opening (diameter up to 2.0 mm) on the shoot surface and exit the wood through it. Emergence of beetles from wood commences in June and is completed early July. Life cycle completed in one to two years.

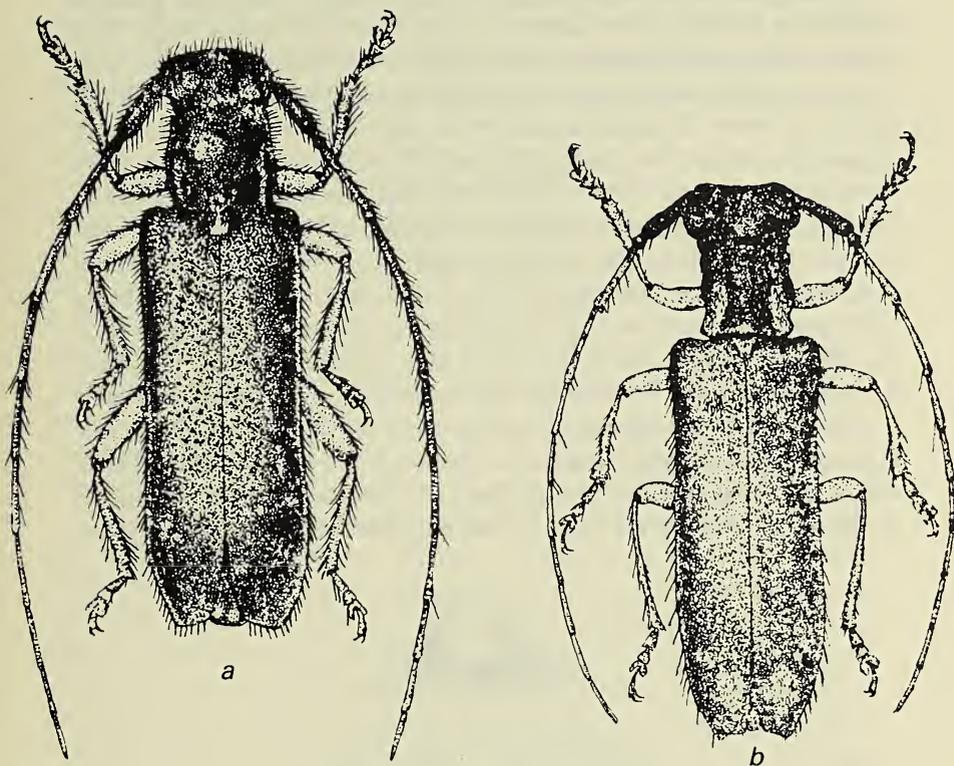
The dynamics of weight indices during metamorphosis is demonstrated with eight insects. For example, males (four) in the larval stage before pupation weighed 73.6 mg (100%), in the pupal stage 59.2 mg (80.4%), and as young beetles before emergence from cells 47.7 mg (64.8%). Females (four) weighed correspondingly 100.9 mg (100%), 74.8 mg (74.3%), and 66.7 mg (66.1%). Based on 31 insects (males and females), larvae before pupation weigh 7.0–35.5 mg (18.3 ± 1.2), pupae 6–28 mg (15.7 ± 1.0), beetles before emergence from cells 5.3–21.0 mg (12.6 ± 0.8).

Menesia bipunctata (Zoubk.) infests boughs or knots 0.7–4.2 cm diameter on drying and growing trees of willow and aspen. From larvae collected in the floodplain forests of the southern Urals, we raised 257 beetles—248 on willow and 9 on aspen. We did not find this species on other trees. Density of infestation was quite high. In one shoot of willow 41 cm long and up to 2.5 cm diameter, we found 36 beetles; in another willow shoot 36 cm long and 3.0 cm diameter, 21 beetles. *Acanthoderes clavipes* Schr. beetles also developed on these very shoots. According to reports in the literature, *M. bipunctata* (Zoubk.) damages shoots of buckthorn (*Rhamnus tatarica*, *R. frangula*) and walnut.

4. *Menesia albifrons* Heyd.

Heyden, 1886. *Deutsche Entom. Zeitschr.*, 30: 276; Aurivillius, 1922. In Junk: *Coleopt. Catal.*, 73: 490; Breuning, 1966. *Catalog. Lamiair. (Col., Ceramb.)*, 9: 726.

Adult (Fig. 51): In general habits, similar to *Menesia bipunctata* (Zoubk.), but well distinguished from it by dense white pubescence throughout sinciput, white pilose bands on sides of pronotum, more elongate elytra, and other characters. Body elongate. Head notably broader than pronotum, with minute dense punctation, frontally convex, medially with faint longitudinal groove, with dense white pubescence throughout surface of sinciput or on its anterior part and around eyes, and erect bright hairs. Eyes highly convex, almost hemispherical, sharp-



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Fig. 51. *Menesia albifrons* Heyd.a — forma typica; b — ab. *macularis* Tsch.

ly faceted, lower ocular lobes half (male) or two-thirds (female) size of genae. Antennae with short adherent, not dense brownish hairs, on inner side with numerous bright setae, extending beyond apex of elytra by 10th (female) or 9th (male) segment. First antennal segment comparatively thin, elongate, equal to 4th, slightly shorter than 3rd segment.

Pronotum parallel-sided, slightly oblong (male) or slightly transverse (female), disk uniformly convex, basally with narrow indistinct transverse groove, with recurved posterior margin, with uniform deep dense punctation and long erect bright hairs, basally in front of shield with white pilose, sometimes longitudinally elongate spot, laterally with dense white pilose longitudinal band. This band extends from base to anterior margin (in posterior half often more expanded) or remains in form of short dots at base, very rarely totally absent. Pronotal shield parallel-sided or slightly tapering posteriorly, apically directly truncate or gently rounded, with dense adherent white hairs.

Elytra parallel-sided, elongate, 3.5 times longer than total width at humeri (in *M. bipunctata* (Zoubk.) elytra only three times longer than total width), apically obtuse, with straight or rounded inner angles, disk not compressed, with deep bold punctuation and gray semierect hairs (f. *typica*), on hind clivus sometimes with pair of white pilose spots (ab. *macularis* nov.). Body ventrally with white, closely adherent hairs forming longitudinal band on sides of thorax and white fringe expanding laterally on posterior margin of abdominal sternites I–IV. Abdominal sternite V in male insignificantly convex, apically rounded, in female highly convex, in posterior third with transverse flange, medially with longitudinal groove, apically truncate or broadly emarginate. Legs thin, femora slightly thickened, hind tarsi almost half size of tibiae. Body, antennae, and elytra black, legs bright rust. Body length 6–9 mm.

Larva (Fig. 52): Characterized by small size, dense specklike spinules on pronotal shield, and sclerotization of locomotory ampullae of abdomen. Distinguished from the larva of *Menesia bipunctata* (Zoubk.) by broad sclerotized band on basisternum and other characters. Head

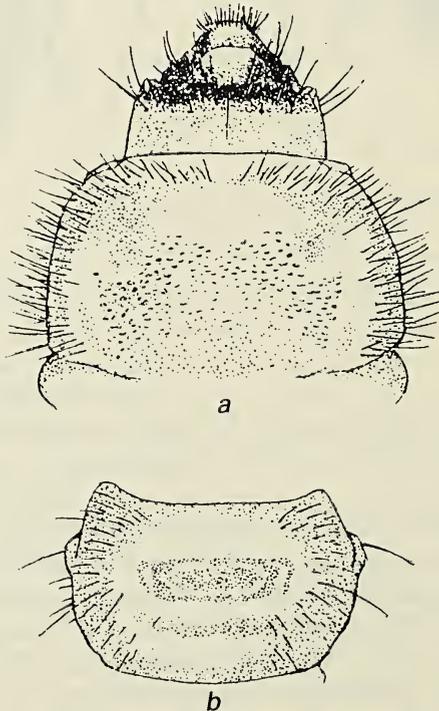


Fig. 52. Larva of *Menesia albifrons* Heyd.

a — head and pronotum; b — abdominal tergite with dorsal locomotory ampulla.

parallel-sided, half retracted into prothorax. Epistoma flat, whitish, and hence clearly demarcated from temporo-parietal lobes, medially divided by faint longitudinal (median) suture, at anterior margin with broad rusty-brown fringe, here with eight setigerous pores in transverse row. Hypostoma parallel-sided, broadly emarginate posteriorly, with straight anterior angles, distinctly convex, rusty, in anterior half with four distinct or faint whitish setigerous pores in transverse row. Temporo-parietal lobes bright rust, at anterior margin with narrow brownish fringe, behind it with solitary bright rust hairs. Antennae whitish, often with brownish tinge, short, barely projecting from antennal sockets. Clypeus broad, mildly tapering anteriorly, with rounded anterior angles, whitish. Labrum tapering toward base, apically broadly rounded, whitish, in anterior half with bright short bristles. Mandibles black, 90 basally reddish-rust, apically truncate, with sharply extended ventral and projecting dorsal denticle, on inner side with ridge extending from ventral denticle toward middle of dorsal margin.

Pronotum slightly tapering anteriorly, insignificantly sloping, disk and laterally yellowish-rust, lustrous, at anterior margin with whitish fringe, behind it with somewhat rusty hairs forming narrow transverse band interrupted medially. Pronotal shield moderately convex, with dense specklike, distinctly projecting spinules, with sparse small, slightly glossy, whitish dots, laterally demarcated by short longitudinal grooves, at anterior angles with gentle notch having transverse impression. Alar lobes near longitudinal grooves with minute spinules forming single longitudinally extended cluster, lateral to which with sparse rusty hairs. Mesonotum in anterior half, metanotum on disk sclerotized, with very minute spinules. Prothoracic presternum with very minute rusty hairs, laterally with glabrous, longitudinally extended yellowish spot. Eusternum glabrous, lustrous, coriaceous. Basisternum in anterior half with minute spinules forming transverse sclerotized band not tapering toward middle. Meso- and metasterna on disk sclerotized, with minute dense spinules.

Abdomen elongate, parallel-sided, laterally with short bright hairs. Dorsal locomotory ampullae moderately convex, with very minute dense spinules, divided by two transverse faint grooves uniting laterally. Ventral locomotory ampullae sclerotized, in posterior half divided by transverse groove. Body length of late instar larvae 12–17 mm, width of head up to 1.5 mm.

Pupa (Fig. 53): Distinguished from the pupa of *Menesia bipunctata* 91 (Zoubk.) by large spinules on abdominal tergites. Head distinctly tapering anteriorly from base of antennae, frontally convex, medially with narrow longitudinal dotted groove, on sides with antennal tubercles

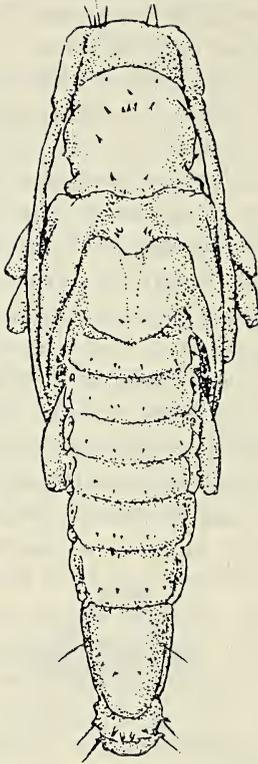


Fig. 53. Pupa of *Menesia albifrons* Heyd.

90

extended laterally, inner to them with three–four bristles, at anterior margin with four bristles in transverse row (two bristles on each side). Labrum convex, apically broadly rounded, lustrous, semitransparent. Mandibles on outer side without bristles. Antennae long, thin, in second half curved annularly, their apices adjoining their own base.

Pronotum parallel-sided, disk uniformly convex, basally with narrow faint transverse groove, with slightly recurved posterior angles, with acute minute or large solitary, randomly dispersed spinules. Mesonotum lustrous, medially with transverse depression, posteriorly with raised, broadly rounded shield bearing pair of adjacent lateral spinules. Metanotum oblong, lustrous, insignificantly convex, medially with broad transverse flange, at posterior margin transversely truncate, basally with pair of adjacent paramedial spinules.

Abdomen gradually tapering toward tip. Abdominal tergites uniformly convex, at posterior margin more raised, here with acute recurved (tergites I–V) or directly projecting (tergite VI) spinules. Tergite

VII convex, elongate, apically rounded, posteromedially with small (male) or large (female) acute spinules forming transverse recurved row. Tergite VIII convex, transverse, broadly rounded posteriorly, in middle with spinules forming transverse row. Tip of abdomen (in ventral view) obtuse, laterally bound by ridge bearing two–three setigerous spinules on each side. Valvifers of female hemi-spherical, very small, slightly wide-set, with small interspace. Body length 8–10 mm, width of abdomen up to 1.8 mm.

Material: Collected in the Ussuri-Primor'e region and Altai. Adults 24, larvae 48, pupae 2 (male and female), larval exuviae with beetles from cells 10.

Distribution: Ussuri-Primor'e region: Ussuriisk sanctuary, Gorno-Taezhnaya station, Kondratenovka, Amur region, and Altai (Lake Teletskoe).

Inhabits biotopes of broad-leaved and mixed forests. Vitally associated with manchu stripe maple, apricot, Amur chokecherry, and other deciduous plants. Beetles fly from mid-June to August. They infest boughs 1.4–6.6 cm diameter on drying and growing trees. Larvae live in or under bark, make sinuous, sometimes squarish galleries not impressed in wood, and pack them with fine fibrous frass. In one instance, the total area of a gallery made by a larva under bark was 14 cm². Larvae of last instar drill into wood, leaving an entry hole on the surface reaching up to 3.0 mm in width. Pupal cell made in upper layer of wood longitudinal to the shoot. Entry hole plugged with fibrous frass. Length of cell 10–15 mm, width 3–5 mm. Sometimes the cell is made under bark, in which case it is deeply impressed in wood and plugged on sides with fibrous frass. Larvae pupate in cell with head toward entry hole.

Pupation commences in May and is completed in second half of June. Under natural conditions, the pupal stage lasts for not less than two–three weeks. Under laboratory conditions at a temperature of 20°C, a pupa formed on March 17th and the beetle emerged on March 29th. Emergence of beetles from pupae commences during first ten days of
92 June and is concluded early July. Developed beetles nibble a round flight opening (1.5–2.0 mm diameter) on the shoot surface and exit the cell through it. They require supplementary feeding and remain on host trees. They do not visit flowers and feed on bark of young shoots and tissues of green leaves. During metamorphosis the insects lose considerable weight. For example, before pupation a larva weighed 21.1 mg (100%), the pupa formed from it 19.2 mg (91%), and the beetle before emergence from cell 11.2 mg (52.1%). Based on 13 specimens, larvae before pupation weigh 10.7–28.0 mg (17.1 ± 1.1), pupae 9–25 mg (15.3

± 1.1), young beetles before emergence from cells 7—21 mg (11.9 ± 0.9).

Menesia albifrons Heyd. was found by us on several woody species of plants. From larvae collected in the forest, 23 beetles were raised—9 on manchu stripe maple (*Acer tegmentosum*), 6 apricot, 4 Amur chokecherry, 1 each on plum (*Prunus* sp.), pear (*Pyrus ussuriensis*), elm, and alder. Sometimes *Monochamus guttatus* Bless. and *Rhopaloscelis bifasciatus* Kr. also coinfect the same trees as this species.

6. Genus *Paramenesia* Breun.

Breuning, 1952. *Entom. Arbeit. aus dem Museum*. Bd. 3: 139; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 155.

Adult: In general habits, close to the genus *Menesia* Muls. Well distinguished from it by location of yellow pilose spots and lateral longitudinal bands on elytra.

Larva: Characterized by minute dense sclerotized spinules at anterior margin of pronotum and on alar lobes imparting matte tone. Pronotal shield at anterior angles gently incised. Dorsal locomotory ampullae with minute uniform spinules and U-shaped folds with their ends facing median line.

Pupa: Body moderately elongate. Head with long bristles frontally. Labrum with four, mandibles two bristles. Pronotum and abdominal tergites with setigerous spinules. Femora on outer side without apical bristles.

In northern Asia, one species of the genus *Paramenesia* is found, which inhabits the southern Kuril' islands (Kunashir) and Japan.

Type species: *Paraglenea theaphia* Bates, 1884.

1. *Paramenesia theaphia* (Bat.)

Bates, 1884. *Journ. Linn. Soc. Lond., Zool.*, 18: 257–258 (*Paraglenea*); Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 72 (214); Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 155.

Adult (Fig. 54): Readily recognized by pilose spot on dorsal side of body and bright yellow color of legs. Body moderately elongate, ridgelike. Head short, barely broader than pronotum, antennal tubercles insignificantly extended laterally, with deep irregular punctation, dense compact pubescence and dense erect dark brown hairs, on sinciput and at posterior margin, sometimes in middle of sinciput, without adherent pubescence. Frons broad, mildly convex or almost flat. Eyes sharply faceted, more (male) or less (female) convex. Lower ocular lobes 1.5 times longer (male) or almost not longer (female) than genae. Antennae

thin, longer than body, extending beyond apex of elytra by 9th–10th segment, with minute gray adherent hairs, on inner side of 1st–7th segments with bright setae. Fourth antennal segment shorter than 3rd, but slightly longer than 1st.

93 Pronotum parallel-sided, not longer than wide, basally with narrow transverse, barely perceptible groove, with curved posterior margin, disk convex, with minute punctation and erect, blackish-brown or bright hairs, with dense yellow compact adherent pubescence forming broad longitudinal band laterally on disk and small spotlet in front of shield. Longitudinal pilose bands often have a medial angular inward projection. Pronotal shield flat, insignificantly tapering posteriorly, apically broadly rounded, with dense compact adherent yellow pubescence.

Elytra parallel-sided, basally with straight humeri, individually broadly rounded apically, disk uniformly convex, with small irregular punctation, short erect brownish hairs and compact adherent yellow pubescence forming characteristic pattern of spots and longitudinal bands. One round or angular spot laterally at base of shield, second

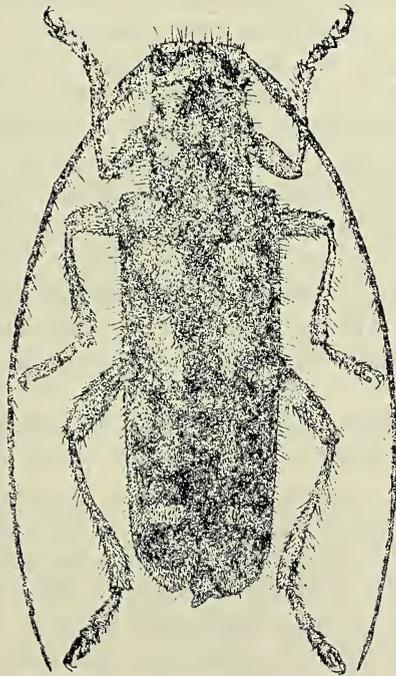


Fig. 54. *Paramenesia theaphia* (Bat.).

triangular or obliquely elongate spot before middle third of elytron, third spot obliquely elongate anteromedially, fourth bandlike spot situated obliquely in front of posterior third of elytron, and fifth small round spotlet on sides at level of anterior margin of fourth spot. Peripheral short band occurs at base below humeral tubercle. Humeral band extends from humeral tubercle to hind clivus, here bends inward at an acute angle and forms transverse band not reaching suture. Apical fringe passes over to narrow peripheral band on sides. Legs comparatively short, midtibiae on outer margin with faint distal notch. Hind tarsi almost half size of tibiae, 1st segment not longer than next two together. Body ventrally with dense adherent gray pubescence, with dense (male) or sparse (female) bright erect hairs. Abdominal sternite V apically truncate, medially angularly expanded (male) or uniformly tapering, or medially not expanded, with longitudinal groove and apically truncate (female). Body, elytra and antennae black. Legs bright rust. Adherent pubescence on head and dorsally on body yellow, rarely gray. Body length 7–10 mm.

Larva (Fig. 55): Body white, elongate. Head parallel-sided, half or less retracted into prothorax. Epistoma mildly convex, in anterior half dark rust, in posterior half bright rust, in anterior third with long and short setiform hairs forming transverse recurved row, medially divided by longitudinal suture, laterally demarcated by faint frontal sutures. Hypostoma in length one-third width, rusty, mildly convex, almost flat, parallel-sided, insignificantly emarginate posteriorly, with rounded anterior angles, in anterior half with three–four setiform hairs forming transverse row. Temporo-parietal lobes bright rust, in anterior half with coarse setiform hairs forming two transverse rows. Antennae whitish, their apices projecting from antennal sockets. Clypeus trapezoid, whitish, semitransparent. Labrum slightly tapering toward base, apically broadly rounded, whitish, in anterior half with short bright bristles. Mandibles black, basally red, apically steeply truncate, with projecting dorsal denticle.

94 Pronotum 2.5 times wider than long, at anterior margin with matte sclerotized fringe covered with very minute dense spinules, behind it with sparse wide-set, laterally long, medially short hairs forming transverse row, disk and laterally lustrous, rusty, in front of shield with short hairs forming interlacing transverse row. Pronotal shield mildly convex, with moderately large, transversely extended, basally minute spinules, laterally demarcated by short longitudinal grooves, at anterior angles gently and insignificantly emarginate, here with transverse notch. Alar lobes sclerotized near longitudinal groove, with dense minute spinules forming longitudinal band. Mesonotum in anterior half with dense, very

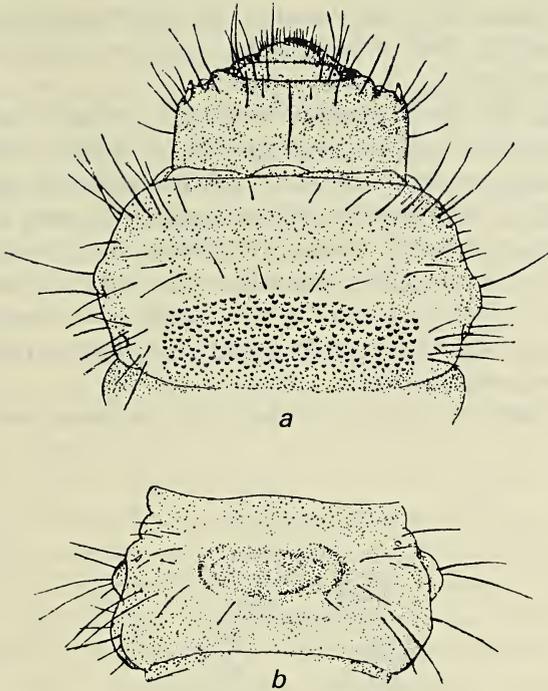


Fig. 55. Larva of *Paramenesia theaphia* (Bat.).

a — head and pronotum; b — abdominal tergite with dorsal locomotory ampulla.

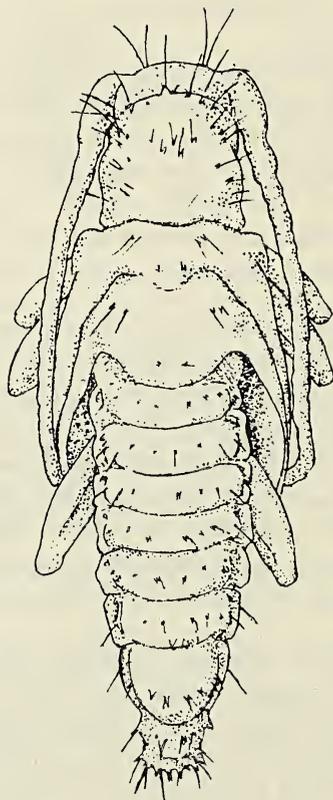
minute spinules imparting matte tone. Metanotum with very minute spinules forming broad transverse field extending from hind clivus to anterior margin, disk divided by transverse whitish groove, foreclivus with lustrous transverse interspace. Prothoracic presternum convex, with irregular rusty, not very dense hairs. Eusternum glabrous, coriaceous, without spinules. Basisternum in anterior half with dense, very minute spinules forming transverse rusty band tapering gradually toward middle or here even interrupted. Meso- and metasterna on disk with minute spinules, in posterior half divided by whitish transverse groove.

Abdomen moderately elongate, gradually tapering posteriorly, laterally with sparse irregular bright rust hairs. Dorsal locomotory ampullae convex, with minute dense uniform specklike spinules, medially divided by common deep longitudinal groove, paramedially by two excurved grooves; as a result, ampulla consists of two folds with their ends projecting toward median line. Ventral locomotory ampullae throughout with minute specklike spinules forming extensive field

divided in posterior half by transverse groove uniting laterally with short longitudinal grooves. Spinous field behind groove twice narrower than the one in front. Body length of late instar larvae 14–16 mm, width of head up to 1.5 mm.

Pupa (Fig. 56): Body moderately elongate, white. Head tapering anteriorly, frontally between antennae flat or slightly convex, with barely projecting antennal tubercles, sinciput laterally with pair of adjacent bristles, frons laterally with two pairs of bristles in irregular longitudinal row, anteriorly at base of clypeus with six bristles forming transverse row. Labrum thick, lustrous, apically narrowly rounded, disk with four bristles forming transverse row. Mandibles on outer side with pair of rusty bristles. Antennae in second half bent annularly, their apices adjoining sides of head.

Pronotum slightly transverse, disk convex, lustrous, basally and in



anterior third with distinct gentle transverse grooves, with acute setigerous spinules forming transverse rows at anterior margin and medially. Posterior angles of pronotum faintly curved. Mesonotum convex, laterally compressed, at posterior margin with raised, broadly rounded shield, at anterior angles with pair of minute rusty setigerous spinules, laterally on shield at posterior margin with a small spinule. Metanotum moderately convex, lustrous, with median longitudinal groove, at posterior margin broadly (sometimes slightly angularly) rounded, at anterior angles with pair of minute adjacent setigerous spinules, basally along sides of longitudinal groove with very minute acute spinule.

Abdomen elongate, gradually somewhat tapering posteriorly. Tergites I–VI convex, medially with common longitudinal groove, posteromedially with acute setigerous spinules (on disk four and one on each side) forming transverse, slightly recurved row. Tergite VII convex, lustrous, apically broadly rounded, posteromedially with six large acute setigerous spinules on coriaceous extended base forming transverse recurved row. Tergite VIII transverse, convex, hyaline, with six setigerous spinules in transverse row. Tip of abdomen (in ventral view) obtuse, laterally bound by broad U-shaped ridge set with eight large acute setigerous spinules forming semicircle. Valvifers of female small, hemispherical, slightly wide-set, lustrous. Femora on outer side without apical bristles. Body length 9–11 mm, width of abdomen about 2.0 mm.

Material: Collected from forests on Kunashir Island. Adults 14, larvae 16, pupae 11 (males and females), larval exuviae with beetles from cells 3.

Distribution: Kunashir (Alekhino). Japan (Hokkaido, Honshu, Shikoku).

Biology: Infests broad-leaved forests of Pacific Ocean islands. According to our observations on Kunashir, ecologically associated with *Kalopanax septemlobum*. Beetles fly from mid-July to September and are maximum in last ten days of July. They feed on green tissues of leaves. In gardens, they nibble leaf-veins and petioles of *Kalopanax septemlobum*, leaving traces of damaged tissues in the form of a narrow band.

Larvae live under bark of shoots 0.7–3.2 cm diameter, make longitudinal, often sinuous galleries, pack them with fine fibrous frass consisting of bark. Galleries are not impressed on sapwood. Larvae of last instar bore into wood, make a cell in the upper layer longitudinal to the shoot, and plug the entry hole with coarse fibrous frass. Very rarely, cells are made under bark. Width of gallery under bark 5–10 mm. Width of entry hole up to 3.0 mm. Length of pupal cell 11–15

mm, width 3.5–5.0 mm. Larvae pupate in cells with head toward the entry hole. Pupation commences in second half of June and is completed early August. We found one pupa on August 13th in the forest on Kunashir Island. Pupae complete development in more than two weeks. In one instance, with the temperature ranging from 12°C in the morning to 26°C later in the day (average $17.7 \pm 0.5^\circ\text{C}$), beetles emerged 16 days after pupation. Emergence of beetles from pupae commences in first half of July and is concluded in second half of August. Beetles remain in cells up to seven days, then nibble a round or slightly oval opening (2–3 mm diameter) on the shoot surface and emerge from wood through it. Generation—two-year cycle. Based on 14 specimens, larvae before pupation weigh 17–35 mg (26.4 ± 1.8), pupae 15–30 mg (23.2 ± 1.4), young beetles in cells 12–28 mg (19.2 ± 1.4). In one instance, a larva before pupation weighed 35 mg (100%), the pupa developed from it 30 mg (85.7%), and the beetle before escape from wood 28 mg (80%).

Paramenesia theaphia (Bat.) infests boughs of thick-stemmed drying and growing trees of *Kalopanax septemlobum* and is generally restricted to the upper tier of the canopy. We did not find it on other tree species. According to reports by Japanese workers (Kojima and Okabe, 1960), it damages lime (*Tilia japonica*) and *Kalopanax septemlobum*.

7. Genus *Eumecocera* Sols.

Solsky, 1871. *Horae Soc. Ent. Ross.*, 7: 391; Ganglbauer, 1884. *Best.-Tab.*, 8: 151; Aurivillius, 1923. In Junk: *Coleopt. Catal.*, 73: 540; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 195; Gressit, 1951. *Longic. Beetles of China*, 2: 608; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1:163.

Adult: Characterized by elongate body and more (*E. impustulata* (Motsch.)) or less (*E. callosicollis* (Breun.)) dense pubescence. Head short, markedly broader than pronotum. Eyes highly convex; lower ocular lobes twice (male) or barely (female) longer than genae. Antennae extending beyond apex of elytra by 9th–10th segment. Elytra elongate, with uniform punctation, angularly incised toward apex, individually narrowly rounded apically. Legs thin, long. Claws basally segmented (with spinule).

Larva: Body white, elongate. Pronotum at anterior margin with sparse bristles forming transverse row (*E. callosicollis* (Breun.)) or with dense bristles forming broad transverse lateral band (*E. impustulata* (Motsch.)). Pronotal shield with large, transversely extended spinules,

at anterior angles with deep transverse notch. Eusternum glabrous, coriaceous, without spinules. Basisternum in anterior half with spinules in one–two transverse rows. Locomotory ampullae with comparatively sparse acute spinules.

Pupa: Characterized by elongate body and long bristles frontally on head forming lateral longitudinal incurved row. Labrum and mandibles with bristles (*E. impustulata* (Motsch.)) or without them (*E. callosicollis* (Breun.)). Pronotum with long thin bristles on sclerotized base. Abdominal tergites at posterior margin with acute setigerous spinules forming transverse row. Femora on outer side with pair of adjacent apical bristles or setigerous spinules.

In the fauna of northern Asia, the genus *Eumecocera* Sols. includes two species that are close in morphological characters of larvae and pupae as well as in ecological characteristics. Both species are ecologically associated with deciduous woody plants. Larvae live under bark 97 and make galleries not impressed on sapwood. They mainly infest desiccated trees.

Type species: Saperda impustulata Motschulskyi, 1860.

KEY TO SPECIES

Adults

- 1 (2). Head and pronotum covered with compact adherent scaly grayish-green pubescence. From Altai, Ob' to Pacific Ocean coasts. 1. *E. impustulata* (Motsch.)
- 2 (1). Head and pronotum covered with simple nonscaly grayish pubescence. Ussuri-Primor'e region, northeast China
. 2. *E. callosicollis* (Breun.)

Larvae

- 1 (2). Pronotum at anterior margin on disk with sparse, laterally with dense hairs forming transverse band. On many deciduous plants. 1. *E. impustulata* (Motsch.)
- 2 (1). Pronotum at anterior margin on disk and laterally with sparse hairs forming transverse row. On lime and manchu stripe maple. 2. *E. callosicollis* (Breun.)

Pupae

- 1 (2). Labrum with four bristles in transverse row; mandibles with two bristles on outer side. 1. *E. impustulata* (Motsch.)

- 2 (1). Labrum and mandibles on outer side without bristles.
 2. *E. callosicollis* (Breun.)

1. *Eumecocera impustulata* (Motsch.)

Motschulskyi, 1860. *Schrenk's Reisen, Amurl., 2. Coleopt., 151* (*Saperda*); Solsky, 1871. *Horae Soc. Ent. Ross., 7: 392*; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny, 195*; Gressitt, 1951. *Longic. Beetles of China, 2: 608*; Kojima and Hayashi, 1969. *Insects' Life in Japan, 1: 163*; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri, 5: 46-48*; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovykh lesov Sibiri, 195-199*.

Adult (Fig. 57): Characterized by compact adherent scaly pubescence. Head insignificantly broader than pronotum, with compact adherent dense scaly grayish-green pubescence and bright setiform erect hairs, frontally slightly convex, medially with faint narrow longitudinal groove, with extended antennal tubercles and projecting temples. Eyes deeply emarginate, sharply faceted, moderately (female) or highly (male) convex. Lower ocular lobe twice (male) or barely (female) longer than gena. Antennae thin, longer than body, extending beyond apex of elytra by 9th (male) or 11th segment, with short adherent hairs, on inner side with sparse setae. First antennal segment thickening toward apex, notably shorter than 3rd, equal to 5th or slightly longer than it.

Pronotum slightly oblong (male) or not longer than wide (female), disk uniformly convex, basally with narrow, in anterior third with gentle, barely visible, transverse groove, and slightly extended posterior margin, with grayish-green adherent scaly pubescence and long bright erect hairs, laterally with one, on disk with two broad longitudinal
 98 black bands, their interspace generally narrow, sometimes triangularly dilated in middle, or medially interrupted, or markedly reduced anteriorly. Pronotal shield slightly oblong, posteriorly broadly rounded, with compact adherent greenish pubescence.

Elytra parallel-sided, subapically emarginate, apically angularly rounded, with barely projecting humeral tubercle, with dense compact adherent greenish pubescence, throughout surface with erect setiform bright brownish hairs. Legs thin, with adherent greenish pubescence and dense erect setiform hairs. Hind tarsi notably shorter than tibiae, their 1st segment longer than next two together. Body ventrally with dense adherent grayish-green pubescence and long erect hairs. Abdominal sternite V distinctly elongate, apically broadly truncate (female) or slightly elongate and apically rounded (male). Body, antennae, and legs black. Adherent pubescence grayish-green. Body length 9-14 mm.

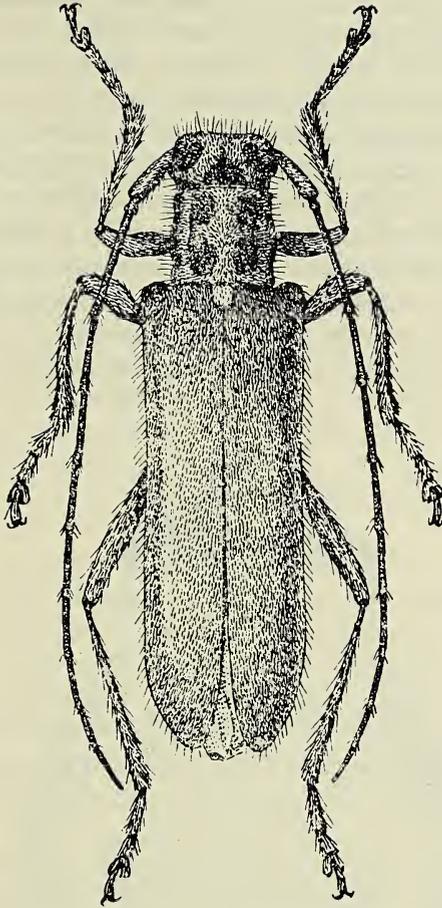


Fig. 57. *Eumecocera impustulata* (Motsch.).

Egg: White, matte, elongate, obtusely rounded at poles. Chorion with distinct alveoli with silvery base; interspaces slightly smaller than alveoli per se. Length 1.4 mm, width 0.4 mm.

Larva (Fig. 58): Similar to the larvae of *Eutetrappa metallescens* (Motsch.) and *Saperda populnea* (L.). Well distinguished from them by absence of spinules at posterior margin of eusternum and large uniform spinules on locomotory ampullae of abdomen. Body white. Head parallel-sided, half retracted into prothorax. Epistoma mildly convex, in anterior third rusty, medially divided by longitudinal suture, laterally fusing with temporo-parietal lobes, frontal sutures lacking. Hypostoma markedly convex, parallel-sided or slightly tapering

posteriorly, with straight anterior angles, length one-fourth width, at posterior margin broadly emarginate. Temporo-parietal lobes lustrous, in anterior third rusty, here with two lateral bristles, at anterior angle of hypostoma with one bristle. Antennae whitish, barely projecting from antennal sockets. Ocelli ampullaceous, more or less whitish, sometimes with black pigmented spotlet, situated below antennae near periantennal bristle. Clypeus very large, whitish, basally rusty. Labrum narrower than clypeus, bright rust, laterally and apically rounded, here with short rusty bristles, medially with much longer bristles forming transverse row. Mandibles black, basally rusty-red, on outer side with pair of transversely set bristles, apically obliquely truncate.

99 Pronotum twice wider than long, moderately sloping toward head, in anterior half bright yellow, medially with longitudinal whitish spot,

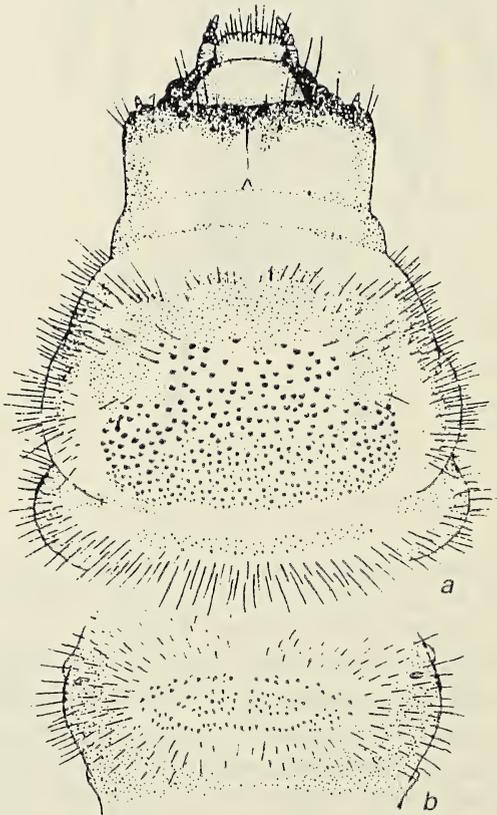


Fig. 58. Larva of *Eumecocera impustulata* (Motsch.).

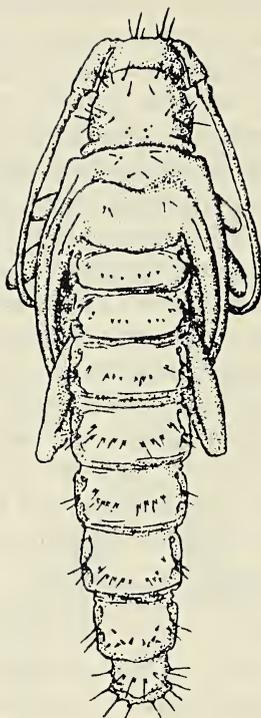
a — head and pronotum; b — abdominal tergite with dorsal locomotory ampulla.

in anterior third with long rusty setiform hairs forming on disk an interlacing transverse row passing over to compact transverse band laterally. Pronotal shield in anterior half with large, in posterior third with minute, transversely extended spinules which are rounded terminally and recurved, at anterior angles with saccular notch having an oblique depression, laterally demarcated by short longitudinal grooves, at anterior margin with solitary setiform hairs. Alar lobes with solitary spinules or without them, with numerous hairs. Mesonotum in anterior half with specklike spinules forming transverse band, behind it with hairs forming compact transverse row. Metanotum on disk with minute spinules forming two–three interlacing transverse rows, in posterior half with long hairs forming transverse row. Prothoracic presternum convex, with irregular rusty hairs, laterally with longitudinal glabrous lustrous rusty spot. Eusternum glabrous, coriaceous, without spinules. Basisternum in anterior half with spinules in one or two transverse rows, laterally with dense hairs. Meso- and metasterna with acute spinules forming transverse band divided medially by transverse groove.

Abdomen elongate, laterally with long dense hairs. Dorsal locomotory ampullae moderately convex, medially divided by common longitudinal troughlike groove and by two transverse grooves converging laterally, with large acute spinules forming between transverse grooves up to three, outer to them (in front and behind) one transverse row. Ventral locomotory ampullae divided by transverse groove having one row of acute spinules behind and up to two–three transverse rows in front. Body length of last instar larvae 18–20 mm, width of head 1.8 mm.

100 *Pupa* (Fig. 59): Body elongate, white. Head short, roundly tapering anteriorly, frontally in region of sinciput convex, on sinciput inward to antennae on each side with pair of adjacent bristles, laterally on sinciput with four–six long bristles forming longitudinal excurved row, anteriorly at base of clypeus with two pairs of adjacent lateral bristles. Labrum lustrous, apically broadly rounded, in anterior half with four bristles in transverse row. Mandibles lateromedially with pair of adjacent bristles in transverse row. Antennae thin, flexed toward sides of body, in second half bent almost annularly, their apices adjoining sides of head.

Pronotum parallel-sided or slightly tapering anteriorly, disk convex, lustrous, basally with narrow transverse groove, with insignificantly recurved posterior angles, with long rusty dispersed bristles on sclerotized base. Mesonotum lustrous, medially transversely compressed, at posterior margin with angularly recurved raised shield, with three pairs of bristles—two at anterior angles and one at posterior margin in region



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Fig. 59. Pupa of *Eumecocera impustulata* (Motsch.).

of shield. Metanotum broad, mildly convex, medially with faint longitudinal groove, at posterior margin broadly rounded, alar base with pair of adjacent lateral bristles.

Abdomen elongate, gradually tapering from base toward tip. Abdominal tergites convex, medially with faint longitudinal groove, in posterior third with large acute or not very large acute setigerous spinules forming transverse row. Tergite VII oblong (female) or almost not longer than wide (male), posteriorly broadly rounded, disk convex, lustrous, medially (female) or in posterior half (male) with large acute spinules in transverse row. Tergite VIII almost semicircular, disk convex with four–six minute setigerous spinules in transverse row. Tip of abdomen bound by U-shaped ridge set with minute setigerous spinules. Valvifers of female small, contiguous, ampullaceous, recurved laterally. Body length 9–16 mm, width of abdomen 2.0–3.5 mm.

Material: Collected in Salair, Altai, and Ussuri-Primor'e region. Adults 74, larvae 103, pupae 4 (males and females), larval and pupal exuviae with beetles from cells 22.

Distribution: Northern Asia from the Ob', Altai, to Pacific Ocean

coasts. Northeast China, Korean peninsula, Japan.

Biology: Infests deciduous and mixed forests and ecologically associated with many deciduous and woody plants. Beetles fly in June and July but not in first half of August. Feed on tissues of green leaves and bark of young shoots. After mating, the female lays eggs in bark crevices, mostly in radical part of undergrowth up to 7.0 cm diameter or more, but does not make cavities. Sometimes the eggs are lined up on exposed roots. They are found on shoots of willow, alder, bird cherry, maple, hornbeam, birch, and other plant species. A female can lay quite a number of eggs. In a female caught in nature, 42 mature eggs were found in the ovaries. Egg development under natural conditions is completed in 15–18 days. For example, beetles laid eggs in the forest on June 25th and the larvae hatched from them on July 12th. During this period the atmospheric temperature varied from 3.8°C in the morning to 36°C later in the day (average 18.9°C). Hatching of larvae commences in July and is completed early September. Larvae live under bark, make longitudinal galleries upward, and pack them with fine frass. On shoots with thin bark, the galleries are deeply impressed on sapwood, but on shoots with thick bark, they are not. In the last instance, the galleries are packed with frass containing bark. Larvae of last instar drill into wood and there in the upper layer make a short gallery longitudinal to the shoot, then make a cell in it, fill the entrance hole with frass, and pupate. On thick-barked shoots, pupal cells are made under bark and deeply impressed in wood. An exit hole is nibbled by the larva in the thick bark from the cell to the surface and an “unnibbled” portion about 5.0 mm remains there. Length of cell 12–28 mm, width 4–7 mm. Pupation commences May-end and is completed in last ten days of June. Pupal stage lasts about three weeks. Young beetles appear in second half of June and in July. They remain in cells for five–eight days, then nibble a round flight opening (2–3 mm diameter) on the shoot surface, and exit through it. Emergence of beetles from cells commences in second half of June and is completed by last week of July. Generation—two-year cycle (Table 6).

Change in weight during metamorphosis is illustrated by one insect. A larva before pupation weighed 52.2 mg (100%), the pupa developed

Table 6. Development of *Eumecocera impustulata* (Motsch.)

Year	April	May	June	July	August	September	October
1st	L	LP	LPA	PAE	AEL	EL	L
2nd	L	L	L	L	L	L	L
3rd	L	LP	LPA	PAE	AEL	EL	L

from it 49.6 mg (95%), the beetle that emerged 46.1 mg (88.3%). Based on five specimens, larvae before pupation weigh 20–90 mg (45.8 ± 12.2), pupae 18.0–78.8 mg (41.5 ± 10.6), beetles 15.2–64.5 mg (35.1 ± 8.9).

Eumecocera impustulata (Motsch.) infests stems 2.4–28.0 cm diameter, mainly of desiccated and drying trees. From larvae collected in the forest, 40 beetles were raised—9 on willow, 9 manchurian stripe maple, 6 oak, 2 each ash, Amur chokecherry, hornbeam, apricot, and lime, and 1 each on Manchurian walnut, plum, Japanese alder, birch, lilac, and hazelnut. During forest inspections 112 specimens (larvae, pupae, beetles) were also collected—34 from oak, 20 willow, 14 bird cherry, 11 birch, 8 elm, 6 maple, 5 each ash and lime, 3 alder, 2 each rowan berry and apricot, and 1 each from hornbeam and lilac.

2. *Eumecocera callosicollis* (Breun.)

Breuning, 1943. *Misc. Entom.*, 40: 100 (*Stenostola*); Gressitt, 1951. *Longic. Beetles of China*, 2: 609 (*Stenostola*); — *incallosa* Breuning, 1952. *Entom. Arb. Mus. Cg. Frey*, 3: 205 (*Stenostola*).

Adult (Fig. 60): Distinguished from *Eumecocera impustulata* (Motsch.) by grayish, not very dense pubescence. Body elongate. Head barely broader than pronotum, sinciput with dense whitish compact adherent pubescence, occiput, sinciput, and temples with erect bright brownish hairs, and deep irregular punctation. Eyes sharply faceted, deeply emarginate, highly convex. Lower ocular lobe in male twice, in female barely longer than gena. Antennae thin, longer than body, extending beyond apex of elytra by 9th or 11th segment, with minute adherent hairs, on inner side (especially 1st–7th segments) with brownish setae. First antennal segment two-thirds to one-half size of 3rd, equal to or slightly longer than 4th.

Pronotum very slightly oblong (male) or not longer than wide (female), basally with narrow, in anterior third with gentle faint transverse groove, with compact deep punctation and dense erect brownish hairs, medially with narrow longitudinal whitish pilose band or without it, paramedially with small, sometimes barely visible, ampullaceous convexity. Pronotal shield tapering posteriorly, narrowly rounded apically, with gray dense or extremely sparse hairs.

Elytra parallel-sided, elongate, steeply incised toward apex, individually (often narrowly) rounded apically, basally inner to humeral tubercle with indistinct notch, disk mildly convex, with deep uniform punctation, very sparse adherent grayish, not forming continuous cover, pubescence, and short erect or semierect bright brownish hairs. Legs thin, comparatively long, throughout surface with gray adherent and erect bright hairs; midtibiae on outer margin with distal notch; hind

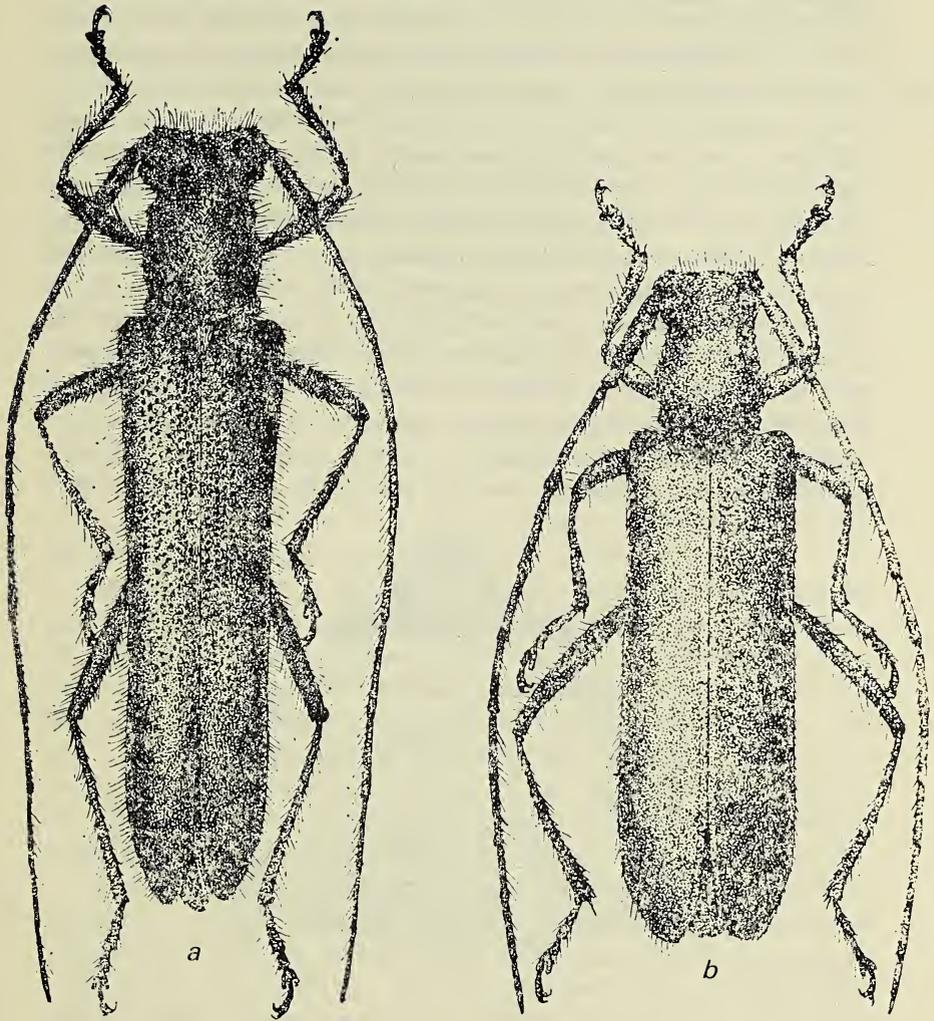


Fig. 60. *Eumecocera callosicollis* (Breun.).

a — male; b — female.

femora slightly longer than tibiae, their apices extending beyond three-fourths of elytra. Body ventrally with gray adherent and long erect hairs. Sternite V angularly incised posteriorly, apically truncate or slightly emarginate, with apex projecting beyond posterior margin of tergite (male) or not reaching it (female). Body, antennae, elytra, and legs black. Body length 7–9 mm.

Larva (Fig. 61): In form of spinules on pronotal shield and on

- basisternum, resembles the larva of *Eumecocera impustulata* (Motsch.). Distinguished from it by location of hairs on pronotum. Body white, moderately elongate. Head parallel-sided, half retracted into prothorax.
- 103 Epistoma mildly convex, in anterior half rusty, in posterior half yellowish, medially divided by sharp longitudinal suture, laterally fusing with temporo-parietal lobes (frontal sutures faint), in anterior third with eight hairs (four on each side of longitudinal suture) forming transverse row. Hypostoma rusty, mildly convex, parallel-sided, in anterior half with two large wide-set bristles in transverse row. Temporo-parietal lobes in anterior half rusty, in posterior half yellowish, laterally in anterior third with two, at anterior angles of hypostoma with one spinule forming common transverse row. Antennae whitish, barely projecting from antennal sockets. Ocelli ampullaceous, with translucent pigmented spotlet, Clypeus large, trapezoid, at anterior angles not rounded, hyaline, semitransparent. Labrum narrower than clypeus, broadly rounded apically, in anterior half with short bright bristles.

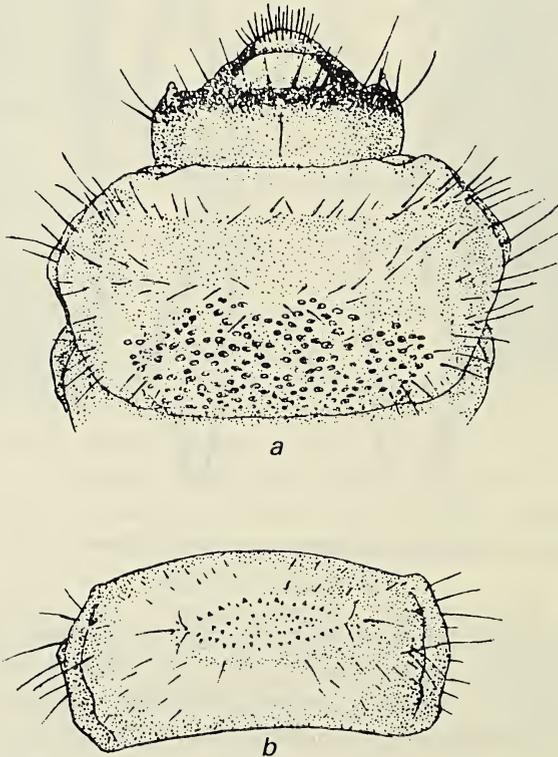


Fig. 61. Larva of *Eumecocera callosicollis* (Breun.).

a — head and pronotum; b — abdominal tergite with dorsal locomotory ampulla.

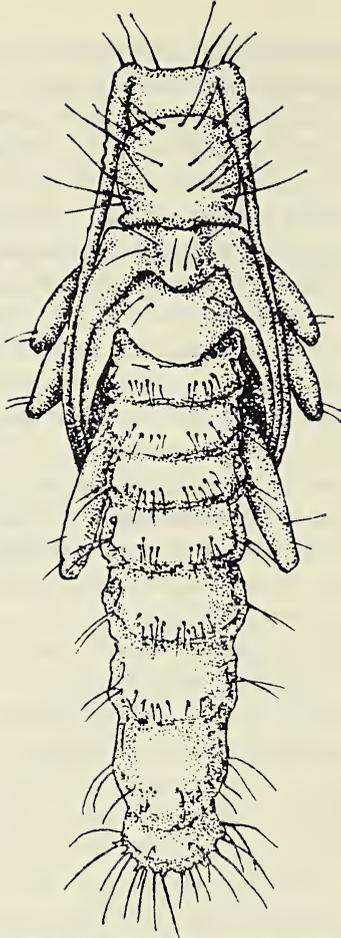
Mandibles black, basally reddish rust, apically sloping, with extended ventral and projecting dorsal denticle, ventrally with sharply marked ridge extending from apex of ventral denticle toward dorsal margin.

Pronotum on disk flat or mildly convex, sloping toward head, in anterior half bright rust, at anterior margin with rusty setiform hairs forming uniform rarefied transverse row. Pronotal shield with flat transversely extended, apically rounded spinules directed backward and minute bright hairs. Spinules in anterior half of shield large, gradually reducing posteriorly. Anterior angles of shield almost with rectangular notch having deep transverse depression. Lateral longitudinal grooves on shield short, uniting anteriorly with transverse depressions. Pronotum in anterior half, metanotum on disk with minute specklike spinules, behind them with hairs forming uniform transverse row. Prothoracic presternum convex, with sparse rusty hairs, laterally with lustrous glabrous square. Eusternum glabrous, coriaceous, without spinules. Basisternum in anterior half with specklike spinules forming one–two transverse rows. Meso- and metasterna with specklike spinules forming two transverse rows separated by transverse groove.

Abdomen laterally with irregular rusty hairs. Dorsal locomotory ampullae mildly convex, with minute irregular rarefied acute spinules divided by two transverse grooves fusing laterally. Spinules between grooves minute, in three interlacing rows, outer ones (in front and behind) markedly larger, forming single uniform transverse row. Ventral locomotory ampullae divided by deep transverse groove, with two–three rows of spinules in front of and one row behind groove. Spinules adjacent to groove notably larger than remaining spinules. Body length of late instar larvae up to 15 mm, width of head 1.5 mm.

Pupa (Fig. 62): In location of bristles on pronotum and spinules on abdominal tergites similar to the pupa of *Eumecocera impustulata* (Motsch.). Well distinguished from it by absence of bristles on labrum and on sides of mandibles. Body comparatively thin, elongate. Head short, roundly tapering anteriorly, between antennae flat, with barely projecting antennal tubercles, with long rusty bristles—two adjacent laterally on sinciput, four–five laterally on frons, four at its anterior margin, and four in transverse row at base of clypeus. Antennae thin, in second half beyond midfemora curved annularly, their apices adjoining sides of head.

Pronotum parallel-sided, disk convex, lustrous, basally with narrow transverse groove, with recurved posterior angles, with long rusty bristles—eight at anterior margin, two on disk medially, and up to ten on hind clivus. All these bristles correspondingly form three transverse rows. Mesonotum longitudinally convex, compressed laterally, at



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Fig. 62. Pupa of *Eumecocera callosicollis* (Breun.).

posterior margin with rounded shield, at anterior angles with two adjacent and at posterior margin of shield on both sides with one–three long rusty bristles. Metanotum convex, medially with longitudinal groove, at posterior margin broadly rounded, in anterior half on lateral convexities with pair of long bristles, basally with group (seven–eight) of minute, sometimes barely perceptible bristles.

Abdomen elongate, parallel-sided, slightly tapering toward tip. Abdominal tergites in posterior half highly convex, medially with broad longitudinal groove, along sides of which at a more convex place acute setigerous spinules forming transverse row interrupted medially by longitudinal groove (spinules on tergite I minute, on remaining tergites considerably larger). Tergite VII convex, hyaline, posteriorly broadly rounded, posteromedially with acute setigerous spinules forming com-

paratively compact transverse row. Tergite VIII hyaline, transverse, highly convex, with six long rusty bristles in transverse row. Tip of abdomen bound by distinctly or mildly convex ridge set with long rusty bristles. Valvifers of female minute, hemispherical, slightly wide-set. Body length 9–11 mm, width of abdomen up to 2.5 mm.

Material: Collected in Ussuri-Primor'e region (Ussuriisk sanctuary, Gorno-taezhnaya station, Kondratenovka, Osinovka, Khasanovsk region). Adults 24, larvae 8, pupae 4 (males and females), larval and pupal exuviae with beetles from cells 17.

Distribution: Amur and Ussuri-Primor'e regions. Northeast China.

105 *Biology:* Inhabits biotopes of broad-leaved forest plantations. Ecologically associated mainly with lime and manchu stripe maple. Flight of beetles from early June to July-end. Larvae live under bark of shoots 1.5–5.5 cm diameter, there make longitudinal galleries not impressed on wood, and pack them with fine fibrous frass containing bark. Larvae of the last instar drill into wood, make a short gallery longitudinal to the shoot, fashion a pupal cell in it, and plug the entry hole with fibrous frass. They pupate with head toward the entry hole. Width of entry hole up to 3.5 mm. Length of gallery in wood 1.8–4.5 cm. Length of pupal cell 11–22 mm, width 3.5–4.0 mm. Pupation commences in May and is completed by June-end. Pupal stage lasts up to three weeks. Under laboratory conditions, from a pupa formed on November 19th the beetle emerged December 12th, i.e., after 23 days. The atmospheric temperature during this period fluctuated from 15° to 18°C (average 17.8°C). Young beetles appear mostly in June. Their emergence from wood commences in first ten days of June and is concluded by June-end. Generation—two-year cycle. Based on ten specimens, larvae before pupation weigh 17–32 mg (24.2 ± 1.6), pupae 15.1–28.5 mg (21.9 ± 1.5), young beetles 12.5–23.0 mg (17.2 ± 1.2).

Eumecocera callosicollis (Breun.) infests shoots of dead trees. From larvae collected in nature, we raised 15 beetles—11 on lime tree and 4 on manchu stripe maple. During forest inspections 13 specimens (larvae, pupae, beetles) were also collected: 10 from lime tree and 3 from maple. In morphological characters of the adult, this species is similar to *Eumecocera unicolor* Kano, which inhabits islands of Japan. It may be presumed that they are analogues of two east Asiatic faunas (continental and insular).

42. Tribe GLENEINI

The tribe Gleneini is mainly found in the fauna of southeast Asia. It includes up to 15 genera, of which only one polymorphic genus,

Glenea New., spreads eastward in the south to the limits of Sakhalin and the southern Kuril' islands. Representatives of the tribe Gleneini are not found on the continent in northern Asia. In some publications (Breuning, 1966; Kojima and Hayashi, 1969), it is combined with the tribe Saperdini. However, in this work we retain it as an independent taxon.

1. Genus *Glenea* New.

Newman, 1842. *Entom.*, 1: 301; — *Macroglenea* Aurivillius, 1920. *Ark. Zool.*, 13, 9: 30; — *Stiroglenea* Aurivillius, 1920. *Ibid.*, 31; Gressit, 1951. *Longic. Beetles of China*, 2: 570; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 158.

Adult: Body moderately elongate. Pronotum distinctly oblong. Elytra laterally with sharply projecting humeral ridge, apically emarginate, with acutely extended outer angle.

Larva: Characterized by head barely retracted into prothorax. Mandibles apically steeply slanting, on inner side flat, uniform, without ridge. Pronotal shield in anterior half with large transversely extended, in posterior half minute spinules. Eusternum without spinules, basisternum with transversely extended spinules forming transverse band. Locomotory ampullae of abdomen developed on segments I–VII, covered with acute uniform spinules.

Pupa: Setigerous spinules well developed, frontally on head, dorsally on body, and at tip of abdomen.

106 The genus *Glenea* New. is spread throughout Asia, New Guinea, Australia, Africa, and elsewhere. It includes more than 300 species, of which 34 are known in the southern regions of China, 5 in Japan, and 1 species on Sakhalin and Kunashir. It is absent in Ussuri-Primor'e region. It belongs to the group of ancient fauna infesting mainly tropical and partly subtropical forests.

Type species: *Sphenura novemguttata* Guérin, 1831.

1. *Glenea relicta* Pasc.

Pascoe, 1858. *Trans. Entom. Soc. Lond.*, 2, 4, 258; — *assimilis* Gahan, 1897. *Annal. Mag. Nat. Hist.*, 6, 19: 484; Matsumura, 1908. *Thous. Ins. Japan*, 3 (N 699), 52: 14; — *silhetica* Plavilstshikov, 1927. *Encyc. Ent. B. Coleopt.*, 2, 2: 63; Gressit, 1951. *Longic. Beetles of China*, 2: 578; Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 71, 213; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 159; Krivolutskaya, 1973. *Entomofauna Kuril' skikh ostrovov*, 111.

Adult (Fig. 63): Body elongate. Head short, barely broader than

pronotum, with antennal tubercles insignificantly extended laterally, medially between them with longitudinal groove, with deep, not very dense punctation and short erect hairs. Frons, genae, and temples with compact white dense adherent pubescence, sinciput and occiput glabrous, with deep punctation. Eyes more (male) or less (female) convex, narrowly and deeply emarginate, finely and sharply faceted. Lower ocular lobes two (female) or almost three times (male) longer than genae. Antennae extending beyond apex of elytra by 8th or 9th segment, with minute dense, closely adherent, brownish hairs, on inner side with numerous setae. First antennal segment highly tapering basally, apically rounded, with minute dense punctation, shorter than 4th segment. Third segment more (male) or less (female) long, 1.5 times longer than 5th segment.

Pronotum parallel-sided, oblong, distinctly longer (male and female) than wide, disk convex, with narrowly recurved posterior margin,

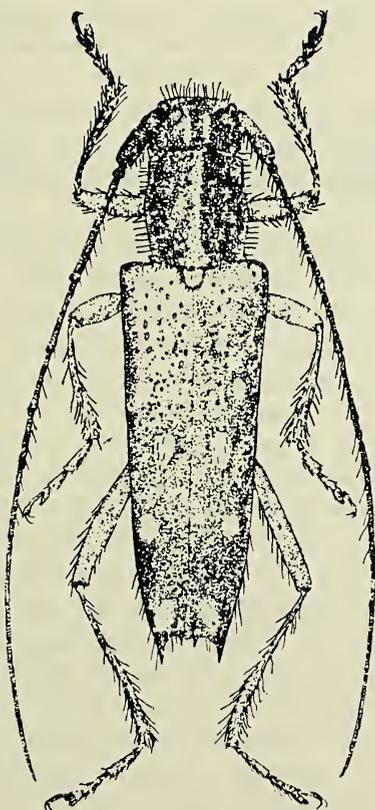


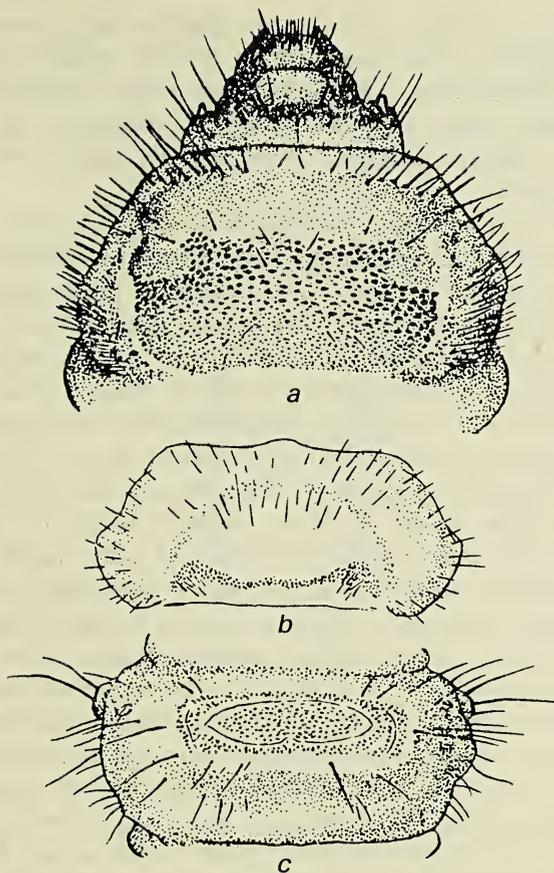
Fig. 63. *Glenea relicta* Pasc.

with deep, not very dense punctation and sparse brownish erect hairs, on disk medially with narrow, densely pilose, white longitudinal band, laterally with dense adherent white pubescence forming broad longitudinal band. Pronotal shield parallel-sided or slightly tapering posteriorly, apically truncate or broadly rounded, with dense white adherent pubescence.

Elytra parallel-sided or slightly tapering posteriorly, basally with straight humeri, apically deeply incised, with acute inner and aciculary extended outer angle, laterally with well-developed humeral ridge extending from humeral tubercle to the outer apical angle, with convex interspace between marginal and humeral ridges, with not very dense, deep (in posterior third distinctly erased) punctation, with five white pilose spotlets—first and third (starting from base) closer to suture, second and fourth shifted laterad, fifth much larger at apex. Body ventrally with tender adherent whitish pubescence forming white spots laterally and very narrow fringe at posterior margin of abdominal sternites I–IV. Abdominal sternite V convex, apically distinctly compressed, with more (female) or less (male) dense brownish hairs. Legs comparatively thin; femora slightly thickened, 1st segment of hind tarsi markedly longer than next two together. Body and antennae black. Elytra bright brownish with straw-yellow tinge, much darker toward apex in some individuals. Legs rusty, with brownish tinge. Body length 8.0–9.5 mm.

Larva (Fig. 64): Body elongate, white. Head parallel-sided, barely retracted into prothorax. Epistoma slightly convex, divided longitudinally by median suture, laterally fusing with temporo-parietal lobes, at anterior margin with broad rusty-brown fringe, here lateral to suture with setigerous pores in transverse row. Hypostoma mildly convex, parallel-sided or slightly tapering posteriorly, with rounded, almost straight anterior angles, bright or dark rust, anteromedially with four setigerous pores in transverse row. Temporo-parietal lobes rusty-yellow, lustrous, in anterior half with thin hairs forming transverse row. Antennae thin, whitish, barely projecting from antennal sockets. Ocelli below antennae, ampullaceous, whitish or with brownish tinge. Clypeus trapezoid, tapering toward apex, whitish, basally rusty. Labrum narrowly rounded anteriorly, slightly tapering toward base, whitish or rusty, in anterior half with dense rusty bristles. Mandibles black, basally reddish-rust, apically steeply slanting, with barely extended ventral and rounded dorsal denticle, ventrally without projecting ridge.

Pronotum roundly tapering anteriorly, at anterior margin with whitish fringe, in anterior half on disk and on sides bright rust, lustrous, medially with longitudinal whitish narrow band, in anterior third with



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Fig. 64. Larva of *Glenea relictata* Pasc.

a — head and pronotum; b — prothorax (ventral view); c — abdominal tergite with dorsal locomotory ampulla.

thin bright rust hairs forming regular or interlacing transverse row. Pronotal shield sloping anteriorly and convex posteriorly, in anterior half with large transversely extended, rounded, in posterior half with minute specklike spinules, at anterior margin with sparse, basally with numerous short hairs, laterally demarcated by deep longitudinal grooves, at anterior angles with notch having oblique depression and forming an acute angle with lateral longitudinal groove. Alar lobes inner to longitudinal grooves with minute specklike spinules. Mesonotum in anterior half and metanotum on disk with minute specklike spinules forming transverse sclerotized band, behind it with dense short hairs forming compact interlacing transverse row. Metanotum without median transverse groove. Prothoracic presternum mildly convex, with sparse

short rusty hairs, laterally with lustrous glabrous or yellowish square. Eusternum glabrous, coriaceous, without spinules, apically with sparse short hairs. Basisternum with large, transversely extended spinules comprising three interlacing rows. Meso- and metasterna on disk with minute acute spinules forming transverse band divided medially by transverse groove.

108 Abdomen insignificantly tapering posteriorly, laterally with randomly dispersed irregular bright rust hairs. Dorsal locomotory ampullae convex, with regular minute acute, distinctly projecting spinules, divided medially by common longitudinal groove, two transverse grooves (fusing laterally) and short lateral grooves not connected with them (interspace occupied by spinules occurs between transverse and longitudinal grooves). Ventral locomotory ampullae with minute acute spinules, divided in posterior half by transverse groove. Spinous field in front of this groove twice larger than spinous field behind it. Body length of last instar larvae 18–20 mm, width of head up to 2.0 mm.

Pupa (Fig. 65): Body elongate, white. Head short, roundly tapering anteriorly, lateral to frons convex, here with broad longitudinal trough, at anterior margin with pair of wide-set bristles, at base of clypeus with two pairs of bristles. Labrum lustrous, semitransparent, convex, apically narrowly rounded, disk with four bristles in transverse row. Mandibles on outer side with pair of adjacent thin bright bristles. Antennae curved semicircularly or almost annularly, their apices adjoining sides of head.

109 Pronotum sometimes parallel-sided, laterally slightly rounded, disk convex, lustrous, medially sometimes with longitudinal groove, on sides basally with sharp transverse groove, with recurved posterior angles, with large acute setigerous erect projecting or anteriorly curved spinules forming transverse row at anterior margin, transverse row of two spinules on disk anteromedially, and two divergent rows on hind clivus. Mesonotum convex, in posterior half with thickened raised shield (rounded apically), lateral to which large acute setigerous spinules forming two obliquely longitudinal rows extending from posterior margin toward anterior angles. Metanotum convex, medially with longitudinal groove, at posterior margin broadly (sometimes angularly) rounded, with minute spinules forming transverse recurved row anteromedially and transverse elongate cluster at posterior margin.

Abdomen elongate, parallel-sided or slightly tapering posteriorly. Abdominal tergites convex in posterior half, medially with faint common longitudinal groove, at posterior margin with acute, backwardly directed, setigerous spinules forming uniform transverse row (three–five spinules on each side of longitudinal groove), medially on sides with two large spinules. Tergite VII not longer than basal width, disk

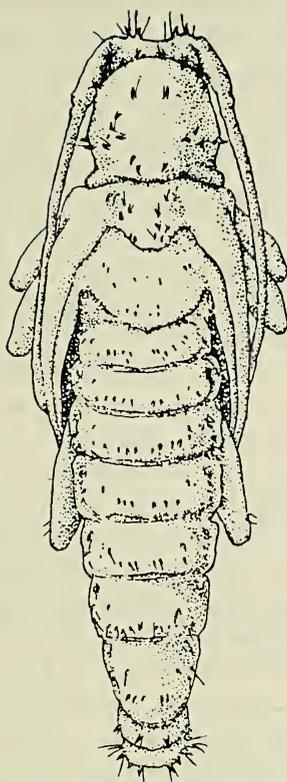


Fig. 65. Pupa of *Glenea relicta* Pasc.

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convex, lustrous, apically broadly rounded, at posterior margin with numerous (7–15) large setigerous erect projecting spinules forming compact uniform or interlacing transverse row, along sides beyond middle with two transversely set large spinules. Tergite VIII lustrous, medially with four large spinules in transverse row. Tip of abdomen (in ventral view) laterally bound by U-shaped, mildly convex ridge bearing five–seven large acute setigerous spinules on each side. Valvifers of female small, ampullaceous, contiguous. Body length 10–14 mm, width of abdomen 2.8 mm.

Material: Collected on Kunashir Island (Alekhino, Sernovodsk). Adults 12, larvae 34, pupae 7 (males and females), larval exuviae with beetles and pupae from cells 19.

Distribution: Sakhalin, Kunashir. Japan (Hokkaido, Honshu, Kyushu, Kyukyu). China (Hainan, Taiwan). Vietnam (Tonkin).

Biology: According to our investigations on Kunashir Island, inhabits deciduous forests and is ecologically associated with oak, alder,

birch, and other deciduous trees. Beetles appear mid-July and are found up to September inclusive, remaining on host trees. They infest shoots 2–4 cm diameter on growing trees. Larvae live under bark, make longitudinal sinuous galleries weakly or highly impressed on wood, pack them with fine frass containing bark and wood, and hibernate twice. Larvae of last instar make a cell longitudinal to the shoot in upper layer of wood. On removing the bark, the cell appears as a depression in the wood. Often a layer of wood 1–2 mm thick remains between the bark and the cell. In this case, the entry hole into the cell is plugged with fibrous frass. Width of gallery under bark 4–15 mm. Width of entry hole into wood up to 5.0 mm. Length of pupal cell 15–19 mm, width 3.5–5.0 mm. Pupation commences early June and continues up to mid-July. Pupae are found up to end of this month and lie in cell with head toward the entry hole. Development of pupae continues for up to four weeks. For example, a larva pupated on June 26th and the beetle emerged from the developed pupa on July 23rd, i.e., after 27 days. The atmospheric temperature during this period fluctuated from 7° to 26°C (average diurnal temperature $15.5 \pm 0.4^\circ\text{C}$). In some insects, the pupal stage is prolonged up to five weeks. Emergence of young beetles from pupae commences within the first week of July and is completed in first ten days of August. Developed beetles remain in the cell for six–eight days, then nibble a round flight opening (3–4 mm diameter) on the shoot surface, and exit through it. At this time their gonads are underdeveloped and they require supplementary feeding. Generation—two-year cycle. Larvae before pupation weigh 39–83 mg (52.7 ± 5.0), pupae 35–75 mg (47.8 ± 4.5), young beetles before emergence from cells 29–59 mg (38.5 ± 3.9) (based on 10 insects).

We found *Glenea relictata* Pasc. on oak, alder, birch, and willow. In one instance, on three shoots of oak (total length 93 cm, diameter 2.8–3.3 cm), eight specimens (larvae, pupae) were found. In another instance, on a shoot 11 cm long and 2.8 cm in diameter, two pupae were found. During forest inspections 43 specimens were collected—20 from oak, 11 alder, 10 birch, and 2 from willow. Shoots damaged by the larvae wither. In Japan (Kojima and Okabe, 1960), *G. relictata* Pasc. infests *Juglans ailanthifolia*, *Prunus jamasacura*, *Ulmus* sp., and other plants.

43. Tribe PHYTOECIINI

Adults: In external appearance, distinguished from those of other tribes by comparatively elongate (*Oberea* Muls.) or slightly stocky (*Nupserha* Thoms., *Phytoecia* Muls.) body. Head broad, with wide-set antennal tubercles. Pronotum laterally without spiniform tubercle,

parallel-sided or slightly rounded. Elytra highly (*Oberea* Muls.) or less highly (*Phytoecia* Muls., *Nupserha* Thoms.) elongate, laterally with thin longitudinal ridge (*Nupserha* Thoms.) or without ridge (*Oberea* Muls., *Phytoecia* Muls.). Midtibiae at outer margin with distal notch bearing one more or less compact brush of short bristles.

Larvae: Characterized by a combination of these characters: head bent downward at almost 45°, antennae very short, barely projecting from antennal sockets. Pronotum steeply sloping toward head, laterally in anterior half with deep oblique grooves (notches) extending from anterior angles of spinous field of shield toward anterior angles of pronotum. Pronotal shield basally highly raised, with transversely extended, recurved spinules. Thoracic legs absent. Eusternum and basisternum without spinules.

Pupae: Head broad, with wide-set, barely raised antennal tubercles, frontally with generally thin sparse bristles. Antennae flexed laterad, behind midlegs curved ventrad, here directed forward, their apices adjoining forelegs or sides of head. Pronotum generally transverse or square, rarely oblong, laterally without extended tubercle. Abdominal tergites with large or minute spinules forming transversely extended cluster or transverse row. Tip of abdomen obtuse, bound by U-shaped ridge set with minute or large setigerous spinules. Urogomphal protuberance on dorsal side absent.

In the fauna of northern Asia, three genera belong to the tribe Phytoeciini: *Nupserha* Thoms., *Oberea* Muls., and *Phytoecia* Muls. Of these, the last two genera are the richest in species composition and number of populations. All the representatives of these genera have one feature in common—they infest growing plants, some infesting deciduous trees or bushy plants, others herbaceous species. Larvae live in thin shoots (stems) and make longitudinal galleries in them. Only in a few species (*Phytoecia volgensis* Kr., *P. rufiventris* Gaut.) do the larvae infest mainly the roots.

KEY TO GENERA

Adults

- 1 (2). Elytra laterally with thin longitudinal ridge 1. **Nupserha** Thoms.
- 2 (1). Elytra laterally without thin longitudinal ridge.
- 3 (4). Hind femora not extending beyond abdominal sternite II.
Elytra elongate, parallel-sided 2. **Oberea** Muls.
- 4 (3). Hind femora extending far beyond posterior margin of ab-

dominal sternite II. Elytra slightly elongate, often tapering toward apex. 3. **Phytoecia** Muls.

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Larvae

- 1 (2). Body more elongate, parallel-sided. Oblique lateral grooves extending from anterior angles of spinous field to anterior angles of pronotum, rounded commalike or simply enlarged at posterior end 2. **Oberea** Muls.
- 2 (1). Body less elongate, not parallel-sided, generally tapering posteriorly. Oblique lateral grooves extending from anterior angles of spinous field to anterior angles of pronotum, not rounded and not enlarged, often sharp at posterior end. 3. **Phytoecia** Muls.

Pupae

- 1 (2). Body elongate, not stocky. Abdomen lateral to spiracles with large spinules (*Oberea* s. str.) or without spinules (*Amauros-toma* Müll.). 2. **Oberea** Muls.
- 2 (1). Body less elongate, generally appears stocky. Abdomen lateral to spiracles without large spinules. 3. **Phytoecia** Muls.

1. Genus *Nupserha* Thoms.

Thomson, 1860. *Classif. Ceramb.*, 41; Gressit, 1951. *Longic. Beetles of China*, 2: 581; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 159.

Adult: Characterized by moderately elongate body distinctly enlarged on humeri. Antennae longer than body. Pronotum laterally slightly rounded (simply convex). Elytra laterally with thin, distinctly projecting longitudinal ridge.

Two species of the genus *Nupserha* Thoms. inhabit the southeastern regions of northern Asia. Up to 16 species are found in the southeastern regions of China.

Type species: *Stibara cosmopolita* Thomson, 1860.

KEY TO SPECIES

Adults

- 1 (2). Elytra with setiform erect hairs. Body length 7–9 mm. Ussuri-Primor'e region, northeast China ...1. **N. alexandrovi** (Plav.)

- 2 (1). Elytra without setiform erect hairs, only with compact adherent pubescence. Body length 10–13 mm. Ussuri-Primor'e region, Kuril' islands. Japan. Northeast China.
 2. **N. marginella** (Bat.)

1. **Nupserha alexandrovi** (Plav.)

Plavilstshikov (Plavil'shchikov), 1921. *Russk. entom. obozr.*, 17: 121 (*Oberea*); — ab. *infrequens* Plavilstshikov, 1921. *Ibid.*, 121.

Adult (Fig. 66): Very similar to *Nupserha marginella* (Bat.). Distinguished from it by smaller body and presence of setiform erect hairs on elytra. Body small, slightly elongate. Head broad, frontally highly convex, medially with broad longitudinal groove, with irregular double (large and minute), randomly distributed, dense as well as sparse punctation, with semiadherent dense or sparse grayish or yellow hairs. Antennal tubercles insignificantly raised, slightly extended laterally. Eyes large, very convex, sharply faceted, on inner side deeply incised, very close to base of mandibles. Lower ocular lobe five times longer than gena. Antennae slightly longer than body, extending beyond apex of elytra by 10th–11th segment, with short sparse rusty hairs, on inner side with sparse setae. First antennal segment gradually thickening moderately toward apex, with minute punctation and gray adherent hairs. Fourth antennal segment distinctly shorter than 3rd, almost not longer or slightly longer than 5th, equal to 1st.

Pronotum slightly transverse, laterally insignificantly rounded, basally with distinct narrow transverse flange, apically with faint transverse groove, disk convex, with distinct deep or slightly evanescent punctation, with minute faint compact adherent yellow pubescence or without it, with sparse tender hairs, on hind clivus sometimes with short smooth median longitudinal band. Pronotal shield slightly tapering posteriorly, apically gently rounded, with sparse yellow adherent pubescence.

Elytra slightly elongate, at humeri enlarged, distinctly tapering posteriorly, basally with straight humeri, with rounded humeral tubercle, apically obtuse, with rounded outer and acutely produced inner angle, laterally with thin faint ridge, disk slightly flat, with large deep (apically erased) punctures forming faint longitudinal rows, with grayish or yellowish adherent pubescence and short semiadherent setiform hairs. Legs with not very dense adherent yellow pubescence; midtibiae at outer margin with oblique distal notch bordered by sparse uneven yellow bristles. Body ventrally with compact adherent golden-yellow pubescence, on abdomen with erect setiform yellow hairs. Abdominal sternite V with broad notch fringed with long yellow erect bristles

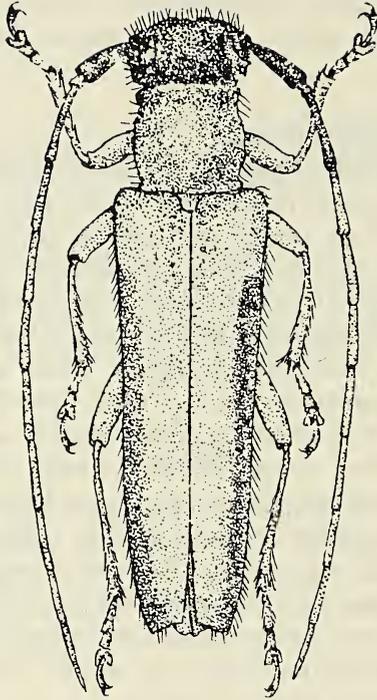


Fig. 66. *Nupserha alexandrovi* (Plav.).

(male) or convex, with median longitudinal groove, apically with long lateral bristles (female). Tergite V insignificantly convex, apically gently rounded, at posterior margin with short bristles (male) or disk highly convex and posterior margin decurved (female). Head black, palpi yellow. Antennae rusty; 1st segment brownish or black. Pronotum and shield red. Elytra on disk rusty-yellow, laterally dark brown. Legs yellowish-rust. Body ventrally rusty-yellow throughout (f. *typica*) or pro-, meso-, and metasterna and abdominal sternites II–III dark brown, almost black, or only abdominal sternites II–III brownish (ab. *infrequens* Plav.). Body length 7–9 mm.

Material: Collected in Ussuri-Primor'e region (Komarovka River, "Kedrovaya Pad'" sanctuary, Lake Khanka). Adults six. Type specimens were examined in the Zoological Museum of Moscow State University.

Distribution: Ussuri-Primor'e region. Northeast China.

Biology: Inhabits fringes of deciduous and mixed forests. Beetles fly from June-end to mid-August. A rare species. Interstadeal development still not known.

113 2. *Nupserha marginella* (Bat.)

Bates, 1873. *Ann. Mag. Nat. Hist.*, 4, 12: 388 (*Oberea*); — *japonica* Kraatz, 1879. *Deutsch. Ent. Zeitschr.*, 23: 95 (nec. Thunb.); — *sericans* Bates, 1884. *Journ. Linn. Soc. Lond., Zool.*, 18: 260 (*Oberea*); Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 218; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 159–160 (ssp. *sericans* Bat.); Breuning, 1967. *Catal. Lamiair. (Col., Ceramb.)*, 10: 780–781 (m. *buchihige* Nak., — m. *rufoantennata* Breun.).

Adult (Fig. 67): Body slightly elongate, comparatively thick. Head short, broad (distinctly transverse), with deep bold punctation and rusty-brown semiadherent hairs not masking punctation, medially with longitudinal groove, antennal tubercles weakly raised, distinctly shifted laterad. Eyes very large, sharply faceted, on inner side deeply emarginate, lower ocular lobes highly convex, adjacent to base of antennae, almost four times longer than genae. Antennae longer than body, extending beyond apex of elytra of 10th–11th segment, with minute rusty hairs, on inner side of 3rd–7th segments with dense, on remaining segments with sparse rusty (bright) setae. First antennal segment gradually thickening toward apex, with minute dense punctation, on upper side short, on lower side long rusty hairs; 4th segment distinctly longer than 1st, considerably shorter than 3rd.

Pronotum transverse, almost parallel-sided, basally with narrow groove-like flange, apically with distinct transverse groove, disk moderately convex, with minute faint punctation and very minute, barely perceptible, compact adherent golden-yellow or grayish pubescence forming at seam (medially) a bright longitudinal band, with very sparse thin erect hairs. Pronotal shield tapering posteriorly, flat, apically rounded, with compact adherent, not very dense pubescence.

Elytra at humeri enlarged, slightly tapering posteriorly, basally with projecting humeral tubercle, apically broadly or slightly obliquely truncate, laterally with distinct or faint thin ridge, disk flat, with more or less distinct, apically evanescent punctation, with rarefied short compact adherent pubescence not masking punctation, at posterior margin (in truncate part) with long dense rusty bristles directed posteriorly. Body ventrally with dense compact adherent yellowish-golden pubescence, with individual erect bright setiform hairs. Legs with short adherent yellowish pubescence. Midtibiae at outer margin with distal deep notch covered with short golden-yellow bristles forming dense brush. Abdominal sternite V deeply compressed triangularly (male) or convex, medially with deep longitudinal groove (female). Tergite V 114 mildly convex, apically truncate (male) or very convex, at posterior edge with round median notch (female). Head black. First antennal

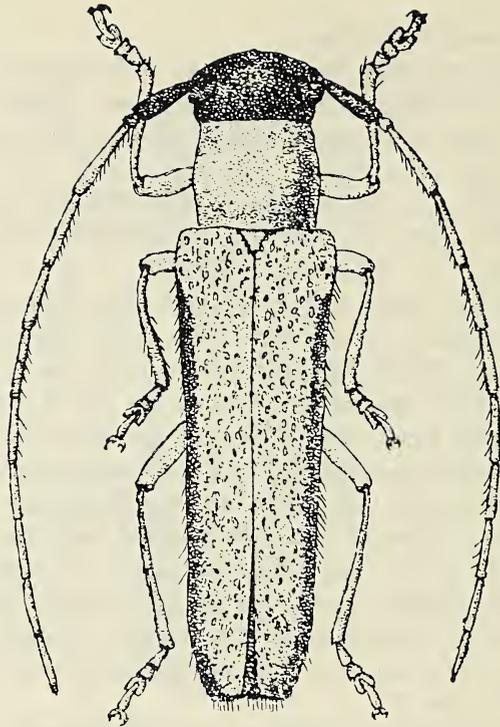


Fig. 67. *Nupserha marginella* (Bat.).

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segment black, remainder brownish with rusty tinge. Pronotum and shield red (f. *typica*) or entirely black (ssp. *sericans* Bat.). Elytra bright red, laterally black, sometimes in posterior half much darker. Legs reddish-rust. Body ventrally entirely rusty (f. *typica*) or black (ssp. *sericans* Bat.), sometimes only metasternum darkened, but sometimes middle or first few sternites of abdomen also. Body length 10–13 mm.

Material: Collected in Ussuri-Primor'e region and on Kunashir Island. Adult insects five.

Distribution: Southeastern regions of northern Asia (Ussuriisk, Dukhovsk, Spassk). Northeast China, Korean peninsula, Japan.

Biology: Infests deciduous plantations. Flight of beetles commences in second half of June and continues almost up to mid-August. According to reports by Japanese workers (Kojima and Okabe, 1960), it is found on *Malus pumila*. A comparatively rare species. Interstadeal development still not known.

2. Genus *Oberea* Muls.

Mulsant, 1839. *Coleopt. France, Longic.*, 192; — *Isosceles* New-

man, 1842. *Entom.*, 1: 318; — subg. *Amaurostoma* Müller, 1906. *Wien. Entom. Zeit.*, 25: 223; Reitter, 1913. *Fauna Germ.*, 4: 71–72; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 176–177; Mamaev and Danilevskii, 1975. *Lichinki zhukov-drovosekov*, 258–259.

Adult: Body elongate, cylindrical. Head frontally convex, from frons to occiput (in lateral view) generally uniformly rounded, with antennal tubercles more or less deflected laterally with shallow longitudinal groove between them. Eyes convex, contiguous (*O. morio* Kr., *O. linearis* (L.), *O. chinensis* Tsher., *O. japonica* (Thun.), and others) or distinctly removed from base of mandibles (*O. erythrocephala* (Schr.), *O. donceeli* Pic). Because of latter feature, genae much shorter or not shorter than lower ocular lobe. Antennae shorter than body, not extending or barely extending up to apex of elytra (*O. oculata* (L.), *O. morio* Kr., and others) or longer than body, extending beyond apex of elytra by 8th–10th segments. Elytra apically obtuse (*O. chinensis* Tsher.) or slightly incised (*O. inclusa* Pasc. and others) or with very highly, spiniformly extended outer angle (*O. japonica* Thun.). Abdomen elongate, long, terminally decurved (male) or not decurved (female). Abdominal sternite V in second half with more or less distinct notch (male) or convex, generally with median longitudinal groove (female).

Larva: Characterized by elongate body. Head half retracted into prothorax, almost bent ventrad at 45°. Antennae short, two-segmented. Ocelli small, ampullaceous, below antennae; laterally behind brownish-rust fringe two transversely wide-set black pigmented spotlets occur, which are either distinct or faint. Pronotum slightly transverse, steeply slanting anteriorly, at anterior margin whitish, disk rusty, medially with narrow white longitudinal band. Pronotal shield with both large and minute flat recurved spinules. Spinous field at anterior angles with deep interruption accommodating oblique lateral grooves. Locomotory ampullae with dense minute spinules (*Oberea* s. str.) or without them, coriaceous (*Amaurostoma* Müll.).

Pupa: Body elongate. Head short, with wide-set, barely projecting antennal tubercles, frontally convex, with sparse thin bristles. Antennal apices flexed toward forelegs or toward sides of head. Pronotum with sparse minute bright bristles. Abdomen in region of segments IV–V more (female) or less (male) enlarged, tapering insignificantly toward base, more toward tip. Abdominal segments (generally III–VII) laterally in pleural region with large recurved spinules (*Oberea* s. str.) or without them (*Amaurostoma* Müll.).

The genus *Oberea* Muls. is the richest in species composition in southeast Asia, but depauperate in the northern regions. Northern Asia

is inhabited by 12 species, of which three species (*O. linearis* (L.), *O. euphorbiae* (Germ.), and *O. erythrocephala* (Schr.)) come closer to the fauna of Europe and penetrate in the east only up to the southern Urals and northern Kazakhstan. One species (*O. oculata* (L.)) is Palearctic; two species (*O. depressa* (Gebl.) and *O. transbaicalica* Suv.) are migrants from Altai, while the remainder are of east Asiatic origin. Some species (*O. oculata* (L.), *O. depressa* (Gebl.), *O. inclusa* Pasc., and others) are associated ecologically with deciduous and bushy plants, while others (*O. euphorbiae* (Germ.), *O. erythrocephala* (Schr.), *O. morio* Kr., and others) are associated with herbaceous plants. But all the species of this genus characteristically infest only thin shoots of viable plants. They do not infest dead shoots. This specifies their role in the ecosystem.

Type species: Cerambyx oculatus Linnaeus, 1758.

KEY TO SPECIES

Adults

- 1 (18). Eyes large, closer to base of mandibles. Genae considerably shorter than lower ocular lobe (*Oberea* s. str.).
- 2 (11). Shield gray, only in melanic forms (*O. depressa* (Gebl.), *O. herzi* Ganglb.) with brownish tinge.
- 3 (4). Pronotum red, on disk with pair of round transversely set black spots. Europe, the Caucasus, northern Asia 1. ***O. oculata*** (L.)
- 4 (3). Pronotum red, on disk without round black spots.
- 5 (10). Elytra apically with moderately extended or even nonextended outer angles.
- 6 (7). Elytra with interlacing or irregular punctation not forming uniform longitudinal rows. Northern Asia. Northern China, Korean peninsula 2. ***O. depressa*** (Gebl.)
- 7 (6). Elytra with orderly punctation forming uniform longitudinal rows.
- 8 (9). Body comparatively large, body length 12–19 mm. Northern Asia from Baikal to the coasts of seas of Okhotsk and Japan. Northeast China, Korean peninsula 3. ***O. inclusa*** Pasc.
- 9 (8). Body smaller, body length 9–12 mm. Southern regions of Trans-Baikal. Northern China. 4. ***O. herzi*** Ganglb.
- 10 (5). Elytra apically with highly subulate, extended outer angle. Northeast China, Korean peninsula, Japan, Taiwan 5. ***O. japonica*** (Thun.)

- 11 (2). Shield black.
- 12 (13). Pronotum red, with black median band. From Altai to coasts of Sea of Japan. 6. *O. transbaicalica* Suv.
- 13 (12). Pronotum entirely black.
- 14 (15). Elytra with deep coarse punctation. From Atlantic Ocean coasts to the southern Urals. 7. *O. linearis* (L.)
- 15 (14). Elytra with much finer (especially on sutural band) punctation.
- 16 (17). Elytra entirely black or only on shield with rusty tinge. Ussuri-Primor'e region. Northeast China, Korean peninsula. 8. *O. morio* Kr.
- 116 17 (16). Elytra laterally black, on disk with yellow longitudinal band almost throughout length. Southeastern parts of Ussuri-Primor'e region. China, south up to Peking*. 9. *O. chinensis* Tsher.
- 18 (1). Eyes small, removed from base of mandibles. Genae not shorter or slightly shorter than lower ocular lobe (subgenus *Amaurostoma* Müll.).
- 19 (22). Antennae shorter than body. Pronotum squarish or transverse.
- 20 (21). Pronotum distinctly tapering in anterior third. Large, body length 14.2–19.0 mm. Europe to the southern Urals. 10. *O. euphorbiae* (Germ.)
- 21 (20). Pronotum not tapering in anterior third, parallel-sided. Smaller, body length 9–13 mm. Europe, southwest northern Asia, southern Urals. 11. *O. erythrocephala* (Schr.)
- 22 (19). Antennae longer than body. Pronotum oblong. Southern Trans-Baikal, northern Mongolia, Tibet. 12. *O. donceeli* Pic

Larvae

- 1 (16). Locomotory ampullae sclerotized on disk with minute dense spinules.
- 2 (3). Dorsal locomotory ampullae with two transverse grooves uniting laterally at acute angle; posterior groove complete, anterior medially broadly interrupted. On willow. 1. *O. oculata* (L.)
- 3 (2). Dorsal locomotory ampullae with transverse groove dividing spinous field into two transverse bands.
- 4 (5). Spinous field on pronotum elongate, extending anteriorly beyond middle. Dorsal locomotory ampullae of abdomen late-

* Now "Beijing"—General Editor.

- rally with short anterior transverse groove. Spiracles of abdomen highly elongate, three times longer than wide. On *Lonicera*..... 2. **O. depressa** (Gubl.)
- 5 (4). Spinous field not extending anteriorly beyond middle of pronotum. Dorsal locomotory ampullae of abdomen laterally without anterior transverse groove. Spiracles of abdomen less elongate, only twice longer than wide.
- 6 (13). Spinous field of pronotum at anterior margin between oblique groovelike depressions rounded.
- 7 (12). Spines in basal part of spinous field sharply reduced, almost one-fourth length of spines in anterior part.
- 8 (11). Abdominal spiracles large, expanded, their maximum to minimum diameter ratio 2 : 1 or 2.5 : 1.
- 9 (10). Large spinules on pronotal shield constitute not more or even less than half of spinous field. Spiracles of abdomen oval, their maximum to minimum diameter ratio 2 : 1. On several deciduous woody and bushy plant species.....
- 3. **O. inclusa** Pasc.
- 10 (9). Large spinules on pronotal shield constitute more than half of spinous field. Spiracles of abdomen rimiform their maximum to minimum diameter ratio 2.5 : 1. On *Spiraea flexuosa*..
- 6. **O. transbaicalica** Suv.
- 11 (8). Abdominal spiracles comparatively small, oval, their maximum to minimum diameter ratio 1.5 : 1. On hazelnut and other bushy and woody deciduous species 7. **O. linearis** (L.)
- 12 (7). Spinules gradually reducing toward base of spinous field, in length half size of anteriorly situated spinules. On *Saphora flavescens* 9. **O. chinensis** Tsher.
- 117 13 (6). Spinous field on pronotum at anterior margin between oblique groovelike depressions bifurcate, appearing biapical.
- 14 (15). Hypostoma uniformly convex. Lateral oblique groovelike depressions on pronotum straight. On *Saphora* sp.
- 4. **O. herzi** Ganglb.
- 15 (14). Hypostoma planed, appearing flat. Lateral oblique groovelike depressions on pronotum in anterior half slightly bent, apically decurved (in lateral view). On *Vicia amurensis*.
- 8. **O. morio** Kr.
- 16 (1). Locomotory ampullae coriaceous on disk, not sclerotized, without spinules.
- 17 (18). Locomotory ampullae of abdomen moderately convex, not extended, dorsally divided by median transverse groove. On spurge..... 10. **O. euphorbiae** (Germ.)

- 18 (17). Locomotory ampullae of abdomen highly extended (in lateral view), dorsally divided by transverse groove in posterior half. On many spurge species 11. *O. erythrocephala* (Schr.)

Pupae

- 1 (16). Abdominal segments laterally in pleural region with one or two large acute recurved spinules.
- 2 (3). Abdominal tergites with numerous spinules forming in posterior half a transversely elongate cluster bent forward on sides and a transverse row (of minute spinules) in anterior half 1. *O. oculata* (L.)
- 3 (2). Abdominal tergites with fewer spinules forming posteromedially a small cluster, in anterior half without spinules.
- 4 (7). Pronotum at anterior margin or on disk with spinules.
- 5 (6). Abdomen on tergites I–VI with minute spinules 2. *O. depressa* (Gebl.)
- 6 (5). Abdomen on tergites I–II without spinules, on tergites III–VII with coarse spinules 6. *O. transbaicalica* Suv.
- 7 (4). Pronotum without spinules, only with dispersed bristles or without them.
- 8 (11). Spinules on abdominal tergites III–VII large, forming a broad, transversely elongate cluster. Pronotum with distinct bristles.
- 9 (10). Frons with well-developed narrow median longitudinal groove. Pronotum basally with perceptible transverse groove 3. *O. inclusa* Pasc.
- 10 (9). Frons without distinct longitudinal groove. Pronotum basally without perceptible transverse groove . . 9. *O. chinensis* Tsher.
- 11 (8). Spinules on abdominal tergites III–VI minute, specklike, forming a narrow, transversely elongate cluster. Pronotum without bristles or with barely perceptible (under high magnification) bristles.
- 12 (13). Tip of abdomen with thick bristles on sclerotized base, sometimes produced laterally in form of spinule. 4. *O. herzi* Ganglb.
- 13 (12). Tip of abdomen with thin bright sparse bristles with or without an acute spinule basally.
- 14 (15). Hind femora with apices barely extending beyond abdominal tergite III. Spinules on abdominal tergites forming interlacing transverse row. 7. *O. linearis* (L.)

- 118 15 (14). Hind femora with apices extending or just barely not extending up to posterior margin of abdominal tergite IV. Spinules on abdominal tergites forming transversely elongate cluster medially divided by longitudinal groove. . . . 8. *O. morio* Kr.
- 16 (1). Abdominal segments laterally in pleural region without spinules.
- 17 (18). Abdominal tergites medially with convex, transversely elongate ridge covered with large spinules. 10. *O. euphorbiae* (Germ.)
- 18 (17). Abdominal tergites uniformly convex medially, without transversely elongate ridge, here with moderately large spinules forming transverse row, in posterior half with minute spinules forming one-two transverse rows. 11. *O. erythrocephala* (Schr.)

1. *Oberea oculata* (L.)

Linnaeus, 1758. *Syst. Nat.*, ed. 10: 394 (*Cerambyx*); — *melanocephala* Voet, 1778. *Catal. Coleopt.*, 2: 19 (*Cerambyx*); — *ab. inoculata* Heyden, 1892. *Jahrb. Nass. Ver. Naturk.*, 45: 81; — *borysthenica* Morzecki, 1900. *Horae Soc. Entom. Ross.*, 34: 294; — *tomensis* Kiss, 1926. *Doklady Tomsk. un-ta*, 77: 131; Jakobson, 1911. *Zhuki Rossii*, tabl. 72, fig. 17; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 157–158; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 177; Il'inskii, 1949. *Opredelitel' vredit. lesa*, 280; Cherepanov, 1952. *Vrednye nasekomye polezashchitnykh polos*, 88; Duffy, 1953. *Monogr. Immat. Stag. Brit. and Import. Timb. Beetl.*, 295–297; Plavil'shchikov, 1955. *Vredit. lesa. Spravochnik*, 2: 545; Demelt, 1966. *Die Tierwelt Deuschl.*, 52: 102–103; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 50–51; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 204; Cherepanov and Cherepanova, 1975. *Zhuki-drovoseki ivovykh lesov Sibiri*, 199–202.

Adult (Fig. 68): Distinguished from other species of the genus *Oberea* Muls. by comparatively large body, black head and elytra, and fine ash-gray adherent pubescence. Pronotum, body ventrally, and legs bright rust. Body moderately elongate, virgate. Head short, with extended antennal tubercles, medially with distinct longitudinal groove, with not very dense punctation masked (partially) by fine gray compact adherent pubescence, with black erect hairs (male) or without them (female). Eyes large, moderately convex, very finely faceted, broadly emarginate, lacertus between ocular lobes barely narrower than upper lobe. Lower lobe twice (male) or 1.5 times (female) longer than gena. Antennae tapering from base toward apex, markedly shorter than body,

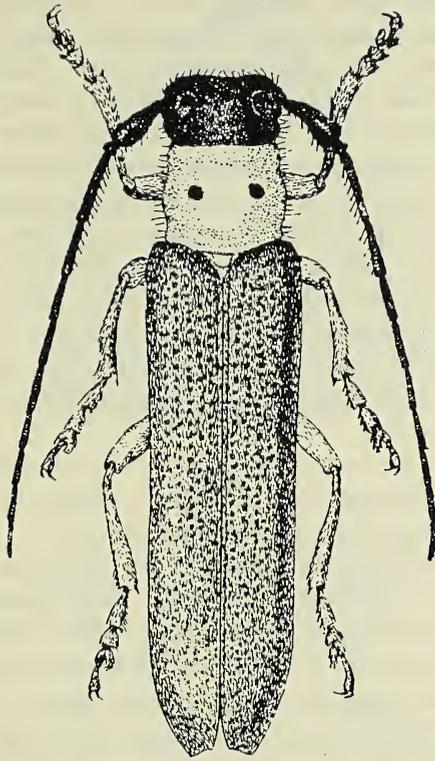


Fig. 68. *Oberea oculata* (L.).

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barely reaching or not reaching posterior third of elytra, with fine black adherent pubescence, on lower side of 3rd–4th segments with black bristles. First antennal segment thick, compactly punctate, sharply tapering basally, equal to 3rd segment (female) or slightly shorter than it (male), distinctly longer than 4th.

Pronotum transverse (female) or almost square (male), laterally barely rounded, basally with barely perceptible transverse groove, with comparatively compact punctation, medially in posterior half with narrow longitudinal short streaklike groove, anteromedially on disk along sides with distinct smooth round ampullaceous or faint squarish area, with not dense, compact adherent fine bright yellowish pubescence, at posterior margin with somewhat long adherent yellow hairs forming fimbria before shield. Pronotal shield transverse, posteriorly broadly rounded, with bright yellow dense, closely adherent hairs.

Elytra parallel-sided, basally with insignificantly projecting humeral tubercle, apically obtuse, with narrowly rounded inner and broadly rounded outer angles, disk uniformly convex, with narrow perisutural groove,

with short compact dense adherent ash-gray pubescence, dense large (minute only apically) black round lustrous (not masked by pubescence) punctures. Legs not very long; femora uniformly thickened, midtibiae
 119 at outer margin with small distal notch covered with dense brush of short golden-yellow bristles. Body ventrally with short dense compact adherent yellowish-golden pubescence. Abdominal sternite V in second half with deep broad impression, without median longitudinal groove (male) or apically with shallow impression, more convex, with median longitudinal groove (female). Tergite V on disk uniformly (male) or sharply convex, apically with rounded projection (female). Body, shield, and legs reddish-rust. Pronotum bright rust on disk with two black round spots (f. *typica*) or without them (ab. *inoculata* Heyd.). Head and elytra black, with ash-gray pubescence. Antennae jet-black. Body length 15–20 mm.

Egg: White with yellowish tinge, elongate, almost uniformly rounded at poles. Chorion matte, with fine sculpture visible under high magnification. Length 3.5 mm, width 0.8 mm.

Larva (Fig. 69): Well distinguished from the larvae of other species by sclerotization of locomotory ampullae. Body moderately elongate, white, with yellowish tinge. Head parallel-sided, half retracted into prothorax, bent downward at 45°. Epistoma slightly depressed, divided almost throughout length by median suture, laterally demarcated by distinct whitish frontal sutures, at anterior margin with entire rusty-brown fringe, laterally on it with long setiform hairs in transverse row. Hypostoma parallel-sided, mildly convex, with rounded anterior angles, bright yellowish, at anterior margin with somewhat rusty narrow fringe, broadly emarginate, in anterior half with six setigerous pores forming transverse row. Temporo-parietal lobes lustrous, with yellowish tinge, at anterior margin with somewhat rusty-brown fringe, behind it with setiform hairs forming together with hairs of hypostoma a common transverse row. Antennae whitish, short, barely projecting from antennal sockets. Ocelli below antennae ampullaceous, in some individuals with sparsely pigmented black spotlet. Clypeus large, transverse, whitish, basally with somewhat rusty tinge. Labrum transversely oval, at anterior margin broadly rounded, in anterior half whitish, with coarse bright bristles, basally glabrous, rusty-brown. Mandibles elongate, black, basally rusty-red, here with four bristles in an anteriorly curved transverse row, apically slightly obliquely truncate, with acutely produced ventral and projecting dorsal denticle.

Pronotum slightly transverse, highly inclined toward head, at anterior margin with whitish fringe enlarging laterad, before shield with lustrous yellowish-rust square, with rusty setiform hairs forming comparatively

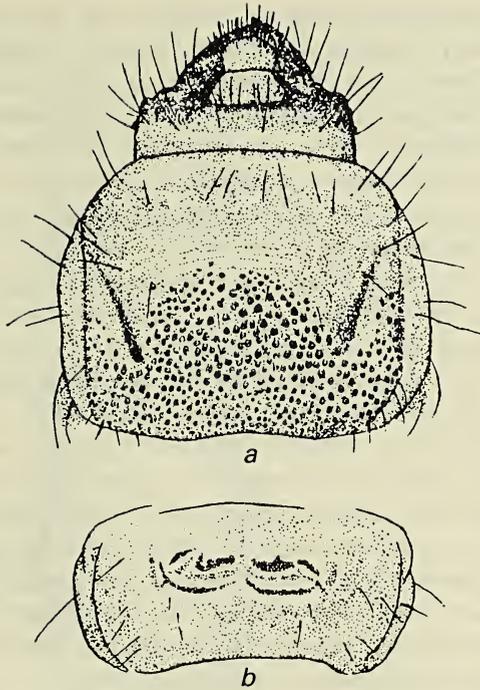


Fig. 69. Larva of *Oberea oculata* (L.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

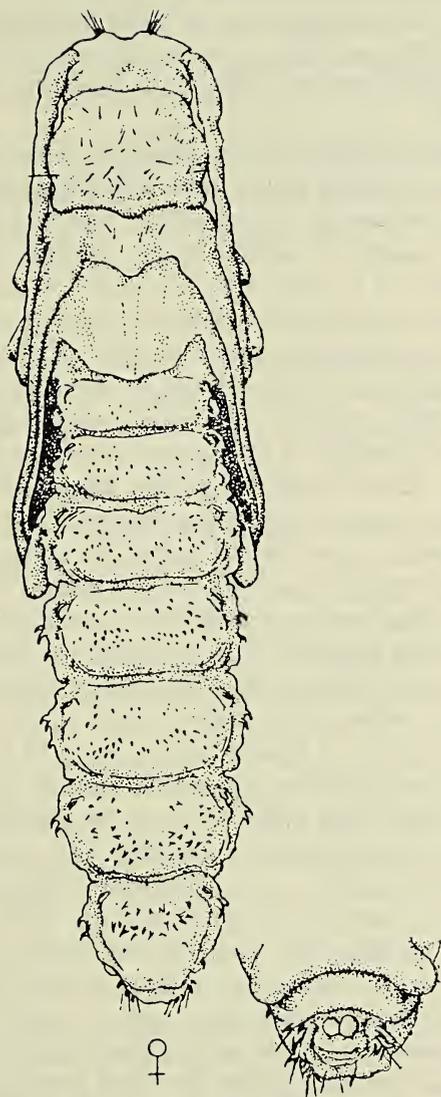
uniform row in anterior third and anteriorly curved row at anterior margin of spinous field. Pronotal shield basally raised (highly convex), laterally demarcated by longitudinal folds, with large, but in posterior third reducing and transversely enlarging spinules forming spinous field, at anterior angles of this field with oblique rusty-brown, deeply depressed grooves extending from anterior angles of spinous field toward anterior angles of pronotum but not reaching them. Mesonotum in posterior half with short rusty hairs forming lateral transverse band. Metanotum on disk with very minute spinules forming narrow sclerotized, somewhat rusty, transverse band divided by barely perceptible whitish transverse groove. Prosternum in region of eusternum highly convex, in anterior half with numerous rusty hairs, laterally on presternum with longitudinally extended lustrous yellowish tetragon, along sides basally with rusty hairs forming small cluster. Meso- and metasterna on disk with very minute spinules forming transverse, somewhat rusty, sclerotized band divided by whitish transverse groove, on foreclivus (before sclerotized band) and laterally with rusty hairs forming transverse row.

Abdomen moderately elongate, laterally with short solitary hairs. Dorsal locomotory ampullae moderately convex, divided by narrow longitudinal groove, complete posterior transverse and incomplete anterior transverse grooves uniting laterally and demarcating medial and fimbriate posterior ridges covered with fine dense sclerotized spinules. Ventral locomotory ampullae quite convex, covered with minute spinules forming two parallel transverse, somewhat rusty bands divided by whitish transverse groove uniting laterally with short longitudinal fold, demarcating in turn short longitudinal ridge covered with
 121 minute spinules. Tip of abdomen with sparse long hairs. Body length of late instar larvae up to 27 mm, width of head 2.0 mm.

Pupa (Fig. 70): Characterized by comparatively large body and numerous spinules on abdominal tergites. Head barely tapering anteriorly, on frons convex, between antennal tubercles with deep longitudinal groove, lateral to groove with short thin, somewhat rusty bristles forming small clusters laterally on sinciput and longitudinal row in front of it; at anterior margin with six bristles forming transverse row. Labrum lustrous, apically broadly or narrowly rounded, in anterior half with four rusty bristles in transverse row. Mandibles on outer side with three rusty bristles. Antennae flexed laterad, encircling midlegs, their apices directed forward and adjoining foretarsi.

Pronotum transverse, slightly tapering in anterior third, basally with narrow transverse groove, disk uniformly convex, with very minute short bright rust bristles forming three transverse rows—one in anterior third, second medially, and third laterally on hind clivus. Mesonotum convex, posteromedially transversely depressed saddlelike, at posterior margin with angularly produced shield, laterally at anterior angles with barely perceptible rusty bristles. Metanotum broad, insignificantly convex, with broad median longitudinal groove, at posterior margin broadly rounded, in anterior half with sparse fine paramedial bristles forming row extending from middle toward anterior angles.

Abdomen slightly tapering toward base, more toward tip. Abdominal tergites in posterior half more convex. Tergite I with very small, tergite II with not large spinules forming narrow transverse band. Tergites III–VI with numerous spinules forming in posterior half a broad transverse (laterally bending forward) band, in anterior half uniform or interlacing transverse row. Tergite VII tapering posteriorly, apically broadly rounded, disk convex, with large and minute acute spinules forming extensive cluster occupying entire medial third of tergite. Tergite VII transverse, posteriorly broadly rounded, in anterior half with minute sparse acute spinules. Tergite II laterally with two small close-set, tergites III–VII with three large recurved spinules. Tip



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Fig. 70. Pupa of *Oberea oculata* (L.).

of abdomen (in ventral view) laterally bordered by large setigerous acute spinules (up to seven spinules on each side) forming two compact rows. Valvifers of female hemispherical, with somewhat rusty tinge. Body length 15–22 mm, width of abdomen 3.0–3.8 mm.

Material: Collected in western and eastern Siberia, in Ussuri-Primor'e region. Adults 93, larvae 13, pupae 2 (male and female),

larval exuviae with beetles from cells 3.

Distribution: Northern Asia from the Urals to Pacific Ocean coasts, from northern Kazakhstan, Tuva, Amur in the south to the forest limits in the north. All of Europe, Asia Minor, the Caucasus, northern China, Korean peninsula.

Biology: Inhabits forest and forest-steppe zones, within growth limits of different species of willow, with which it is vitally associated. Flight of beetles commences in first half of June and continues up to August-end. We caught 30 beetles in the environs of Novosibirsk during one season—14 in June, 9 in July, and 7 in August and early September. Beetles feed on tissues of leaves and bark of young willow shoots, leaving longitudinal bite marks on them. Sometimes leaf-veins are damaged. During the day they settle on trees, feed, and mate; in the second half of the day (toward evening) they often fly from one branch to another in search of oviposition sites. They live for about three–four weeks. After mating, the female, having priorly selected a
123 young willow shoot, uses its mandibles to make two cavities, appearing as longitudinal bands, on the smooth bark of the shoot. These cavities are located prominently on the node and the female nibbles the bark up to the wood; in the depression so formed, it introduces its ovipositor and lays an egg under the bark. Up to 20 minutes or more are spent on making the cavity and laying an egg. One egg (rarely two–three) is laid per shoot. Females infest only growing shoots 0.5–4.0 cm diameter, more often up to 2.5 cm. A female can lay up to 50 eggs. Tissues of the shoot around the egg darken and appear necrotic. After two weeks a callus forms on both sides of the cavity by the regenerative process. The eggs appear to be enclosed in a chamber. Larvae hatch from eggs 13–18 days after oviposition. Larval hatching commences in second half of July and is completed early September. After hatching, the larvae eat a small portion of the bast fiber and destroy the regenerated tissues around the cavity. At the site of larval infestation the bark turns dark, forming a distinctive dark spot. Larvae then bore into wood, penetrate to the heartwood, make a longitudinal gallery up to 20 cm long, and discard frass through the inlet and ventilation holes. The gallery remains hollow and the larva moves freely through it from one end to the other. Length of gallery up to 36 cm or more, width 4–7 mm. After the second hibernation, the larva generally makes a cell midgallery, isolating it from below and above by a plug of coarse fibrous frass. Length of cell up to 4.5 cm, width 8.0 mm. An exit is nibbled in the upper part, plugged with frass, and the larva pupates with its head upward. Pupation commences early June and is completed in July. Young beetles appear in June–July. They remain in cells for

about one week. After emergence from cells they require supplementary feeding. Generation—two-year cycle (Table 7).

Based on four insects, larvae before pupation weigh 112–218 mg, pupae 101–198.5 mg, young beetles before emergence from cells 83–146 mg.

Oberea oculata (L.) develops on young shoots of willow. We did not find it on other plant species. In Kulunda, thickets of sharp-leaved willow (*Salix acutifolia*) and crack willow (*Salix fragilis*) infested by this species in the 1950s were damaged to 27%. Shoots infested by larvae wither in one–two years.

2. *Oberea depressa* (Gebler)

Gebler, 1825. In Hummel: *Ess. Entom.*, 4: 51 (*Saperda*); ab. *altaica* Gebler, 1830. *Ledebaur's Reise*, 2, 3: 187; — *pupillata* Gebler (nec. Gyllenhal), 1848. *Bull. Soc. Nat. Mosc.*, 21, 1: 408; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 48–50; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 204.

123 *Adult* (Fig. 71): Close to *Oberea inclusa* Pasc. Well distinguished from it by interlacing punctation on elytra and other characters. Body of female large, male smaller. Head short, frontally convex, medially from anterior margin of frons to posterior margin of occiput with narrow longitudinal groove, with somewhat large deep punctation, on
 123 frons with dense gray adherent pubescence or without it, with numerous erect black hairs. Eyes large, moderately convex, finely faceted, broadly emarginate. Lower ocular lobe 1.5 times (female) or twice longer than gena. Antennal tubercles distinctly produced. Antennae extending up to posterior fourth (female) or almost up to apex (male) of elytra, on lower side of 1st–4th (female) or 1st–6th (male) segments with black bristles, with minute adherent gray hairs on lower side, dark brown on upper side, not forming dense pubescence. First antennal segment gradually tapering toward base, with fine compact striate punctation, equal to 3rd segment or slightly shorter than it.

Pronotum square or slightly transverse, disk slightly rounded laterally, basally with barely perceptible transverse groove, with compact uneven punctation, medially on hind clivus with raised longitudinal band or without it, with tender sparse bright hairs. Pronotal shield short,

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Table 7. Development of *Oberea oculata* (L.)

Year	May	June	July	August	September	October
1st	L	LP AE	PA EL	A EL	E L	L
2nd	L	L	L	L	L	L
3rd	L	LP AE	PA EL	A EL	E L	L

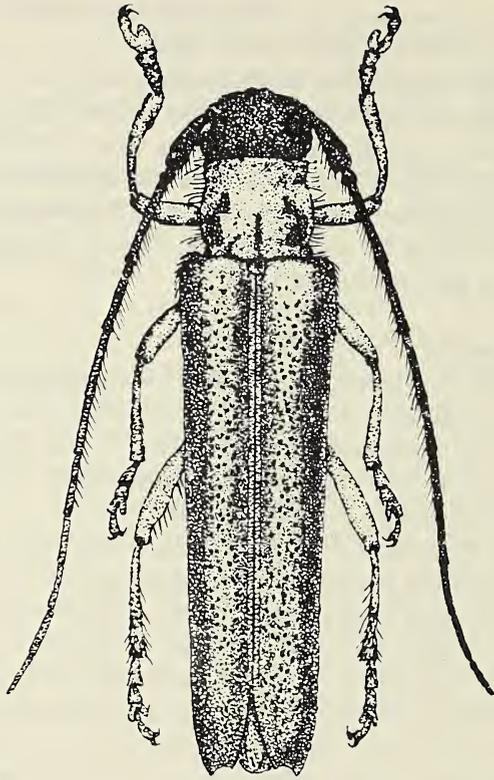


Fig. 71. *Oberea depressa* (Gebler).

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posteriorly transversely truncate, smooth, slightly depressed.

Elytra parallel-sided, basally with smooth, weakly projecting, gently or comparatively steeply rounded, humeral tubercle, apically obtuse or slightly incised, with rounded or uniformly produced angles, disk (especially posteromedially) flat, with narrow perisutural groove, deep black interlacing (not forming distinct longitudinal rows) punctures, minute adherent bright grayish pilose pubescence, with short raised, not numerous, bright hairs. Legs comparatively slender, with golden-yellow compact adherent pubescence and long yellow erect hairs. Femora elongate, slightly thickened. Midtibiae at outer margin with distal oblique notch covered with short yellow bristles forming comparatively short brush. Body ventrally with minute compact adherent golden-yellow pubescence and isolated long raised bright hairs.

Abdomen in female thick, sternite V apically angularly incised, medially with narrow longitudinal groove. Tergite V convex, anteriorly (in posterior view) depressed, at posterior margin slightly laminate.

Abdomen in male slender, slightly produced apically. Sternite V on disk with longitudinally extended triangular depression, at posterior margin transverse, truncate, with produced posterior angles, here with dense bristles. Tergite V oblong, mildly convex, without projection. External genitalia of male elongate. Parameres in second half slightly enlarged, apically with narrowly rounded inner and gently sloping outer angles, with long dense curved dark brown bristles, basally glabrous. Phallus tapering apically, acute, brownish.

124 Head, antennae, and elytra black. Pronotum reddish- or yellowish-rust, laterally at base with or without large or small rounded or elongate black spot, entirely yellowish-rust, rarely in posterior half, or even more rarely almost throughout surface, black with brownish tinge. Pronotal shield yellowish-rust or, very rarely, dark brown. Elytra on disk bright rust, along suture and laterally dark brown, in lower portion from humeral tubercle with yellowish fringe. Body ventrally mostly yellowish-rust or yellow. Pro-, meso-, and metasterna partially or completely (base of abdomen mostly on disk) black, sternite V completely or partially black. Body length 14–15 mm (male), 16–20 mm (female).

125 *Larva* (Fig. 72): Distinguished from the larva of *Oberea oculata* (L.) by much thinner, less developed hairs on epistoma and almost uniform structure of dorsal and ventral locomotory ampullae of abdomen. Body slender, elongate, white, with slight yellowish tinge. Head parallel-sided, less than half retracted into prothorax, slightly bent ventrad. Epistoma mildly convex, divided longitudinally by sharp brownish median suture, laterally demarcated by distinct whitish frontal sutures, at anterior margin with somewhat rusty-brown fringe, behind it with eight somewhat rusty setiform hairs that are comparatively short and thin. Hypostoma slightly narrowing anteriorly, mildly convex, at anterior margin not broadly emarginate, bright or dark rust, anteromedially with pair of transversely set bristles. Temporo-parietal lobes bright or dark rust, at anterior margin with faint, somewhat rusty or brownish fringe, behind it with four short setiform hairs in transverse row. Antennae whitish, short, barely projecting from antennal sockets. Ocelli small, ampullaceous, close below base of antennae, sometimes with sparsely pigmented black spotlet. Clypeus transverse, trapezoid, whitish. Labrum transversely oval, in anterior half whitish, with coarse bright bristles, basally glabrous and somewhat rusty. Mandibles elongate, black, basally reddish, apically gently sloping, with acutely produced ventral and rounded dorsal denticle, on outer side with three bristles forming transverse row.

Pronotum barely transverse, steeply inclined toward head, at anterior margin with comparatively broad, whitish fringe, on disk and

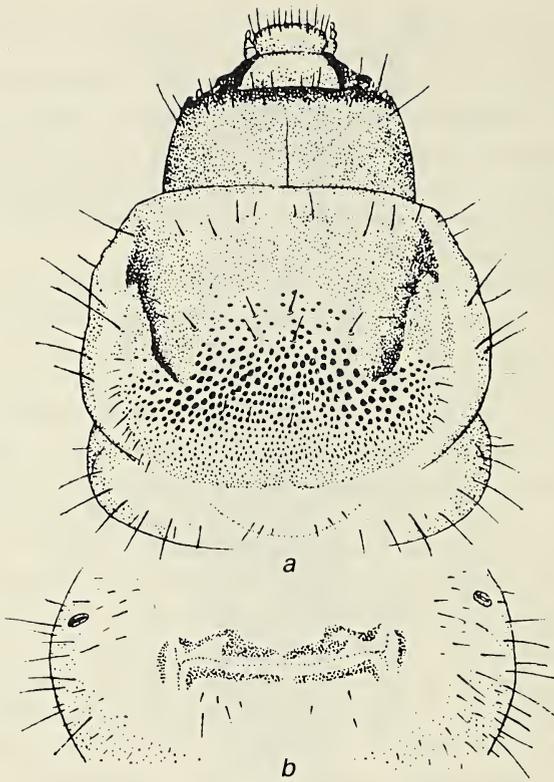


Fig. 72. Larva of *Oberea depressa* (Gebl.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

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laterally with somewhat rusty, lustrous square bearing at its anterior margin sparse setiform lateral hairs forming uniform transverse row. Pronotal shield basally raised, laterally demarcated by slightly curved longitudinal folds, covered with large (at base and anterior margin small) spinules. Deep lateral grooves extending obliquely from anterior angles of spinous field toward anterior angles of pronotum. Spinous field between these grooves with somewhat rusty, dispersed hairs. Mesonotum on disk glabrous, coriaceous, laterally with rusty hairs in interlacing transverse row. Metanotum on disk with minute dense spinules forming transversely elongate sclerotized band divided medially by narrow transverse groove. Prosternum laterally with longitudinally elongate lustrous yellow square, in region of eusternum more convex, with sparse rusty setiform hairs. Meso- and metasterna on disk with very fine dense spinules forming transverse sclerotized band interrupted medially by narrow whitish transverse groove, on foreclivus with sparse

short hairs forming interlacing transverse row.

Abdomen elongate, with moderately convex locomotory ampullae, laterally with sparse bright rust hairs. Dorsal locomotory ampullae on disk with minute spinules forming transversely elongate sclerotized band divided by whitish transverse groove uniting laterally with short longitudinal grooves. Ventral locomotory ampullae similar. Tip of abdomen with sparse long thick hairs. Body length of late instar larvae 20–24 mm, width of head 1.9 mm.

Pupa (Fig. 73): Distinguished from the pupa of *Oberea inclusa* Pasc. by minute spinules on abdominal tergites forming a cluster on each side of longitudinal groove. Body elongate, white. Head uniformly convex frontally, from frons to occiput (in lateral view) rounded, between antennal tubercles without longitudinal groove, with very fine, thin sparse bristles forming rarefied longitudinal row laterally and transverse row (of six bristles) at anterior margin. Labrum triangular, lustrous, without bristles, apically very acute. Mandibles on outer side with two–three very fine, barely perceptible bristles. Antennae flexed laterad, behind midlegs bent forward ventrally, their apices adjoining midtibiae.

Pronotum transverse, basally with faint narrow transverse groove, disk uniformly convex, with sparse short bristles on sclerotized base, sometimes elongate and resembling short acute spinules. Mesonotum convex, lustrous, posteromedially with gentle transverse depression, laterally with solitary, barely perceptible bristles. Metanotum moderately convex, with broad median longitudinal groove, at posterior margin angularly rounded, laterally slanting at an obtuse angle, with barely perceptible solitary bristles.

Abdomen elongate, insignificantly tapering toward base, more toward tip. Abdominal tergites convex, with narrow median longitudinal groove. Tergites I–VI in posterior half with minute spinules forming a rounded or transversely elongate cluster on each side, in pleural region (lateral to spiracles) with paired, close-set large acute spinules apically directed backward. Tergite VII elongate, posteriorly broadly rounded, medially with specklike spinules forming transversely extended cluster, laterally in anterior half with pair of close-set spinules. Tergite VIII short, transverse, on disk with very minute, specklike spinules forming transverse row. Tip of abdomen obtuse, laterally bound by U-shaped ridge set with short conical setigerous spinules (six spinules on each side and two dorsally). Valvifers of female elongate, apically rounded, with small brownish tubercle, contiguous. Body length up to 19 mm, width of abdomen 3.5 mm.

Material: Collected in Altai, Salair, Tuva, and Ussuri-Primor'e

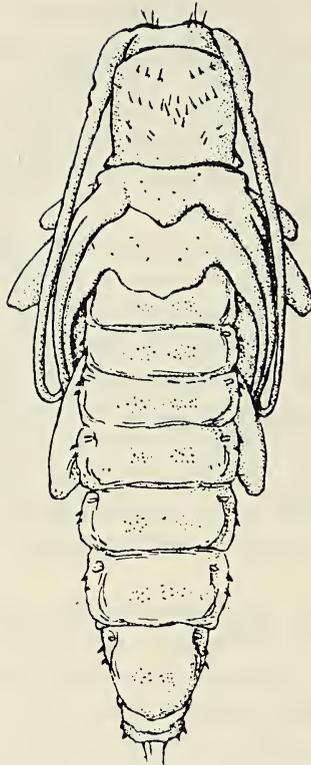


Fig. 73. Pupa of *Oberea depressa* (Gebler).

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region. Adults 46, larvae 74, pupae 4 (males and females), larval exuviae with beetles from cells 8.

Distribution: Northern Asia from northern Kazakhstan, Altai, Tuva to coasts of Sea of Japan. Northern China, Korean peninsula.

Biology: Inhabits forest plantations where, among other species, honeysuckle (*Lonicera* sp.) grows. It ascends mountains up to 1,000 m. Flight of beetles commences mid-June and continues up to mid-August. Beetles remain on shoots of growing honeysuckle where they mate and the females oviposit. The female initially makes a cavity on the shoot, then lays an egg through it under the bark. Diameter of infested shoots 1.5–4.0 cm. Larvae hatch from eggs after two–three weeks. They initially live under bark, nibble a small area, then bore into wood, and there make a longitudinal gallery, throwing frass out through ventilation holes. Length of gallery up to 30 cm or more. Larvae hibernate twice. After second hibernation they make a cell and isolate it from above and below with frass. Length of cell 20–25 mm,

width 4.0–4.5 mm. Pupae lie in cells with head upward. Pupation commences May-end and is completed by June-end. Pupal stage lasts for about 2.5 weeks, possibly more. In one instance, a pupa was found on June 7th and the beetle developed from it on June 23rd. The atmospheric temperature varied from 5° to 29°C, average 15.1°C. After development, beetles remain in cells for up to six–eight days and, on emergence from cells, require supplementary feeding. Generation—two-year cycle. During metamorphosis insect weight reduces markedly. Three larvae before pupation weighed 342 mg and the beetles before emergence from cells 252.5 mg, i.e., their weight reduced by 26.2%. Based on 12 specimens, larvae before pupation weigh 86–174 mg (114.9 ± 8.5), pupae 70–156 mg (101.6 ± 7.6), young beetles before emergence from cells 56–120 mg (81.6 ± 5.9).

We found *Oberea depressa* (Geb.) on honeysuckle (*Lonicera altaica*, *L. tatarica*). Not found on other plant species.

3. *Oberea inclusa* Pasc.

Pascoe, 1858. *Trans. Entom. Lond.*, 2, 4: 261; — *vittata* Blessig, 1873. *Horae Soc. Entom. Ross.*, 9: 223; Bates, 1888. *Proc. Zool. Soc. Lond.*, 380; — *discipennis* Fairmaire, 1889. *Ann. Soc. Entom., Fr.*, 9, 6: 68; — *Longissima* Pic, 1905. *Longic.*, 5, 2: 15; — *amurica* Suvorov, 1913. *Russk. entom. obozr.*, 13, 1: 78; Plavil'shchikov, 1932. *Zhukidrovoseki vrediteli drevesiny*, 195 (*O. vittata* Bless.); Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 218 (*O. vittata* Bless.); — *m. partenogrescens* Breuning, 1961. *Frust. Ent.*, 4: 203; Breuning, 1967. *Catal. Lamiair. (Col., Ceramb.)*, 10: 822; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 161.

Adult (Fig. 74): Readily recognized by large black punctation on elytra, the punctures forming distinct longitudinal rows. Body fairly elongate, in male slender, in female notably larger and thicker. Head short, frontally (on frons) convex, with barely produced antennal tubercles, between them with median longitudinal groove, with deep punctation, glabrous or with sparse (female) or dense white compact adherent pubescence forming fine pattern on frons and narrow white longitudinal band on sinciput (male), with minute black erect hairs. Eyes very convex, finely faceted, deeply emarginate. Lower ocular lobes thrice (male) or twice (female) longer than genae. Antennae barely reaching (male) or definitely not reaching (female) apex of elytra, on lower side with dark brown bristles, with brownish (dorsally) or grayish (ventrally) fine pubescence.

Pronotum more (female) or less (male) transverse, parallel-sided, laterally slightly rounded, disk uniformly convex, basally with narrow

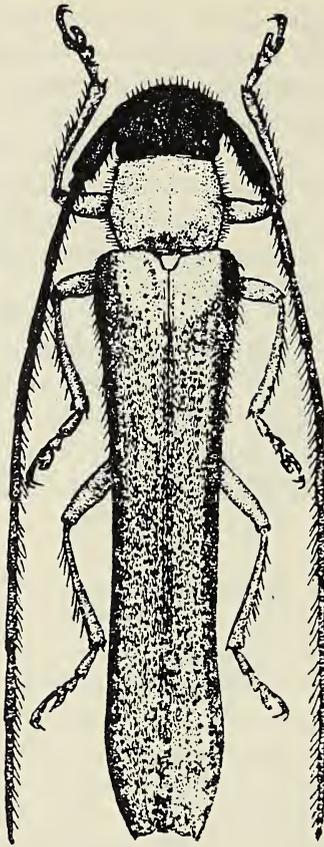


Fig. 74. *Oberea inclusa* Pasc.

transverse groove, with dense faint punctation, with numerous thin erect hairs, at posterior margin before pronotal shield with yellowish-golden setiform hairs forming fringe. Pronotal shield small, barely tapering posteriorly, at apex transversely truncate, broadly rounded or even slightly emarginate, with tender yellow adherent hairs.

Elytra elongate, parallel-sided, posteromedially slightly enlarged, basally with rounded (not projecting) smooth humeral tubercle, apically obliquely truncate or incised, with barely or distinctly produced angle, disk mildly convex (almost flat), with narrow perisutural groove, large round black punctures forming uniform longitudinal rows, fine compact adherent grayish pubescence not masking black punctures, in anterior third with fine bright erect hairs. Legs comparatively short, with sparse pubescence; femora slightly thickened, hind femora elongate, midtibiae at outer margin with shallow oblique distal notch bearing brush of short

golden bristles. Body ventrally with short adherent grayish or yellowish pubescence and isolated bright raised hairs. In male sternite V of abdomen broadly depressed almost from base to posterior margin, with extended posterior angles; tergite V oblong, mildly convex, at posterior margin arcuately curved. In female sternite V more convex, in posterior half with small flat impression, medially with narrow longitudinal groove, at posterior margin gently emarginate; tergite V at posterior margin convex, with insignificantly compressed posterior margin. Head and antennae black. Pronotum and shield rusty-red. Elytra laterally and along suture black or blackish-brown, medially much brighter, with yellowish tinge, basally (near shield) bright rust, laterally at base with yellowish-rust fringe. Legs yellowish-rust, hind tibiae apically with brownish tinge. Pro-, meso-, and metasterna and first three sternites of abdomen black or blackish-brown, sternite IV and sides of sternites I–III bright rust, tip of abdomen black. Body length 12–16 mm (male), 13–19 mm (female).

Egg: Yellowish, elongate, almost entirely gently rounded at poles. Chorion matte, with fine noncellular sculpture. Length 3.0 mm, width 0.9 mm.

- 128 *Larva* (Fig. 75): Similar to the larva of *Oberea depressa* (Gebl.) but readily distinguished from it by much larger spinules on pronotal shield and deep notch at base of spinous field. Body elongate, white, with yellowish tinge. Head parallel-sided, half retracted into prothorax. Epistoma yellowish, mildly convex, divided by groove-like (medial) suture, laterally fusing with temporo-parietal lobes (frontal sutures faint), at anterior margin with narrow rusty-brown fringe, behind it with 8–10 uniformly dispersed hairs forming uniform transverse row. Hypostoma parallel-sided, distinctly convex, somewhat rusty, sometimes in posterior half whitish, anteromedially with short hairs forming transverse row. Temporo-parietal lobes of general bright yellowish tinge, fusing with epistoma, at anterior margin with brownish-rusty fringe barely covering ocular-antennal zone, with thin setiform hairs forming common transverse row together with hairs of hypostoma and epistoma, behind fringe with two transversely set, pigmented spotlets. Antennae short, barely projecting from antennal sockets. Ocelli ampullaceous, whitish or with brownish tinge, situated below antennae. Clypeus large, transverse, trapezoid, whitish basally with slight rusty tinge. Labrum transverse, at anterior margin gently or angularly rounded, in anterior half whitish, with sparse coarse bristles, tapering toward base, here glabrous, somewhat rusty. Mandibles elongate, black, basally reddish, with uneven depression and along its anterior margin five coarse bristles forming transverse row curved forward, apically obliquely

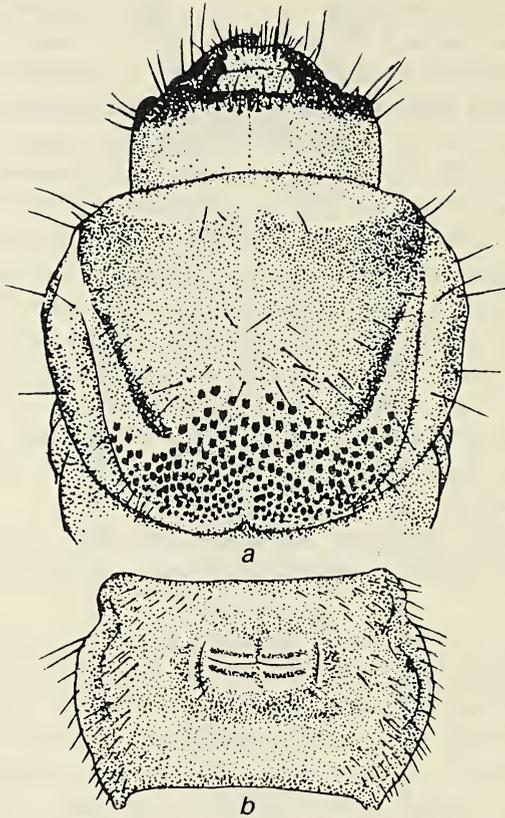


Fig. 75. Larva of *Oberea inclusa* Pasc.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

truncate, with produced ventral and projecting dorsal denticle, on inner side with acute ridge extending from ventral denticle dorsad.

Pronotum transverse (ratio of width to length 7 : 5), highly inclined toward head, at anterior margin with entire whitish fringe, behind it lustrous, rusty, medially with narrow white longitudinal band, in anterior third laterally with long, on disk short setiform hairs forming uniform or interlacing transverse row, before shield with short hairs. Pronotal shield quite convex, posteriorly rounded, medially at posterior margin depressed, laterally demarcated by long longitudinal folds, with large and minute (gradually reducing backward) flat spinules forming in general background of spinous field distinct transverse rows curving forward. Spinous field at base with whitish interspace, at anterior angles with deep, obliquely situated, straight grooves (goovelike impressions) extending from here toward anterior angles of pronotum, at posterior

edge with thin rusty hairs. Mesonotum coriaceous, without spinules, with rusty irregular hairs forming transverse row. Metanotum on disk with two transverse sclerotized, somewhat rusty bands divided by whitish transverse groove. Prosternum laterally with yellowish lustrous glabrous square, on disk (in region of eusternum) with sparse rusty hairs. Meso- and metasterna on disk with minute dense spinules forming two transverse sclerotized bands separated from each other by whitish transverse groove.

Abdomen elongate, parallel-sided, laterally with sparse rusty hairs, with moderately convex locomotory ampullae. Dorsal locomotory ampullae transversely elongate, sclerotized, with minute dense spinules, divided medially by deep whitish, sometimes recurved, transverse groove uniting laterally with short longitudinal grooves. Ventral locomotory ampullae similar. Tip of abdomen with rusty, not very long hairs. Body length of last instar larvae 20–24 mm, width of head up to 2.0 mm.

In first instar larvae segments I–VII or I–V of abdomen bear well-developed, lateral sclerotized spinules that disappear in subsequent instars.

Pupa (Fig. 76): Very similar to the pupa of *Oberea depressa* (Gebl.). Distinguished from it by distinct longitudinal groove on head between antennal tubercles, very minute, barely perceptible bristles on pronotum, and other characters. Body elongate, white, with yellowish tinge. Head short, almost transverse (in anterior view), frontally convex, between antennal tubercles with distinct longitudinal groove, along sides of it, inner to antennal tubercles, with somewhat rusty bristles (four–five) forming small cluster, in front of it with very minute, bright wide-set bristles forming longitudinal row on each side, at anterior margin with barely perceptible bristles (up to six) in transverse row. Labrum triangular, apically very acute, disk lustrous, glabrous, without bristles. Mandibles on outer side with two–three barely perceptible bristles or without them. Antennae in second half bent forward, their apices flexed to sides of head.

130 Pronotum transverse, narrowing in anterior third, basally with narrow groove, with barely recurved posterior angles, disk uniformly convex, with very minute, quite sparse, bright bristles (forming transverse row anteromedially but laterally highly dispersed). Mesonotum lustrous, mildly convex, posteromedially transversely (saddlelike) depressed, at posterior margin with barely produced shield. Metanotum mildly convex, posteriorly broadly rounded, medially with narrow longitudinal groove, lustrous, without bristles.

Abdomen elongate, slightly enlarged in region of segments IV–V,

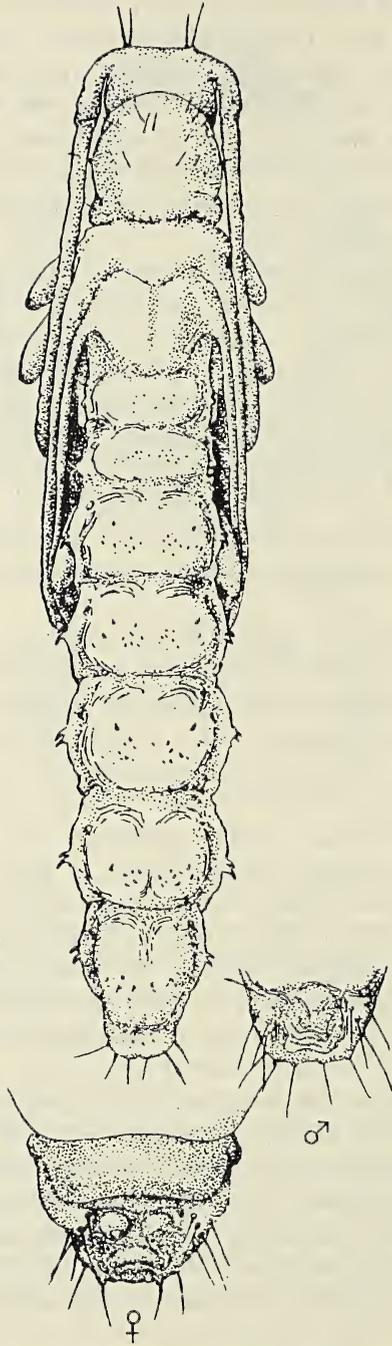


Fig. 76. Pupa of *Oberea inclusa* Pasc.

tapering toward base and tip. Abdominal tergites I–VI convex, posteromedially with a few very minute (on tergites I–II) or numerous large (on tergites III–VI) spinules forming transversely elongate cluster interrupted on disk by narrow longitudinal groove. Tergite VII convex, apically more or less broadly rounded, posteromedially with much larger acute spinules forming narrow transverse band. Tergite VIII transverse, posteriorly broadly rounded, on disk with acute minute spinules forming one or two interlacing transverse rows. Tip of abdomen obtuse, bound by U-shaped ridge bearing minute setigerous spinules. Valvifers of female elongate, slightly wide-set. Body length 14–18 mm, width of abdomen up to 3.5 mm.

Material: Collected in Ussuri-Primor'e region. Adults 117, larvae 193, pupae 27 (males and females), larval exuviae with beetles from cells 45.

Distribution: Northern Asia from Baikal to coasts of seas of Okhotsk and Japan. Northeast China, Korean peninsula, Japan.

Biology: Most populous in the forests of Ussuri-Primor'e region. Inhabits niches in rarefied deciduous forests, forest glades overgrown with bushes of hazelnut, *Lespedeza*, Altai birch (*Betula fruticosa*, *B. ovalifolia*), and other species. Flight of beetles commences in second half of June and continues up to August. Beetles maximum in July. They remain on shoots of host plants and mate there. Females oviposit on apical nascent part of shoots up to 1.5 mm diameter. For this purpose, the female first nibbles the shoot circularly at one place (makes a transverse cut around the shoot), then at another place (2–3 cm below) above the second ring, makes a longitudinal incision in the bark through which it introduces its ovipositor, and lays an egg with the cranial pole downward under the bark through the longitudinal cut. After oviposition on one shoot, it flies to another. One egg laid per shoot. Egg stage lasts for 18–25 days, average 20.2 ± 0.3 days. We kept 27 eggs under observation. The atmospheric temperature during this period varied from 13° to 26°C, average $20.2 \pm 0.1^\circ\text{C}$. Larval hatching commences in July and is completed in August or early September.

On hatching, larvae bore into wood of shoot, penetrate to heartwood, and make downward gallery through it. A round ventilation hole is made in the wall and fine frass consisting of fecal matter is discarded through it. Ventilation holes appear infundibular from the inner side and the larva inserts its posterior end into the hole and evacuates the gut. The feces appear as granules or nodular threads, as if pressed through the ventilation hole, and accumulate in a small heap at the base of the shoot. Such a mode of gut evacuation is typical of all species of the genus *Oberea* Muls.

Larvae live for about two years and during this period make a gallery up to 57 cm long or more and 3–4 mm wide. After the second hibernation, in May or June, the larva makes a cell and isolates it from above and below with a plug of fibrous frass. Length of cell 4–10 cm, width 3–4 mm. The cell is made at a height of up to 17–20 cm or near
 131 the root of the shoot. If the shoot is short, the larva goes deeper into the root and makes a longitudinal gallery there. The pupal cell is made in the basal (underground) part of the stem. Often before the second hibernation, the larva nibbles the shoot from inside and it breaks here, the larva remaining in the underground part of the shoot and filling the terminally exposed gallery compactly with fibrous frass. Sometimes before pupation the larva nibbles a longitudinal hole outward and plugs it with frass. This hole subsequently serves as an exit for the beetle. The cell is made below the exit hole.

Pupation commences in May and is completed in June. Under laboratory conditions, at a temperature of 15.6°–19.0°C (average 17.5±0.1°C), pupae completed development in 17–20 days (average 18.2±0.4). We kept 11 pupae under observation. Emergence of beetles from pupae commences in second half of June and continues almost to mid-July. The developed beetle breaks the upper plug, scrapes away frass, and escapes through the hole made by the larva before pupation or through the exposed gallery at the end of the shoot. Young beetles require supplementary feeding and chisel the bark or young tissues from the leaves of hazelnut and other host plant species. Generation—two-year cycle (Table 8). Before pupation larvae weigh 42–140 mg (85.1±4.1), pupae 38–122 mg (75.4±3.7), young beetles before emergence from cells 32–98 mg (59.7±2.8). Weight records of 34 insects were kept.

Oberea inclusa Pasc. infests the shoots of many deciduous woody and bushy plant species. In every case, they attack viable thin shoots. Knots in the crown are damaged on thick-stemmed trees. Young trees are damaged more often. During forest inspections 182 specimens (larvae, pupae, beetles) were collected—49 from birch (*Betula ovalifolia*, *B. fruticosa*), 38 bush clover, 36 hazelnut, 31 alder, 19 acanthus, 6 hornbeam, and 3 from montane elm. In 1982, in forests of various species composition in the southern spurs of Sikhote-Alin' and in

Table 8. Development of *Oberea inclusa* Pasc.

Year	April	May	June	July	August	September
1st	L	LP	LPA	PAE	AEL	L
2nd	L	L	L	L	L	L
3rd	L	LP	LPA	PAE	AEL	L

Pogranichnoe-Kamen'-Rybolov region, 76 larvae were collected, from which pupae and beetles were raised—22 on maple, 21 acanthus, 19 *Lespedeza*, 8 hazelnut, 5 birch, and 1 on the undergrowth of Mongolian oak.

4. *Oberea herzi* Ganglb.

Ganglbauer, 1887. *Horae Soc. Entom. Ross.*, 21: 23; — *coreana* Pic, 1912. *Mat. Longic.*, 8, 2: 21; — *licenti* Pic, 1939. *Echange*, 55 :3; Gressitt, 1951. *Longic. Beetles of China*, 2: 596 (593); Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 162 (+ ssp. *teranishii* Ohb.).

Adult (Fig. 77): Distinguished from other species of the genus *Oberea* Muls. by a combination of the following characters: head and antennae black, pronotum red, elytra yellow, with blackened humeri. Body comparatively slender, long. Head frontally highly convex, medially with narrow longitudinal groove, with antennal tubercles produced laterally, with dense punctation, gray adherent, not very dense pubescence and short erect, somewhat rusty hairs. Eyes large, very convex, finely faceted, deeply incised, drawn closer to base of mandibles. Genae short, two (female) or three (male) times shorter than lower ocular lobe. Antennae barely short of reaching apex of elytra, with very minute dark brownish adherent hairs, inner to 1st–7th segments with a few long black bristles.

Pronotum squarish (female) or oblong (male), parallel-sided, almost cylindrical, with barely recurved posterior margin, irregular, sometimes vanishing punctation, medially in posterior half with longitudinal, sometimes faint, smooth ridge, with somewhat rusty, not very dense, adherent and erect setiform rusty hairs. Pronotal shield small, narrowing posteriorly, apically transversely truncate, with dense rusty adherent hairs.

Elytra elongate, parallel-sided, basally with straight humeri, humeral tubercle narrowly rounded (generally smooth), lustrous, apically obliquely obtuse, posterior angles gently rounded, with large round punctures forming longitudinal rows, gray compact adherent pubescence, long (in anterior third) setiform erect or raised hairs forming longitudinal rows. Legs with minute sparse yellowish pubescence. Midtibiae at outer margin with distal notch covered with golden-yellow bristles. Body ventrally with thin compact adherent pubescence, short semierect hairs. Abdominal sternite V in second half with perceptible triangular depression (male) or disk convex, with narrow longitudinal groove (female) or mildly convex (male). Head black. Antennae black or dark brown with somewhat rusty tinge. Pronotum red. Pronotal shield reddish-rust or dark brown. Elytra yellow, with blackened

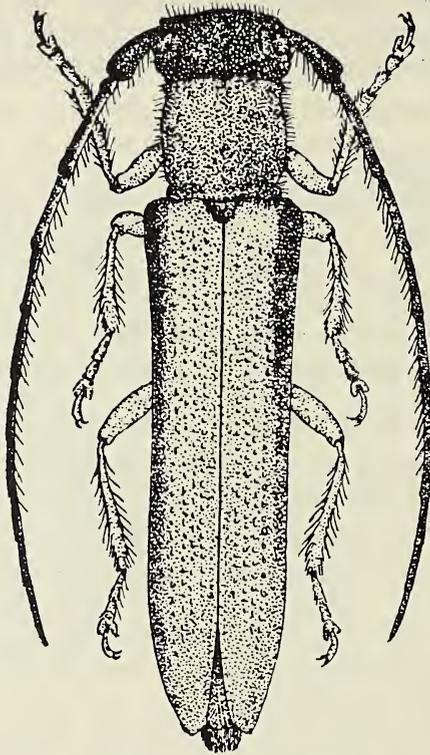


Fig. 77. *Oberea herzi* Ganglb.

humeri. Often black humeral spot enlarging, becoming a lateral longitudinal band. Legs somewhat rusty. Pro-, meso-, and metasterna black. Abdomen on sternites I-IV black, at tip red or entirely black. Body length 9-12 mm.

Egg: White with yellowish tinge, elongate, slightly tapering toward caudal pole, broadly rounded at poles. Chorion smooth, matte, without cellular sculpture. Length 2.8 mm, width 0.5 mm.

Larva (Fig. 78): Quite similar to the larva of *Oberea chinensis* Tsher. Distinguished from it by weaker sclerotization of locomotory ampullae, sparse hairs at tip of abdomen, and other characters. Body elongate. Head parallel-sided, barely retracted into prothorax, epistoma convex, lustrous, with yellowish tinge, at anterior margin with narrow rusty-brown fringe bearing faint setigerous pores in transverse row, medially divided by narrow groove-like longitudinal suture, laterally fusing with temporo-parietal lobes, frontal sutures not perceptible. Hypostoma uniformly convex, parallel-sided, with straight or acute anterior angles, somewhat rusty, medially with longitudinal whitish

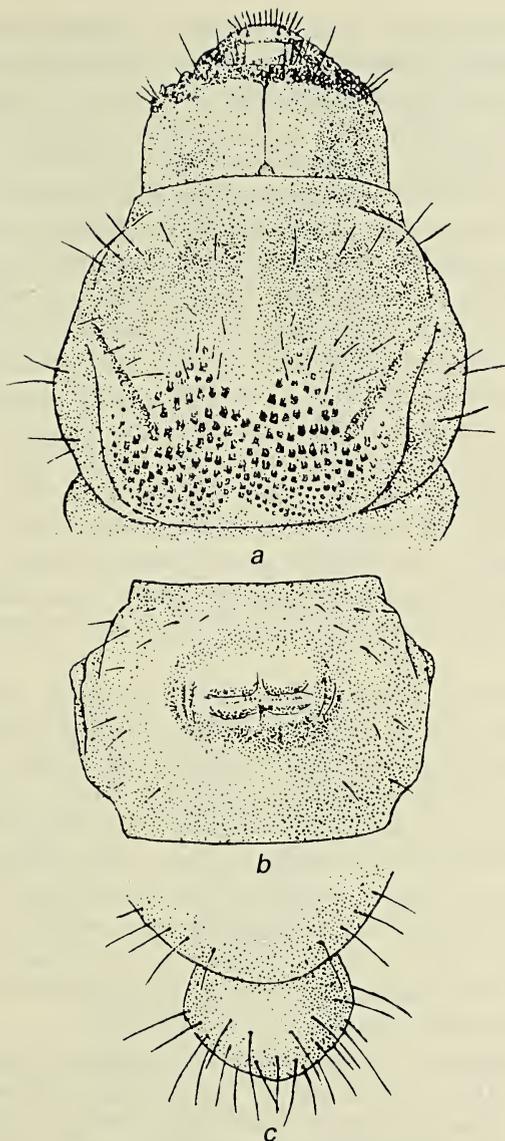


Fig. 78. Larva of *Oberea herzi* Ganglb.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

band, at posterior angles (in posterior half) much brighter. Temporo-parietal lobes bright yellowish, at anterior margin and on lower side somewhat rusty or rusty-brown. Antennae thin, short, slightly whitish, barely projecting from antennal sockets. Ocelli pigmented, one at base

of antennae, second some distance behind it. Clypeus short, trapezoid, lustrous, brownish. Labrum transversely oval, at anterior margin broadly rounded, with short dense, somewhat rusty bristles. Mandibles comparatively short, apically sloping, black, basally reddish-rust.

Pronotum parallel-sided, highly inclined toward head, basally more convex (raised), at anterior margin laterally with whitish fringe, behind it somewhat rusty, lustrous, in anterior third with solitary hairs forming transverse row laterally, with narrow (tapering toward apex) straight grooves extending obliquely from shield dorsally to anterior angles, medially with whitish longitudinal band. Pronotal shield with dense, transversely elongate, scaly recurved spinules forming transverse, gently bent forward rows. Spinules at anterior margin minute, specklike, forming two faint triangles. Pronotum laterally with sparse bright hairs.

134 Abdomen elongate, laterally with sparse short bright hairs. Dorsal locomotory ampullae convex, medially divided by transverse groove fringed anteriorly and posteriorly with sclerotized band of very minute brownish spinules. Ventral locomotory ampullae similar. Tip of abdomen (segment X) gently rounded, with sparse short, somewhat rusty hairs. Body length of last instar larvae 15–18 mm, width of head 1.2 mm.

Pupa (Fig. 79): Distinguished from the closely related species *Oberea chinensis* Tsher. by sparse solitary bristles on pronotum and location of spinules on abdominal tergites. Body elongate. Head frontally convex, medially with faint longitudinal groove, inner to frontal tubercles with more (male) or less (female) developed rusty bristles forming longitudinal row, lateral to frons with solitary bristles, at anterior margin (in region of clypeus) with four bristles in transverse row. Labrum triangular, lustrous, apically acute, without bristles. Mandibles lustrous, without bristles (female) or with a barely perceptible bristle (male). Antennae flexed laterad, ventrally bent forward looplike, their apices adjoining midtibiae or sides of head.

Pronotum square or slightly transverse, laterally slightly rounded, basally with faint narrow transverse groove, with recurved posterior angles, disk convex, in anterior half with barely perceptible, short bristles forming transverse row laterally at anterior margin (sometimes on disk). Mesonotum transverse, at posterior margin almost directly transversely truncate, lustrous, without bristles. Metanotum uniformly convex, lustrous, medially with more or less distinct longitudinal groove, without bristles, at posterior margin directly truncate, with rounded posterior angles.

Abdomen elongate, in region of segment V slightly enlarged, gradually tapering anteriorly and steeply posteriorly. Abdominal ter-

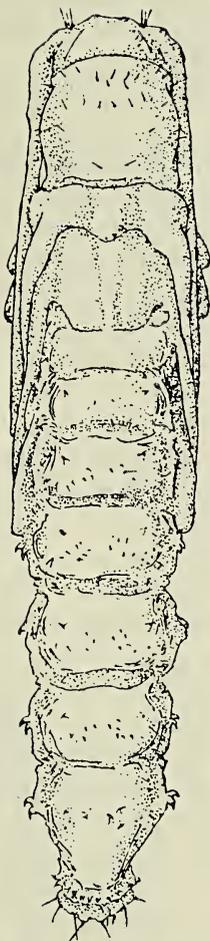


Fig. 79. Pupa of *Oberea herzi* Ganglb.

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gites convex, with faint median longitudinal groove, posteromedially with minute spinules forming transverse band, laterally with one much larger spinule. Segments III–VII on lateral pleural fold with pair of close-set acute recurved spinules. Tergite VII convex, in posterior half narrowing conically, medially with acute spinules forming transverse band. Tergite VIII short, at posterior margin broadly rounded, basally with pair of transversely extended, barely perceptible, setigerous spinules. Tip of abdomen obtuse, bound by flat U-shaped ridge bearing long, basally sclerotized bristles. Valvifers of female lustrous, brownish, bent toward each other. Body length 12.0–16.5 mm, width of abdomen 2.8 mm.

Material: Collected in Ussuri-Primor'e region (Kaman'- Rybolov, Troitsk, Okeansk). Adults 16, larvae 17, pupae 7 (males and females), exuviae of larvae and pupae 10.

Distribution: Southern parts of Ussuri-Primor'e region. Northeast China.

Biology: Inhabits rarefied deciduous plantations. Occupies niches mainly along forest fringes with a grass cover containing leguminous plants. Ecologically associated with *Sophora flavescens*, possibly with other species of leguminous plants. Flight of beetles in June and July. Females make a cut on the stems of growing plants at a height up to 32 cm or more and oviposit through it. Stems up to 5–6 mm diameter are infested. After hatching, the larva makes a gallery through the heartwood and here and there in the wall of the stem bores ventilation holes through which fine frass is discarded. The stem is often nibbled from inside at a height of 10–12 cm and the apical part subsequently breaks off, in which case the larva compactly plugs the end of the gallery with fibrous frass. Sometimes the larva penetrates the root zone and the gallery there is packed with fine frass. One larva inhabits one stem. Before the second hibernation, the larva makes a pupal cell in the underground part of the stem and undergoes a second hibernation in it. Length of cell 4–9 cm, width 3–4 mm. In spring (May–early June) larvae pupate. Pupae lie in cells with head upward. After 2.5–3.0 weeks, beetles emerge from the pupae. In the laboratory, at temperatures of 15.6°–19.0°C ($16.8 \pm 0.4^\circ\text{C}$), beetles emerged 18–21 days after pupation. Four pupae were under observation. Generation—two-year cycle. During metamorphosis the weight indices of females (based on 13 insects) vary markedly; larvae before pupation 51–85 mg (65.2 ± 3.1), pupae 44.5–78.0 mg (57.7 ± 3.1), beetles before emergence from cell 34.5–65.1 mg (48.3 ± 2.7); males (based on four insects) correspondingly weigh 37–46 mg (41.9 ± 1.9), 32–40 mg (37.1 ± 1.8), and 26.3–32.0 mg (29.7 ± 1.2).

Oberea herzi Ganglb. infests stems of *Sophora* sp. While examining thickets of *Sophora*, 28 larvae were collected from the stems and pupae and adult insects were raised from them. Not found on other plants.

5. *Oberea japonica* (Thun.)

Thunberg, 1787. *Mus. Nat. Acad. Upsal.*, 4: 57 (*Saperda*); — *nipponensis* Bates, 1884. *Journ. Linn. Soc. Lond., Zool.*, 18: 260; Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 72: 215–217; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 161; — *laterifusca* Breuning, 1947. *Misc. Entom.*, 44: 58; — *infraniorescens* Breuning, 1947. *Misc. Entom.*, 44: 58.

Adult (Fig. 80): In general features, similar to *Oberea depressa* (Gebbl.). Well distinguished from it by highly elongate outer angle at apex of elytra and location of punctures on them. Body elongate. Head short, frontally convex, with antennal tubercles entirely produced laterally, with deep median longitudinal groove between them, with minute deep, not very dense punctation, somewhat sparse, rusty adherent pubescence (male) or without it (female), and black erect hairs. Eyes very convex, large, finely faceted, deeply emarginate. Genae very short, three (female) or four (male) times shorter than lower ocular lobe. Antennae gradually tapering toward apex, with sparse brownish adherent pubescence, on lower side with sparse bristles. First antennal

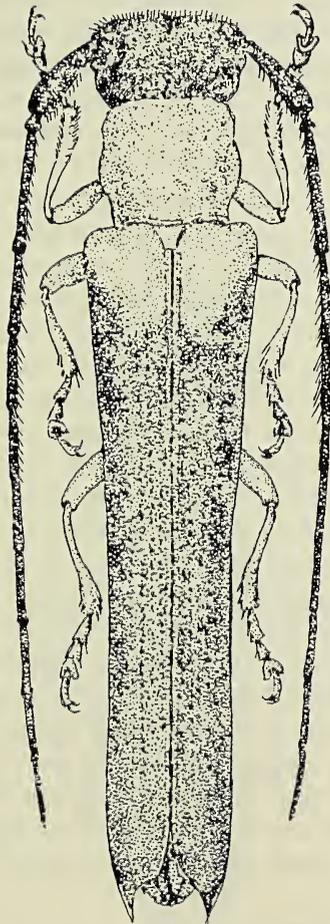


Fig. 80. *Oberea japonica* (Thun.).

segment not shorter than 3rd, distinctly longer than 4th.

Pronotum slightly transverse (female) or almost square (male), basally with narrow distinct, apically gentle faint transverse groove, with indistinct or fully distinct, comparatively dense punctation, minute erect (female) or dense adherent (male) rusty hairs, at posterior margin before shield with long yellow hairs or without them. Pronotal shield narrowing toward apex, posteriorly rounded, with bright yellow hairs.

Elytra elongate, distinctly tapering from humeri posteriorly, basally with barely projecting, narrowly rounded, humeral tubercle, apically obliquely truncate with long aciculary produced outer and rounded inner angles, on disk beyond base appears somewhat flat, with narrow perisutural groove, at base with much larger, toward apex with minute punctures forming distinct longitudinal rows (in this feature, closer to *Oberea inclusa* Pasc.), with fine compact adherent gray pubescence not masking punctation, with sparse short bright erect hairs (especially in anterior third). Legs with yellowish compact adherent, not dense pubescence. Midtibiae at outer margin with deep oblique distal notch bearing dense brush of short golden-yellow bristles. Body ventrally with comparatively dense, short compact adherent yellowish pubescence. Abdominal sternite V mildly depressed, apically deeply emarginate, lateral to notch rounded (male) or short, convex, medially with longitudinal groove, apically broadly emarginate, with angularly extended posterior angles (female). Tergite V elongate, insignificantly convex, apically broadly rounded (male) or more convex, steeply sloping toward apex, here with dense black setiform hairs, at posterior margin angularly emarginate (female). Head and antennae black. Pronotum, pronotal shield, legs, and ventral side of body yellow or rusty-yellow, hind tibiae apically with brownish tinge, tip of abdomen black. Elytra dark brown, laterally much darker, basally rusty-yellow, lateral to humeral tubercle with bright yellowish fringe. Body length up to 17 mm (male), 18–20 mm (female).

Material: Several adult insects were examined in the collections of the Zoological Museum, Moscow State University.

Distribution: Northeast China, Korean peninsula, Taiwan, Japan. Not found in the territory of the Soviet Union. Its occurrence is possible in the southeastern parts of Ussuri-Primor'e region.

Biology: Occupies isolated patches of broad-leaved forests. Flight of beetles in July. Develops on various species of plum (*Prunus persica*, *P. avium*, *P. yedonensis*, *P. tomentosa*, and others), *Cinnamomum camphore*, and other plants (Kojima and Okabe, 1960).

6. *Oberea transbaicalica* Suv.

Suvorov, 1913. *Russk. entom. obozr.*, 13, 1: 78; Pic, 1915. *Longic.*,

9, 2: 10; Breuning, 1967. *Catal. Lamiar. (Col., Ceramb.)*, 8: 824.

Adult (Fig. 81): Close to *Oberea depressa* (Gebl.). Distinguished from it by elytra black, more convex on disk, and other characters. Body moderately elongate, virgate. Head short, frontally significantly convex, with antennal tubercles produced laterally, from frons toward occiput rounded, medially with narrow groove between antennae, sometimes flat, with large deep, comparatively uniform punctation and short black erect hairs, in anterior half of frons with sparse (female) or somewhat dense (male) gray adherent pubescence. Eyes convex, finely faceted, broadly emarginate. Lower ocular lobes twice longer than genae. Antennae thin, not extending or barely extending to apex of elytra, on upper side with minute brownish, on lower side yellowish-gray, not dense adherent pubescence; on 1st-7th segments with thin bright brown bristles. First antennal segment gradually and moderately enlarging toward apex, with dense punctation, distinctly shorter than 3rd segment, slightly longer than 4th or equal to it.

Pronotum slightly transverse or square, parallel-sided, basally with barely recurved margin, uniformly convex, often with irregular deep

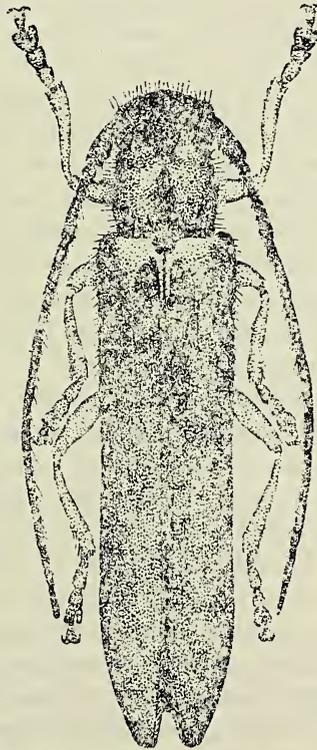


Fig. 81. *Oberea transbaicalica* Suv.

punctuation, with grayish adherent pubescence (appearing fluffy) forming narrow fringe at anterior margin and transverse, angularly forward extending band anteromedially, with thin bright erect hairs (fringe and transverse band distinct in some individuals, faint or totally imperceptible in others). Pronotal shield small, narrowing posteriorly, apically transversely incised or broadly rounded, with minute punctuation and thin, somewhat rusty, not dense, adherent hairs.

Elytra elongate, parallel-sided, basally with insignificantly projecting humeral tubercle, apically obtuse, with rounded outer and straight or narrowly rounded inner angle, disk uniformly convex, with narrow perisutural groove, lateral to shield with much larger, in remaining part minute uniform punctuation, dorsally with tender adherent grayish (not masking punctuation), on sides dark brown sparse pubescence (therefore elytra appear edged laterally with dark band), basally with erect solitary hairs. Legs with somewhat sparse rusty pubescence. Femora uniformly thickened. Midtibiae at outer margin with shallow distal notch bearing sparse yellowish bristles. Body ventrally with short compact adherent grayish or yellowish pubescence. Abdominal sternite V slightly convex, apically depressed, without longitudinal groove (male) or fully convex, with narrow median longitudinal groove (female). Tergite V slightly convex (male) or apically (in lateral view) tubercularly convex (female). Head, antennae, and pronotal shield black. Pronotum reddish-rust, basally with broad or narrow black fringe, from which arise long medial band (up to anterior margin) and short lateral bands (one on each side as a protuberance). Elytra black, at base of shield with yellowish, transversely elongate spot, laterally at base with narrow yellowish fringe. Pro-, meso-, and metasterna black. Abdominal sternites on disk black, laterally rusty-red. Sternite V and tergite V reddish-rust. Legs bright rust, hind tarsi and apex of hind tibiae with faint brownish tinge. Body length 13–18 mm.

Larva (Fig. 82): Similar to the larva of *Oberea inclusa* Pasc. Well distinguished from it by elongate (slitlike), almost drooping spiracles of abdomen and large spinules on pronotum forming more than half of spinous field. Body yellowish. Head half retracted into prothorax. Epistoma laterally with faint frontal sutures, medially divided by longitudinal suture, here broadly depressed, at anterior margin with brownish or somewhat rusty, raised (perceptibly convex) fringe, behind it with long and short bristles forming transverse row. Hypostoma slightly narrowing anteriorly, at anterior margin transversely truncate, at posterior margin deeply incised, insignificantly convex, somewhat rusty, in posterior half whitish, with rounded anterior angles, anteromedially with four bristles in transverse row. Temporo-parietal lobes

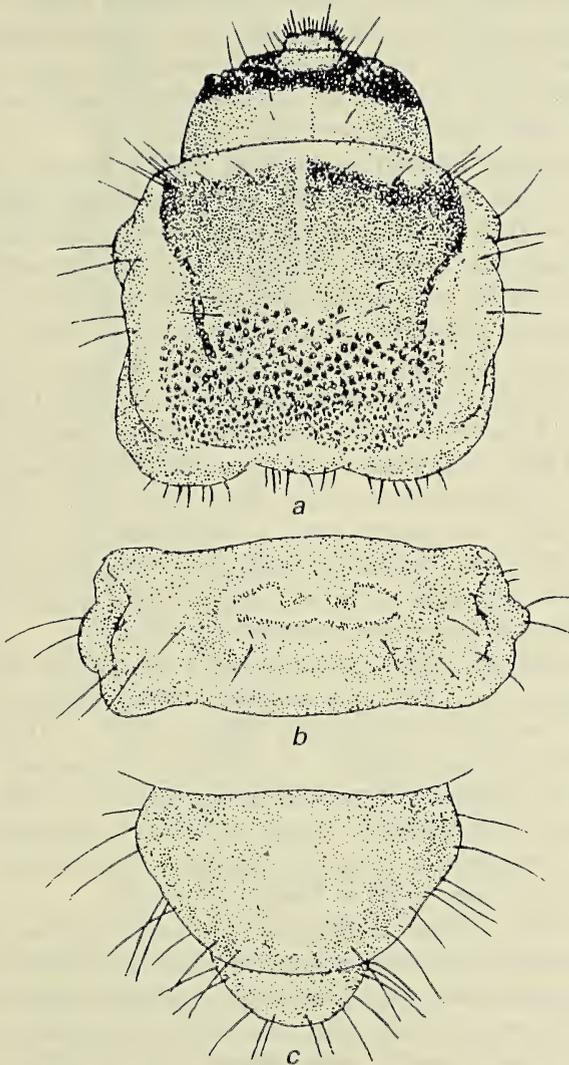


Fig. 82. Larva of *Oberea transbaicalica* Suv.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

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with somewhat rusty tinge, at anterior margin with brownish-rust fringe
138 covering ocular-antennal zone, with long thick piliform bristles com-
prising interlacing transverse row. Antennae whitish, with apices barely
projecting or not projecting from antennal sockets. Ocelli (below an-
tennae) convex, pigmented. Clypeus trapezoid, perceptibly convex,

whitish, basally slightly rusty. Labrum comparatively small, at anterior margin broadly rounded, toward base tapering, in anterior half whitish, with dense rusty bristles, in posterior half somewhat rusty, glabrous. Mandibles moderately elongate, apically obliquely truncate, with acutely produced ventral and projecting dorsal denticle.

Pronotum steeply inclined toward head, basally convex, at anterior margin with whitish fringe, posteriorly with bulge on each side, behind fringe rusty, medially in anterior half with narrow streaklike whitish longitudinal band, near anterior margin and before shield with wide-set setiform hairs forming correspondingly two transverse rows, on sides with deep oblique groove-like impressions extending from shield to anterior angles of pronotum. Pronotal shield with large, in posterior third minute, apically rounded, recurved spinules. Spinous field at apex broadly rounded, posteriorly perceptibly emarginate, basally with short setiform rusty hairs. Mesonotum coriaceous, on disk and laterally with solitary hairs. Metanotum on disk sclerotized, with very minute spinules, laterally with sparse hairs in transverse row. Prothoracic presternum with sparse, basisternum with dense rusty hairs. Eusternum glabrous. Meso- and metasterna with minute rusty spinules forming transverse band divided by deep transverse groove.

Abdomen elongate, slightly tapering toward tip, laterally with sparse rusty hairs. Spiracles of abdomen elongate, slitlike, almost drooping, ratio of their maximum to minimum diameter 2.5 : 1. Dorsal locomotory ampullae convex, divided by common longitudinal groove, sclerotized, with very minute spinules forming transverse band divided by narrow transverse groove. Ventral locomotory ampullae almost similar. Tip of abdomen with sparse rusty hairs. Body length of late instar larvae 20–23 mm, width of head 2.5–3.0 mm.

Pupa (Fig. 83): Similar to the pupa of *Oberea depressa* (Geb.). Well distinguished from it by absence of spinules on abdominal tergites I–II. Body elongate, yellowish. Head broad, medially with faint longitudinal trough, inner (dorsal) to antennal tubercles with three bristles on sclerotized base, frontally with isolated lateral bristles in longitudinal row, at anterior margin with six bristles in transverse row. Labrum lustrous, apically narrowly rounded, without bristles. Mandibles on outer side with two bristles. Antennae flexed laterad, in second half bent (on ventral side) forward looplike, their apices adjoining foretarsi.

Pronotum transverse, convex, lustrous, basally with faint transverse groove, with minute, somewhat rusty spinules forming small round cluster medially on disk. Mesonotum at posterior margin with extended whitish shield, without bristles. Metanotum at posterior margin directly

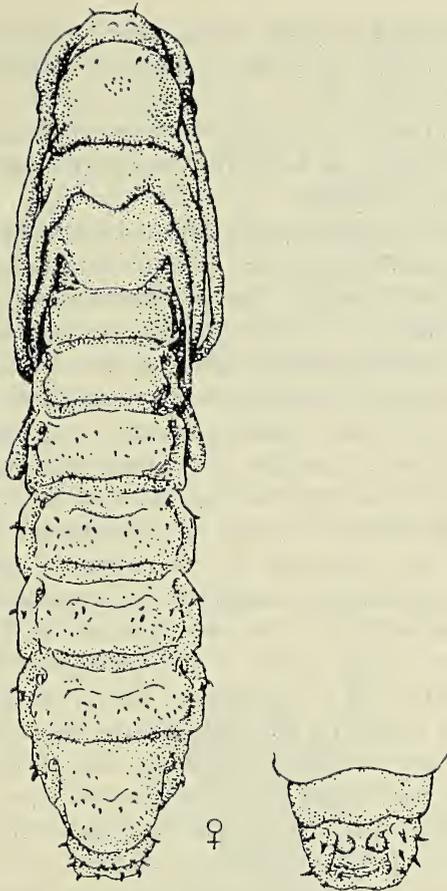


Fig. 83. Pupa of *Oberea transbaicalica* Suv.

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truncate, with barely rounded posterior angles, convex, lustrous, without bristles, medially with narrow longitudinal groove.

Abdomen in region of segments IV–V enlarged toward base and tapering toward tip. Tergites I–II glabrous, without spinules. Tergites III–VI in posterior half more convex, with coarse spinules forming transversely elongate cluster slightly interrupted medially. Tergite VII tapering posteriorly, apically rounded, medially with irregular spinules forming transversely elongate cluster. Tergites III–VII laterally in pleural region with pair of long acute recurved spinules. Tergite VIII transverse, medially with eight acute spinules in transverse row. Tip of abdomen obtuse, bound by U-shaped ridge set with large acute spinules. Valvifers of female hemispherical, slightly wide-set, somewhat rusty. Body length up to 18 mm, width of abdomen 3–4 mm.

Material: Collected in Altai, Tuva, Baikal region (Kultuk), and Ussuri-Primor'e. Adults 15, larvae 9, pupae 4 (males and females), larval exuviae from cells 8.

Distribution: From Altai to coasts of seas of Okhotsk and Japan. Inhabits southern regions of northern Asia, partly Mongolia, northern China, and Korean peninsula.

Biology: Inhabits mainly well-illuminated forest fringes and forest glades of the montane-forest belt. Vitrally associated with *Spiraea flexuosa*. Beetles fly from last week of June to mid-July. They infest the thin apical (diameter 2–3 mm) part of growing shoots of spirea. Sometimes their pre-imaginal stages develop on the lower adventitious
140 shoots. Larvae bore into heartwood of shoots and make galleries there from above downward. They make very minute, round ventilation holes in the shoot walls and discard fine amorphous frass through them. In due course the frass accumulates near the base of damaged shoots. Toward autumn, the larvae penetrate the underground part. Length of gallery up to 140 cm, more often less. In autumn or spring, the larvae nibble the stem from inside at a height of 4–13 cm and the stem breaks here, becoming infundibular at the end. Diameter of shoot at point of breakage 6–15 mm. Larvae remain in the underground (stub) part of the stem and plug the end of the exposed gallery compactly with fine fibrous frass. They remain for hibernation in the underground stem part or in the root. After the first hibernation, they continue boring the gallery in the root and toward the end of summer have filled much of it with fine reddish frass. The second hibernation takes place in the root. The following spring the gallery is enlarged in the lower underground part of the stem or in the root and the larvae pupate there. Pupae lie with head upward. Pupal stage lasts about two–three weeks. Under laboratory conditions, at temperatures of 16.5°–19.8°C ($18.3 \pm 0.1^\circ \text{C}$), beetles emerged 16–17 days after pupation. Eight pupae were under observation. After emergence, beetles ascend the gallery, destroy the plug at the terminal hole, and escape through it. Generation—two-year cycle. Larvae of mid- and last instars hibernate. Weight of larvae before pupation 98.5–211.5 mg (138.3 ± 10.6), pupae 82–155 mg (115.5 ± 8.4), beetles before emergence from cells 66.5–123.0 mg (93.7 ± 6.9). Twelve insects were weighed.

We found *Oberea transbaicalica* Suv. only on *Spiraea flexuosa* and not on other spirea species (e.g., *Spiraea salicifolia*) growing nearby. It infests mainly dense thickets and generally avoids solitary shoots.

7. *Oberea linearis* (L.)

Linnaeus, 1761. *Fauna Suec.*, ed. 2: 191 (*Cerambyx*); — *regularis*

Poda, 1761. *Ins. Mus. Graec.*, 28; — *parallela* Scopoli, 1763. *Entom. Carniol.*, 47 (*Leptura*); — *fulvipes* Geoffroy, 1785. In Fourer: *Entom. Paris*, 1: 79; — *cylindricollis* Griffith, 1832. *Anim. Kingd.*, 2: 119; — *limbata* Mulsant, 1839. *Coleopt. France, Longic.*, 197; Funke, 1957. *Zoolog. Jahrbuch.*, 85, 1/2: 90, 109–11, 121, 145, 165; Kemner, 1922. *Zur. Kenntnis . . . Der. Schwedische. Ceramb.*, 131–132.

Adult (Fig. 84): Characterized by comparatively slender, elongate, cylindrical, and black body. Head between antennae with gentle impression, frons convex, medially with barely perceptible longitudinal groove, with deep dense punctation and dense erect blackish-brown hairs. Antennal tubercles produced laterally. Eyes very convex, finely faceted, deeply incised; lower ocular lobes 2.5 (male) or 2.0 (female) times longer than genae. Antennae shorter than body, significantly short of or reaching apex of elytra, with minute punctation, sparse brownish hairs, on inner side of 1st–7th segments with dark brown bristles. First antennal segment slightly shorter than 3rd, equal to 4th or barely longer than it.

Pronotum square, basally and apically with insignificant transverse

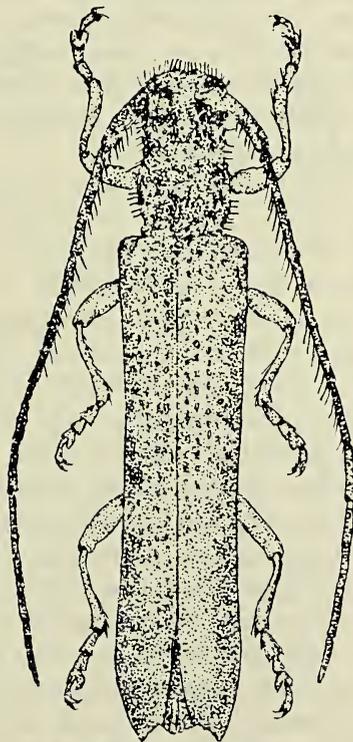


Fig. 84. *Oberea linearis* (L.).

groove, laterally gently rounded, disk convex, with irregular punctation and dense erect dark brown hairs, medially with narrow smooth longitudinal band (in some individuals this band appears as a small spotlet on disk). Pronotal shield small, narrowing posteriorly, apically rounded or transversely truncate.

Elytra narrow, elongate, parallel-sided, basally with insignificantly projecting, often gently, rarely narrowly rounded, humeral tubercle, apically insignificantly incised, with very acute angles, on disk in anterior and posterior thirds slightly convex, middle third slightly flat, 141 with deep, comparatively uniform punctation and sparse bright brown adherent pubescence and isolated semierect bright brownish hairs. Legs not long; femora (especially forefemora) highly enlarged medially. Hind femora more elongate. Midtibiae at outer margin with gentle distal notch bearing brush of short yellow bristles. Body ventrally with not very dense, adherent grayish pubescence and sparse semierect hairs (especially in male). In male abdominal sternite V with triangular impression in anterior half, at posterior margin transversely truncate; tergite V slightly convex, apically deeply angularly incised. In female sternite V with deep longitudinal groove medially, at posterior margin gently rounded; tergite V insignificantly convex, apically transversely truncate, or barely rounded. Body, antennae, and pronotal shield black. Elytra black, basally lateral to shield and laterally below humeral tubercle with short yellow fringe. Legs entirely rusty-yellow. Body length 11–13 mm (male and female).

Larva (Fig. 85): Very similar to the larva of *Oberea inclusa* Pasc. Distinguished from it by less elongate, comparatively small spiracles. Head half retracted into prothorax. Epistoma convex, whitish, at anterior margin with rusty-brown fringe, behind it with short thin hairs forming transverse row, medially divided by longitudinal suture, laterally barely demarcated from temporo-parietal lobes by faint frontal sutures. Hypostoma slightly convex, at anterior margin more, at posterior less emarginate, with yellowish tinge, anteriorly with rusty-brown fringe (in some individuals more, in others less distinct). Temporo-parietal lobes yellowish, at anterior margin with rusty-brown fringe. Antennae whitish, concealed in antennal sockets. Clypeus short, transverse, somewhat rusty. Labrum basally somewhat rusty, in anterior half whitish, here with dense bright rust bristles, at anterior margin gently rounded. Mandibles rusty-brown, apically obliquely truncate, with more extended ventral and barely projecting dorsal denticle.

Pronotum highly inclined toward head, lustrous, somewhat rusty, medially with narrow longitudinal bright band, at anterior margin with whitish fringe, behind it with sparse thin hairs in transverse row.

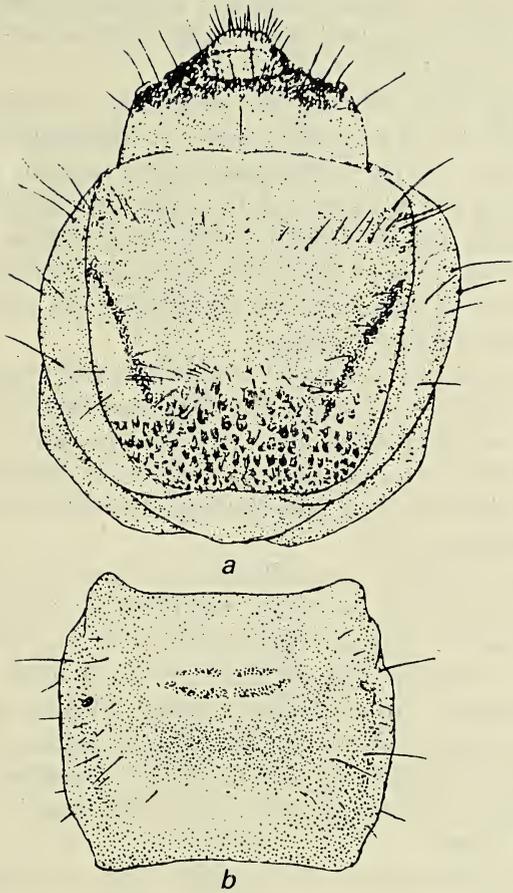


Fig. 85. Larva of *Oberea linearis* (L.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

Pronotal shield basally more raised, here with minute, anteriorly with large recurved spinules, at anterior margin with long hairs. Spinous field at anterior angles deeply emarginate. Lateral oblique grooves arising from these notches. Prosternum convex, whitish, laterally and in region of eusternum bright rust (with yellowish tinge), on disk with long sparse hairs forming transversely elongate field.

Abdomen elongate, parallel-sided. Spiracles small, slightly elongate, oval (their maximum to minimum diameter 1.5 : 1). Dorsal locomotory ampullae insignificantly convex, medially divided by transverse groove, sclerotized, with dense minute spinules forming two narrow, transversely extended, yellow bands interrupted medially by small interspace; one band located in front, the other (much longer) behind

transverse groove. Ventral locomotory ampullae almost similar. Tip of abdomen with rusty setiform hairs. Body length of last instar larvae 19 mm, width of head up to 1.5 mm.

Pupa (Fig. 86): Very similar to the pupa of *Oberea morio* Kr. Distinguished from it by fewer spinules on abdominal tergites forming transverse row and other characters. Body slender, elongate. Head short, on frons and sinciput with faint narrow longitudinal groove, at anterior margin with six, laterally with solitary bristles, inner to antennal tubercles with pair of short wide-set bristles. Antennae thin, flexed laterad, in second half bent forward looplike (on ventral side), their apices adjoining base of midtarsi.

Pronotum convex, not longer or even less than width, disk convex, laterally, sometimes medially, with barely perceptible bristles, posteriorly glabrous. Mesonotum at posterior margin with extended shield, medially transversely depressed, without bristles. Metanotum posteriorly transversely truncate, at posterior angles rounded, lustrous, medially with longitudinal groove.

Abdomen elongate, parallel-sided. Abdominal tergites with extended coriaceous base, laterally in pleural region with paired, close-set recurved spinules. Tergite VII moderately convex, posteriorly broadly rounded, in posterior half on each side with three acute close-set recurved spinules. Tip of abdomen obtuse, laterally (in ventral view) with rusty bristles (four on each side) without spinules. Apices of hind femora barely extending beyond tergite III of abdomen. Valvifers of female digitate, bent toward each other. Body length 12 mm, width of abdomen 1.5 mm.

Material: Collected in the southern Urals and northern Caucasus (Goryachii Klyuch). Adults eight, larvae thirteen, pupae three (male and female), exuviae of larvae and pupae five. We also examined a series of beetles preserved in the collections of the Zoological Institute, Academy of Sciences, USSR and the Zoological Museum, Moscow State University.

Distribution: Europe, from Sweden to the Mediterranean, the Caucasus, the southern Urals.

Biology: Occupies rarefied forest plantations and forest fringes. Vitally associated with hazelnut and other deciduous woody and bushy plant species. Flight of beetles in first half of summer. Females infest growing shoots 5–12 mm diameter. They lay eggs under the bark through cavities made on the thin apical part of shoots (up to 2.0 mm diameter). Bast tissues around laid eggs become necrotic. After hatching, larvae initially live under bark, then bore into wood, and generally make a longitudinal gallery along the heartwood. Sometimes the wood

Fig. 86. Pupa of *Oberea linearis* (L.).

is damaged to such an extent that only a layer of bark remains outwardly. Damaged shoots wither and sometimes break. The larvae throw out frass through ventilation holes and the gallery remains hollow. Length of gallery up to 24 cm, width up to 4.0 mm. Pupation observed after second larval hibernation, in May and June. The larva initially, generally midgallery, nibbles an oval exit hole (7.0 mm × 2.5 mm) longitudinal to the shoot. The gallery below this hole is then plugged compactly with fibrous frass and the lower part of the gallery filled with fine frass. Sometimes the larva makes another plug a little away from the first one, thus isolating the pupal cell in which it pupates with its head upward. Length of cell 2.0–3.5 mm, width 2.5 mm; length of upper plug 3.0 mm, of lower plug isolating cell from hollow gallery

2.0 mm. In the laboratory, at a temperature of $18.2 \pm 0.3^\circ\text{C}$, the pupal stage lasted for 16 days, and at $19.1 \pm 0.2^\circ\text{C}$ for 14 days.

Developed beetles destroy the upper plug, scrape away frass, and escape through the hole made by the larva. Generation—two-year cycle. Weight of larvae before pupation 35.0–52.5 mg (45.1 ± 2.2), pupae 32–47 mg (40.5 ± 1.9), adults 25–39 mg (32.7 ± 1.7).

We found *Oberea linearis* (L.) on hazelnut. It appears to be one of the ecological analogues of *Oberea inclusa* Pasc. damaging thickets of hazelnut in the Far East. According to reports of Funke (1957) and other authors, it develops on shoots of *Corylus*, *Carpinus*, *Alnus*, *Ostria*, *Ulmus*, and *Juglans*.

8. *Oberea morio* Kr.

Kraatz, 1873. *Deutsch. Ent. Zeitschr.*, 23: 117; — var. *pictibasis* Reitter, 1901 (1902). *Deutsch. Ent. Kuku-noor Zeitschr.*, 186.

Adult (Fig. 87): Characterized by black body and a combination of other characters. Body elongate. Head on frons highly convex, almost hemispherical (in lateral view), with insignificantly produced antennal tubercles, medially with narrow longitudinal groove, with compact erect punctation, with sparse adherent grayish pubescence or without it, and erect brownish hairs. Eyes highly convex, finely faceted, deeply and not very broadly incised. Lower ocular lobes large, highly drawn close to base of mandibles. Genae very short, 3.0–3.5 times shorter than lower ocular lobes. Antennae extending almost up to apex of elytra, with fine short dark brown pubescence, on inner side of 1st–7th segments with long brownish bristles. First antennal segment with fine dense punctation, markedly thickening toward apex, distinctly shorter than 3rd, equal to 4th.

Pronotum square, parallel-sided, basally with narrow transverse groove, with narrowly recurved margin, compact uneven punctation and thin erect bright brown hairs. Pronotal shield small, slightly tapering posteriorly, apically transversely incised, with sparse bright brown hairs.

Elytra elongate, parallel-sided, basally with straight humeri, with rounded humeral tubercle, apically obtuse, with dense irregular, laterally generally large, on disk at suture minute punctation, with short sparse thin gray adherent pubescence not masking punctation, basally with sparse raised setiform hairs. Legs with sparse yellowish pubescence. Midtibiae at outer margin with faint distal notch bearing dense brush of short golden-yellow bristles. Body ventrally with uniform gray adherent pubescence, with isolated semierect bright hairs. Abdominal sternite V with deep triangular impression (male) or more convex, with

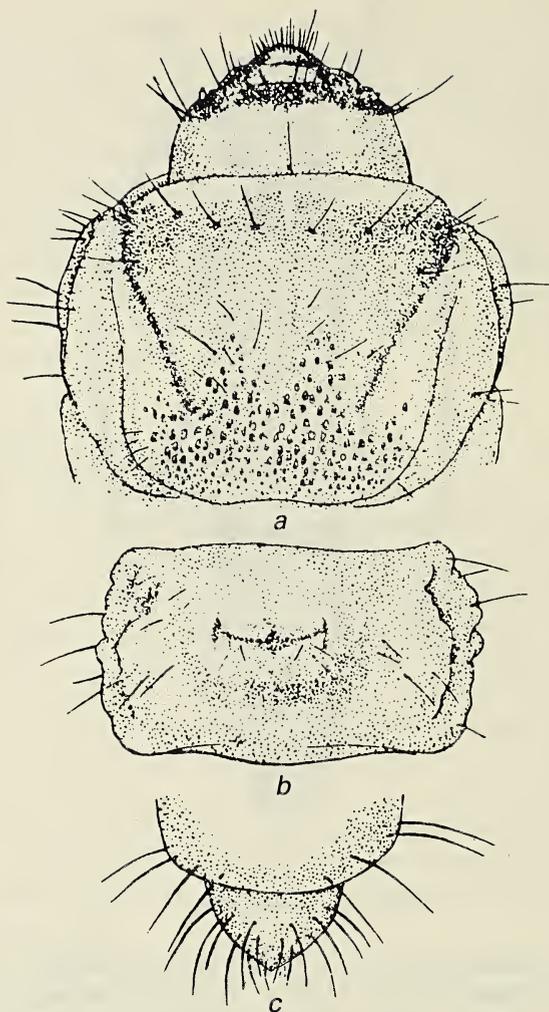


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Fig. 87. *Oberea morio* Kr.

median longitudinal groove (female). Body, antennae, and pronotal shield black. Elytra entirely black (f. *typica*) or at base of shield with yellow spot, laterally with bright yellowish fringe (v. *pictibasis* Reitt.). Body length 9.0–12.5 mm.

Larva (Fig. 88): Distinguished from the larva of the closely related species *Oberea chinensis* Tsher. by shape of spinous field on pronotal shield and weak (almost not perceptible) sclerotization of dorsal locomotory ampullae. Body white with yellowish tinge. Head parallel-sided, half retracted into prothorax. Epistoma convex, divided longitudinally by groovelike median suture, laterally fusing with temporo-parietal lobes, frontal sutures not perceptible, at anterior margin with narrow faint, somewhat rusty fringe, behind it with long setiform hairs in transverse row. Hypostoma convex, parallel-sided, lustrous, with bright yellowish tinge, with narrowly rounded, almost straight



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Fig. 88. Larva of *Oberea morio* Kr.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

anterior angles, at anterior margin directly truncate (not emarginate), with narrow faint, somewhat rusty fringe. Temporo-parietal lobes rusty-yellow, at anterior margin with dark rust fringe, with long rusty setiform hairs forming transverse row. Antennae short, whitish, barely projecting from antennal sockets. Two pigmented wide-set spotlets occur below and slightly posterior to antennae. Clypeus broad, short, whitish. Labrum transversely oval, at anterior margin broadly rounded, with short bright bristles. Mandibles elongate, apically gently sloping,

with produced ventral denticle, black, basally somewhat rusty.

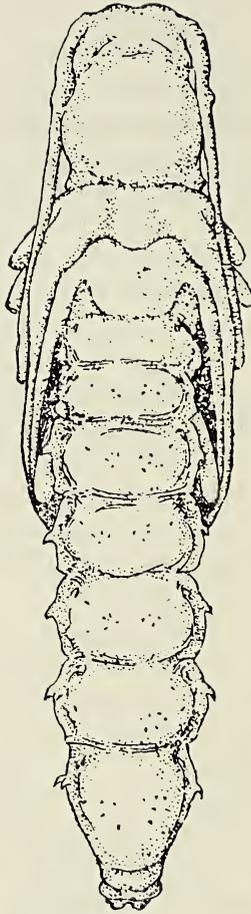
145 Pronotum highly inclined toward head, disk convex, lustrous, somewhat rusty at anterior margin, with narrow white fringe, behind it with thick setiform hairs in uniform transverse row, in front of shield with sparse solitary hairs, laterally with deep oblique rusty-brown groove-like impressions extending from anterior angles to spinous field, invading deeply into field by their posterior ends. Pronotal shield demarcated laterally by longitudinal folds, covered with large (at base and anterior margin minute) spinules. Spinous field at anterior margin bifurcate (appearing biapical). Prothoracic presternum convex, on disk with long dense hairs, at anterior margin glabrous, eusternum conical, without hairs.

Abdomen elongate, parallel-sided, laterally with sparse short hairs. Dorsal locomotory ampullae moderately convex, medially divided by transverse, slightly recurved groove uniting laterally with short longitudinal folds, with faint sclerotization forming two narrow bands divided by transverse groove. Ventral locomotory ampullae similar. Tip of abdomen with long dense hairs. Body length of last instar larvae up to 12 mm, width of head 1.2 mm.

146 *Pupa* (Fig. 89): Body white, elongate. Head short, frons convex, between antennal tubercles with faint longitudinal trough, inner to antennal tubercles with three bristles in transverse row, at anterior margin with six thin bright, barely perceptible bristles forming transverse row. Labrum triangular, hyaline, apically narrowly rounded, almost acute, disk without bristles. Mandibles lustrous, on outer side without bristles. Antennae thin, flexed laterad, in second half extending beyond midfemora, directed forward looplike, their apices adjoining sides of head.

Pronotum slightly transverse, laterally broadly (barely) rounded, disk convex, lustrous, without spinules. Mesonotum mildly convex, at posterior margin broadly rounded, posteromedially with faint transverse impression. Metanotum medially with broad troughlike longitudinal groove, at posterior margin almost directly truncate, without bristles and spinules.

Abdomen elongate, thicker in region of segments IV–VI, laterally on segments III–VII with large recurved spinule, at base of this spinule with barely perceptible additional acute dorsal spinule. Abdominal tergites posteromedially more convex, here with small spinules forming small round paramedial cluster (one on each side), lateral to clusters with acute, somewhat large, erect and projecting spinule. Spinules on first tergite slightly, on second tergite perceptibly more, and on tergites III–VI much larger. Tergite VII barely longer than wide, apically broadly rounded, disk highly convex, lustrous, posteromedially with



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Fig. 89. Pupa of *Oberea morio* Kr.

minute acute spinules forming transverse band or transverse row. Tergite VIII small, at posterior margin broadly rounded, disk with six minute acute spinules forming uniform transverse row. Tip of abdomen obtuse, laterally bound by U-shaped ridge (in ventral view) bearing very minute, specklike setigerous spinules (female) or bristles with spinules (male). Valvifers of female hemispherical, with barely perceptible space between them. Body length up to 11 mm, width of abdomen 1.8 mm.

Material: Collected in Ussuri-Primor'e region (Lazovsk sanctuary, Komarovka River, and elsewhere). Adults 23, larvae 22, pupae 8 (males and females).

Distribution: Ussuri-Primor'e region from Khabarovsk to the Sea

of Japan. Northeast China, Korean peninsula.

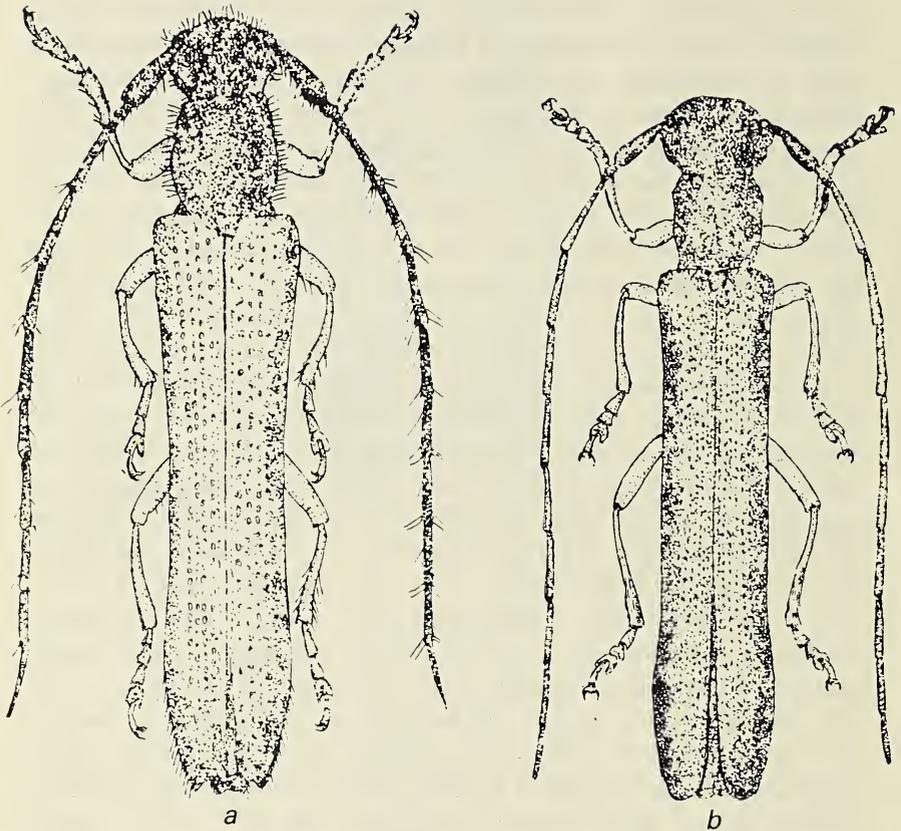
Biology: Inhabits forest glades, forest fringes along river banks, and rarefied plantations. Ecologically associated with leguminous plants. Flight of beetles in June and July. Females make a notch on vetch stems using their mandibles and through it lay eggs in the soft plant tissues. Diameter of stems at infestation site 3–4 mm, rarely 1.5–2.0 mm. Length of stems up to 108 cm. Sometimes notch is made on leaf petiole. After hatching, larvae make a gallery from above downward through the heartwood, then penetrate the main stem via secondary ones, making ventilation holes in the wall as they advance and throwing out fine frass through them. By autumn they penetrate the underground part (basal stub) of the stem and nibble it circularly from inside; consequently, the apical part of the stem breaks off. Larvae remain in the lower underground stem part, make a cell here, and pupate with head upward. Length of gallery in stem up to 33 cm or more. Length of underground part of stem 4–11 cm, diameter 2.5–4.0 mm. Length of cell 1.5–3.8 cm, width up to 2–3 mm. Pupal cell isolated from above and below by fibrous frass. Sometimes an exit (round hole) is made in the wall and plugged with frass. Pupae lie in the cell with head toward the exit. Pupation from May to early June. At temperatures of 15.6°–18.8°C, the pupal stage lasted about three weeks. Under laboratory conditions, at a temperature of $16.8^{\circ} \pm 0.4^{\circ}\text{C}$, a beetle emerged 17 days, another 18 days after pupation. Beetles exit the pupal cell one week after emergence from pupae, which occurs in June–early July, and are
147 seen up to July-end. Females are distinctly larger than males. During metamorphosis the weight of females (based on 13 insects) varied as follows: larvae before pupation 18.5–56.0 mg (37.7 ± 3.0), pupae 15.8–51.5 mg (29.0 ± 2.9), beetles before emergence from cells 13.0–39.5 mg (23.4 ± 2.1); males (based on nine insects) correspondingly weighed 23–40 mg (29.8 ± 2.2), 21.0–34.2 mg (25.8 ± 1.5), and 15.0–28.5 mg (20.9 ± 1.5).

Oberea morio Kr. is found on leguminous plants. We found it on Amur vetch (*Vicia amurensis*). During forest inspections 44 larvae were collected from the stems of this plant and pupae and beetles raised from them. We did not find it on other plants.

9. *Oberea chinensis* Tsherepanov nom. nov.

— *scutellaris* Fairmaire, 1888 (nec Gerst., 1855), *Revue d'Ent.*, 7: 147; Gressit, 1951. *Longic. Beetles of China*, 2: 600 (*O. scutellaris* Fairm.).

Adult (Fig. 90): Characterized by black body and elytra on disk mainly yellow, laterally black, basally with yellowish fringe. Body



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Fig. 90. *Oberea chinensis* Tsher.

a—female; b—male.

elongate. Head from frons to occiput (in lateral view) uniformly rounded, medially with narrow longitudinal groove, antennal tubercles produced laterally, with deep punctation, sparse grayish adherent pubescence and short erect dark brown hairs. Eyes large, closer to mandibles, sharply and finely faceted, deeply incised. Lower ocular lobes highly convex, almost hemispherical. Genae short, 2.0 (female) or 2.5 (male) times shorter than lower ocular lobe. Antennae almost reaching or not quite reaching apex of elytra, with sparse minute bright hairs, on 1st–7th segments with long dark brown bristles. First antennal segment uniformly thickening toward apex, shorter than 4th segment, which, in turn, is significantly shorter than 3rd.

Pronotum parallel-sided, basally, rarely apically, with narrowly

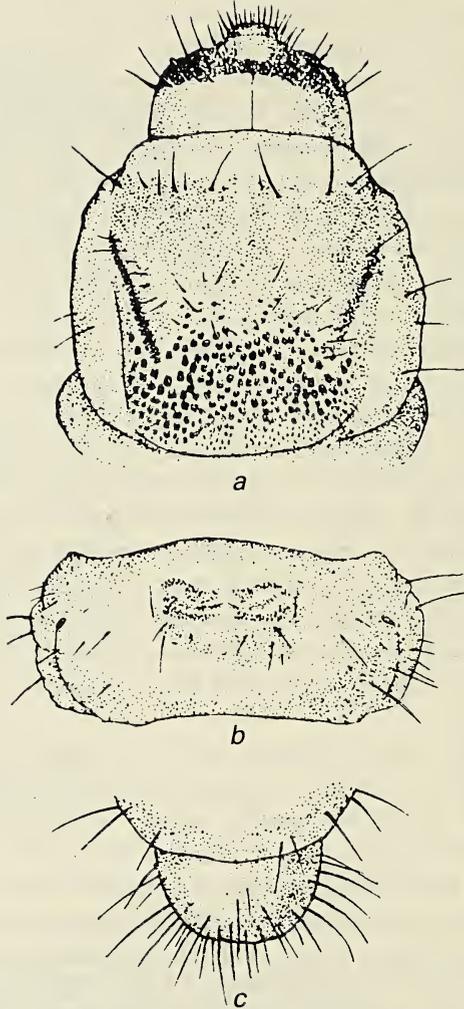
recurved margin, with irregular punctation, grayish or yellowish compact adherent tender, not dense pubescence and long thin erect hairs, medially with smooth longitudinal band or without it. Pronotal shield small, slightly tapering toward apex, posteriorly transversely incised.

Elytra elongate, parallel-sided, basally with insignificantly projecting humeral tubercle, apically obliquely truncate, on disk posteromedially flatter, behind shield slightly convex, with dense round black punctures forming longitudinal rows, with minute grayish sparse pubescence not masking punctation and semierect setiform hairs (at base long, on remaining part short). Legs lustrous, with minute, barely perceptible punctation, sparse adherent bright pubescence and solitary erect long thin hairs. Body ventrally with not very dense, short yellowish pubescence. Abdominal sternite V in second half with deep impression (male) or without it, medially with deep longitudinal groove (female). Head, antennae, pronotal shield, and ventral side of body black. Maxillary and labial palps bright yellow. Pronotum black, sometimes in front of shield with red spotlet, rarely in anterior third and on disk red, laterally and medially black (in form of narrow longitudinal band). Elytra laterally black, on disk yellowish, at base of shield bright yellow or rusty-yellow. Hind tibiae apically brownish. Body length 9–11 mm.

Egg: White, with time becoming brownish, slightly curved, gently rounded at poles. Chorion matte, with fine sculpture. Length 2.4 mm, width 0.5 mm.

148 *Larva* (Fig. 91): Body elongate, white with yellowish tinge. Head barely retracted into prothorax. Epistoma bright rust, convex, divided longitudinally by groovelike median suture, laterally demarcated by barely perceptible frontal sutures, at anterior margin with narrow rusty-brown or almost black fringe, behind it with numerous irregular hairs forming transverse row. Hypostoma somewhat rusty, at anterior margin with narrow rusty-brown fringe, convex, parallel-sided, almost four times wider than long. Temporo-parietal lobes somewhat rusty, fusing in background with epistoma, at anterior margin with rusty-brown fringe covering antennal-ocular zone, behind fringe with wide-set hairs forming transverse row. Clypeus whitish with somewhat rusty tinge, trapezoid, comparatively large. Labrum transversely oval, apically broadly rounded, in anterior half much brighter, with coarse rusty bristles, in posterior half rusty, glabrous, without bristles. Mandibles black, basally somewhat rusty, apically sloping, with acutely produced ventral denticle, medially on outer side with long bristle.

Pronotum as long or barely less than width, convex, at anterior margin with whitish fringe, behind it on disk and laterally with rusty lustrous square, at anterior border of this square with wide-set setiform



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Fig. 91. Larva of *Oberea chinensis* Tsher.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

hairs forming transverse row, laterally with deep oblique groovelike impressions penetrating by their posterior ends into spinous field, before latter on disk with irregular hairs. Pronotal shield laterally demarcated by longitudinal grooves with extended, rounded, apically recurved spinules. Spinules in anterior half large, in posterior half and at anterior margin gradually reducing, basally forming narrow median groovelike interception. Mesonotum less, metanotum more distinctly

divided by transverse groove. Prosternum convex, with very sparse
 149 bristles, basally in middle glabrous, laterally with numerous hairs. Meso- and metasterna on disk with minute dense spinules, medially divided by transverse groove.

Abdomen elongate, parallel-sided, laterally with solitary setiform hairs. Dorsal locomotory ampullae moderately convex, on disk with minute dense spinules, medially divided by transverse groove uniting laterally with short lateral longitudinal grooves. Ventral locomotory ampullae similar. Segment X of abdomen with coarse rusty hairs. Body length of last instar larvae up to 20 mm, width of head 1.2 mm. Interstadeal variability is evidenced in first instar larva having two spinules at anterior margin of epistoma, four spinules (two on each sclerite) on hypostoma, and one spinule on outer side of mandibles and laterally on abdominal segments I–VIII. These spinules disappear after molt.

Pupa (Fig. 92): Similar to the pupa of *Oberea morio* Kr. but well distinguished from it by bristles on pronotum and other characters. Body yellowish, elongate, parallel-sided. Head short, transverse, on frons convex, between antennal tubercles with broad longitudinal through, inner to antennal tubercles with three–four rusty bristles forming longitudinal row, in anterior half, lateral to frons, with long, medial-
 150 ly minute spinules forming common transverse row, at anterior margin with four bristles (two on each side) forming transverse row. Labrum triangular, hyaline, somewhat rusty, without bristles. Mandibles with one short bristle on outer side, closer to base. Antennae flexed laterad, ventrally bent forward looplike at level of hind coxae, their apices adjoining sides of head.

Pronotum slightly transverse, disk convex, lustrous, laterally barely rounded, with recurved posterior angles, dispersed rusty bristles forming transverse row in anterior half, much denser row medially, and rarefied row basally. Mesonotum insignificantly convex, laterally slightly depressed, lustrous, without bristles, at posterior margin slightly angularly produced. Metanotum mildly convex, medially with longitudinal groove, at posterior margin transversely truncate, at base of wings with barely perceptible paired bristles.

Abdomen parallel-sided, laterally with extended margin, here on segments III–VII with paired large acute recurved spinules on extended coriaceous base. Abdominal tergites convex, beyond middle with minute (on tergites I–II) or large (on tergites III–VI) spinules forming transverse row (on tergite I) or transverse band (on tergites II–VI); lateral to latter and slightly ahead lies one much larger spinule. Tergite VII almost not longer than basal width, convex, conically narrowing

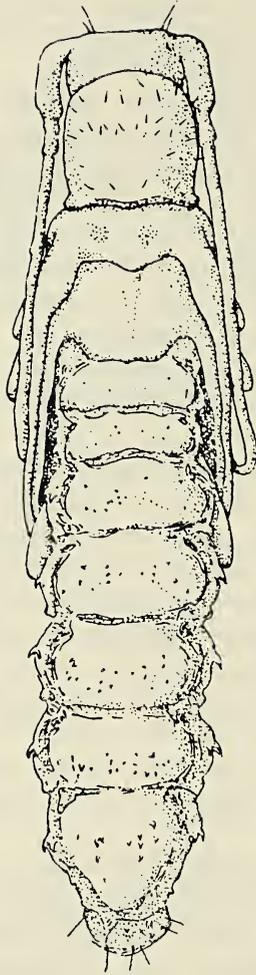


Fig. 92. Pupa of *Oberea chinensis* Tsher.

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toward apex, posteromedially with large acute spinules forming interlacing transverse row resembling transversely elongate cluster. Tip of abdomen obtuse, laterally bound by U-shaped ridge bearing numerous rusty bristles (male, female) on sclerotized base. Valvifers of female elongate, digitate, somewhat rusty, bent toward each other. Body length up to 14 mm, width of abdomen 2.8 mm.

Material: Collected in Ussuri-Primor'e region (Pogranichnoe, Vladivostok). Adults 18, larvae 14, pupae 7 (males and females), larval exuviae with beetles and pupae 8.

Distribution: Ussuri-Primor'e region. Northeast China up to Peking in the south.

Biology: Ecologically associated with leguminous plants. Inhabits forest glades, forest fringes, and rarefied forest plantations. Flight of beetles from second half of June to early August. Females infest stems of *Sophora flavescens*. The female initially makes a notch (1.5 mm diameter) on the stem at a height of 18–40 cm from the ground, then introduces its ovipositor through it, and generally lays one egg in the soft tissues. Rarely, two eggs are laid through one notch. Larvae rupture the chorion and make a downward gallery that remains hollow, not filled with frass. Ventilation holes are made in the wall of the stem and fine frass is thrown out through them. By autumn larvae penetrate the underground part of the stem, then, generally in September, nibble the stem from inside at a height of 5–9 cm; when the stem breaks here, the end of the exposed gallery is plugged with fibrous frass. Larvae remain in the underground part, bore into the root, and here compactly fill the gallery with fine frass. Before the second hibernation, they make a cell in the underground part of the stem and remain in it for the second winter. Larvae pupate from May–early June. Pupae lie in the cell with head upward. Under laboratory conditions, at 15.6°–19.0°C (16.8 ± 0.4°C), pupae (four specimens) completed development in 17–19 days (average 17.8 ± 0.5). Length of infested stems up to 80 cm, diameter of underground part of stem 6–9 mm, diameter of stem at level of notch 5–7 mm. Length of pupal cell 2.4–9.5 cm, width 2.8–4.0 mm. Length of plug in gallery at terminal part of stem 5–20 mm. Generation—two-year cycle (Table 9).

Weight indices of insects during metamorphosis vary markedly. 151 Males (seven insects) in the larval stage before pupation weigh 31–57 mg (41.6 ± 3.2), pupae 26.5–51.2 mg (36.9 ± 3.4), beetles before emergence from cells 21.2 ± 40.0 mg (30.2 ± 2.6). Females (15 insects) correspondingly weigh 38.5–106 mg (62.1 ± 4.4), 37.2–90.5 mg (55.4 ± 3.8), and 32.0–60.5 mg (44.8 ± 2.5). Insects of this species are distinctly larger than those of *Oberea morio* Kr.

Oberea chinensis Tsher. is sporadically found in forest glades. It was found only on *Sophora*. Not seen on other plants.

Table 9. Development of *Oberea chinensis* Tsher.

Year	April	May	June	July	August	September
1st	L	LP	LP AE	AE L	EL	L
2nd	L	L	L	L	L	L
3rd	L	LP	LP AE	AE L	EL	L

10. *Oberea euphorbiae* (Germ.)

Germar, 1813. *Mag. Ent.*, 1: 131 (*Saperda*); Reitter, 1913. *Fauna Germanica*, 4: 72; — *histrionis* Pic, 1917. *Echange*, 33: 11; Kaszab, 1971. *Cincérek—Ceramb.*, *Coleopt.*, 4, 5: 281.

Adult (Fig. 93): Distinguished from *Oberea erythrocephala* (Schr.) by comparatively larger body, pronotum distinctly tapering at anterior margin, and elytra with more interlacing punctation. Body virgate, elongate. Head frontally convex, with barely raised antennal tubercles produced laterally, between them slightly flat, with faint longitudinal groove, with irregular punctation, gray adherent pubescence, and erect black hairs. Eyes quite convex, finely faceted, deeply emarginate, markedly removed from base of mandibles. Genae barely shorter than lower ocular lobes. Antennae shorter than body, their apices barely extending beyond hind clivus of elytra, with minute punctation, on lower side with dense, on upper side fine sparse pubescence, on 1st–6th

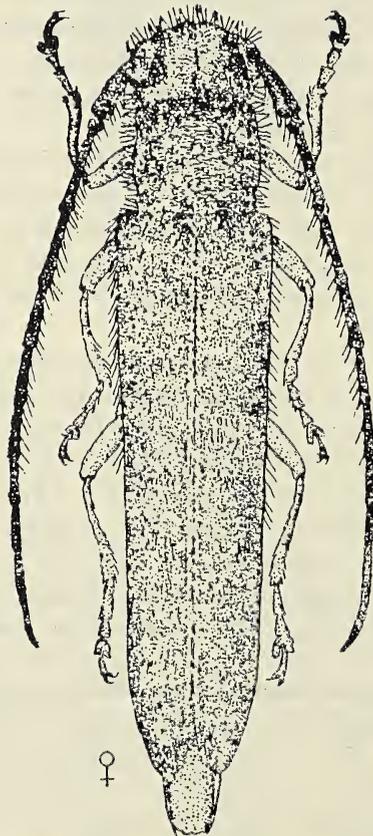


Fig. 93. *Oberea euphorbiae* (Germ.).

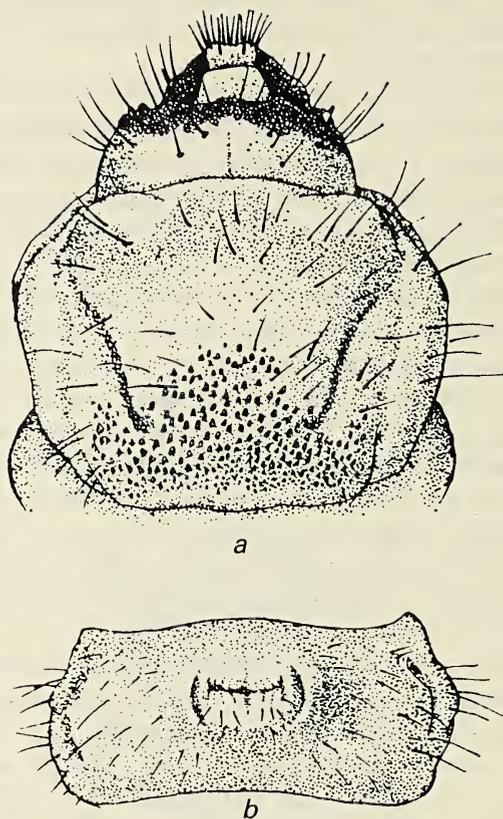
segments with sparse brownish bristles. First antennal segment insignificantly thickened, shorter or almost not shorter than 4th, 3rd segment somewhat longer than it.

Pronotum in posterior half enlarged, parallel-sided, distinctly tapering in anterior third, disk uniformly convex, at posterior margin with barely perceptible, narrow transverse groove, with fine punctation, adherent (directed mediad) short grayish pubescence, and long bright erect hairs. Pronotal shield small, posteriorly broadly rounded, with long dense adherent bright hairs.

Elytra parallel-sided, elongate, basally with projecting humeral tubercle, apically barely obtuse, with narrowly rounded inner and gently rounded outer angle, distinct perisutural groove, beyond shield more convex, in middle third slightly flat, with dense grayish adherent pubescence masking punctation, in anterior third with long erect or almost erect bright hairs. Legs with thin yellowish compact adherent pubescence, with long setiform bright erect hairs. Midtibiae at outer margin with deep oblique distal notch covered with short dense, somewhat rusty bristles. Body ventrally with dense compact adherent grayish-yellow pubescence and isolated bright erect setiform hairs. Abdominal sternite V apically with broad impression (male) or uniformly convex, without impression and without median longitudinal groove (female).

152 Tergite V distinctly elongate (male) or moderately long, not elongate (female), markedly convex. Head red. Antennae dark brown, 1st segment black. Pronotal shield and elytra black, laterally at base without yellow fringe. Pro-, meso-, and metasterna black. Legs reddish-rust. Abdomen black, terminally (sometimes laterally) rusty-red. Body length 14–19 mm.

Larva (Fig. 94): Characterized by locomotory ampullae of abdomen well developed, not sclerotized, not highly extended. Body comparatively thick, yellowish. Head half retracted into prothorax. Epistoma slightly convex, medially divided by faint longitudinal suture, laterally fusing with temporo-parietal lobes (frontal sutures not perceptible), at anterior margin with dark brown fringe with long thick setiform hairs in transverse row on its posterior border, behind it with minute bright hairs. Hypostoma mildly convex, almost flat, bright rust, at anterior margin with dark rust fringe enlarging at angles, broadly emarginate, in anterior half with rusty bristles forming transverse row. Temporo-parietal lobes bright rust with yellowish tinge, at anterior margin with broad fringe, behind it with short setiform hairs in transverse row. Antennae very short, barely projecting from antennal sockets, whitish, 1st segment with brownish tinge. Ocelli small, ampullaceous, below antennal base. Clypeus large, trapezoid, whitish. Labrum transverse, at



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Fig. 94. Larva of *Oberea euphorbiae* (Germ.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

anterior margin broadly rounded, whitish, with dense, somewhat rusty bristles, basally with somewhat rusty tinge. Mandibles elongate, black, basally somewhat rusty, here with four bristles in transverse row bent forward, apically obliquely incised, with elongate ventral denticle.

Pronotum barely transverse, insignificantly wider than long, laterally rounded, drooping toward head, in anterior third with somewhat rusty lustrous transverse square divided medially by whitish longitudinal band, with sparse setiform hairs dispersed on disk before spinous field of shield and forming transverse row in anterior fourth. Pronotal shield basally raised, laterally demarcated by diverging lateral longitudinal groovelike folds, with large transversely extending spinules forming spinous field, narrowly rounded at anterior margin and emarginate at anterior angles. Dark rust oblique grooves penetrating deeply into these

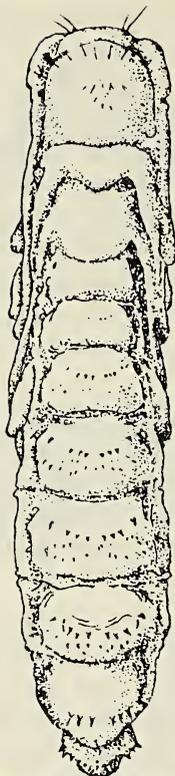
notches are comma-shaped at posterior end and extend from anterior angles of spinous field to anterior angles of pronotum. Mesonotum on disk divided by semicircular (recurved) groove, with short rusty hairs forming transverse band. Metanotum on disk convex, divided by transverse groove and excurved lateral folds, laterally with setiform hairs forming uniform or interlacing transverse row. Prosternum convex, disk with rusty setiform hairs, laterally with elongate glabrous yellow longitudinal tetragon, at base laterally with dense hairs, medially glabrous, coriaceous. Meso- and metasterna in anterior half and laterally with rusty hairs, in posterior half glabrous, medially divided by transverse groove, laterally with longitudinal grooves diverging forward.

Abdomen moderately elongate, laterally with minute, somewhat rusty hairs. Dorsal locomotory ampullae convex, coriaceous, not sclerotized, divided medially by transverse groove uniting with lateral excurved longitudinal folds. Ventral locomotory ampullae similar. Tip of abdomen with short, not very dense, rusty hairs. Body length of last instar larvae up to 23 mm, width of head 1.8 mm.

Pupa (Fig. 95): Body elongate, yellowish. Head narrowing anteriorly, frontally convex, medially between antennal tubercles with deep longitudinal groove, lateral to it with long thin dispersed, at anterior margin long, somewhat rusty bristles forming transverse row. Labrum cuneiform, apically narrowly rounded, lustrous, without bristles. Mandibles elongate, laterally without bristles. Antennae flexed laterad, behind midtibiae (on ventral side of body) bent forward, their apices adjoining forecoxae.

Pronotum barely transverse, almost square, slightly tapering in anterior third, basally with narrow transverse groove, disk uniformly convex, with short thin bright bristles forming interlacing transverse row at anterior margin, short transversely elongate cluster medially and (one each) at posterior angles. Mesonotum lustrous, in posterior half with small lateral impression, at posterior margin with angularly produced shield. Metanotum convex, with narrow median longitudinal groove, at posterior margin broadly rounded, laterally with solitary, barely perceptible bristles.

Abdomen elongate, barely tapering toward base, more toward tip. Abdominal tergites I–II moderately convex, without perceptible spinules. Tergites III–VI with transversely elongate convex median ridge bearing spinules in transverse row (becoming larger on each successive tergite), in posterior half with minute spinules. Tergite VII with median transverse ridge curved backward and bearing up to eight large acute setigerous spinules, at posterior margin and laterally with



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Fig. 95. Pupa of *Oberea euphorbiae* (Gem.).

minute acute spinules. Tergite VIII short, posteriorly gently rounded, with numerous minute acute spinules. Tip of abdomen obtuse, laterally bound by U-shaped ridge bearing minute setigerous spinules. Body length up to 15 mm, width of abdomen up to 2.0 mm.

Material: Collected in the southern Urals. Adult one, larva one, pupa one male, larval exuvia with beetle from cell one.

Distribution: Southern and central Europe, the Caucasus, southern Urals.

Biology: Inhabits steppe areas adjoining forest plantations. Beetles fly from May-end to July. Larvae live in stems of spurge and make galleries through the heartwood. By autumn, they descend into the underground part of the stem. Pupation in first half of summer. Emergence of beetles from pupae commences mid-May and is completed in June. Found very rarely.

11. *Oberea erythrocephala* (Schr.)

Schrank, 1776. *Beitr. Naturg.*, 67 (*Cerambyx*); — ab. *luteicollis*

Gebler, 1833. *Bull. Soc. Nat. Mosc.*, 6: 303; — ab. *ruficeps* Fischer, 1842. *Catal. Coleopt. Karel.*, 18; — ab. *insidiosa* Mulsant, 1863. *Col. France, Longic.*, ed. 2: 369; — ab. *nigriceps* Mulsant, 1863. *Col. France, Longic.*, ed. 2: 394; — *melitana* Reiche, 1877. *Ann. Soc. Ent. France*, 5, 7: 149; — ab. *semirufa* Kraatz, 1882. *Deutsch. Ent. Zeitschr.*, 26:115; — ab. *richteri* Bau, 1888. *Handb. Käfer.*, 425; Reitter, 1913. *Fauna Germ.*, 4: 72; — ab. *theophilei* Pic, 1914. *Longic.*, 9, 1: 11; — ab. *monthandoni* Pic, 1914. *Longic.*, 9, 1: 11; — ab. *hungarica* Pic, 1914. *Longic.*, 9, 1: 11; — ab. *erivanica* Pic, 1917. *Echange*, 33: 11; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 177–178; Funke, 1957. *Zool. Jahrbüch.*, 85, 1/2: 112–113; Demelt, 1966. *Die Tierwelt Deutschl.*, 52: 105; Kaszab, 1971. *Cincérek—Cerambycidae, Coleopt.*, 4, 5: 281.

Adult (Fig. 96): Close to *Oberea euphorbiae* (Germ.). Distinguished from it by location of large punctures forming longitudinal rows on elytra. Body moderately elongate. Head short, frontally convex, medially with narrow longitudinal groove, with deep, not very dense, on occiput more evanescent punctures, with dense erect black hairs, between them sometimes with barely perceptible, whitish adherent pubescence. Eyes moderately convex, finely faceted, deeply emarginate, significantly removed from base of mandibles. Genae comparatively long, not shorter than lower ocular lobes. Antennae not extending to apex of elytra, on upper side covered with dark brownish, on lower side with yellowish pubescence, with long black bristles. Fourth antennal segment longer than 1st, distinctly shorter than 3rd.

Pronotum square or slightly transverse, parallel-sided, apically not narrower than at base (perceptibly narrower in *O. euphorbiae* (Germ.)), with narrowly recurved posterior and barely raised (as if trimmed) anterior margin, with minute uneven, often vanishing punctation, medially with smooth, barely perceptible or distinct longitudinal band, with dense or not very dense, erect bright brownish or somewhat rusty hairs, at posterior margin in front of shield with long incurved rusty hairs forming fimbria. Pronotal shield small, posteriorly gently rounded, with long adherent, somewhat rusty, bright hairs.

Elytra elongate, parallel-sided, basally with rounded humeral tubercle, apically slightly obtuse, with rounded outer and inner angles, narrow perisutural groove, on disk in middle third slightly flat, in anterior half with much larger punctures forming distinct longitudinal rows, with dense grayish compact adherent pubescence (masking punctation), in anterior third with long, often numerous erect or almost erect bright hairs. Legs with fine, sparse, bright, adherent pubescence and sparse erect bright hairs. Midtibiae at outer margin with deep distal

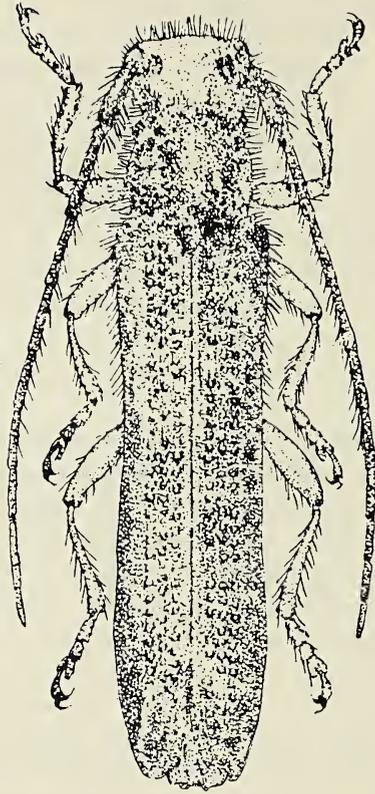


Fig. 96. *Oberea erythrocephala* (Schr.).

notch bearing dense brush of short golden-yellow bristles. Body ventrally with minute compact adherent bright (grayish or yellowish) pubescence and sparse semierect bright or dark brown setiform hairs. Abdominal sternite V with broad gentle impression, apically emarginate (male) or comparatively convex, with narrow median longitudinal groove, apically broadly rounded (female). Head red. Antennae black, rarely dark brown, with somewhat rusty tinge. Pronotum entirely red or black, or red with black fringe at anterior and posterior margins, or black in anterior and posterior thirds, with broad red median transverse band, or black on disk and laterally (or only on disk or only laterally) with red spots. Pronotal shield and elytra black. Pro-, meso-, and metasterna black. Legs rusty or somewhat rusty-yellow. Abdominal tergites I–III, sometimes I–IV on disk black, on sides somewhat rusty, tip of abdomen rusty. Color quite variable, ranging from much brighter (ab. *lutericollis* Gebl.) to much darker (ab. *nigriceps* Muls., ab. *monthandoni* Pic). Body length 9–13 mm.

Egg: White, quite elongate, slender, narrowly rounded at poles.

Chorion matte, with noncellular, fine sculpture. Length 2.8 mm, width 0.5 mm.

Larva (Fig. 97): Distinguished from the larva of *Oberea euphorbiae* (Germ.) by highly extended locomotory ampullae of abdomen and other characters. Body moderately elongate, yellowish. Head half retracted into prothorax, perceptibly bent ventrad. Epistoma insignificantly convex, divided by distinct longitudinal (median) suture, laterally demarcated by narrow whitish, barely perceptible frontal sutures, at anterior margin with narrow rusty-brown fringe bearing long thick setiform hairs in compact transverse row at its posterior border. Hypostoma yellowish, at anterior margin with narrow rusty-brown fringe, broadly emarginate, with rounded anterior angles, in anterior half with six bristles forming transverse row. Temporo-parietal lobes yellowish, at anterior margin with broad rusty-brown fringe, behind it with somewhat rusty hairs forming interlacing transverse row. Antennae barely projecting from antennal sockets. First antennal segment brownish, 2nd lustrous, whitish. Ocelli below antennae, ampullaceous, whitish. Clypeus trapezoid, broad, whitish, basally somewhat rusty. Labrum transversely oval, basally glabrous, rusty-brown, in anterior half whitish, with bright bristles. Mandibles black, basally reddish-rust, apically obliquely truncate, with produced ventral and projecting dorsal denticle, on inner side with projecting ridge extending from ventral denticle to dorsal margin, on outer side with four bristles, of which two medial bristles slightly shifted forward.

Pronotum steeply inclined toward head, at anterior margin with narrow whitish fringe, beyond it with rusty-yellow, transversely extended, lustrous tetragon bearing somewhat rusty setiform hairs in interlacing transverse row on its anterior margin, on disk medially, in front of shield and laterally with sparse dispersed short, somewhat rusty hairs. Pronotal shield basally raised, laterally demarcated by longitudinal folds, covered with large, transversely extended spinules forming vast field penetrated at its anterior angles by deep brown or dark brown long oblique grooves extending from anterior angles of spinous field to anterior angles of pronotum. Mesonotum divided by transverse recurved groove, laterally with short hairs forming transverse row. Metanotum on disk convex, coriaceous, divided by median transverse groove. Prosternum on disk in anterior half with rusty hairs, on sides with longitudinally extended glabrous yellow tetragon. Meso- and metasterna at anterior margin with rusty hairs forming narrow transverse band, on disk and in posterior half glabrous, without hairs and spinules.

Abdomen laterally with short bright sparse hairs. Dorsal and ventral locomotory ampullae of abdomen almost uniformly highly extended (in

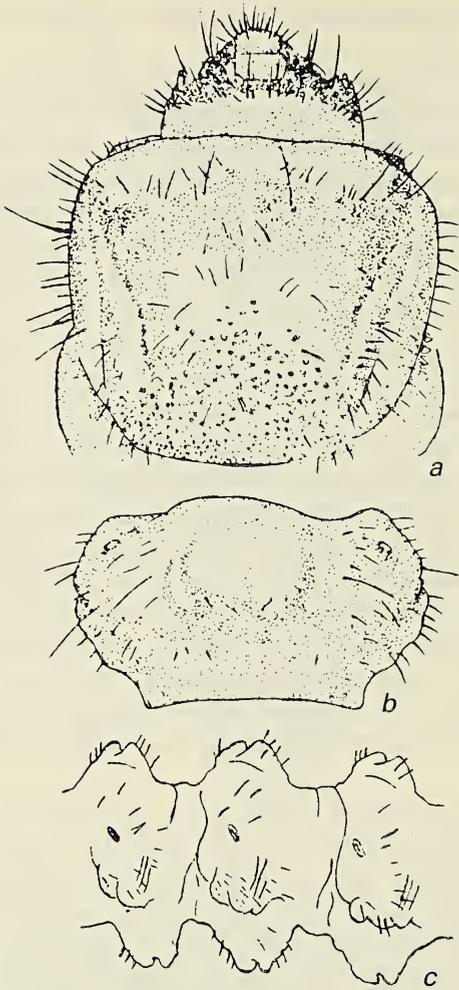


Fig. 97. Larva of *Oberea erythrocephala* (Schr.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—abdomen (lateral view).

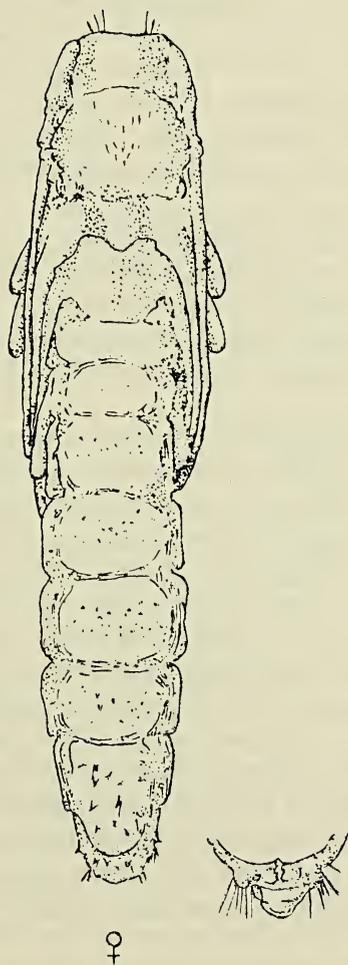
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lateral view), medially divided by longitudinal, in posterior half by transverse recurved groove, coriaceous, not sclerotized, without spinules. Tip of abdomen with short rusty hairs. Body length of last instar larvae 16–20 mm, width of head up to 1.9 mm.

Pupa (Fig. 98): Distinguished from the pupa of *Oberea euphorbiae* (Germ.) by less developed spinules on abdominal tergites. Body elongate, white, often with yellowish tinge. Head significantly narrowing anteriorly, frontally highly convex, medially (especially between antennal tubercles)

with deep longitudinal groove, lateral to it with solitary (dispersed) bristles, at anterior margin with six bristles forming entire transverse row. Labrum cuneiform, highly narrowing anteriorly, apically lustrous, on disk without bristles. Mandibles laterally without bristles. Antennae in second half bent forward behind midfemora, their apices (on ventral side) adjoining forecoxae.

Pronotum transverse (female) or square (male), barely tapering at anterior margin, in posterior half parallel-sided, basally with narrow transverse groove, with a few minute, barely perceptible bristles forming two irregular transverse rows—one in anterior third, the other



medially. In some individuals, these bristles not perceptible. Mesonotum convex, lustrous, at posterior margin with angularly produced shield, without bristles. Metanotum convex, medially in anterior half with deep, in posterior half with flaring longitudinal groove, at posterior margin broadly rounded, without visible bristles.

Abdomen elongate, in region of segments IV–V enlarged, tapering toward base and tip. Abdominal tergites I–II glabrous, without spinules, mildly convex. Tergite III with minute, tergites IV–VI with moderately large spinules forming transverse row medially, and minute spinules forming one or two transverse rows in posterior half. Tergite VII posteromedially with somewhat large spinules forming interlacing transverse recurved row, in posterior half with fine dispersed acute spinules. Tergite VIII transverse, on disk with minute acute spinules forming transverse row. Tip of abdomen obtuse, laterally bound by ridge bearing minute setigerous spinules which, in some individuals, appear as bristles on sclerotized base. Valvifers of female slightly elongate, apically rounded, contiguous. Body length 11–15 mm, width of abdomen up to 2.0 mm.

Material: Collected in northern Kazakhstan, the southern Urals (Orenburg, Ural'sk), and northern Caucasus. Adults 42, larvae 36, pupae 8 (males and females), larval exuviae 9.

Distribution: Southern and central Europe, the Caucasus, the southern Urals, and northern Kazakhstan. Found comparatively frequently everywhere.

Biology: Inhabits open glades in deciduous forests and steppe areas; often found along roadsides. Ecologically associated with spurge. Flight of beetles from June-end to mid-August. Beetles require supplementary feeding. They remain on spurge, scratch the epidermis on stems, leaving injuries in the form of narrow bands up to 2.0 cm long, and often also damage leaf petioles. Stems 5–20 mm diameter are infested and mating takes place here. The female makes a notch on the stem surface at a height 5–42 cm above ground and lays an egg through it in the stem. One egg is laid in each notch. Generally, only one notch is made in each stem, rarely two. Larvae hatch from eggs two weeks later and make a gallery through the heartwood, generally downward (rarely upward), continuing downward to penetrate the root where they remain for hibernation during winter. The following summer they often emerge from the root and move into a new stem, ascend up to 8–11 cm and at this height nibble it from inside, which causes the upper part of the stem to break. The gallery exposed in the apical part of the stem is then plugged with frass by the larvae and they remain in it for the second winter. The following summer they make a cell and pupate in

it with head upward. Pupation takes place in May and June and the pupal stage lasts more than two weeks. In the laboratory, a larva pupated on February 19th and the beetle emerged on March 9th. The pupa completed development in 18 days. The temperature during this period ranged within 17–20°C (average $17.8 \pm 0.3^\circ\text{C}$). Generation—two-year cycle. Based on 30 insects, larvae before pupation weigh 34–102 mg (60.1 ± 2.4), pupae 31–93 mg (54.1 ± 2.2), young beetles before emergence from cells 25.0–72.5 mg (43.7 ± 1.7).

In the Urals and northern Kazakhstan, *Oberea erythrocephala* (Schr.) develops on spurge species (*Euphorbia uralensis*, *E. seguieriana*, and others). According to reports of Funke (1957), it infests the stems of *E. esula*, *E. cyparissias*, and *E. platyhyllus*.

12. *Oberea donceeli* Pic

Pic, 1907. *Mat. Longic.*, 6, 2: 23; — var. *obscuripennis* Pic, 1939. *Echange*, 55: 3; Gressit, 1951. *Longic. Beetles of China*, 2: 595; — *atrosignata* Breuning, 1947. *Misc. Ent.*, 44: 57.

Adult (Fig. 99): In general habits and appearance similar to the adult of *Pseudocalamobius japonicus* (Bat.). Well distinguished from other species of the genus *Oberea* Muls. by slender, considerably longer body, antennae, and oblong pronotum. Body slender, highly elongate. Head frontally moderately convex, medially with narrow linear longitudinal groove extending from anterior margin of frons to occiput, with insignificantly laterally produced antennal tubercles, moderately dense punctation, grayish or yellowish adherent pubescence, with solitary brownish erect hairs or without them. Eyes convex, very finely faceted, deeply incised, notably removed from base of mandibles. Genae not shorter than lower ocular lobe. Antennae longer than body, extending beyond apex of elytra by 8th (male) or 10th (female) segment, with sparse grayish adherent hairs not forming continuous pubescence, on inner side of 1st–8th segments with long bristles. First antennal segment with fine dense rugose punctation, almost 1.5 times shorter than 3rd, the latter not longer or even shorter than 4th segment.

Pronotum parallel-sided, oblong, considerably longer than wide, almost cylindrical, basally with narrow transverse groove, with fine, not dense, evanescent punctation, adherent grayish-yellow, not dense pubescence directed mediad, without erect hairs, sometimes with smooth median longitudinal band. Pronotal shield small, parallel-sided, posteriorly broadly rounded, with dense yellowish adherent pubescence.

Elytra narrow, elongate, parallel-sided, basally with insignificantly projecting rounded humeral tubercle, apically obtuse, with rounded

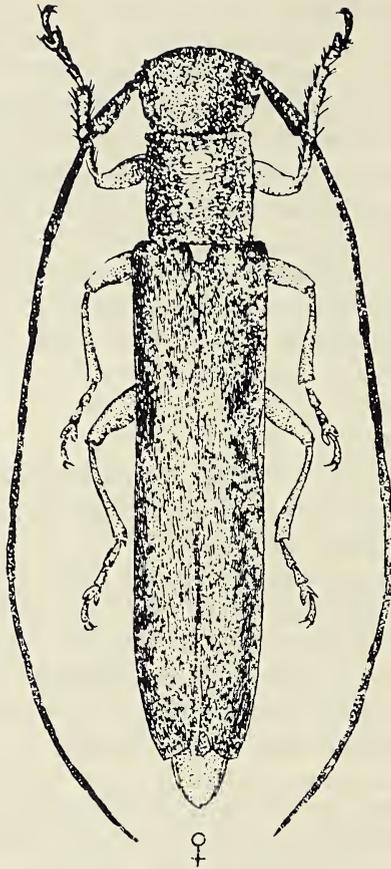


Fig. 99. *Oberea donceeli* Pic.

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angles, disk uniformly convex, with deep punctures forming longitudinal rows, gray or yellowish adherent pubescence, short raised bright setiform hairs forming longitudinal rows. Legs with tender yellowish pubescence, without erect hairs. Midtibiae at outer margin with small distal notch covered with short bristles. Body ventrally with uniform compact adherent yellowish pubescence, without erect hairs. Abdominal sternite V apically rounded, with pitlike depression (male) or uniformly convex, with narrow median longitudinal groove (female). Head reddish, maxillary and labial palps apically brownish. Pronotum red, on sides (in lateral view) with dark brown longitudinal band. Thorax on ventral side, abdomen and legs somewhat rusty-yellow. Antennae black or rusty-brown. Elytra yellow (f. *typica*) or black with grayish pubescence (var. *obscuripennis* Pic). Shield rusty-red. Body length 9–13 mm.

Material: Collected in outskirts of Khabarovsk and in Trans-Baikal

(Dul'durga). Adults two. Additionally, a series of beetles was examined in the collections of the Zoological museum, Moscow State University.

Distribution: Southern Trans-Baikal. Northern Mongolia, northern China, Tibet.

Biology: Inhabits montane-steppe regions. Flight of beetles from mid-May to mid-July.

3. Genus *Phytoecia* Muls.

Mulsant, 1839. *Coleopt. France, Longic.*, 199; — subg. *Opsilia* Mulsant, 1863. *Coleopt. France, Longic.*, 2: 387, 431; subg. *Musaria* Thomson, 1864. *Syst. Ceramb.*, 120; *Hoplotoma* Arcas, 1874. *An. Soc. Esp. Hist. Nat.*, 3: 151; Aurivillius, 1923. In Junk: *Coleopt. Catal.*, 73: 550; Winkler, 1928. *Catal. Coleopt.*, 1221; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 187–188; Gressit, 1951. *Longic. Beetles of China*, 2: 611 (type: *Saperda vittigera* F.); Mamaev and Danilevskii, 1975. *Lichinki zhukov-drovosekov*, 260–261.

Adult: Body moderately elongate, perceptibly large (*Musaria* Muls.) or small (*Phytoecia* s. str., *Opsilia* Muls., and others). Head short, frontally in region of frons convex, with wide-set antennal tubercles, between them from frons to occiput broadly rounded, rarely with median longitudinal groove. Eyes deeply emarginate, with more or less broad faceted interspace between ocular lobes (*Musaria* Muls., *Phytoecia* s. str., and others) or completely divided, without space between lobes (*Opsilia* Muls.). The absence of a faceted interspace brings the subgenus *Opsilia* Muls. closer to the genus *Tetrops* Steph. Pronotum transverse, square or barely oblong, laterally gently rounded, basally generally with narrow transverse groove. Elytra parallel-sided, laterally with distinct longitudinal humeral ridge (many *Phytoecia* s. str.) or rounded, without perceptible longitudinal ridge (*Musaria* Muls., *Opsilia* Muls., some species of *Phytoecia* s. str.). Abdominal sternite V in second half (at posterior margin) with more or less deep depression (male) or without it, convex, with longitudinal groove (female).

Larva: In structure of pronotum quite similar to the larvae of *Oberea* Muls. Body moderately elongate, large (*Musaria* Muls.) or small (*Phytoecia* s. str., *Opsilia* Muls.). Head half retracted into prothorax, perceptibly bent ventrad. Epistoma with distinct (*P. pustulata* (Schr.), *P. nigricornis* (F.)) or with almost imperceptible, faint frontal sutures (*P. cylindrica* (L.), *P. sareptana* Ganglb., and others). Pronotum highly inclined toward head, basally raised, at anterior margin with whitish fringe, behind it with yellowish, transverse, in front twice emarginated band. Pronotal shield with large, transversely extended spinules form-

ing extensive spinous field occupying one-third or more than half of pronotum, laterally demarcated by whitish longitudinal folds, at anterior angles with narrow notch in which rusty groovelike depressions are embedded at one end, which extend obliquely from shield to anterior angles of pronotum and are straight or insignificantly curved. Thoracic legs absent. Abdomen moderately elongate, generally tapering posteriorly. Dorsal locomotory ampullae coriaceous, without spinules (*P. affinis* (Harr.), *P. cylindrica* (L.), and others) or sclerotized, with dense minute specklike spinules (*P. volgensis* Kr., *P. sareptana* Ganglb., and others) divided by one transverse groove (*P. affinis* (Harr.), *P. cylindrica* (L.), and others) or by two transverse grooves converging laterally (*P. cinctipennis* Mannh., *P. coerulescens* (Scop.), and others). Tip of abdomen with dense or comparatively sparse setiform hairs.

Pupa: Characterized by large (*Musaria* Muls.) or small (*Phytoecia* s. str., *Opsilia* Muls.) body. Head short, with wide-set antennal tubercles, between them from frons to occiput broadly rounded, frontally with sparse bristles. On sinciput inner to antennal tubercles with one (*P. rufiventris* Gaut., *P. pustulata* (Schr.)) or two close-set bristles (*P. cylindrica* (L.), *P. cinctipennis* Mannh., and others). Antennae bent semicircularly, their apices flexed toward forelegs or sides of head. Pronotum on disk uniformly convex, laterally slightly rounded, basally with narrow transverse groove, with sparse dispersed (*P. cylindrica* (L.) and others) or dense bristles forming cluster (*P. coerulescens* (Scop.)). Bristles located on sclerotized base (*P. nigricornis* (F.), *P. cinctipennis* Mannh.) or without it (*P. cylindrica* (L.) and others). Abdomen moderately elongate, slightly tapering toward base, more toward tip. Abdominal tergites in second half or medially with setigerous spinules forming transversely extended cluster. Spinules on all tergites developed almost equally (*P. nigricornis* (F.)) or on tergites I–II barely perceptible, but on remaining tergites fully developed (*P. cinctipennis* Mannh. and others).

Not less than 11 species are characteristic for northern Asia. *P. rufipes* Oliv., *P. sibirica* Gebl., and *P. annulipes* Muls. and Rey are morphologically similar to *P. icterica* (Schall.). Therefore, they cannot be considered separate species. Of the 11 species, only 3 (*P. rufiventris* Gaut., *P. sareptana* Ganglb., *P. cinctipennis* Mannh.) are close to the fauna of eastern regions, while the remainder (*P. cylindrica* (L.), *P. nigricornis* (F.), *P. coerulescens* (Scop.), and others) are migrants from the southwestern provinces of the Palearctic. *P. volgensis* Kr. mainly belongs to the faunistic group of northern Caucasus. All species of the genus *Phytoecia* Muls. are ecologically associated with herbaceous

plants. Some species (*P. affinis* (Harr.), *P. volgensis* Kr., and others) develop mainly on Umbelliferae, others (*P. cinctipennis* Mannh., *P. sareptana* Ganglb., *P. nigricornis* (F.)) develop on Compositae, while some (*P. cylindrica* (L.)) infest Boraginaceae and other plants. Larvae live in the stems, feed on internal tissues, and often penetrate the roots. They develop through a one-year or, more often, two-year life cycle. Hibernation occurs in the larval stage (*P. sareptana* Ganglb. and others) or once in the larval stage and again as an adult (*P. nigricornis* (F.), *P. cylindrica* (L.)). Many species (*P. coerulescens* (Scop.) and others) nibble the stem from inside before pupation and, consequently, the upper part of the stem breaks; the larvae make a cell in the remaining underground part. Some species (*P. volgensis* Kr., *P. rufiventris* Gaut., *P. nigricornis* (F.)) make a pupal cell in the roots or underground part of the stem, others (*P. sareptana* Ganglb.) in the aerial part.

Type species: Cerambyx cylindricus Linnaeus, 1758.

KEY TO SPECIES

Adults

- 1 (4). Body comparatively large, stocky. Length not more than 10 mm, width at humeri 3.5–5.0 mm. Hind coxae on inner margin in males with spinule. Femora and tibiae red, tarsi black (subgenus *Musaria* Thoms.).
- 2 (3). Pronotum red, on disk with two transversely set round black spotlets. From western borders of southern Europe to Altai, northern Kazakhstan 1. ***P. affinis*** (Harr.)
- 3 (2). Pronotum black, without spots. Northern Caucasus, southern Povalzh'e, the southwestern Urals 2. ***P. volgensis*** Kr.
- 4 (1). Body not large, comparatively narrow, elongate. Length less than 10 mm, rarely slightly more than 10 mm, width at humeri not more than 3.0 mm. Hind coxae on inner margin in males with spinule or without spinule. Femora and tibiae only partially red, often entirely black.
- 5 (20). Eyes emarginate, between ocular lobes with narrow or broad lacertus. Elytra laterally with more or less distinct humeral ridge (subgenus *Phytoecia* s. str.).
- 6 (11). Pronotum on disk with red spotlet, only in *P. pustulata* (Schr.) ab. *pulla* Ganglb. without spotlet.
- 7 (8). Head and pronotum without compact compressed pubescence, with black erect setiform hairs. From Baikal to Pacific Ocean coasts 3. ***P. rufiventris*** Gaut.

- 8 (7). Head and pronotum with compact adherent pubescence, with brownish or bright brown erect hairs.
- 9 (10). Pronotum laterally with perceptible longitudinal pilose band, legs with dense pubescence. Red spot on disk of pronotum longitudinally extended, rarely absent (ab. *pulla* Ganglb.). Hind coxae on inner margin (male) without spinule. Europe, the Caucasus, the southern Urals. 4. **P. pustulata** (Schr.)
- 10 (9). Pronotum laterally without perceptible longitudinal pilose band, legs with sparse pubescence. Red spot on disk of pronotum round. Hind coxae on inner margin (male) with long spinules. Europe, the Caucasus, Kazakhstan, the southern Urals. 5. **P. virgula** (Charp.)
- 11 (6). Pronotum on disk always without red spotlet.
- 12 (13). Legs entirely black, only in some individuals foretibiae proximally with somewhat rusty tinge. Hind coxae on inner margin (male) with large spinule. Europe, the Caucasus, Kazakhstan, Siberia up to Baikal. 6. **P. nigricornis** (F.)
- 13 (12). Forelegs, often mid- and hind, red. Hind coxae (male) with spinule or without it.
- 14 (15). Forelegs (femora in second half and tibiae usually entirely) red. Mid- and hind legs black. Hind coxae (male) with large spinule. Europe, the Caucasus, Turkey, Kazakhstan, Siberia up to Baikal, northern China. 7. **P. cylindrica** (L.)
- 15 (14). All legs mostly red.
- 16 (17). Elytra laterally below humeral tubercle black, without bright yellow fringe. Hind coxae (male) without spinule. Europe, the Caucasus, western Siberia, northwest China. 8. **P. ictERICA** (Schall.)
- 162 17 (16). Elytra laterally below humeral tubercle with well-developed bright yellow fringe.
- 18 (19). Elytra laterally with well-developed humeral ridge. Hind coxae (male) without spinule. Ussuri-Primor'e region, north-east China. 9. **P. cinctipennis** Mannh.
- 19 (18). Elytra laterally rounded, without humeral ridge. Hind coxae (male) with well-developed spinule. Ussuri-Primor'e region. 10. **P. sareptana** Ganglb.
- 20 (5). Eyes completely divided into lower and upper lobes, between them without lacertus (subgenus *Opsilia* Muls.). Europe and Asia up to Baikal. Northern China. 11. **P. coerulecens** (Scop.)

Larvae

- 1 (4). Body of last instar larvae large. Width of head more than 2.5 mm.
- 2 (3). Locomotory ampullae coriaceous, without sclerotized minute spinules. Pronotum at anterior margin with sparse thin hairs. On umbellifers..... 1. *P. affinis* (Harr.)
- 3 (2). Locomotory ampullae sclerotized, with minute sclerotized spinules. Pronotum at anterior margin with sparse thin setiform hairs forming transverse row. On umbellifers 2. *P. volgensis* Kr.
- 4 (1). Body of last instar larvae small. Width of head not more than 2.0 mm.
- 5 (16). Dorsal locomotory ampullae divided by transverse groove.
- 6 (15). Locomotory ampullae of abdomen moderately produced, their height considerably less than total width. Eusternum sparsely pilose.
- 7 (10). Frontal sutures almost not perceptible, epistoma fusing with temporo-parietal lobes. Eusternum only in anterior half sparsely pilose.
- 8 (9). Spinous field of pronotum at anterior margin rounded, pronotum anteriorly round or angularly produced. On Compositae. 3. *P. rufiventris* Gaut.
- 9 (8). Spinous field of pronotum at anterior margin short, directly truncate, pronotum not produced anteriorly. On Compositae. 5. *P. virgula* (Charp.)
- 10 (7). Frontal sutures whitish, sharply distinguished, epistoma distinctly demarcated by them from temporo-parietal lobes. Eusternum with long hairs.
- 11 (12). Width of head of late instar larvae up to 1.2 mm. Tip of abdomen with sparse bright hairs. On Compositae. 4. *P. pustulata* (Schr.)
- 12 (11). Width of head of late instar larvae more than 1.6 mm. Tip of abdomen with dense rusty setiform hairs.
- 13 (14). Spinous field of pronotum consisting of compact large spinules. Distance between spinules not more or even less than their own width. On Compositae 6. *P. nigricornis* (F.)
- 14 (13). Spinous field of pronotum consisting of rarefied minute spinules. Distance between spinules more than their width. On umbellifers. 8. *P. ictERICA* (Schall.)
- 15 (6). Locomotory ampullae of abdomen highly produced (in lateral view), their height not less than total width. Eusternum basally

- glabrous, in anterior half densely pilose. Mainly on umbellifers and Labiatae 7. *P. cylindrica* (L.)
- 163 16 (5). Dorsal locomotory ampullae divided by two transverse grooves converging laterally.
- 17 (20). Locomotory ampullae of abdomen sclerotized, with spinules.
- 18 (19). Eusternum with long dense hairs. Spinous field of shield occupies almost half of pronotum, extending far ahead. On Compositae 9. *P. cinctipennis* Mannh.
- 19 (18). Eusternum with sparse, not very long hairs. Spinous field of shield occupies one-third of pronotum, not extending far ahead. On Compositae. 10. *P. sareptana* Ganglb.
- 20 (17). Locomotory ampullae of abdomen coriaceous, without spinules. On many borage plants. 11. *P. coerulescens* (Scop.)

Pupae

- 1 (4). Body comparatively large. Length 11–19 mm, width of abdomen 3.5–4.5 mm.
- 2 (3). Pronotum with thin minute bristles without perceptible sclerotization at their base. 1. *P. affinis* (Harr.)
- 3 (2). Pronotum with long thick bristles on sclerotized base. Sometimes this base together with bristle produced into an acute spinule. 2. *P. volgensis* Kr.
- 4 (1). Body small. Length 8–12 mm. Width of abdomen 1.5–3.0 mm.
- 5 (10). Sinciput inner to antennal tubercles with one bristle.
- 6 (9). Bristles on pronotum forming two transverse rows—one antero-, the other posteromedial.
- 7 (8). Abdominal tergite VII posteromedially with large acute setigerous spinules forming transverse band. 3. *P. rufiventris* Gaut.
- 8 (7). Abdominal tergite VII posteromedially with minute setigerous spinules forming barely perceptible, transversely elongate cluster. 5. *P. virgula* (Charp.)
- 9 (6). Bristles on pronotum dispersed mainly along periphery, not forming transverse rows. 4. *P. pustulata* (Schr.)
- 10 (5). Sinciput inner to antennal tubercles with pair of close-set bristles.
- 11 (20). Pronotum with sparse bristles not forming large clusters.
- 12 (15). Bristles on pronotum with sclerotized base, sometimes produced into acute spinule.
- 13 (14). Abdominal tergites with uniform minute setigerous spinules.

- 6. **P. nigricornis** (F.)
- 14 (13). Abdominal tergites I–II with minute, barely perceptible, tergites III–VI with large acute spinules. 9. **P. cinctipennis** Mannh.
- 15 (12). Bristles on pronotum without sclerotized base; in any case, without spinule.
- 16 (19). Width of abdomen not less than 2.5 mm. Spinules on abdominal tergites I–II considerably shorter than spinules on subsequent tergites.
- 17 (18). Metanotum without bristles. Spinules on abdominal tergites without extended coriaceous base. . . . 7. **P. cylindrica** (L.)
- 18 (17). Metanotum with solitary, barely perceptible bristles. Spinules on abdominal tergites with extended coriaceous base. 8. **P. icterica** (Schall.)
- 19 (16). Width of abdomen not more than 1.5 mm. Spinules on all abdominal tergites of almost equal size. 10. **P. sareptana** Ganglb.
- 20 (11). Pronotum with bristles forming dense cluster at anterior angles and two diverging bands at base. 11. **P. coerulescens** (Scop.)

164 1. **Phytoecia affinis** (Harr.)

Harrer, 1784. *Beschreib. Ins.*, 1: 209 (*Saperda*); — *nigripes* Voet, 1778. *Catal. Coleopt.*, 2: 23; — *bipunctata* Piller, 1783. *Iter. Posegan*, 36; — *janus* Frölich, 1793. *Naturf.*, 27: 154; — *nigritarsis* Schönherr, 1817. *Synon. Ins.*, 1, 3: 435; — *circassica* Reitter, 1888. *Wien Ent. Zeit.*, 7: 282; — ab. *nigropubescens* Reitter, 1888. *Ibid.*, 282; — *starki* Reitter, 1888. *Ibid.*, 282; — *subaurata* Pic, 1889. *Echange*, 5: 68; — *mutata* Pic, 1892. *Echange*, 8: 4; Yakobson, 1911. *Zhuki Rossii*, tabl. 72, fig. 24; — ab. *altaica* Suvorov, 1913. *Rev. Russe d'Ent.*, 13: 79; Reitter, 1913. *Fauna Germ.*, 4: 70 (*P. affinis* Panz); Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 195 (*P. nigripes* Voet.); Panin and Savulescu, 1960. *Fauna Rep. Popul. Romine Ins.*, 10: 490–491; Demelt, 1966. *Die Tierwelt Deutschl.*, 52, 2: 106 (*P. nigripes* Voet.); Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 229 (*P. nigripes* Voet.); Mamaev and Danilevskii, 1975. *Lichinki zhukov-drovosekov*, 262 (*P. nigripes* Voet.); Cherepanov and Cherepanova, 1979. *Chlenistonogie i gel'minty (Nov. i maloizv. vidy fauny Sibiri)*, 107–110.

Adult (Fig. 100): Distinguished from other species of the genus *Phytoecia* Muls. by much larger size, reddish color of pronotum and legs, black tarsi. Body stocky, comparatively thick. Head short, not broader than pronotum, with wide-set longitudinal tubercles, between

them medially with narrow linear longitudinal groove or without it, with large compact punctation, erect black hairs (f. *typica*), in some individuals in frontal region with dense compact adherent bright yellow pubescence and bright raised or erect hairs (ab. *compacta* Pic). Eyes moderately convex, very finely faceted, matte, broadly emarginate, with narrow lacertus between ocular lobes. Antennae not longer than body, barely extending (male) or just short of extending (female) up to apex of elytra, with minute compact punctation, on inner lower side with dense gray compact adherent pubescence, with solitary bristles, here emarginate on 3rd–4th segments (these segments look flat, apically slightly convex). First antennal segment thick, shorter than 3rd, slightly longer than 5th.

Pronotum transverse, laterally rounded, basally and apically with narrow flange, with recurved edge, disk convex, medially with narrow smooth longitudinal line, with pair of smooth dark tubercles in transverse row, with comparatively compact punctation, erect bright (f.

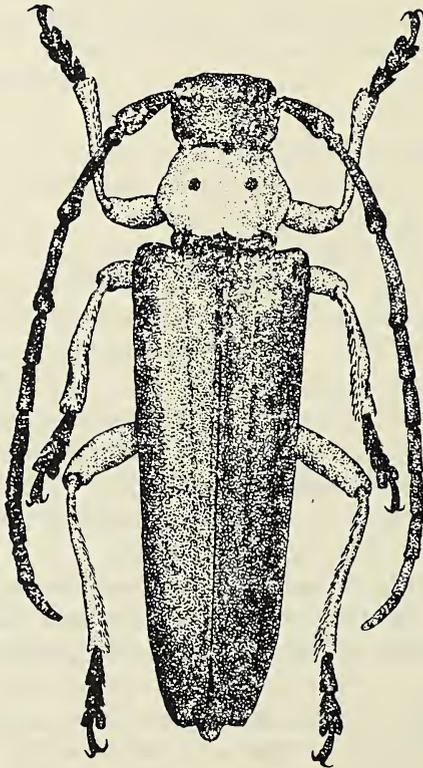


Fig. 100. *Phytoecia affinis* (Harr.).

typica) or black (ab. *nigropubescentis* Reitt.) short hairs. Pronotal shield short, transverse, almost flat or medially compressed troughlike, with compact minute punctation, posteriorly broadly rounded.

Elytra almost parallel-sided or slightly tapering posteriorly, basally with straight humeri, with barely projecting humeral tubercle, inward to it with gentle, barely perceptible impression, apically directly or obliquely truncate, on disk moderately convex, matte, with double (large, in spaces between large punctures with minute) punctation, with very minute short bright grayish or brownish hairs forming more or less dense pubescence. Legs smooth, without perceptible punctation, with thin, not very dense, adherent yellowish hairs. Midtibiae at outer margin with sharp oblique distal notch. Body ventrally with compact adherent yellowish pubescence, with short, semierect bright or black hairs. Abdominal sternite V fully convex, apically directly truncate or slightly emarginate, medially in posterior half with barely perceptible longitudinal groove (female) or mildly convex, apically narrowly rounded, without longitudinal groove (male). Head, antennae, two spots on pronotum, pronotal shield, elytra, thorax on ventral side, and base of abdomen black. Pronotum, abdomen laterally and at tip red. Epipleura of elytra basally (below humeral tubercle), femora, and tibiae yellow, tarsi black. Pubescence on elytra bright grayish, dense, masking punctation, imparting grayish tone to elytra (f. *typica*) or brownish, sparse, not covering punctation, imparting black tone to elytra (ab. *altaica* Suv.). Body length 12.0–20.5 mm.

Larva (Fig. 101): Body large, thick, darkish. Head half retracted into prothorax. Epistoma slightly convex, medially divided by faint longitudinal suture, laterally fusing with temporo-parietal lobes (frontal sutures faint), in anterior third rusty-brown, with thin hairs forming transverse row. Hypostoma somewhat rusty, at anterior margin broadly emarginate, posteriorly slightly enlarged. Temporo-parietal lobes with somewhat rusty tone, at anterior margin with dark rust or brownish fringe covering ocular-antennal zone. Antennae short, whitish, barely projecting from antennal sockets, close below them lie whitish ampullaceous ocelli. Anterior half of temporo-parietal lobes with hairs in two transverse rows (three–four hairs in each row). Clypeus transverse, short (taenoid), basally somewhat rusty. Labrum transversely oval, narrower than clypeus, at anterior margin broadly rounded, whitish, basally somewhat rusty. Mandibles black, massive, apically obliquely or slightly truncate, with extended ventral and angularly projecting dorsal denticle.

Pronotum highly inclined toward head, at anterior margin with whitish biapical fringe (appearing as two triangles with backward directed apices), disk with transverse, at anterior margin twice emar-

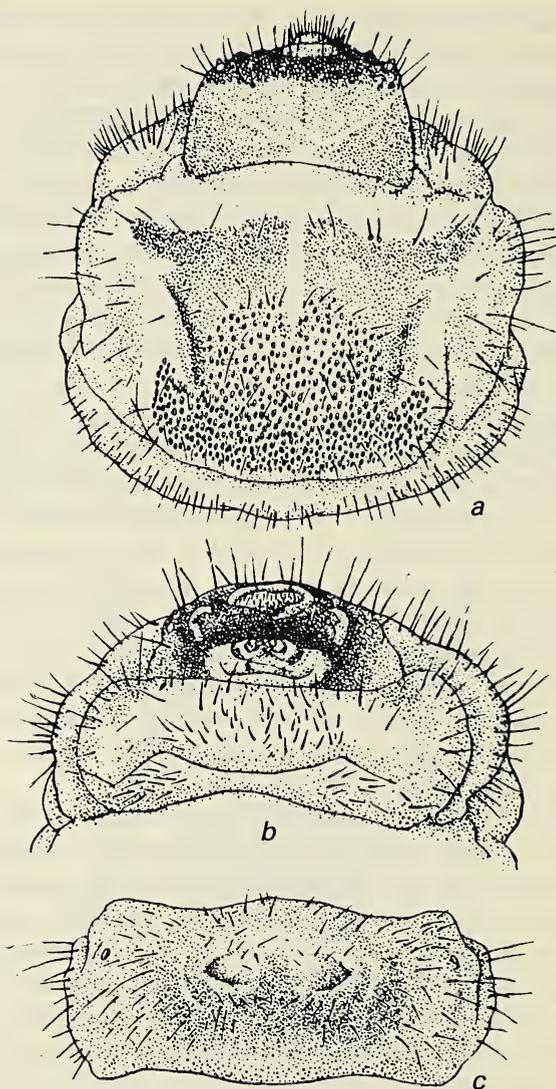


Fig. 101. Larva of *Phytoecia affinis* (Harr.).

a—head and pronotum; b—head and prosternum;
c—abdominal tergite with dorsal locomotory ampulla.

ginate, rusty lustrous square, at anterior fringe of this square with thin sparse hairs in transverse row. Pronotal shield highly raised posteriorly (basally more convex), laterally demarcated by whitish longitudinal grooves, with dense large (at base perceptibly smaller) spinules forming common spinous field, rounded at anterior margin and intersected on

sides by deep dark rust groovelike impressions extending obliquely from anterior angles of pronotal shield to anterior angles of pronotum. These impressions spread almost over one-third of angular part of shield. Sides of pronotum with long sparse hairs. Prothoracic presternum sparsely pilose, laterally with very large lustrous yellowish-rust spot. Eusternum and basisternum laterally with dense rusty hairs. Meso- and metasterna in anterior half with dense rusty hairs, disk coriaceous, without sclerotized spinules.

Abdomen thick, highly tapering toward tip, laterally with short sparse, somewhat rusty hairs. Dorsal locomotory ampullae very convex, whitish, coriaceous, without spinules, medially divided by common longitudinal and more or less distinct transverse groove. Ventral locomotory ampullae divided by transverse groove uniting laterally with bent longitudinal fold. Body length 24–27 mm, width of head 2.5–3.0 mm.

Pupa (Fig. 102): Characterized by comparatively large body, sparse minute bristles on pronotum and multiple spinules on abdominal tergites. Body moderately elongate, yellowish. Head cuneately tapering anteriorly, between antennae broad, here mildly convex or flat, lateral to frons with three–five minute bristles in uniform or interlacing longitudinal row. Clypeus basally with four–six bristles in transverse row interrupted medially. Labrum lustrous, almost cuneiform, apically narrowly rounded, without bristles or with solitary bristles. Mandibles on outer side with pair of minute close-set bristles. Antennae flexed laterad, in second half (on ventral side) bent forward, their apices adjoining foretibiae.

Pronotum slightly transverse, disk convex, laterally angularly rounded, basally with transverse groove, with minute, randomly dispersed hairs or hairs concentrated along periphery. Mesonotum posteriorly with insignificantly produced rounded shield, posteromedially with transverse depression, laterally ahead of depression with two–three minute bristles forming generally an oblique row. Metanotum broad, posteriorly directly truncate or broadly rounded, convex, medially with longitudinal groove, in anterior half with one–two barely perceptible lateral bristles.

167 Abdomen elongate, parallel-sided or in region of segment IV slightly enlarged. Abdominal tergites moderately convex, medially with common longitudinal groove, with acute minute (on tergites I–II) or large (on tergites III–VI) paramedial spinules forming broad transverse field. Spinules recurved, at their base on posterior side with one thin, barely perceptible bristle. Tergite VII tapering posteriorly, apically narrowly or broadly rounded, disk convex, with acute spinules forming transverse row before middle and transverse broad recurved field in

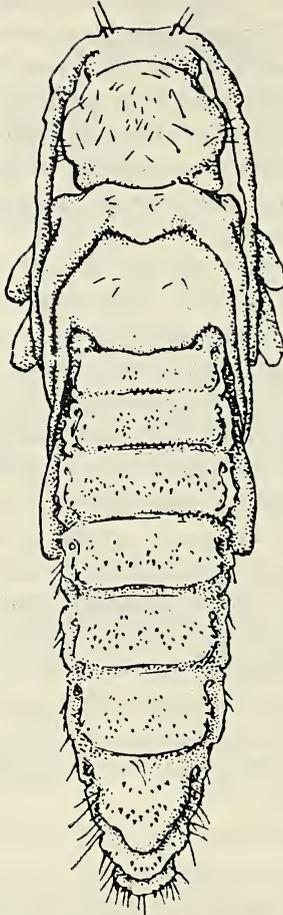


Fig. 102. Pupa of *Phytoecia affinis* (Harr.).

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posterior half. Tip of abdomen (in ventral view) bound by U-shaped ridge bearing 6–14 setigerous spinules (three–seven on each side). Valvifers of female small, elongate, bent toward each other. Body length 18–19 mm, width of abdomen 4.0–4.5 mm.

Material: Collected in the upper Ob' region, in Kulunda (Karasuk River). Adults 12, larvae 8, pupae 6 (males and females), larval exuviae with beetles from cells 3.

Distribution: From the western borders of France, Germany to the upper Ob' region and Altai, northern Kazakhstan.

Biology: Inhabits the forest-steppe zone, occupies open glades, and sometimes individual patches on saline lands. Ecologically associated with Umbelliferae. Beetles emerge from hibernation sites in June and

are found up to July-end. They require supplementary feeding. Females lay eggs in stems of *Libanotis intermedia*. Stems 50–100 cm long and 5–22 mm diameter at root collar are infested. After hatching, larvae make a gallery downward through the heartwood, fill it with frass, penetrate into the root, and there continue to make a longitudinal gallery, destroying almost all the inner tissues. Length of gallery in the root 10–23 cm, width 5–10 mm. Larvae hibernate in the roots. After hibernation, in second half of summer, they make a cell in the upper part of the root or in the underground part of the stem, nibble a hole up to 5.0 mm diameter, and plug it with fibrous frass. The cell is separated from above and below by a plug of coarse fibrous frass. Length of upper plug 15 mm, of lower plug up to 26 mm. Length of pupal cell 15–40 mm, width 5–8 mm. Larvae pupate in cell with head upward. Pupal stage lasts about three weeks. Under laboratory conditions, at a temperature of 24°C, two pupae completed development in 18 days. Developed beetles enter diapause. They hibernate in pupal cells and leave them the following spring. Beetles lose weight during hibernation. In an experiment, seven insects (under laboratory conditions) had a total weight of 788 mg (100%) at the commencement of diapause and two months later weighed 667 mg (84.6%), i.e., weight loss 15.4%. Generation—two-year cycle, possibly prolonged up to three years. Based on 18 insects, larvae before pupation weigh 64.5–216.0 mg (134.5 ± 9.2), pupae 50–197 mg (122.8 ± 8.8), young beetles before hibernation 37–154 mg (96.1 ± 7.4) (Cherepanov and Cherepanova, 1979).

Phytoecia affinis (Harr.), according to our observations, damages *Libanotis intermedia* in large numbers in Kulunda. According to Demelt (1966), this species develops on stems of *Umbellifera chaerophilum* and *Laserpitium latifolium*.

2. *Phytoecia volgensis* Kr.

Kraatz, 1883. *Wien. Ent. Zeit.*, 2: 276; Ganglbauer, 1884. *Best.-Tab.*, 8: 124; — ab. *m-notata* Pic, 1911. *Echange*, 27: 185; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 195.

Adult (Fig. 103): Close to *Phytoecia affinis* (Harr.). Distinguished from it by black pronotum, structure of abdominal tergite V, and other characters. Body comparatively stocky, large. Head with extended antennal tubercles, between them with smoother ampullae, from frons to occiput uniformly rounded, frontally broadly convex, with large compact punctation, numerous erect setiform black hairs; in male, frons, genae, and temples with dense grayish-yellow adherent pubescence; in female, glabrous. Eyes very finely faceted, slightly matte,

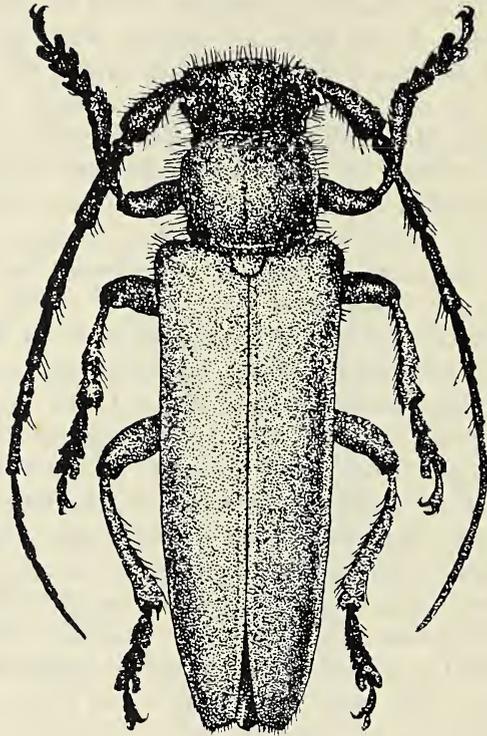


Fig. 103. *Phytoecia volgensis* Kr.

deeply emarginate, with narrow interspace between ocular lobes. Lower lobe barely longer than gena. Antennae barely reaching (male) or not reaching (female) apex of elytra, on lower side with dense gray adherent, on upper side brownish pubescence, in region of 3rd–4th segments on lower side flat (as if emarginate). First antennal segment thick, considerably shorter than 4th, which, in turn, is slightly shorter (male) or even not shorter (female) than 3rd.

Pronotum transverse (female) or almost square (male), laterally slightly rounded, at base and apex with faint transverse groove, with narrowly recurved margin, disk convex, with minute, not very dense punctation, with adherent grayish or grayish-yellow pubescence, thin bright or dark brown erect hairs, medially before posterior transverse groove sometimes looks tubercularly convex. Pronotal shield slightly transverse, broad, posteriorly broadly rounded, with compact adherent dense grayish-yellow pubescence.

Elytra parallel-sided, basally with rounded, not projecting, humeral

tubercle, inner to it without distinct impression, apically transversely truncate, with rounded outer and projecting (straight or slightly obtuse) inner angles, disk uniformly convex, basally and laterally with fully perceptible punctation, dense compact adherent grayish-yellow or gray pubescence masking punctation. Legs with fine adherent pubescence. Femora moderately thickened medially, insignificantly tapering toward base and apex. Midtibiae at outer margin with deep distal notch covered with dense bristles. Body ventrally with compact adherent grayish-yellow pubescence. Abdominal sternite V apically with small pitlike impression (male) or without it (female); tergite V apically broadly, angularly emarginate, with narrow dense pilose fimbria (male) or tapering toward apex, here barely emarginate, without pilose fimbria (female). Body, antennae, pronotum, shield, and elytra black. Legs and abdomen posteriorly in region of segments IV–V rusty, tarsi contrastingly black, epipleura of elytra below humeral tubercle yellow. Body length 13–15 mm.

Egg: Orangish, elongate, almost identically rounded at poles. Chorion matte, with fine noncellular sculpture. Length up to 2.5 mm, width 0.7 mm.

Larva (Fig. 104): In general features resembles the larva of *Phytoecia affinis* (Harr.). Distinguished from it by sclerotization of locomotory ampullae of abdomen and other characters. Body white, thick. Head highly retracted into prothorax. Epistoma insignificantly convex or in anterior half flat, rusty-brown, here with eight piliferous bright pores (four on medial suture and two each laterally) forming transverse row, in posterior half bright rust with yellowish tinge, medially divided by barely perceptible median longitudinal suture, laterally demarcated by faint frontal sutures. Hypostoma rusty, slightly convex, enlarged posteriorly, at anterior margin broadly emarginate, with rounded or acute anterior angles. Temporo-parietal lobes in anterior third brownish-rust, posteriorly bright yellow, with coarse hairs forming two transverse rows (three–four hairs in each row). Antennae short, whitish, barely projecting from antennal sockets. Below them lie small ampullaceous, convex, whitish or brownish lustrous ocelli. Clypeus trapezoid, basally reddish-rust, in anterior half whitish. Labrum small, narrower than clypeus, somewhat rusty, in anterior half with short bristles. Mandibles black, on outer side with transverse groove, apically slanting, with produced ventral and projecting (generally rounded) dorsal denticle.

Pronotum almost not or slightly wider than long, basally convex, steeply inclined toward head, at anterior margin with whitish fringe having two triangular or round projections directed backward, in

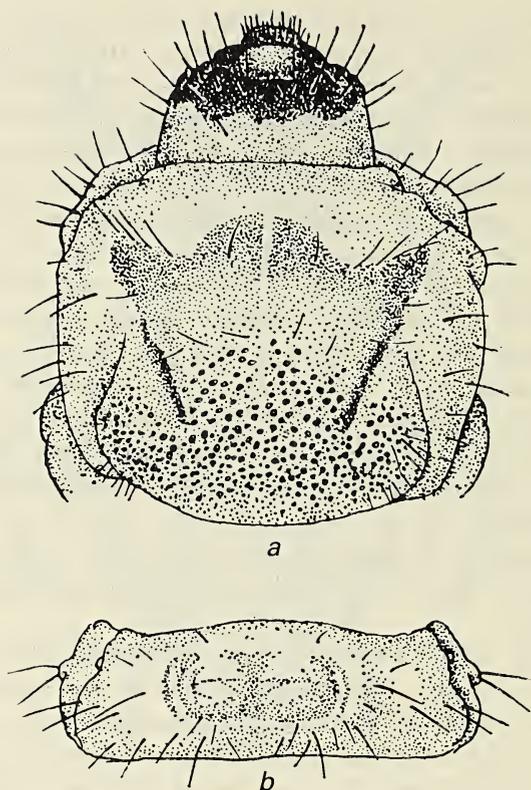


Fig. 104. Larva of *Phytoecia volgensis* Kr.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

anterior half (behind whitish fringe) with lustrous, somewhat rusty square divided medially by narrow longitudinal interspace, at anterior fringe of square on each side of interspace with five thick setiform hairs in transverse row. Pronotal shield laterally demarcated by short longitudinal grooves, with transversely extended large spinules forming common field deeply, almost halfway, intersected at anterior angles by oblique groove-like brownish-rust impressions, at anterior margin with dispersed setiform hairs. Pronotum laterally with long identical hairs. Prothoracic presternum and eusternum with long sparse hairs (in *P. affinis* (Harr.) eusternum densely pilose). Meso- and metasterna on disk with very minute, specklike spinules forming transversely elongate field, in front of it with coarse, not very dense hairs.

Abdomen highly tapering posteriorly, laterally with long sparse rusty hairs. Dorsal locomotory ampullae convex, sclerotized, with very minute spinules (visible under high magnification), divided medially

by common longitudinal and short transverse groove. Ventral locomotory ampullae sclerotized, with dense, very minute, specklike spinules, divided by transverse, barely perceptible, whitish groove uniting with lateral longitudinal grooves. Body length of late instar larvae 14–16 mm, width of head up to 2.5 mm. First instar larvae on sides of segments I–VII with one small spinule, at anterior margin of hypostoma with four spinules. These spinules disappear after molt.

Pupa (Fig. 105): Body large, stocky, moderately elongate, with whitish tone. Head mildly tapering anteriorly, with wide-set, slightly raised antennal tubercles, frontally flat, at base of antennae on inner side with two, in anterior half laterally three, at anterior margin two–three bristles on sclerotized base. Labrum triangular, apically narrowly rounded, without bristles. Mandibles on outer side with two barely perceptible, close-set bristles. Antennae in second half bent ventrad, here curved semicircularly, their apices adjoining foretibiae or sides of head.

Pronotum transverse, laterally rounded, at posterior margin with

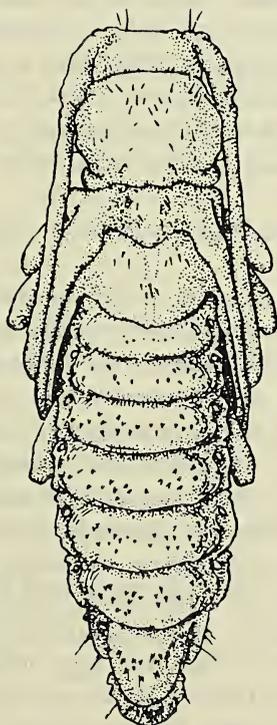


Fig. 105. Pupa of *Phytoecia volgensis* Kr.

narrow transverse groove, disk convex, with numerous bristles on sclerotized base (in some bristles this base is produced into a small acute spinule), forming on disk more or less distinct, transversely extended cluster. Mesonotum mildly convex, posteromedially with gentle transverse depression, at posterior margin with angularly produced shield, laterally in anterior half with five–six long bristles forming two clusters. Metanotum mildly convex, with barely perceptible longitudinal groove, medially with minute bristles (up to four) in transverse row, laterally, closer to anterior angles, with one bristle.

Abdomen in region of segment IV enlarged, gradually tapering toward base and tip. Abdominal tergites moderately convex, with faint narrow median longitudinal groove, with not very large (on tergite I a few, on tergites II–VI numerous) spinules forming transversely elongate spinous field. Tergite VII gradually tapering toward apex, posteriorly narrowly rounded, disk convex, with acute setigerous spinules in transverse row anteromedially, common transversely elongate cluster posteromedially (in some individuals transverse row absent). Tergite VIII on disk with minute acute spinules forming interlacing transverse row. Tip of abdomen obtuse, bound by U-shaped ridge bearing three–six setigerous spinules on each side. Valvifers of female elongate, apically lustrous, with brownish tinge, bent toward each other. Body length 11–15 mm, width of abdomen 3.5–4.5 mm.

Material: Collected in northern Caucasus (Kislovodsk). Adults 17, larvae 12, pupae 4 (males and females), larval exuviae with beetles from cells 2.

Distribution: Northern Caucasus, lower Povolzh'e to the southern Urals.

Biology: According to observations in northern Caucasus, it occupies open fields adjacent to forest plantations and edges of rarefied deciduous forests. Beetles emerge from hibernation sites at May-end or early June. They fly up to July-end and are most active in clear sunny weather. They require supplementary feeding, nibble the stems of umbellifers, and leave injuries in the form of longitudinal belts by scraping the stem surface. Beetles mate after maturation of gonads. The female then oviposits under the epidermis, or in the leaf axis, or on the inner wall of the stem, generally in its underground part. The barely perceptible holes made for oviposition remain on the stem surface. Beetles feed intermittently. At a temperature of 20–25°C, larvae hatched from eggs after 8–14 days (ten eggs under observation). Young larvae make a gallery directed downward under the epidermis or through the heartwood. Later they penetrate the root and hibernate there. By this time the stem has broken and the exposed gallery in the

underground part is plugged with frass. After hibernation, larvae remain in the root and in the second half of summer make a cell in the upper part of the root and pupate in it. Length of cell 29–50 mm, width 8–10 mm. Pupae lie in cells with head upward. After two–three weeks beetles emerge from pupae, enter diapause, and overwinter. After hibernation they remain in cells up to the last week of May or up to June. According to our observations in the outskirts of Kislovodsk at an altitude of 1,000 m above mean sea level, beetles were in cells in mid-May. Generation—two-year cycle (Table 10). Initially, midinstar larvae hibernate, subsequently adults. In one plant of chervil (*Anthriscus aemula*) generally one insect (rarely two) develops. Weight of larvae before pupation 65–155 mg (91.9 ± 15.5), pupae 59.1–141.5 mg (82.5 ± 14.8), beetles before hibernation 39–111 mg (64.7 ± 11.3).

Phytoecia volgensis Kr. is found in large numbers in northern Caucasus and damages chervil and possibly other herbaceous plants. Obviously rare in the southwestern Urals. We did not find it here.

3. *Phytoecia rufiventris* Gaut.

Gautier, 1870. *Pet. Nouv. Entom.*, 1: 104; — *punctigera* Blessig, 1873. *Horae Soc. Entom. Ross.*, 9: 226; — var. *ventralis* Bates, 1873. *Ann. Mag. Nat. Hist.*, 4, 12: 388; — ab. *atrimembris* Pic, 1915. *Mat. Longic.*, 9, 2: 14; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 195; Gressit, 1951. *Longic. Beetles of China*, 2: 612–613; Kojima and Okabe, 1960. *Food Plants of Japan, Ceramb.*, 73: 218; Kojima and Hayashi, 1969. *Insects' Life in Japan*, 1: 166; Cherepanov and Cherepanova, 1982. *Gel'minty, kleshchi and nasekomye (Nov. i maloizv. vidy fauny Sibiri)*, 33–36.

Adult (Fig. 106): Distinguished from all species of the genus *Phytoecia* Muls. by sharp bold compact punctation on head and pronotum and a combination of other characters. Body moderately elongate. Head short, frontally highly convex, from anterior margin of frons to occiput broadly, almost hemispherically rounded (in lateral view), with wide-set, barely perceptible antennal tubercles, dense large navel-shaped punctures (spaces between punctures narrow, septumlike, smaller than punctures), with short black erect hairs, medially with narrow smooth

Table 10. Development of *Phytoecia volgensis* Kr.

Year	April	May	June	July	August	September
1st	A	AE	AEL	AEL	EL	L
2nd	L	L	L	LP	LPA	A
3rd	A	AE	AEL	AEL	EL	L

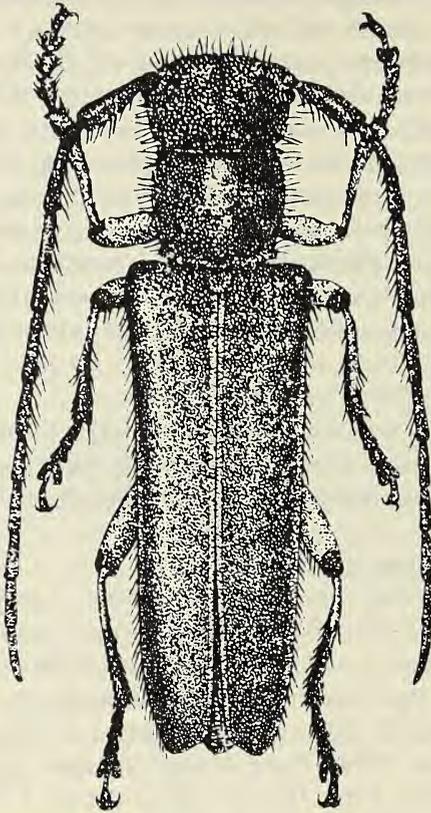


Fig. 106. *Phytoecia rufiventris* Gaut.

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172 streak extending from frons to occiput. In some individuals, frons appears glabrous, with sparse gray hairs not forming continuous pubescence. Eyes broadly and deeply emarginate, quite convex, with narrow interspace between ocular lobes. Lower ocular lobe longer (male) or not longer than gena (female). Antennae reaching (male) or not reaching (female) apex of elytra, with compact punctation, with sparse, on lower side sometimes dense gray adherent hairs, on inner side with long brownish bristles. First antennal segment thick (female) or quite elongate (male), highly tapering toward base, not shorter (female) or barely shorter (male) than 3rd segment; latter equal to 4th segment (female) or slightly longer than it (male).

Pronotum square, laterally gently rounded, with slightly produced posterior and barely raised anterior margin, disk convex, with dense large uniform navellike punctures, in anterior half medially with smooth longitudinal large or small red tubercle, medially in posterior

half and laterally with narrow faint white pilose band, with numerous or sparse blackish-brown erect hairs. Pronotal shield small, transverse, more or less tapering posteriorly, apically rounded, with sparse or dense gray hairs.

Elytra parallel-sided, basally with rounded, not projecting, humeral tubercle, inner to it with barely perceptible or not perceptible impression, apically transversely truncate, disk uniformly convex, with faint humeral and inner longitudinal ridges or without them, with coarse large, in posterior fourth minute punctation, with fine gray compact adherent hairs forming rarefied pubescence not masking punctation. Legs with very sparse, minute bright hairs (almost glabrous). Midtibiae at outer margin with sharp deep distal notch. Body ventrally with sparse compact adherent bright pubescence. Abdominal sternite V mildly convex, apically angularly rounded, with faint flat impression (male) or quite convex, with narrow median longitudinal groove (female). Body, antennae, and elytra black. Abdomen bright rust, basally over larger or lesser part blackened, sometimes darkened on disk of sternites I–III. Femora and base of foretibiae light rust; tibiae, tarsi, and apices of mid- and hind femora black. Sometimes foretibiae and femora entirely rusty or mid- and hind legs entirely black, forefemora somewhat rusty. Color of legs quite variable. Body length 7–9 mm.

Larva (Fig. 107): Body white, elongate. Head parallel-sided, slightly retracted into prothorax. Epistoma insignificantly convex, yellowish, laterally with faint light frontal sutures, in anterior third with long setiform hairs forming interlacing transverse row, beyond middle, near frontal sutures, with one short bristle. Median suture perceptible only apically as a short streak. Hypostoma smooth, slightly convex, anteriorly broadly emarginate, at anterior angles rounded, at posterior angles produced, along almost entire periphery with narrow brownish fringe, near anterior margin with four short bristles in transverse row. Temporo-parietal lobes near anterior margin with long setiform hairs forming irregular transverse row. Antennae very short, their apices barely projecting from antennal sockets. Ocelli hyaline, bright or pigmented, situated close below base of antennae. Clypeus convex, hyaline-whitish, thrice wider than long, almost parallel-sided, in anterior half with rusty bristles, apically broadly rounded, basally with dark rust tinge. Mandibles elongate, apically highly sloping, with elongate acute ventral and gently rounded dorsal denticle, reddish-brown, only toward apex darker brown or black.

Pronotum highly inclined toward head, in anterior third with rusty lustrous indistinct transverse band having narrow median longitudinal whitish interspace, at anterior margin with sparse minute setiform hairs

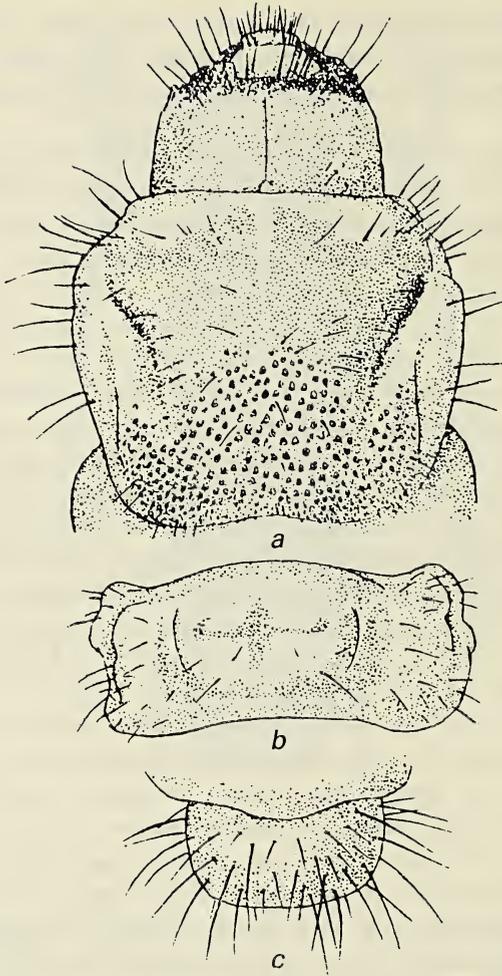


Fig. 107. Larva of *Phytoecia rufiventris* Gaut.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

forming transverse row, posteriorly, in front of shield, with sparse dispersed hairs. Pronotal shield convex, laterally demarcated by short whitish longitudinal grooves, with flat, apically rounded, reddish-rust recurved spinules forming common field angularly produced at anterior margin and narrowly emarginate at anterior angles. Field occupies less than half of pronotal disk. Oblique impressions on sides of pronotum penetrate one-third of spinous field of shield by their posterior ends. Alar lobes glabrous, with only one-two bristles. Prosternum convex, very sparsely pilose, laterally with yellowish lustrous spot. Meso- and

metasterna in anterior half with sparse hairs forming interlacing transverse row.

Abdomen moderately elongate, laterally with long solitary hairs. Dorsal locomotory ampullae convex, lustrous, without perceptible sclerotization, medially divided by common longitudinal and short transverse grooves, with fine silvery sculpture. Ventral locomotory ampullae very convex, with median longitudinal, in posterior half with transverse groove uniting laterally with short longitudinal fold. Sternites VIII and IX at posterior margin with setiform hairs in transverse row. Terminal segment with long coarse hairs, appearing coarsely setaceous. Body length of late instar larvae 14–16 mm, width of head 1.5–2.0 mm.

Pupa (Fig. 108): Characterized by bristles on pronotum and location of spinules on abdominal tergites. Head short, with wide-set antennae, with very narrow median longitudinal groove, near base of antennae on inner side with one, near anterior margin of eyes with two–three, at base of clypeus laterally with one bristle. Antennae flexed laterad, in second half semicircular, their apices adjoining sides of head.

Pronotum transverse, parallel-sided or laterally gently rounded, disk uniformly convex, with thin bristles forming straight transverse row anteromedially, a second row posteromedially bending by its ends toward posterior angles of pronotum (female), sometimes (male) forming transverse band enlarged laterally. Mesonotum posteromedially depressed, saddlelike, with barely produced shield, laterally with one–two minute, barely perceptible bristles or without them. Metanotum lustrous, with median longitudinal groove, laterally with barely perceptible bristle, posteriorly directly truncate, at posterior angles rounded or sloping.

Abdomen insignificantly tapering toward base, more toward tip. Abdominal tergites uniformly convex, with minute setigerous, variously directed spinules (12–17 spinules on each tergite) forming transverse band. Tergite I with sparse, very minute spinules. Tergite VII apically broadly rounded, in posterior half with large setigerous spinules directed backward and forming transverse band. Tergite VIII posteriorly narrowly rounded, at posterior margin with minute setigerous spinules, lateral to them one large spinule on each side. Tip of abdomen (in ventral view) bound by U-shaped ridge bearing six–eight large setigerous spinules. Valvifers of female hemispherical, contiguous, apically with small tubercle. Body length 8.5–11.0 mm, width of abdomen 2.5 mm.

Material: Collected in Primorsk territory. Southern spurs of Sikhote Alin'. Adults 22, larvae 17, pupae 2 (male and female), larval and pupal exuviae with beetles from cells 2.

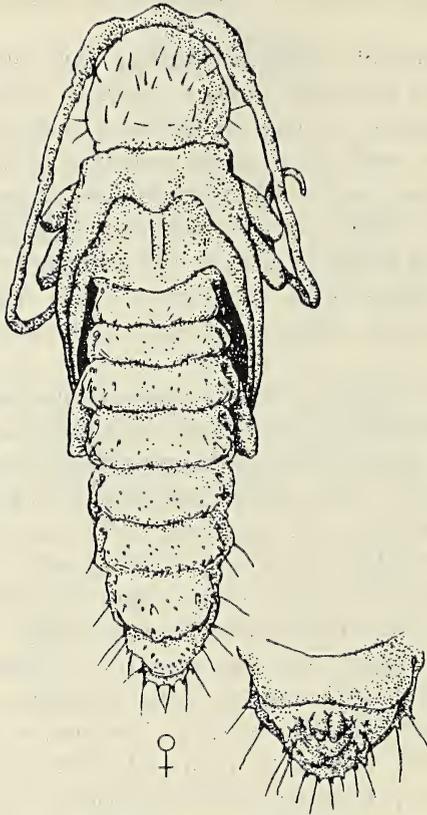


Fig. 108. Pupa of *Phytoecia rufiventris* Gaut.

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Distribution: From Tuva, Baikal to Pacific Ocean coasts: Tuva, Ussuri-Primor'e region (often), Trans-Baikal, Sakhalin, Kunashir, Japan, northern Mongolia, northern China, Korean peninsula.

Biology: Inhabits open forest glades, meadows, and roadsides. Ecologically associated with herbaceous plants of the family Compositae. Flight of beetles commences May-end and is completed in July. Beetles emerge from hibernation sites with underdeveloped gonads and require supplementary feeding. Females oviposit in the underground part of the stem. Larvae initially live in the stem, then move into rhizome or root, and feed on inner tissues. Larvae of last instar make pupal cell in underground part of stem or in the root and isolate it from above and below by a plug of fibrous frass. Length of cell 11–12 mm, width 4–5 mm. Width of lower plug 5.0 mm, of upper plug 4.0 mm. Pupae lie in cells with head upward. Pupation commences mid-August and is concluded early September. Pupae complete development in two–three

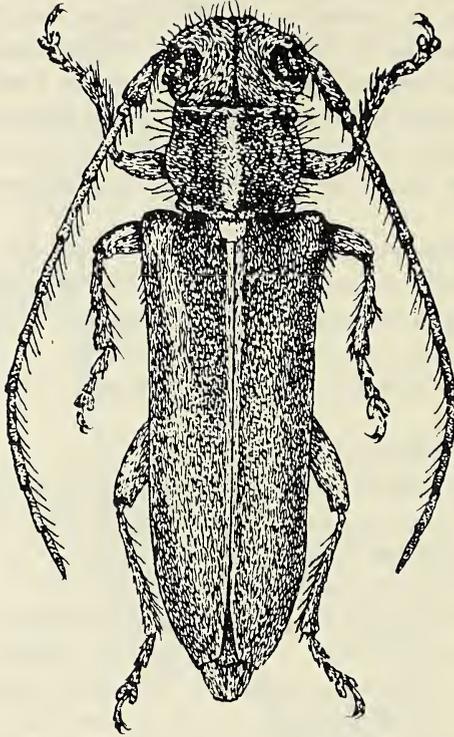
weeks. In one instance, at a temperature of 20.8°C, the pupal stage lasted for 17 days, in another at 15.6°C, 31 days. Beetles over winter in the cell and emerge the following May. During metamorphosis the weight of insects reduces up to 30.5% or more. During hibernation weight loss is 10–15%. Based on 21 insects, larvae before pupation weigh 21.7–53.0 mg (36.9 ± 1.6), pupae 19.5–46.0 mg (32.3 ± 1.5), young beetles before hibernation 16.1–37.0 mg (25.7 ± 1.1) (Cherepanov and Cherepanova, 1982).

Phytoecia rufiventris Gaut. develops on various herbaceous plants. We found it in Ussuri-Primor'e region on *Aster tataricus* and *Ptarmica alpina*. According to reports by Japanese authors (Nakamura, 1960; Kojima and Okabe, 1960), it infests *Solidago serotina*, *Achillea sibirica*, *Artemisia princeps*; *Aster tataricus*, and *A. ageratoides*.

4. *Phytoecia pustulata* (Schr.)

Schrank, 1776. *Beitr. Naturgesch.*, 66 (*Cerambyx*); — *lineola* Fabricius, 1781. *Spec. Ins.*, 1: 235; — *posegana* Piller, 1783. *Inter. per Poseg.*, 67; — *vulnerata* Schaller, 1783. *Abhandl. Nat. Ges. Halle*, 1: 293; — *v. murina* Marseul, 1869. *Abelille*, 6: 384; — *adulta* Ganglbauer, 1884. *Best.-Tab.*, 8: 138; — *ab. pulla* Ganglbauer, 1886. *Horae Soc. Entom. Ross.*, 20: 130; — *ab. gibbicollis* Reitter, 1893. *Wein. Entom. Zeit.*, 12: 114; — *ab. intermedia* Pic, 1895. *Synops.*, 65; — *ab. obscuripes* Pic, 1895. *Synops.*, 65; — *ab. vexans* Reitter, 1895. *Wien. Entom. Zeit.*, 14: 162; Reitter, 1913. *Fauna Germ.*, 4: 70; — *ab. parvimacula* Roubal, 1916. *Ent. Mitteil.*, 5: 186; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 195; Demelt, 1966. *Die Tierwelt Deutschl.*, 52, 2: 108.

Adult (Fig. 109): Characterized by pronotum highly raised carinate-ly on disk, gray pubescence on elytra, and other characters. Body small, mildly elongate. Head frontally uniformly convex, almost hemispherically rounded (in lateral view), with wide-set, barely produced antennal tubercles, between them with faint or almost indistinct median longitudinal groove, with compact minute punctation, dense or not very dense gray compact adherent pubescence, numerous black or dark brown erect hairs (especially on frons). Eyes moderately convex, broadly or very deeply emarginate, with very narrow streaklike interspace between ocular lobes. Lower lobe barely longer than gena. Antennae shorter than body, not extending up to apex of elytra (female) or barely longer than body, extending beyond apex of elytra by 10th–11th segment (male), with minute punctation, bright gray adherent hairs, on lower side with somewhat bright brown bristles; 1st, 3rd, and 4th segments equal in length, 5th segment shorter than 4th, equal to 6th.



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Fig. 109. *Phytoecia pustulata* (Schr.), ab. *pulla* Ganglb.

Pronotum slightly transverse, laterally gently rounded, basally and apically with faint narrow transverse groove, with narrowly recurved posterior margin, disk in middle of ridges and basally raised, here smooth, with red spot (f. *typica*) or without it (ab. *pulla* Ganglb.), with minute compact punctation, gray adherent, not very dense pubescence forming longitudinal, more or less distinct band in middle and one longitudinal band on each side, with sparse erect brownish hairs. Pronotal shield slightly transverse or square, posteriorly broadly rounded, with dense adherent pubescence.

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Elytra parallel-sided or slightly tapering posteriorly, basally with barely projecting humeral tubercle, inner to it with faint impression, apically obliquely or insignificantly truncate, with fully distinct inner and outer angles, with minute (more distinctly projecting at base) punctation and dense compact adherent grayish or slightly greenish pubescence. Legs with dense gray compact adherent pubescence. Mid-tibiae at outer margin with an oblique distal notch. Body ventrally with dense compact adherent gray pubescence. Abdominal sternite V api-

cally transversely truncate, in second half broadly depressed, flat (male) or apically gently rounded, quite convex, in second half not flat (female). Tergite V apically rounded, comparatively mildly convex (male) or apically transversely truncate, toward base more convex (female). Body, antennae, and elytra black, foretibiae and partially forefemora with reddish tinge. Sometimes foretibiae completely, femora apically, and tip of abdomen red. Tergite V basally generally red, apically black. Body length 7–9 mm.

Larva (Fig. 110): In structure of locomotory ampullae close to *Phytoecia cylindrica* (L.). Characterized by prosternum sparsely pilose and locomotory ampullae coriaceous, without spinules. Body elongate, white with yellowish tinge. Head slightly tapering anteriorly, half retracted into prothorax. Epistoma perceptible convex, divided longitudinally by distinct median suture, laterally demarcated by white frontal sutures, at anterior margin with broad dark brown fringe, behind it with long setiform hairs forming transverse row. Hypostoma laterally gently rounded, at anterior margin broadly emarginate, convex, lustrous-rusty, anteromedially with four–six hairs in transverse row. Tem-

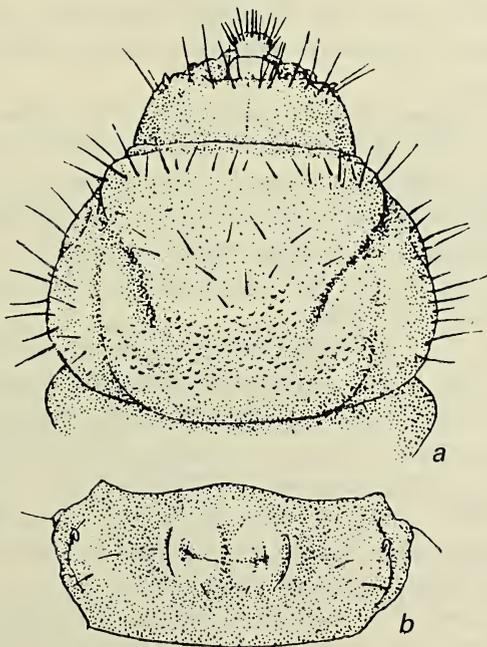


Fig. 110. Larva of *Phytoecia pustulata* (Schr.).

poro-parietal lobes yellowish, in second half somewhat rusty-red, with long sparse hairs forming transverse row. Antennae whitish, very short, almost not projecting from antennal sockets. Ocelli below antennae, ampullaceous, convex. Clypeus large, trapezoid, hyaline-lustrous, basally somewhat rusty. Labrum perceptibly narrower than clypeus, at anterior margin whitish, broadly rounded, with bright dense bristles, slightly tapering toward base, glabrous, with brownish tinge. Mandibles apically steeply obliquely truncate, basally somewhat rusty-red, apically much darker.

Pronotum transversely oval, moderately inclined toward head, at anterior margin with narrow whitish fringe, behind it on disk lustrous-rusty, medially with narrow whitish band, at anterior margin with short sparse hairs forming transverse row, in front of shield with short, laterally long dispersed hairs. Pronotal shield convex, laterally demarcated by whitish
177 longitudinal folds, with dense (on anterior margin rarefied) spinules enlarging transversely toward apex. Lateral groove-like impressions deeply invading (at anterior angles) spinous field, with bright (after molt) or dark brown (before molt) tinge. Prothoracic presternum with solitary hairs, laterally with large lustrous pale yellow spot. Eusternum with long, not very dense hairs. Meso- and metasterna coriaceous, without spinules, medially divided by transverse groove, in anterior half with short hairs forming transverse row.

Abdomen elongate, almost parallel-sided, with sparse, barely perceptible bright hairs. Dorsal locomotory ampullae convex, coriaceous, lustrous, medially divided by common longitudinal and short transverse groove. Ventral locomotory ampullae convex, divided by faint transverse groove uniting laterally with short longitudinal groove. Tip of abdomen with dense, somewhat rusty hairs. Body length of last instar larvae up to 12 mm, width of head 1.2 mm.

Pupa (Fig. 111): Characterized by large spinules on abdominal tergite VII. Body white, moderately elongate. Head short, roundly tapering anteriorly, frontally mildly convex, on sinciput, inner to eyes, with one large bristle, at base of clypeus with two short bristles in transverse row. Labrum lustrous, apically narrowly rounded, without bristles. Mandibles on outer side with pair of small close-set bristles. Antennae flexed laterad, in second half bent forward (on ventral side of body), their apices adjoining sides of head.

Pronotum transverse, laterally slightly, gently rounded, basally with narrow transverse groove, with minute dispersed bristles. Mesonotum posteriorly with insignificantly produced shield, at posterior margin rounded, posteromedially depressed, saddlelike. Metanotum convex, with median longitudinal groove, at posterior margin broadly rounded.

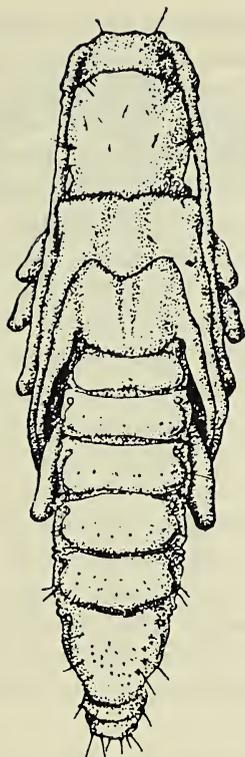


Fig. 111. Pupa of *Phytoecia pustulata* (Schr.).

178 Abdomen gradually tapering toward tip. Abdominal tergites uniformly convex, posteromedially with minute acute spinules forming interlacing transverse row or transverse band. Tergite VII on disk highly convex, apically narrowly rounded, with numerous acute, laterally much larger spinules on extended coriaceous base. Spinules forming vast cluster on disk. Tergite VIII short, at posterior margin broadly rounded, with very minute setigerous spinules forming transverse row. Tip of abdomen (in ventral view) laterally bound by U-shaped ridge bearing up to ten acute setigerous spinules (five spinules on each side). Valvifers of female large, elongate, basally wide-set, apically highly bent toward each other. Body length up to 9.0 mm, width of abdomen 3.0 mm.

Material: Collected in the southern Urals and northern Kazakhstan (foothills of Kokshetau). Adults 14, larvae 2, pupa 1 female, larval exuviae with beetles from cells 2.

Distribution: From the western borders of Europe to the southern Urals and northern Kazakhstan, the Caucasus, Asia Minor. Sporadic in the southern Urals.

Biology: Occupies biotopes of forest-steppe and steppe formations. Vitrally associated with plants of the family Compositae. Beetles emerge from hibernation sites at May-end or in June, found up to July. They require supplementary feeding. Females lay eggs on shoots 2–6 mm diameter. Larvae make galleries from above downward through the heartwood or under the shoot cortex and throw out fine fibrous frass through ventilation holes made here and there. Sometimes eggs are laid on thin secondary shoots. In such cases, the hatched larvae move from secondary to primary shoots. The gallery is packed with frass only here and there but generally remains hollow so that the larva moves freely in it from one end to the other. Larvae of the last instar, after the first hibernation in the crown (rarely in the underground part of the shoot), make a cell and pupate in it. The pupal cell is separated from above and below by fibrous frass. Length of cell 9–18 mm, width 3–7 mm. Length of upper plug 4–5 mm, of lower plug 4–7 mm. Length of gallery in shoot up to 33 cm. Diameter of infested shoots in upper part up to 2.5 mm, in lower part 6.0 mm. Pupation is completed in August. Pupae lie in cells with head upward. Beetles emerge from pupae after about three weeks. They hibernate in cells during winter and exit the following spring with the commencement of warmth. Generation—two-year cycle. A beetle weighing 9.8 mg was raised from a larva collected in nature.

We found *Phytoecia pustulata* (Schr.) on wormwood (*Artemisia procera*). According to Demelt (1966), it develops on shoots of *Achillea* and *Chrysanthemum*.

5. *Phytoecia virgula* (Charp.)

Charpentier, 1825. *Horae Entom.*, 225 (*Cerambyx*); — *punctum* Ménétries, 1832. *Catal. Rais., Zool.*, 227; — ab. *cyclops* Küster, 1848. *Käfer Eur.*, 13: 88; — var. *grisea* Pic, 1891. *Feuill. jenn. Natural*, 21: 139; — var. *major* Pic, 1901. *Longic.*, 3, 3: 14; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 195; Panin and Savulescu, 1960. *Fauna Rep. Popul. Romine. Insecta*, 10, 5: 502–503; Demelt, 1966. *Die Tierwelt Deutschl.*, 52, 2: 108; Kaszab, 1971. *Cincérek—Cerambyx. Coleopt.*, 4, 5: 273; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 229.

Adult (Fig. 112): Similar to *P. pustulata* (Schr.). Distinguished from it by roundish shape of red spot on pronotum, presence of spinule on inner margin of hind coxa, and other characters. Body elongate. Head frontally moderately convex, medially with faint longitudinal groove, antennal tubercles produced laterally, with minute compact punctation, adherent, not very dense, grayish or yellowish pubescence and erect brownish hairs. Eyes broadly emarginate, with very narrow interspace

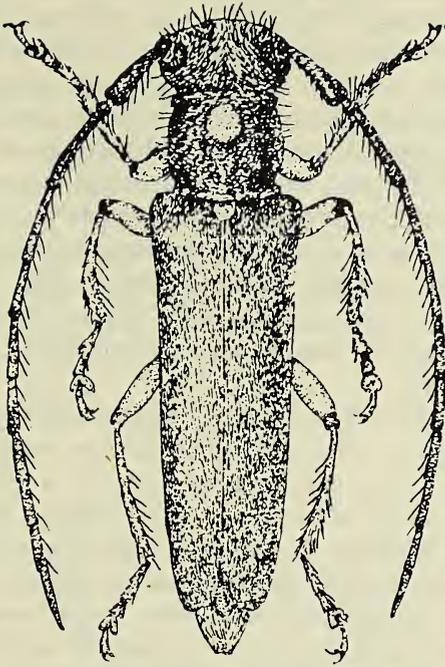


Fig. 112. *Phytoecia virgula* (Charp.).

between lobes. Lower ocular lobe not longer or barely longer than gena. Antennae barely reaching apex of elytra (female) or extending beyond it by 10th–11th segment (male), with gray adherent pubescence, on lower side with brownish bristles. First antennal segment thick, with minute striate punctation, slightly shorter or not shorter than 3rd, almost equal to 4th segment.

Pronotum squarish or slightly transverse, laterally gently rounded, almost parallel-sided, basally and apically with narrow transverse groove, with recurved (posterior and anterior) margins, medially with convex longitudinal ridge, on it in anterior half with round or slightly elongate smooth red spot, with fine punctation, not very dense gray adherent pubescence directed from sides mediad and bright brown erect hairs. Pronotal shield transverse, posteriorly broadly rounded, with dense gray adherent pubescence.

Elytra elongate, almost parallel-sided, basally with rounded humeral tubercle, inward to it with small depression, apically obliquely or insignificantly truncate with projecting angles, laterally with fully or faintly perceptible humeral, on disk barely perceptible or smooth longitudinal ridge, with raised suture, at shield with large, on remaining

part minute punctation, with gray adherent pubescence and short setiform, almost erect bright hairs. Legs with adherent, not very dense pubescence; femora thick, midtibiae at outer margin with deep oblique distal notch. Hind coxae on inner margin with spinules (male) or without spinule (female). Body ventrally with moderately dense gray pubescence. Abdominal sternite VII apically with gentle trough (male) or without trough (female), basally with median longitudinal groove. Body, antennae, and elytra black, tip of abdomen rusty-yellow or red. Legs black, all femora in second half and foretibiae rusty or rusty-red. Apices of foretibiae generally darkened. Body length 7.0–10.5 mm.

Egg: White, elongate, at cranial pole broadly, at caudal pole narrowly rounded. Chorion smooth, matte, semitransparent. Length 2.1 mm, width 0.4 mm.

Larva (Fig. 113): Characterized by short, highly transversely extended spinous field on pronotum and coriaceous, nonsclerotized locomotory ampullae. Body mildly elongate, yellow, in region of prothorax with whitish tone. Head half retracted into prothorax. Epistoma mildly convex, medially with faint longitudinal suture, in anterior third with long setiform bright hairs forming interlacing transverse row, whitish, laterally fusing with temporo-parietal lobes; frontal sutures not perceptible. Temporo-parietal lobes whitish, at anterior margin with narrow, somewhat rusty fringe, in anterior half with long, somewhat rusty hairs. Antennae short, bright, not projecting from antennal sockets. One pigmented ocellus below each antenna. Hypostoma mildly convex, at anterior margin gently emarginate, without rusty fringe, in anterior half with thin, somewhat rusty hairs forming transverse row. Clypeus trapezoid, with somewhat rusty tinge. Labrum apically narrowly rounded, basally with barely perceptible flange, in anterior half with short bright bristles. Mandibles moderately elongate, apically obliquely truncate, in anterior half black, posterior half reddish-rust.

Pronotum highly inclined anteriorly, lustrous, at anterior margin with whitish fringe, behind it with somewhat rusty tinge, on posterior edge of whitish fringe with thin bright hairs forming transverse band, laterally with oblique groove, on disk, before spinous field, sparsely pilose. Pronotal shield with dense, comparatively uniform spinules forming transversely elongate field, with uniform transversely truncate anterior margin. Prosternum convex, with sparse rusty hairs.

Abdomen thick, barely tapering posteriorly, laterally with sparse hairs. Dorsal locomotory ampullae highly produced, medially divided by longitudinal, in posterior half by transverse whitish groove, coriaceous, without spinules. Segment IX apically broadly rounded (appearing obtuse), with dense rusty hairs. Body length of late instar larvae

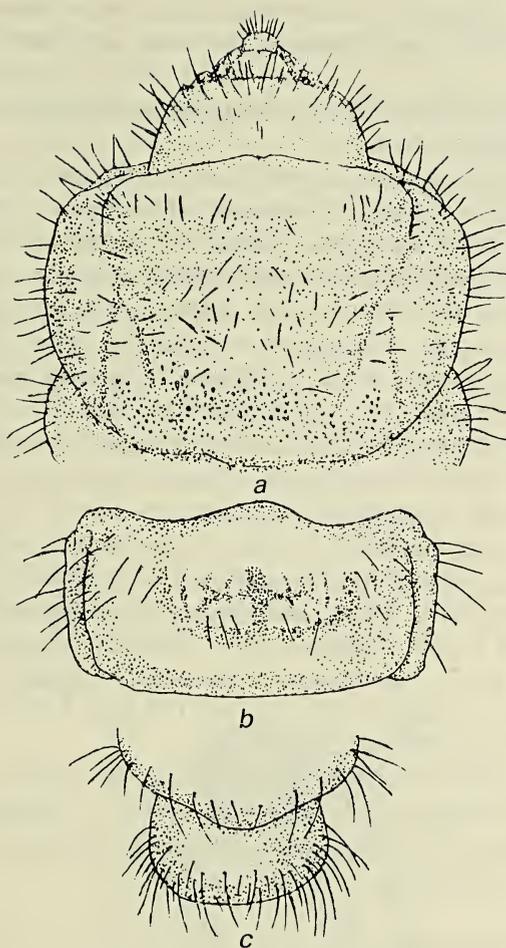


Fig. 113. Larva of *Phytoecia virgula* (Charp.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

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up to 11 mm, width of head 1.5 mm.

Pupa: Highly similar to the pupa of *Phytoecia rufiventris* Gaut. Distinguished from it by poor development of spinules on dorsal side of body. Body white, moderately elongate. Pronotum laterally and in anterior half with sparse bright bristles. Abdomen tapering more toward tip, very slightly toward base. Abdominal tergites in posterior half with minute setigerous spinules forming transverse band. Tergite VII highly convex, posteromedially with minute spinules. Tip of abdomen triangularly obtuse, laterally bound by ridge bearing a few setigerous spinules.

Material: Collected in the southern Urals, in southeast Kazakhstan (Ili River). Adults seven, larva one, pupa one, larval and pupal exuviae four each.

Distribution: Europe, the Caucasus, the southern Urals, Kazakhstan, central and western Asia.

Biology: Inhabits open steppe fields. Ecologically associated with various herbaceous plants (Compositae and others). Flight of beetles observed in first half of summer. Larvae live in stems 3–5 mm diameter, make a longitudinal gallery through the heartwood from above downward, fill it with fine frass, penetrate the basal zone, and hibernate there during winter. Before hibernation or soon after, they nibble the stem from inside and after it breaks remain in the underground part of it or in the root, plugging the exposed gallery with fibrous frass. Subsequently, they make a pupal cell and separate it from above and below by a plug of fibrous frass. Length of gallery in stem 23.5 cm, width 2–3 mm. Length of gallery in root up to 9.0 cm or more. Length of pupal cell 3.4 cm, width 3.0–3.5 mm. Larvae pupate in second half of summer. Beetles appear toward autumn, lie in cells with head upward, hibernate here during winter, and emerge in spring with the onset of warmth. They require supplementary feeding. Generation—two-year cycle. Based on five specimens, larvae before pupation weigh 18–47 mg (31.1 ± 6.1), pupae 16.5–43.0 mg (28.0 ± 5.3), beetles before hibernation 13.4–36.0 mg (23.1 ± 4.4).

We found *Phytoecia virgula* (Charp.) on sage (*Salvia stepposa*) and wormwood (*Artemisia paniciflora*). According to reports in literature (Plavil'shchikov, 1948; Demelt, 1966), this species develops on *Achillea*, *Daucus*, *Chrysanthemum*, and *Tanacetum*.

6. *Phytoecia nigricornis* (F.)

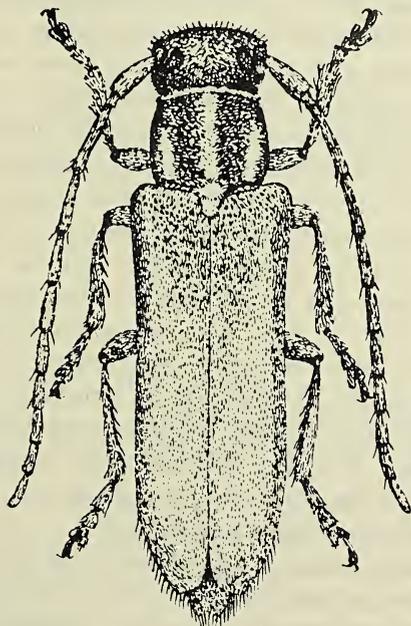
Fabricius, 1781. *Spec. Ins.*, 2: 499 (*Saperda*); — *coerulescens* Brahm, 1790. *Ins.-Kalend.*, 1: 126; — *melanoceras* Gmelin, 1790. In Linn.: *Syst. Nat.*, ed. 13, 1, 4: 1838; — *suturalis* Fabricius, 1792. *Entom. Syst.*, 1, 2: 314; — *canaliculata* Frölich, 1793. *Naturforsch.*, 27: 144; — ab. *solidaginis* Brach, 1856. *Kaferf.*, 3: 39; — *julii* Mulsant, 1863. *Coleopt. France, Longic.*, 3d. 2: 429; — *caroni* Mulsant and Godart, 1876. *Ann. Soc. Linn. Lyon*, 22, 2: 419; Jakobson, 1911. *Zhuki Rossii*, tabl. 72, fig. 23; — ab. *tristigma* Reitter, 1913. *Fauna Germ.*, 4: 70; — *tristigma* Pic, 1914. *Longic.*, 9, 1: 10; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 196; Demelt, 1966. *Die Tierwelt Deutschl.*, 52, 2: 108; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 230; Mamaev and Danilevskii, 1975. *Lichinki zhukov-drovosekov*, 262.

Adult (Fig. 114): Close to *Phytoecia cylindrica* (L.). Full distin-

guished from it by more developed pubescence. Body more (male) or less (female) elongate. Head with antennal tubercles produced laterally, convex, broadly rounded frons, minute, not very dense punctation, grayish or slightly greenish compact adherent pubescence, with dark brown, on temples bright erect hairs. Eyes moderately convex, deeply emarginate; lower ocular lobe (male, female) perceptibly longer than gena. Antennae extending or not extending beyond apex of elytra by 11th segment, with dense adherent pubescence, on lower side with brownish bright bristles. First antennal segment thick, shorter than 3rd, which, in turn, is equal to 4th.

Pronotum slightly transverse or square, parallel-sided, basally and apically with narrow transverse groove, at posterior and anterior margins with insignificantly recurved margin, with minute compact punctation, medially and laterally with narrow whitish or greenish-yellow longitudinal pilose band, with more (female) or less (male) sparse erect brownish hairs. Pronotal shield square or slightly transverse, posteriorly broadly rounded, with dense grayish or yellowish adherent hairs.

Elytra more (male) or less (female) elongate, basally with barely projecting rounded humeral tubercle, inner to it without impression,

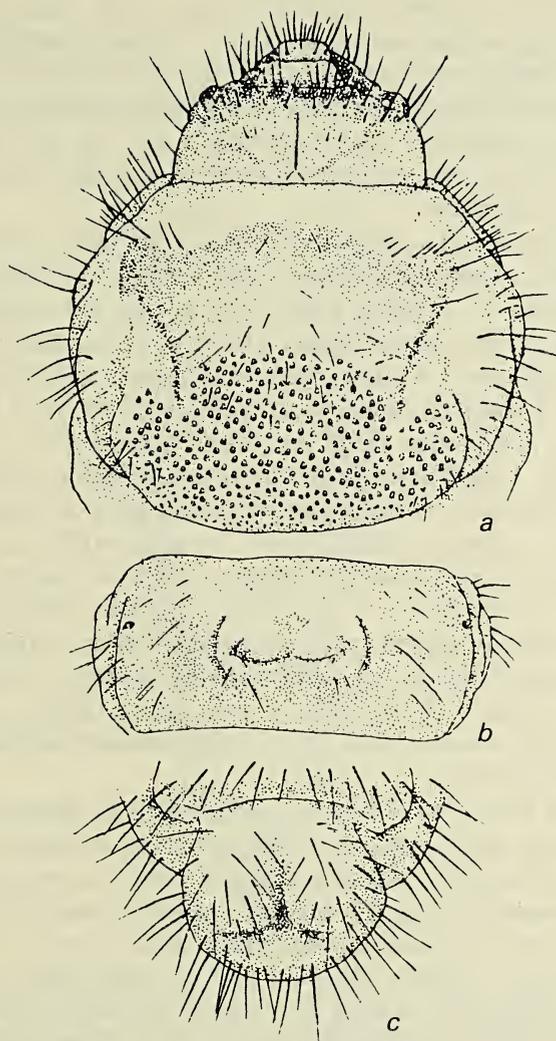


apically obliquely truncate, with rounded or slightly acute angles, laterally roundly sloping, with barely perceptible or almost not perceptible longitudinal (humeral and especially inner) ridges, basally with large deep, on remaining part minute punctation, with dense adherent gray or greenish-yellow pubescence masking punctation, with minute erect brownish hairs (male) or without them (female). Legs with dense adherent grayish or greenish pubescence. Midtibiae in distal third with moderately deep notch. Body ventrally with dense adherent pubescence. Hind coxae at inner margin with acute spinules (male) or without them (female). Abdominal sternite V apically with broad impression (male) or without it, but medially at base with longitudinal groove (female). Body, antennae, elytra, and legs black, only in some individuals foretibiae with reddish-rust tinge. Pubescence gray or greenish-yellow. Body length 8–11 mm.

Egg: White, with brownish tinge, elongate, uniformly rounded at poles. Chorion matte, with fine noncellular sculpture. Length 2.2 mm, width 0.5 mm.

Larva (Fig. 115): Characterized by absence of spinules on locomotory ampullae, extensive spinous field on pronotal shield and dense pubescence at tip of abdomen. Body white, comparatively thick. Head barely rounded laterally, slightly tapering anteriorly, half retracted into prothorax. Epistoma convex, medially divided by distinct longitudinal suture, laterally demarcated by fully perceptible frontal sutures, in general tone merging with temporo-parietal lobes, at anterior margin with somewhat rusty fringe, behind it with eight setigerous pores in transverse row, behind them with solitary bright rust hairs. Hypostoma rusty, slightly enlarged posteriorly, convex, at anterior margin broadly emarginate, with gently rounded anterior and acutely produced posterior angles, in anterior half with minute, barely perceptible bristles in transverse row. Temporo-parietal lobes somewhat rusty, at anterior margin with brownish-rust fringe, with setiform sparse hairs forming transverse row. Antennae very short, tubercular. Ocelli below, antennae, ampullaceous, with perceptible pigmentation. Clypeus white or with brownish tinge, broad, appearing as transversely extended band. Labrum somewhat rusty, apically broadly rounded, with long bristles. Mandibles apically obliquely truncate, with extended ventral and rounded dorsal denticles, black, basally reddish-rust, on outer side with five bristles forming transverse row at base.

Pronotum steeply inclined toward head, basally highly raised, at anterior margin with whitish fringe, on disk in anterior half with broad lustrous yellowish-rust tetragon (interrupted medially by whitish longitudinal interspace with double emargination at anterior margin), with



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Fig. 115. Larva of *Phytoecia nigricornis* (F.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampullae;
c—tip of abdomen (ventral view).

sparse rusty hairs. Pronotal shield basally convex, laterally demarcated by deep longitudinal folds, covered with dense, transversely extended rounded spinules forming common spinous field occupying slightly more than one-third of pronotum. Pronotum laterally with deep brownish groovelike impressions invading anterior angles of spinous field by almost half or slightly less. Mesonotum convex, coriaceous,

entire, laterally in posterior half with short rusty hairs. Metanotum divided by deep median transverse groove, behind it and laterally with rusty hairs forming transverse row. Prothoracic presternum with sparse bright rust hairs, laterally with large yellowish longitudinal spot; euster-
 183 num convex, coriaceous, with somewhat rusty, not very long hairs; basisternum, meso- and metasterna laterally with dense hairs, on disk without hairs, glabrous.

Abdomen gradually tapering toward tip, laterally with bright rust hairs. Dorsal locomotory ampullae quite convex, coriaceous, without spinules, divided by common longitudinal groove and short transverse groove uniting or not uniting laterally with short longitudinal fold. Ventral locomotory ampullae coriaceous, without spinules, divided by transverse groove. Tip of abdomen (segment X) with long dense rusty hairs. Body length of late instar larvae 11–14 mm, width of head up to 1.6 mm.

Pupa (Fig. 116): Characterized by almost uniform development of spinules on first two as well as subsequent tergites of abdomen. Body comparatively elongate. Head broad, frontally mildly convex, with barely raised antennal tubercles, inner to them on sinciput with two close-set, inner to eyes two–four bristles forming longitudinal row, anteriorly at base of clypeus with two lateral bristles in transverse row. Labrum triangular, apically narrowly rounded, lustrous, without bristles. Mandibles on outer side with pair of very minute bristles. Antennae in second half bent forward, their apices flexed toward foretibiae (female) or sides of head (male).

184 Pronotum transverse, laterally gently rounded, narrowing slightly more anteriorly, less posteriorly, basally with narrow transverse groove, disk uniformly convex, with thin piliform bristles on sclerotized base, sometimes produced laterally; bristles resembling short spinules form a transverse row in anterior and posterior half and a transversely extended cluster medially. Mesonotum posteromedially transversely depressed, at posterior margin with barely produced shield, laterally with one–two minute bristles or without them. Metanotum convex, at posterior margin broadly rounded, with median longitudinal groove, laterally with one barely perceptible bristle.

Abdomen in region of segment IV more (female) or less (male) enlarged, tapering less toward base, more toward tip. Abdominal tergites convex, with narrow median longitudinal groove, in posterior half perceptibly more raised, here with minute acute setigerous spinules forming a transverse band. Spinules on first two tergites nearly equal to those on subsequent tergites. Tergite VII oblong, apically narrowly rounded, disk highly convex, with acute spinules forming transverse band medially or, more often, in posterior half. Tergite VIII at posterior

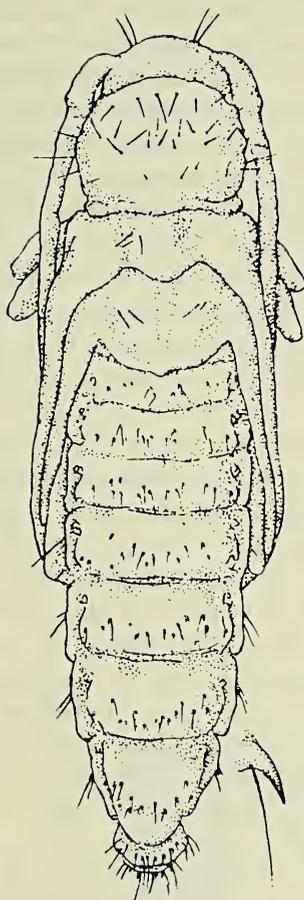


Fig. 116. Pupa of *Phytoecia nigricornis* (F.).

margin broadly rounded, with acute spinules in transverse row. Tip of abdomen bound by well-developed U-shaped ridge bearing on each side six acute setigerous spinules. Valvifers of female hemispherical, lustrous, with brownish tinge, markedly bent toward each other. Body length 9.5–12.0 mm, width of abdomen up to 3.0 mm.

Material: Collected in the southern Urals, Northern Kazakhstan, southern Ob' region, and on Salair. Adults 44, larvae 68, pupae 12 (males and females), larval exuviae with beetles from cells 6.

Distribution: Europe, from Atlantic Ocean coasts to the Urals and northern Asia, from the Urals to Altai and upper Ob' region.

Biology: Inhabits meadow and steppe fields adjacent to forests, often found in ravines, and on unflooded banks of rivulets occupied by

plant associations comprising Compositae. Beetles emerge from hibernation sites May-end or in June and are found up to mid-July. Flight of maximum beetles in second half of June. Females make a notch in middle of plant stems (at a height of 17–36 cm from the ground) and oviposit through it. *Tanacetum*, *Artemisia*, and other plants are infested. Diameter of stems at site of infestation 5–7 mm. After hatching, larvae make a gallery downward. Length of gallery in stem 17–36 cm, width 2–3 mm. By autumn larvae bore into the root and hibernate there during winter. The following year they continue gallery into the root. In July, they make a cell in the upper root part or in the basal part of the stem, nibble an exit from the cell, plug it with frass, and isolate the cell from above and below by a plug of fibrous frass. They then pupate with head upward (toward exit). Pupation commences in July and is completed in August.

According to laboratory observations, the pupal stage lasts 18–20 days at room temperature, but in certain instances is prolonged to 24 days. Length of pupal cell 13–30 mm, width 3–4 mm. Young beetles appear mainly in August and hibernate in cells during winter. In autumn, we found midinstar larvae together with young beetles in cells. In spring, with the onset of warmth (in May–June), beetles break the upper plug, scrape frass downward, enlarge the exit (flight) hole up to 3.0 mm diameter, and escape through it. They require supplementary feeding. Generation—two-year cycle. During metamorphosis insects lose up to 32% of their weight. Based on 16 insects, larvae before pupation range in weight from 20.0–80.8 mg (46.7 ± 3.8), pupae 19.0–73.5 mg (40.4 ± 3.5), young beetles before hibernation 17.0–61.5 (32.6 ± 3.0).

185 *Phytoecia nigricornis* (F.) develops mainly on Compositae plants. From the larvae collected in nature, 30 beetles were raised—10 on *Artemisia sieversiana*, 10 *Galatella macrosciadia*, 7 *Tanacetum vulgare*, 2 *Achillea* 10 sp., and 1 on *Artemisia vulgaris*. According to reports by Plavil'shchikov (1948) and Demelt (1966), it also infests plants of the genus *Solidago*.

7. *Phytoecia cylindrica* (L.)

Linnaeus, 1758. *Syst. Nat.*, ed. 10: 394 (*Cerambyx*); — *cenerea* De Geer, 1775. *Mem. Ins.*, 5: 75; — *verna* Müller, 1776. *Zool. Dan. Prodr.*, 94; — *silphoides* Schrank, 1781. *Enum. Ins.*, 145; — *simplonica* Stierlin, 879. *Mitth. Schweiz. Entom. Ges.*, 5: 438; Jakobson, 1911. *Zhuki Rossi*, tabl. 72, fig. 24; Reitter, 1913. *Fauna Germ.*, 4: 70; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 196; Gressitt, 1951. *Longic. Beetles of China*, 2: 612 (v. *verrea* Ganglb.); Demelt,

1966. *Die Tierwelt Deutschl.*, 52, 2: 107; Cherepanov and Cherepanova, 1971. *Nov. i maloizv. vidy fauny Sibiri*, 5: 51–53; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 229.

Adult (Fig. 117): Close to *Phytoecia icterica* (Schall.). Distinguished from it by short genae and much larger distinct punctation on head and pronotum. Body elongate. Head short, broad, glabrous, without anteriorly produced pubescence, with sparse black erect hairs and dense navellike punctures. Antennal tubercles barely produced laterally, on upper side smooth. Frons convex, toward occiput roundly sloping (in lateral view), medially with short longitudinal groove. Eyes very minutely faceted, convex, on inner side deeply emarginate. Lower ocular lobes distinctly longer than genae. Antennae longer than body, extending beyond apex of elytra by 10th (male) or 11th (female) segment, with minute rugose punctation, with sparse gray adherent hairs, on lower side with solitary bright bristles. First antennal segment markedly thickening toward apex, slightly shorter than 3rd, latter equal to 4th segment.

Pronotum parallel-sided or laterally gently, slightly rounded, barely

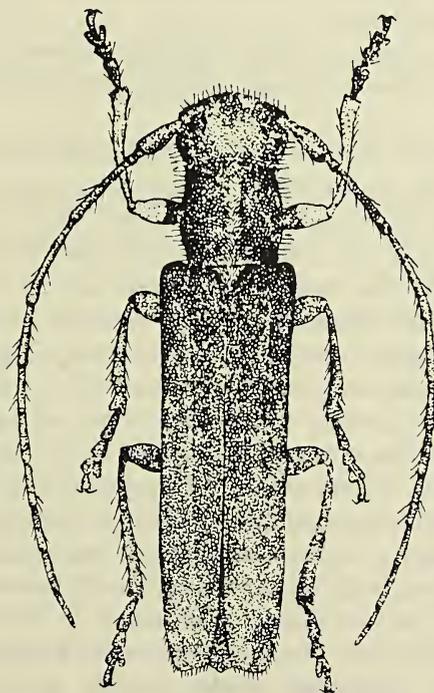


Fig. 117. *Phytoecia cylindrica* (L.).

oblong (male) or square (female), basally and apically with narrow faint transverse groove, with insignificantly recurved posterior and anterior margins, disk uniformly convex, with dense large navellike punctures, erect black hairs, sometimes with narrow white median pilose band. Pronotal shield small, transverse, posteriorly rounded, with sparse or dense gray hairs.

Elytra quite elongate, parallel-sided, basally with insignificantly projecting humeral tubercle, inner to it with small, fully perceptible impression, apically obliquely or slightly truncate, laterally and on disk with longitudinal ridges (of which, sometimes only humeral or only inner ridge more developed, sometimes both equally well developed), slightly raised along suture, in anterior third with much larger, in posterior third minute deep punctation, with gray adherent hairs forming not very dense pubescence. Legs with somewhat sparse gray tender adherent pubescence. Femora medially moderately thickened. Midtibiae at outer margin with short deep distal notch. Body ventrally with entire adherent gray pubescence. Abdominal sternite V at posterior margin slightly broadly depressed (male) or more convex, medially with barely perceptible longitudinal groove (female). Body, antennae, and elytra black. Legs black, midtibiae and apices of forefemora rusty. Body length 6.0–10.5 mm.

Egg: Orangish, elongate, almost uniformly rounded at poles. Chorion slightly matte, with fine noncellular sculpture. Length 2.0 mm, width 0.5 mm.

186 *Larva* (Fig. 118): Distinguished from all other species of the genus *Phytoecia* Muls. by hummocklike produced locomotory ampullae of abdomen, absence of spinules on them, and short spinous field on pronotal shield. Body white, moderately elongate. Head half retracted into prothorax. Epistoma convex, medially divided by faint longitudinal suture, laterally demarcated by barely perceptible whitish frontal sutures, at anterior margin with narrow rusty-brown fringe, behind it with eight bristles in transverse row. Hypostoma bright yellowish, slightly enlarging posteriorly, mildly convex, at anterior margin broadly emarginate, with narrow brownish fringe, anterior angles narrowly rounded, in anterior half with solitary bristles forming transverse row. Temporoparietal lobes bright yellow, at anterior margin with broad rusty-brown fringe, anteromedially with sparse setiform hairs forming transverse row. Antennae short, wartlike, brownish. Ocelli below antennae, with black pigmented spotlet. Clypeus short, broad, in form of a transverse band, whitish basally with somewhat rusty tinge. Labrum narrower than clypeus, whitish, with bright bristles, basally with somewhat rusty tinge. Mandibles black, basally reddish-rust, apically obliquely trun-

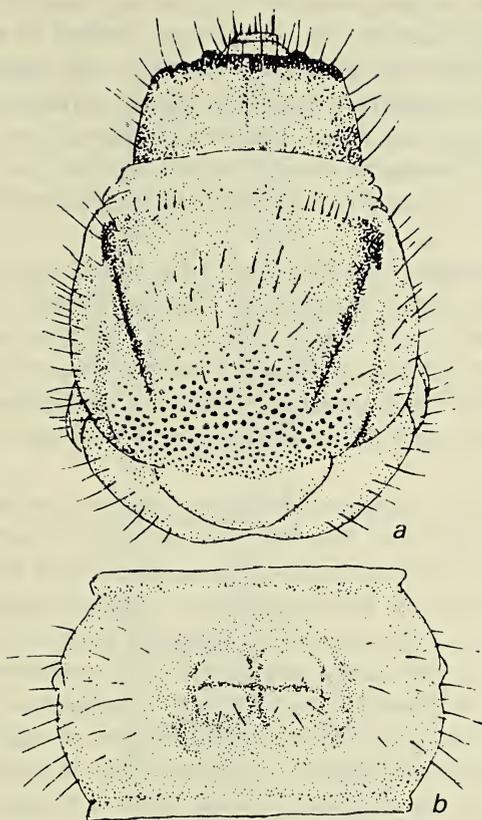


Fig. 118. Larva of *Phytoecia cylindrica* (L.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

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cate, with highly elongate, acute ventral and slightly projecting dorsal denticle, on inner side with well-developed ridge extending from ventral denticle toward middle of dorsal side of mandible.

Pronotum parallel-sided, steeply inclined toward head, basally highly raised, at anterior margin with broad whitish fringe, behind it on disk with lustrous rusty, in front twice emarginate tetragon, in anterior third with sparse hairs forming transverse row, in front of shield with numerous hairs forming transversely elongate pilose field. Pronotal shield basally convex, with dense backward inclined spinules (forming common spinous field occupying not more than one-third pronotum), laterally demarcated by longitudinal folds, at anterior angles with notch invaded by lateral oblique deep groovelike rusty-brown impressions, with somewhat rusty setiform hairs dispersed in anterior half and forming transverse row at base. Pronotum laterally with long sparse

rusty hairs. Meso- and metanota on disk glabrous, laterally with solitary bristles forming transverse row. Metanotum divided by median transverse groove. Prothoracic presternum laterally with sparse hairs, with large yellow spot. Eusternum basally glabrous, coriaceous, in anterior half with numerous long hairs. Basisternum laterally with short rusty hairs. Meso- and metasterna convex, in posterior half divided by transverse groove uniting laterally with short longitudinal grooves diverging forward.

Abdomen gradually tapering toward tip, laterally with long sparse bright rust hairs. Dorsal locomotory ampullae highly convex (as if produced), coriaceous, divided medially by crosslike common longitudinal and short transverse groove, laterally by curved longitudinal fold. Ventral locomotory ampullae similar. Tip of abdomen with dense rusty hairs. Body length of last instar larvae 13–15 mm, width of head 1.8 mm.

Pupa (Fig. 119): Characterized by very minute (not large) spinules on abdominal tergites and thin short bristles on pronotum. Body elongate, white. Head short, frontally convex, broad, from frons to occiput uniformly rounded, with barely projecting antennal tubercles, inner to them with pair of close-set bristles, lateral to frons with long bristles forming uniform or interlacing longitudinal row, at anterior margin with two–six bristles in transverse row. Labrum cuneiform, at anterior margin narrowly rounded, without bristles. Mandibles on outer side without bristles or with one–two barely perceptible ones. Antennae in second half curved, their apices flexed ventrad toward forelegs (female) or sides of head (male).

Pronotum more (female) or less (male) transverse, laterally broadly rounded, disk uniformly convex, basally with narrow transverse groove, with minute bright bristles mainly disposed laterally. Mesonotum lustrous, posteromedially transversely depressed, at posterior margin with insignificantly produced shield, laterally in anterior half with pair of barely perceptible bristles. Metanotum moderately convex, at posterior margin broadly rounded (posterior angles sloping), medially with narrow longitudinal groove, without bristles.

Abdomen elongate, barely tapering toward base and tip. Abdominal tergites convex, with barely perceptible median longitudinal groove, with minute acute setigerous spinules (bristles arising from base of spinules minute, barely perceptible) forming extensive transversely elongate cluster. Laterally, in pleural region, with extended margin, here with solitary, slightly sclerotized, recurved spinules. Tergite VII short, length not more than basal width, convex, posteriorly broadly rounded, with large acute setiform spinules forming transversely ex-

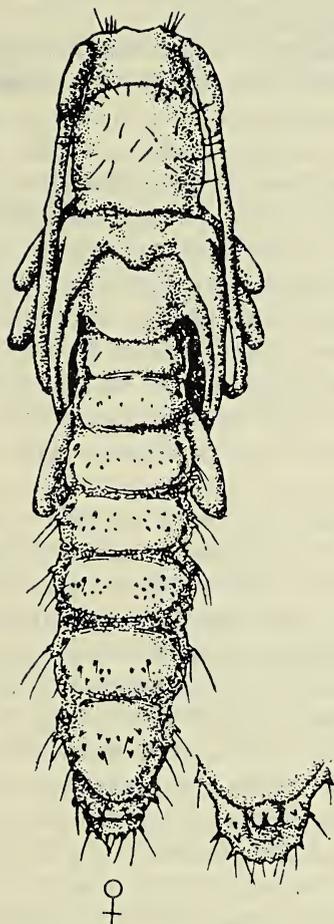


Fig. 119. Pupa of *Phytoecia cylindrica* (L.).

tended cluster posteromedially. Tergite VIII short, hyaline, convex, with large (female) or not very large (male) spinules (10–12) forming uniform or interlacing transverse row. Tip of abdomen (in ventral view) laterally bound by well- (female) or poorly (male) developed U-shaped ridge bearing six–seven minute setigerous spinules on each side. Valvifers of female perceptibly elongate, lustrous, inclining toward each other. Body length 9–12 mm, width of abdomen 2.5–3.0 mm.

Material: Collected in Salair, Ob' region, and the southern Urals. Adults 377, larvae 175, pupae 16 (males and females), exuviae with beetles from cells 39.

Distribution: Europe, northern and Soviet Central* Asia, Turkey, northern China. Abundant in Salair.

Biology: Occupies biotopes of open fields among forest plantations. Ecologically associated with umbellifers (Umbelliferae), mint (Labiatae) and other herbaceous plants. Beetles emerge from hibernation sites at May-end or in June, found up to July-end, visit flowers, and remain on host plants. Females infest stems 5–6 mm diameter. They make a notch on stems and lay one egg through each notch in the heartwood. Generally not more than one egg is laid per stem. At a temperature of 16–19°C larvae hatch from eggs after 8–12 days. Hatching of larvae commences June-end and is completed early August. Larvae feed on inner stem tissues. Toward the end of summer (second half of August), as the plants wither, they descend into the lower underground part of the stem where they hibernate during winter. In the second half of summer, last instar larvae make a pupal cell in the upper root part and pupate in it. Length of cell 15–22 mm, width 4.5–5.0 mm. The cell is plugged from above and below with fibrous frass. Pupae lie in cells with head upward. Pupal stage lasts up to 2.5–3.0 weeks. In the laboratory at room temperature, pupae completed development in 19–23 days. After emergence, beetles hibernate in cells during winter and emerge from them the following spring. Some larvae pupate after hibernation in June. This indicates that part of the population develops through a two-year and part through a one-year life cycle. The insect hibernates as a mid- or last instar larva and as an adult. Change in weight indices during metamorphosis is illustrated with six insects: larvae ready for pupation collectively weighed 321.5 mg (100%), pupae developed from them 271 mg (84.3%), young beetles soon after emergence 194 mg (60.3%). Based on 43 insects, larvae before pupation weigh 18–57 mg (41.2 ± 1.7), pupae 16–48 mg (33.7 ± 1.4), young beetles before hibernation 10.0–34.3 mg (25.1 ± 0.9).

Phytoecia cylindrica (L.) was found by us on umbellifers (*Aegopodium*, *Heracleum*, *Bupleurum*, *Athriscus*, and others) and mint (*Phlonus tuberosa*). In Salair, 32 beetles were raised from larvae collected in nature—29 on *Bupleurum aureum* and 3 on *Aegopodium podagraria*. In the forests of Salair, we examined 93 plants of *Bupleurum* at September-end, of which 67 (72%) were infested by this species. We found

* The Russian literature frequently refers to two geographic locations of identical meaning, viz., Tsentral'naya Aziya (Central Asia) and Srednaya Aziya (loosely translated as Middle Asia). The former term refers to Sinkiang Province in China (or the former Chinese Turkestan), while the latter refers to the former Russian Turkestan (The Kirgiz, Uzbek, Turkman, and Tadzik SSRs). Since there is no geographic locality by name Middle Asia, we prefer to call it Soviet Central Asia. — General Editor.

58 larvae and 9 beetles undergoing hibernation. It has been reported in literature (Plavil'shchikov, 1948; Demelt, 1966) that *Phytoecia cylindrica* (L.) develops on *Heracleum*, *Chaerophyllum*, *Anthriscus*, *Astrantia*, and other plants. It may be a serious pest of medicinal and agricultural plants.

189 8. *Phytoecia icterica* (Schall.)

Schaller, 1783. *Schrift. Naturf. Ges. Halle*, 1: 292 (*Saperda*); — *ephippium* Fabricius, 1792. *Entom. Syst.*, 1, 2: 317; — *rufipes* Olivier, 1795. *Entom.*, IV: 25 (*Saperda*); — *sibirica* Gebler, 1833. *Bull. Soc. Nat. Mosc.*, 6: 504; — *annulipes* Mulsant and Rey, 1863. *Ann. Soc. Linn. Lyon*, 2, 10: 165; Reitter, 1913. *Fauna Germ.*, 4: 70 (*P. rufipes* Oliv.); Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 195, 196; Demelt, 1966. *Die Tierwelt Deutschl.*, 52: 108 (+ *P. ephippium* F.); Gressitt, 1951. *Longic. Beetles of China*, 2: 613 (*P. sibirica* Gebl.).

Adult (Fig. 120): Characterized by elongate body, rusty-red legs, and sharp longitudinal ridges on elytra. Body not very thick, almost slender. Head frontally in region of frons highly convex, with large compact punctation (spaces between punctures smaller than punctures), medially with smooth groovelike longitudinal band or without it, with antennal tubercles barely produced laterally, between them with gentle, barely perceptible, longitudinal trough or without it, almost uniformly rounded, with sparse black hairs. Frons with dense whitish-gray adherent pubescence (male) or glabrous, without dense pubescence (female). Eyes very convex, quite finely faceted, with broad and deep emargination, and narrow lacertus between lobes; lower ocular lobes not longer than genae. Antennae extending beyond apex of elytra by 11th (female) or 9th–10th (male) segment, with fine grayish adherent hairs, on lower side with solitary bright brownish bristles. First antennal segment thick, with large compact punctation, notably (male) or barely (female) shorter than 3rd segment; latter longer (male) or almost not longer (female) than 4th segment.

Pronotum parallel-sided, laterally not convex, basally with barely perceptible narrow transverse groove, with insignificantly recurved posterior margin, disk uniformly convex, with very fine compact punctation, with sparse thin erect bright hairs, adherent (inner) pubescence forming (at seam) in middle narrow whitish-gray longitudinal band, sometimes in addition to it narrow, barely perceptible, white pilose band present laterally. In some individuals, white bands totally absent. Pronotal shield slightly transverse or almost square, posteriorly broadly rounded, with dense adherent whitish-gray pubescence.

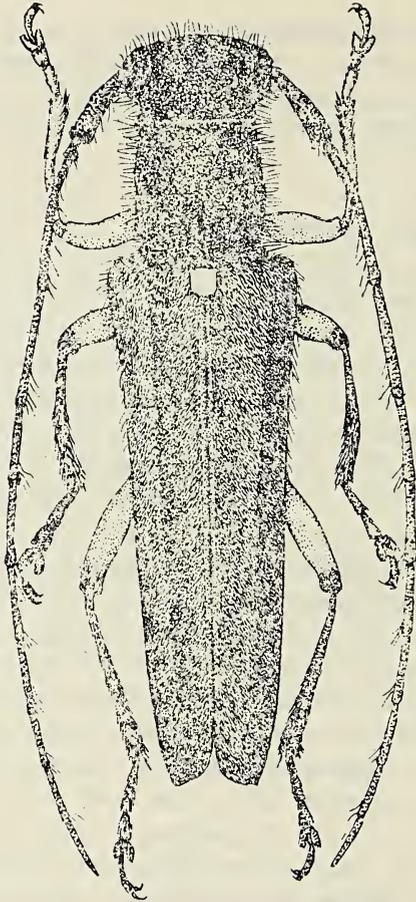


Fig. 120. *Phytoecia icterica* (Schall.).

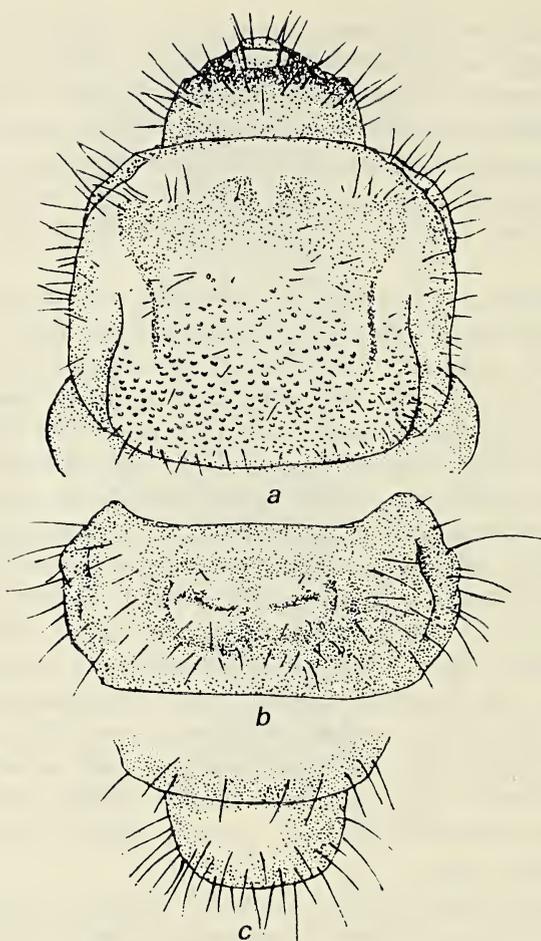
Elytra quite elongate, parallel-sided or slightly tapering posteriorly, basally with straight humeri, steeply rounded humeral tubercle, apically truncate or slightly emarginate, with obtuse outer and fairly acute inner angles, with sharp humeral and inner (on disk) longitudinal ridges, with raised suture (on disk between inner ridge and suture appearing to have
 190 longitudinal troughlike depression), basally partly, laterally in anterior half (below humeral ridge) with large punctation, gray tender, not very dense pubescence, in anterior half with more (male) or less (female) perceptible setiform erect hairs. Femora lustrous, medially moderately thickened, gradually tapering toward base and apex. Midtibiae at outer margin with deep oblique distal notch. Body ventrally with dense compact adherent grayish pubescence and semierect bright hairs. Sternite V slightly convex, at apex gently, barely depressed (male) or

convex, with median narrow groove (female). Tergite V apically rounded, with narrow fimbria of short hairs (male) or apically bent, convex, at posterior margin without fimbria (female). Body, antennae, and elytra black. Epipleura of elytra black, without yellow fringe. Legs rusty, all femora basally, hind and sometimes midfemora apically, mid- and hind tibiae as well as all tarsi blackish-brown or black. Abdomen at tip sometimes slightly rusty with yellowish tinge. Body length 7.5–9.0 mm.

191 *Larva* (Fig. 121): Similar to the larva of *Phytoecia virgula* (Charp.). Distinguished from it by more elongate spinous field on pronotum, whitish body, and other characters. Body comparatively elongate, not yellow, with whitish tone. Head half retracted into prothorax. Epistoma triangular, insignificantly convex, medially divided by faint groove-like longitudinal suture, laterally demarcated by perceptible whitish frontal sutures, at anterior margin with narrow rusty-brown fringe, behind it with short setiform hairs in transverse row. Temporo-parietal lobes at anterior margin with narrow brownish fringe, in anterior half with long thin sparse bright hairs. Antennae short, conical, barely projecting from antennal sockets. Ocelli pigmented, located below antennae. Hypostoma slightly convex, slightly tapering anteriorly, at anterior margin emarginate, with narrow brownish fringe, with somewhat rusty tone, laterally with pair of bristles in transverse row. Clypeus transverse, wider than long, with whitish tone. Labrum small, at anterior margin broadly rounded, with short bright bristles, basally somewhat rusty. Mandibles moderately elongate, apically steeply sloping, blackish-brown, basally rusty.

Pronotum steeply inclined anteriorly, lustrous, at anterior margin with whitish fringe, behind it with rusty transverse band interrupted medially by whitish longitudinal interspace, in anterior third and before spinous field with rusty hairs, laterally with oblique deep, somewhat rusty grooves. Pronotal shield laterally demarcated by short longitudinal folds, with uniform dense spinules forming extensive field extending between oblique grooves comparatively far anteriorly (this field at anterior angles truncate, in *P. virgula* (Charp.) directly transversely truncate). Prothoracic presternum convex, with numerous rusty hairs; basisternum laterally with dense hairs, medially without hairs. Meso- and metasterna in anterior half with numerous rusty hairs.

Abdomen elongate, gradually tapering toward tip, laterally with short sparse rusty hairs. Dorsal and ventral locomotory ampullae coriaceous, without spinules, highly produced uniformly, divided by longitudinal (on dorsal side deep), in posterior half by transverse (sometimes faint) groove. Tergite IX at posterior margin with sparse rusty hairs.



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Fig. 121. Larva of *Phytoecia icterica* (Schall.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

Tip (segment X) of abdomen posteriorly gently rounded, with numerous rusty hairs. Body length of last instar larvae 18–22 mm, width of head up to 1.8 mm.

Pupa (Fig. 122): Well distinguished from other species by absence of spinules on pronotum and extended coriaceous base of spinules on abdominal tergites. Body white, moderately elongate. Head between antennae with gentle trough, inner to antennal tubercles (closer to occiput) with pair of close-set bristles, lateral to frons with solitary bristles forming interlacing longitudinal row, at anterior margin with four–six short bristles forming transverse row. Antennae flexed laterad,

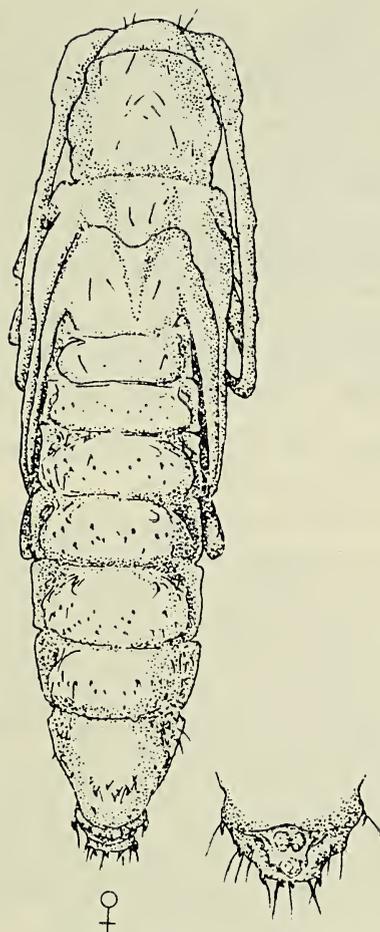


Fig. 122. Pupa of *Phytoecia icterica* (Schall.).

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in second half extending beyond midfemora, directed forward, their apices adjoining sides of head.

Pronotum parallel-sided, length not more than width, disk convex, with thin bristles forming transverse row at anterior margin and on hind clivus medially a small cluster, without spinules (*P. cinctipennis* Mannh. with distinct lateral spinules). Mesonotum convex, at posterior margin with angularly produced shield, laterally with solitary, barely perceptible bristles. Metanotum mildly convex, medially with broad longitudinal groove, laterally with solitary bristles, barely perceptible under high magnification.

Abdomen parallel-sided (male) or in region of segment IV slightly enlarged (female). Abdominal tergites convex, posteromedially with

minute, barely perceptible (on tergites I–II) or large (on tergites III–VII) acute setigerous spinules on extended coriaceous base. Spinules in posterior half of tergites forming broad transversely extended band. Tergite VII slightly elongate, tapering posteriorly, apically gently rounded, disk convex, lustrous, in posterior half with large spinules on coriaceous base forming transversely extended, recurved band. Tergite 192 VIII short, medially with acute spinules forming transverse row. Tip of abdomen bound by U-shaped ridge set with acute setigerous spinules. Valvifers of female hemispherical, barely separated, inclining toward each other. Body length 9–12 mm, width of abdomen 2.5 mm.

Material: Collected in the southern Urals, in Kurgan, upper Ob' region. Adults 25, larvae 19, pupae 2 males and 4 females, larval and pupal exuviae 5.

Distribution: Europe, the Caucasus, Turkey, the southern Urals, northern Asia up to Altai, northern China.

Biology: Inhabits meadow and steppe fields. Flight of beetles commences in May and is completed in first half of July. Larvae develop in stems of umbellifers and other herbaceous plants. From the stem they penetrate the root and there make a gallery up to the lower apical part. Often the inner tissues here are almost completely destroyed and only the cortical layer remains. In autumn, the larvae nibble the stem from inside (in the underground part) and when it breaks, they remain in the root. The gallery exposed in the upper part of the root is completely filled with fibrous frass. When the temperature drops (October), larvae enter hibernation. Once a larva nibbled a root 4.0 cm below the root collar and when the upper part of the root along the stem broke, the larva remained in the lower part of the root. Very rarely, larvae nibble stems 2–3 cm above the root collar.

After hibernation, larvae live in the root, feed on inner tissues, make a pupal cell there, and separate it from above and below by a plug of fibrous frass. They pupate with head upward. Length of gallery in stem 17–33 cm, in the root up to 16.5 cm. Width of gallery up to 4 mm. Length of pupal cell 2–4 cm, width 4.0–4.6 mm. Diameter of nibbled stems in the underground part 4–20 mm. Length of upper plug of pupal cell 6.0 mm, of lower plug up to 5.0 mm. Pupal stage lasts up to three weeks. Under laboratory conditions, at temperatures of 20.0–23.8°C (average $21.5 \pm 0.2^\circ\text{C}$), pupae completed development in 20–21 days (average 20.5 ± 0.2). Six pupae were under observation. After emerging from pupae, beetles enter diapause and remain in cells throughout winter. They leave the cells the following spring with the onset of warmth. For this purpose, they first break the upper plug, scrape the frass downward, and then emerge from the cell through the hole in the

terminal part of the root. Generation — two-year cycle (Table 11). Weight indexes during metamorphosis change as follows: 18 male specimens in the larval stage before pupation weighed 28.0–58.2 mg (41.9 ± 1.7), pupae 25.6–53.0 mg (38.6 ± 1.5), adult insects before hibernation 19.8–44.0 mg (30.5 ± 1.2); females correspondingly weighed 33–68 mg (48.8 ± 3.3), 30.0–62.5 mg (43.3 ± 3.1), and 25.0–50.5 mg (35.0 ± 2.4). Reduction in weight continues during hibernation. In an experiment, six beetles (males) before hibernation had a total weight of 194.6 mg (100%), after hibernation 144 mg (74.5%). Weight reduced by 25.5%.

Phytoecia icterica (Schall.) is found on umbellifers: saxifrage (*Pimpinella saxifraga*), parsnip (*Pastinaca sativa*). According to our estimates in 1982, the former plant, found within the Lesnoe natural boundary (Kurgan), was damaged 82% and the latter (in Kachusovo region) 50%.

93 9. *Phytoecia cinctipennis* Mannh.

Mannerheim, 1849. *Bull. Soc. Nat. Mosc.*, 22, 1: 242–243; Mulsant, 1863. *Coleopt. France, Longic.*, 2: 417; Ganglbauer, 1884. *Best.-Tab.*, 8: 132; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 195; Cherepanov and Cherepanova, 1982. *Gel'minty kleshchi i nasekomye (Nov. i maloizv. vidy fauny Sibiri)*, 42–46.

Adult (Fig. 123): Characterized by a combination of the following characters: elytra black with white pilose perisutural groove, legs bright rust, and tarsi and apices of tibiae (sometimes major part of tibiae) dark. Body elongate. Head with insignificantly raised antennal tubercles, medially between them with narrow longitudinal groove, in frontal region convex, with dense gray or slightly greenish short adherent hairs, compact deep punctation and numerous erect black hairs. Eyes very convex, finely faceted, deeply emarginate; space between lobes insignificantly narrower than upper lobe. Lower ocular lobe twice longer than gena. Antennae comparatively long, extending beyond apex of elytra by 10th or 11th segment, rarely not reaching it (male, female) with very minute gray hairs not forming dense pubescence, on lower (inner) side with not long bright bristles. First antennal segment gra-

Table 11. Development of *Phytoecia icterica* (Schall.)

Year	April	May	June	July	August	September
1st	A	A	AEL	AEL	EL	L
2nd	L	L	L	LP	PA	A
3rd	A	A	AEL	AEL	EL	L

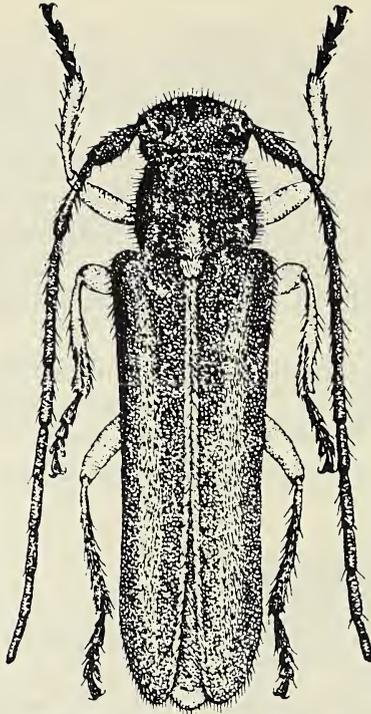


Fig. 123. *Phytoecia cinctipennis* Mannh.

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dually thickening toward apex, not shorter than 4th, barely shorter than 3rd segment.

Pronotum parallel-sided, laterally barely convex, width not more (male) or barely more (female) than length, basally and apically with distinct transverse groove, disk uniformly convex, with minute uneven or comparatively uniform punctation, laterally in anterior half with fully or barely perceptible transversely elongate ampullae resembling a smooth tetragon; with dense grayish-white compact adherent pubescence forming longitudinal band medially and one longitudinal band each laterally; with black erect hairs. Pronotal shield almost parallel-sided or insignificantly narrowing posteriorly, apically broadly rounded, flat or troughlike, longitudinally concave, with grayish-white dense compact adherent pubescence.

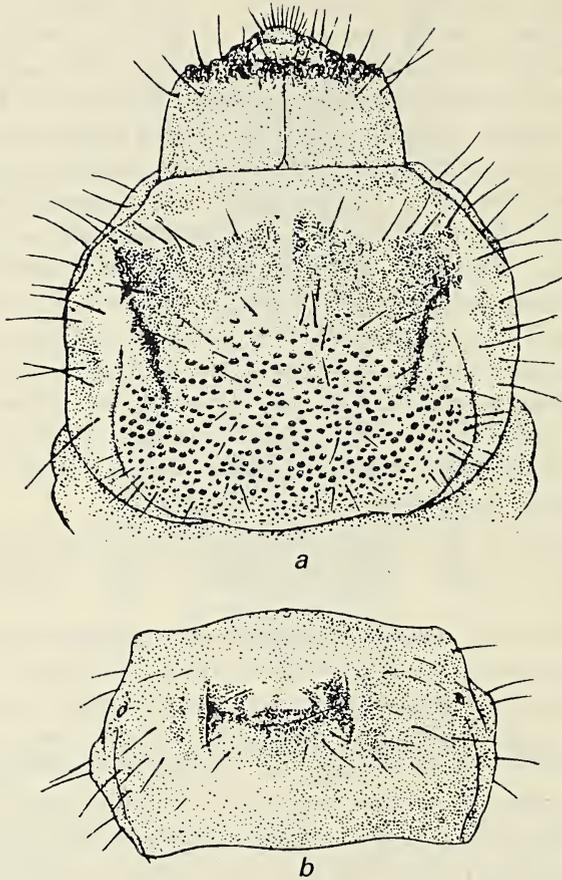
Elytra parallel-sided, in male slightly tapering posteriorly, basally with straight humeri, with rounded humeral tubercle, inner to it with gentle depression or without it, apically generally obtuse, with gently rounded outer and narrowly rounded inner angles, disk beyond shield fairly curved (like an aquiline nose), laterally with humeral ridge extending from humeral tubercle to hind clivus, disk with inner long-

itudinal ridge (in some individuals only inner, in others only humeral ridge developed), basally and laterally with large, on disk minute punctation, with compact adherent dense grayish-white hairs forming distinct narrow perisutural band and a broad indistinct band medially, with short setiform, almost erect hairs. Legs with minute gray compact adherent and somewhat rusty raised hairs not forming dense pubescence. Femora in posterior third gradually thicken insignificantly. Mid-
 194 tibiae at outer margin with distal notch. Body ventrally with compact adherent dense pubescence. In male, sternite V of abdomen apically deeply depressed, pitlike; tergite V apically truncate, not rounded. In female, sternite V convex, apically not depressed, medially with barely expressed longitudinal groove; tergite V ovoidly rounded apically, here with short adherent bright and semierect black or dark brown setiform hairs. Body, antennae, and elytra black; segments IV–V of abdomen, epipleura of elytra below humeral tubercle, and legs rusty; hind tibiae and tarsi slightly dark. Body length 9.0–10.5 mm.

Egg: Creamy white, elongate, tapering toward poles, here narrowly rounded. Chorion matte, with fine cellular sculpture. Length 2.1 mm, width 0.6 mm.

Larva (Fig. 124): In structure of locomotory ampullae and presence of minute sclerotized spinules on them, close to the larva of *Phytoecia sareptana* Ganglb. Distinguished from it in later instars by much larger body. Head parallel-sided, insignificantly retracted into prothorax. Epistoma mildly convex, medially with distinct streaklike brownish longitudinal suture, at anterior margin with broad reddish-rust fringe, here with long setiform hairs, laterally with barely perceptible frontal sutures. Hypostoma parallel-sided or barely tapering anteriorly, mildly convex, lustrous, dark rust, at anterior margin with narrow brownish fringe, in anterior half with four setigerous pores in transverse row. Temporo-parietal lobes yellowish, at anterior margin with somewhat rusty fringe covering ocular-antennal zone, along posterior margin of
 195 fringe with short bristles in transverse row. Antennae very short, whitish. Ocelli below base of antennae, sparsely pigmented. Clypeus trapezoid, broad, basally somewhat rusty. Labrum somewhat rusty, transverse, apically broadly rounded, in anterior half with dense dark rust bristles. Mandibles black, apically steeply inclined, with obtuse dorsal denticle.

Pronotum as if raised basally, more convex, steeply inclined toward head, anterior margin with broad whitish fringe, behind it with rusty transverse tetragon (twice broadly emarginate at anterior margin), medially with narrow whitish interspace, laterally with rusty-brown groovelike impressions diverging laterad and extending from anterior



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Fig. 124. Larva of *Phytoecia cinctipennis* Mannh.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

angles of shield obliquely forward. Pronotal shield laterally demarcated by slightly excurved short longitudinal grooves, with short sclerotized spinules rounded apically and forming common spinous field extending quite anteriorly between lateral brownish impressions. Hairs at anterior margin of yellow transverse tetragon forming even transverse row, at anterior margin of spinous field dispersed. Mesonotum with setiform hairs forming transverse row, metanotum on disk with minute spinules forming sclerotized transverse band divided medially by whitish transverse groove. Prothoracic presternum on disk in anterior half with very short solitary hairs forming transverse row, laterally with rusty-yellow lustrous spot surrounded peripherally by minute sparse bristles. Euster-num convex, with setiform, somewhat rusty hairs. Meso- and meta-

sterna on disk with fine dense spinules forming sclerotized band.

Abdomen elongate, laterally with sparse bright hairs. Dorsal locomotory ampullae moderately convex, medially divided by barely perceptible common longitudinal groove, two short transverse grooves diverging laterad and by lateral excurved short longitudinal folds, with dense minute sclerotized spinules forming two distinct yellow transverse bands— anterior band arcuate, posterior straight. Ventral locomotory ampullae with minute dense spinules forming two yellow transverse bands separated by transverse groove. Tip of abdomen with solitary bright hairs. Body length of last instar larvae 18–22 mm, width of head 2.0 mm.

Pupa (Fig. 125): Distinguished from the pupa of the closely related species *Phytoecia sareptana* Ganglb. by numerous very large, acute spinules on abdominal tergites III–VII and other characters. Head short, roundly narrowing anteriorly, on occiput broadly rounded, near clypeus with six bristles (three on each side) forming transverse row, inner to antennae with solitary bristles forming irregular longitudinal row. Labrum lustrous, apically narrowly rounded, without bristles. Mandibles on outer side near base with pair of long or short bristles. Antennae flexed laterad, in second half on ventral side bent forward, their apices adjoining sides of head (male) or foretarsi (female).

Pronotum slightly oblong or square, in second half barely tapering anteriorly or parallel-sided, disk convex, laterally with solitary minute setigerous spinules or thin bristles on sclerotized base. Mesonotum mildly convex, lustrous, at posterior margin with angularly barely extended shield, laterally with short solitary bristles or without them.

196 Metanotum lustrous, medially with longitudinal troughlike groove, angularly tapering posteriorly, at posterior margin directly truncate, laterally with solitary, barely perceptible bristles.

Abdomen almost parallel-sided, roundly tapering at tip. Abdominal tergites uniformly convex. Tergites I–II with very minute, barely perceptible, tergites III–VI with large acute, apically recurved, sclerotized spinules forming transverse spinous band occupying posterior half of tergite. Tergite VII tapering posteriorly, apically rounded, disk convex, in posterior half with large acute spinules directed backward. Tergite VIII short, posteriorly broadly rounded, at posterior margin with minute acute setigerous spinules forming transverse row. Tip of abdomen obtuse, bound by U-shaped ridge set with acute styloid setigerous spinules. Valvifers of female large, basally slightly wide-set, their apices inclined toward each other. Body length 11–12 mm, width of abdomen 2.5–2.8 mm.

Material: Collected in Ussuri-Primor'e region (southern Sikhotealin', Khasan) and in Tuva. Adults 18, larvae 11, pupae 2 (male and

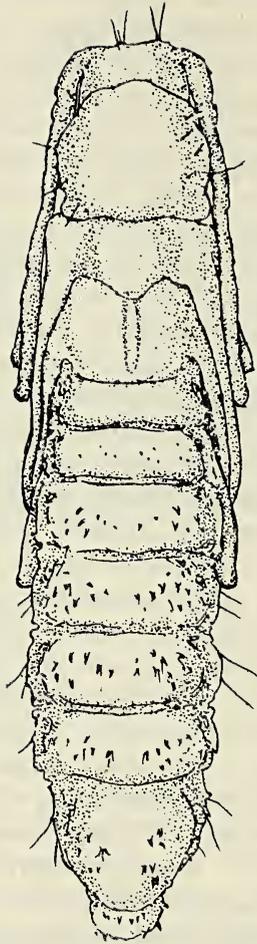


Fig. 125. Pupa of *Phytoecia cinctipennis* Mannh.

female), larval and pupal exuviae from cells with beetles 3 each.

Distribution: From Tuva, northern Mongolia to coasts of Sea of Japan. Tuva, Trans-Baikal, Ussuri-Primor'e region, northern Mongolia, northern China, Korean peninsula.

Biology: Inhabits meadow-shrub association in which wormwood (*Artemisia gmelinii*) occurs. Beetles fly from May to June and infest sagewood shoots 6–15 mm diameter. Female makes notch on the shoot (at a height of 9–13 cm) and oviposits under bark. Larvae initially nibble a small area under bark, then bore into the shoot and make a longitudinal gallery through the heartwood. On the way, they make minute ventilation holes through which they discard fine fibrous frass.

Larvae live for two years; before the second hibernation they nibble the stem from inside, which breaks at this site; larvae remain in the stub (5–30 cm long) of the stem. The opening of the gallery exposed in the terminal part of the stem is compactly plugged with fibrous frass. Sometimes the gallery extends from the stem into the root. Length of gallery 9.5–31.0 cm, width 3–4 mm. In autumn, larvae enter diapause in the lower (stub) part of the stem and remain in this condition for the second hibernation. In spring, with the onset of warmth, pupation takes place. The larval gallery in the stub part of the stem serves as a cell for pupation. Length of cell 5.5–8.5 cm, width up to 5.0 mm. Length of upper plug of cell 10 mm, of lower plug (in the root) up to 6.0 mm. Pupation commences in May and is completed in June. Developed beetles ascend through the gallery and break the plug of frass at the exit in the terminal part, scrape the frass downward or push it upward, and emerge. Generation—two-year cycle. Weight indexes of nine insects: larvae before pupation 44–107 mg (67.0 ± 6.1), pupae 40–98 mg (60.2 ± 5.5), beetles before emergence from cells 35–76 mg (48.6 ± 4.3) (Cherepanov and Cherepanova, 1982).

Phytoecia cinctipennis Mannh. is found sporadically in regions where wormwood grows. To date, not found on other plants. Quite common in the Primorsk territory. Occurs in Tuva. In the eastern Ural region (Kurgan province), it is replaced by *Phytoecia icterica* (Schall.).

10. *Phytoecia sareptana* Ganglb.

Ganglbauer, 1888. *Horae Soc. Ent. Ross.*, 22: 376; Plavil'shchikov, 1932. *Zhuki-drovoseki vrediteli drevesiny*, 195; Cherepanov and Cherepanova, 1982. *Gel'minty, kleshchi i nasekomye (Nov. i maloizv. vidy fauny Sibiri)*, 36–39.

197 *Adult* (Fig. 126): Characterized by head with dense pubescence, eyes large, sharply faceted, and elytra laterally rounded, apically obliquely incised, with produced acute outer angle. Body comparatively slender, elongate. Head short, broad, frontally (in lateral view) hemispherically rounded, with antennal tubercles insignificantly produced laterally, medially with narrow longitudinal groove, with large sparse deep punctures, adherent golden-grayish pubescence, and brownish erect hairs. Eyes large, moderately convex, sharply faceted, broadly emarginate; space between lobes almost not narrower than upper lobe. Lower ocular lobe large, 1.5–2.0 times longer than gena. Antennae extending up to apex of elytra or beyond it by 10th–11th segment, with minute punctation and sparse gray hairs, on lower side with bright brown bristles. First antennal segment gradually thickening toward apex, elongate, shorter than 3rd, equal to 4th.

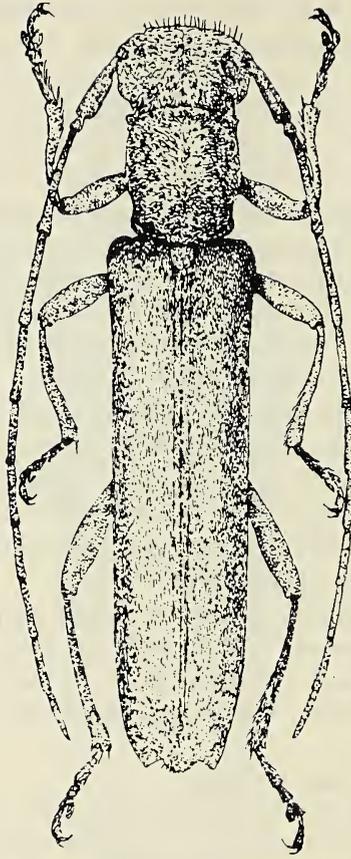


Fig. 126. *Phytoecia sareptana* Ganglb.

Pronotum parallel-sided, laterally not rounded, almost square, basally with barely perceptible transverse groove, at anterior margin without groove, with minute sparse punctation, dense compact adherent pubescence forming median seam in form of bright longitudinal band, with sparse dark brown erect hairs. Pronotal shield not wider than long, posteriorly broadly rounded, with dense adherent hairs.

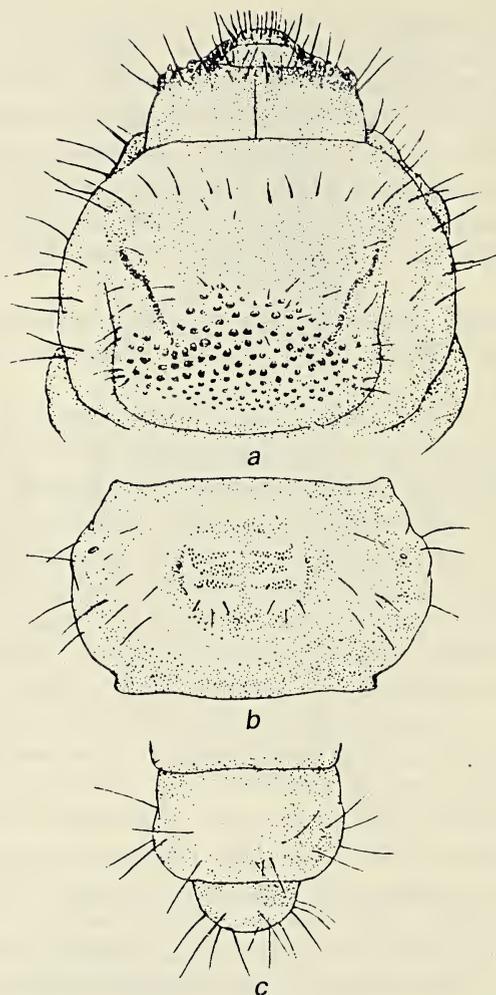
Elytra elongate, parallel-sided, basally with straight humeri, with rounded humeral tubercle, inner to it without distinct depression, with distinct perisutural groove, laterally rounded, without humeral ridge, apically obliquely incised, with produced (acute) outer angle, basally (in some individuals laterally as well) with deep distinct, on remaining part much smaller punctation, with dense compact adherent pubescence and minute bright brownish raised hairs. Legs comparatively long, almost glabrous, with sparse bright adherent hairs. Hind femora

elongate, poorly thickened, their apices extending beyond sternite II (female) or beyond middle of sternite III. Midtibiae at outer margin with barely perceptible distal notch. Body ventrally with dense compact adherent pubescence. Abdominal sternite V apically deeply depressed pitlike (male) or convex, with median longitudinal groove (female). Body, antennae, and elytra black. Epipleura of elytra yellowish. Legs and tip of abdomen reddish-rust, tarsi, mid- and hind tibiae black. Often midtibiae partially dark. Pubescence golden-gray. Body length 6–10 mm.

Egg: Yellowish, elongate, at cranial pole broadly, at caudal pole narrowly rounded. Chorion matte, with fine sculpture. Length 1.8 mm, width 0.5 mm.

Larva (Fig. 127): In structure of pronotum similar to the larva of *Phytoecia rufiventris* Gaut. Well distinguished from it by dense minute sclerotized spinules on locomotory ampullae of abdomen. Body white, elongate. Head barely tapering anteriorly. Epistoma in anterior half rusty-red, with coarse setiform hairs forming transverse row, in posterior half with much brighter, somewhat rusty tinge, with distinct longitudinal (median) brownish suture, laterally with barely perceptible or almost not perceptible frontal sutures. Hypostoma distinctly tapering anteriorly, somewhat rusty, at anterior margin broadly emarginate, mildly convex, in anterior half with four short thick bristles in transverse row. Temporo-parietal lobes bright rust, in anterior half with solitary long hairs forming transverse row. Antennae short, whitish. Ocelli below antennae, one on each side, pigmented. Clypeus whitish, very short, in form of transverse blade. Labrum transverse, at anterior margin broadly rounded, with sparse coarse bristles. Mandibles relatively thick, apically steeply truncate, with moderately elongate ventral and acutely produced dorsal denticle, black, basally with rusty tinge.

Pronotum transverse, highly inclined toward head, in anterior half with yellowish-rusty tone, at anterior margin with whitish fringe, behind it with coarse setiform hairs in transverse row. Pronotal shield with large flat (basally minute) recurved spinules, laterally demarcated by short longitudinal grooves, at anterior angles with narrow notch invaded by oblique brownish groovelike impressions, slightly curved medially, basally with very minute, at anterior margin of spinous field large bristles (forming correspondingly two narrow transverse fields—one at base, the other on anterior edge of spinous field). Mesonotum coriaceous, without spinules, with sparse hairs in transverse row. Metanotum on disk with minute spinules forming brownish transverse band, behind it with solitary hairs. Prothoracic presternum convex, with very sparse dispersed coarse hairs, laterally with vast glabrous lustrous spot.



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Fig. 127. Larva of *Phytoecia sareptana* Ganglb.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

Meso- and metasterna on disk with dense minute spinules.

Abdomen elongate, parallel-sided or perceptibly tapering toward tip, laterally only with solitary hairs. Dorsal locomotory ampullae on abdominal tergites I–VII convex, with common median longitudinal groove, laterally with short longitudinal pitlike folds, with two transverse, barely perceptible grooves uniting laterally with longitudinal folds, with very minute dense spinules. Ventral locomotory ampullae divided by transverse groove, with minute dense sclerotized spinules forming two

transverse brownish bands—one in front of, the other behind transverse groove. Tip of abdomen with long sparse hairs. Body length 10–11 mm, width of head 1.1 mm. In first instar larvae, anterior margin of hypostoma with four acute spinules, which disappear after molt.

Pupa (Fig. 128): Distinguished from the pupa of *Phytoecia rufiventris* Gaut. by more elongate body. Head cuneately tapering anteriorly, inner to antennae with long thin bristles forming longitudinally elongate field or two clusters—one below base of antennae, the other above, closer to occiput. Antennae flexed laterad, in second half (on ventral side of body) bent forward, their apices adjoining sides of head.

Pronotum parallel-sided, uniformly convex, smooth, with short thin bristles mainly along periphery, sometimes with barely perceptible, acute spinules at base of bristles.

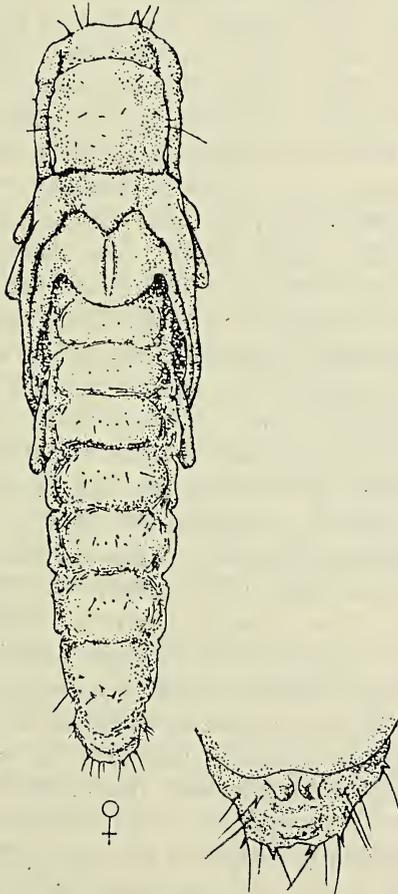


Fig. 128. Pupa of *Phytoecia sareptana* Ganglb.

Abdomen elongate, barely tapering toward base, more toward tip. Abdominal tergites convex, without median longitudinal groove, with sclerotized acute spinules bent in different directions or only forward and forming distinct transverse field on disk. Tergite VII apically narrowly (female) or broadly (male) rounded, in posterior half with large acute spinules that are either erect or bent forward. Tip of abdomen (in ventral view) bound by U-shaped ridge bearing acute setigerous spinules. Valvifers of female elongate, their apices bent toward each other. Body length 9–10 mm, width of abdomen 1.5 mm.

Material: Collected in Ussuri-Primor'e region (Lake Khanka, Khasan, southern Sikhote-Alin'). Adults 11, larvae 15, pupae 2 (male and female), larval exuviae with beetles and pupae from cells 4.

Distribution: Ussuri-Primor'e region. We found it in southern Sikhote-Alin' (environs of Lazovsk sanctuary).

Biology: Occupies open meadow zones near forest plantations. Flight of beetles July and August. Females infest stems of growing wormwood plants of 2–5 mm diameter. In each case, the female initially makes a notch (1.0 mm) on the stem using its mandibles, then introduces its ovipositor into it, and lays one egg in the heartwood of the stem, although sometimes two eggs are laid nearby. Notches are made on the stem at a height of 8–11 cm from the ground. Generally, one notch is made per stem, rarely more. Under natural conditions, at temperatures of 16–26°C ($20.6 \pm 0.5^\circ\text{C}$), larvae hatched 19–21 days (average 20.1) after oviposition. There were 12 eggs under observation.

200 After hatching, larvae live in the heartwood of the stem and feed on soft tissues. With the approach of winter, they penetrate the underground part of the stem or the root zone. After hibernation, they continue to feed. Larvae of late instars nibble the stem circularly from inside, the stem breaks at this site, and the larvae remain in the underground part, which is terminally infundibular. The gallery exposed in the terminal part of the stem is plugged with fibrous frass. A cell is made in the lower part of the gallery, which is plugged from above and below with frass. Length of cell 36–47 mm, width 2.0–2.5 mm. Length of lower plug 1.5–4.0 mm, upper plug 5–10 mm. Larvae pupate in cells with head upward. Pupation commences in June and is completed mid-July. Pupae complete development in two–three weeks. From a pupa collected in nature on July 11th, the beetle emerged on July 26th. The atmospheric temperature fluctuated from 16°C to 26°C (average $21.6 \pm 0.5^\circ\text{C}$). Emergence of beetles from cells begins in the first ten days of July and is completed by August. Developed beetles break the upper plug, scrape frass downward, and escape through the hole in the terminal part of the stem. Based on six insects, larvae before

pupation weigh 17–34 mg (22.7 ± 2.3), pupae 15–30 mg (20.2 ± 2.0), young beetles before emergence from cell 12.0–25.0 mg (16.7 ± 1.7).

Phytoecia sareptana Ganglb. is found sporadically in individual meadow fields and forest glades. It develops in the stems of wormwood (*Artemisia manshurica*).

11. *Phytoecia coerulea* (Scop.)

Scopoli, 1763. *Entom. Carn.*, 49 (*Leptura*); — *viriduscula* Goeze, 1777. *Entom. Beytr.*, 1: 506; — *virescens* Fabricius, 1781. *Spec. Ins.*, 2: 499; — *aeruginosa* Mulsant, 1839 (nec Müll., 1776). *Coleopt. France, Longic.*, 210; — *flavescens* Mulsant, 1843 (nec Brullé, 1832). *Ann. Soc. Agric. Lyon*, 4: 284; — ab. *flavicans* Mulsant, 1851. *Mém. Acad. Sc. Lyon.*, 2, 1: 137; — ab. *grisescens* Chevrolat, 1860. *Rev. Zool.*, 12, 2: 269; — ab. *obscura* Bris. 1863. *Catal. Coleopt. Grenier*, 116; Yakobson, 1911. *Zhuki Rossii*, tabl. 72, fig. 26 (*P. virescens*); Reitter, 1911. *Wien. Entom. Zeit.*, 30: 267; Reitter, 1913. *Fauna Germ.*, 4: 71; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 197–198; Kostin, 1973. *Zhuki-kislofagi Kazakhstana*, 228; Cherepanov and Cherepanova, 1982. *Gel'minty, kleshchi i nasekomye (Nov. i maloizv. vidy fauny Sibiri)*, 39–42.

Adult (Fig. 129): Characterized by eyes divided completely into two lobes and elytra individually rounded apically, laterally without distinct longitudinal ridges. Body moderately elongate. Head frontally mildly arched, almost flat, with antennal tubercles insignificantly produced laterally and slightly raised, medially with narrow longitudinal groove, with fine punctation, dense adherent pubescence, and erect dense black or blackish-brown setiform hairs. Eyes more (male) or less (female) convex, steeply faceted, divided completely into two lobes, the lower being 1.5–2.0 times longer. Antennae barely extending up to apex of elytra or slightly beyond it, on lower side with greenish or grayish, on upper brownish adherent hairs, with solitary bristles. First antennal segment moderately elongate, shorter than 3rd; 4th segment equal to 3rd, longer than 5th.

Pronotum square or slightly transverse, laterally gently rounded, disk uniformly convex, basally and apically with narrow transverse groove, with barely recurved margins, with minute, not very dense punctation and dense compact, transversely adherent pubescence, medially at seam of hairs with bright longitudinal band, with sparse or comparatively dense brownish or black erect hairs. Pronotal shield transverse or square, with dense adherent pubescence.

Elytra parallel-sided, basally with straight humeri, with barely perceptible humeral tubercle, inner to it with insignificant depression,

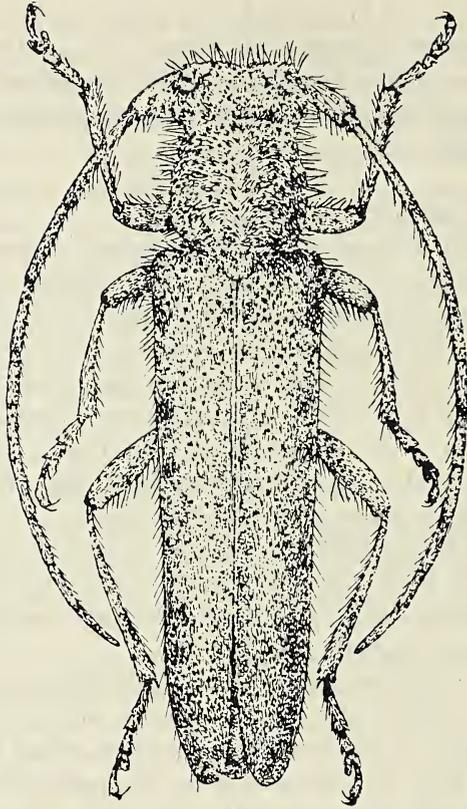


Fig. 129. *Phytoecia coerulescens* (Scop.).

201 individually narrowly (angularly) rounded apically, laterally beyond humeri uniformly sloping, without longitudinal humeral ridge, with raised suture, beyond shield generally more convex, with minute (in anterior third large) punctation, with compact adherent dense pubescence and semierect (in anterior third much longer) black setiform hairs (in lateral view). Legs with dense adherent pubescence and sparse long erect hairs. Hind femora elongate, poorly thickened, extending beyond posterior margin of sternite II. Midtibiae at outer margin with shallow distal notch. Abdominal sternite V short, in second half flat (male) or more elongate, convex basally with median longitudinal groove (female). Body, antennae, elytra, and legs black. Pubescence with metallic dark bluish hue (f. *typica*), in some individuals more rarefied, grayish or grayish-brown (ab. *obscura* Bris.). Body length 7–11 mm.

Egg: White, elongate, slightly curved, almost uniformly rounded at poles. Chorion matte, with very fine noncellular sculpture. Length 1.8 mm, width 0.5 mm.

Larva (Fig. 130): Distinguished from the larva of *Phytoecia sareptana* Ganglb. by absence of minute spinules on locomotory ampullae of abdomen. Body moderately elongate, white. Head laterally slightly rounded, toward base and anteriorly barely narrowing roundly, insignificantly retracted into prothorax. Epistoma longitudinally depressed troughlike in middle, here with more or less distinct brownish suture, laterally with barely perceptible frontal sutures, at anterior margin with somewhat rusty fringe bearing four long bristles, behind it with four much thicker bristles in irregular transverse row, posteromedially, near frontal sutures, with one very short bristle. Hypostoma transverse, laterally broadly rounded or almost parallel-sided, at anterior margin broadly emarginate, perceptibly convex, basally near posterior angles depressed, insignificantly emarginate, with acutely produced posterior and rounded anterior angles, on posterior edge (in notches) with dark rust fringe, medially with four-six bristles forming transverse row. Temporo-parietal lobes at anterior margin with broad reddish-rust

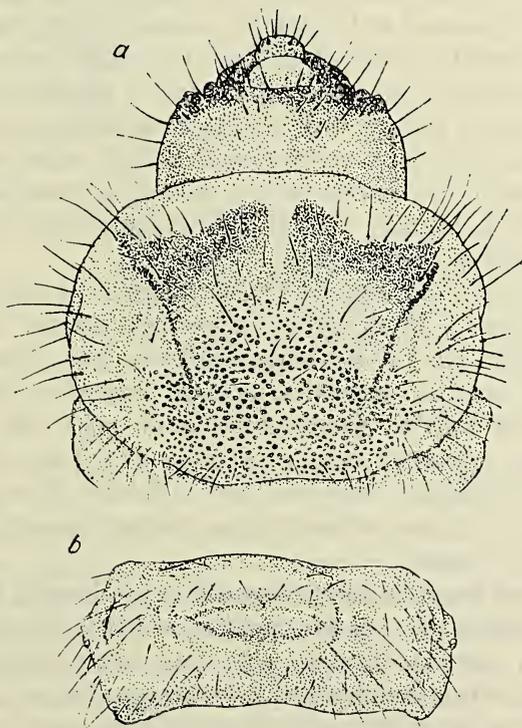


Fig. 130. Larva of *Phytoecia coerulea* (Scop.).

a — head and pronotum; b — abdominal tergite with dorsal locomotory ampulla.

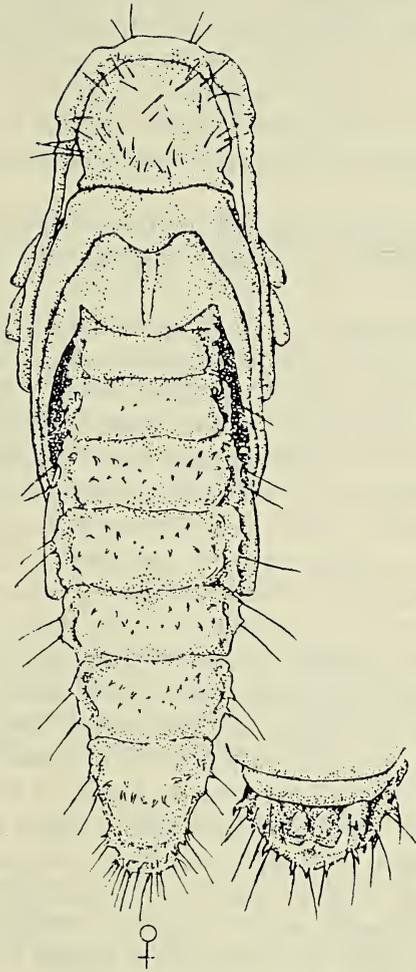
fringe covering ocular-antennal zone, behind this fringe with long setiform hairs forming transverse row, on each side near base of antennae with ampullaceous pigmented ocellus. Antennae short, barely projecting from antennal sockets. Clypeus large, whitish, slightly trapezoid. Labrum transverse, disk convex, basally glabrous, with brownish tinge, in anterior half with sparse coarse bristles, apically gently rounded. Mandibles apically broadly and steeply emarginate, dark rust, blackening toward apex.

202 Pronotum highly inclined toward head, at anterior margin with bright whitish fringe, beyond it with yellowish-rust lustrous transverse band medially interrupted by whitish interspace and twice broadly emarginate at anterior margin, with long sparse hairs. Pronotal shield with transversely extended, backward directed, brownish-rust spinules, laterally demarcated by bright longitudinal folds. Dark brown groovelike impressions arising from anterior angles of spinous field of shield slope forward and laterad. Shield basally with setiform hairs forming transverse row. Prothoracic presternum convex, with long sparse hairs, laterally with somewhat rusty glabrous spot. Eusternum with numerous, somewhat rusty hairs.

Abdomen laterally with thin bright, at tip thick dense, somewhat rusty hairs. Dorsal locomotory ampullae convex, whitish, with common median longitudinal groove, disk with two transverse grooves uniting together laterally with excurved longitudinal fold, coriaceous, without sclerotized spinules. Ventral locomotory ampullae in posterior half with transverse groove, laterally with faint longitudinal fold. Body length 12–15 mm, width of head 1.8 mm.

Pupa (Fig. 131): Distinguished from the pupae of other species of the genus *Phytoecia* Muls. by setigerous prominences medially on abdominal tergites III–VII and other characters. Body elongate. Head short, roundly tapering anteriorly, beyond antennae with two long closeset piliform bristles, before antennae on inner side with short solitary bristles, at anterior margin near base of clypeus with four–six bristles forming uniform transverse row. Antennae flexed laterad, in second half extending beyond midfemora, directed forward, their apices adjoining sides of head.

203 Pronotum not longer or barely longer than basal width, basally with narrow transverse groove, barely tapering anteriorly and toward base, disk uniformly convex, lustrous, with long bright bristles forming medial cluster, two clusters at anterior margin laterally, and two diverging bands on hind clivus. Mesonotum insignificantly convex, at posterior margin with angularly produced shield, laterally with barely perceptible, solitary bristles or without them. Metanotum at posterior margin broadly rounded, with narrow median longitudinal groove, and



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Fig. 131. Pupa of *Phytoecia coerulescens* (Scop.).

one–two barely perceptible bristles or without them.

Abdomen elongate toward base and gently tapering toward tip. Abdominal tergites III–VI transversely convex medially, here with large or minute spinules—some recurved apically, others erect. Lateral spinules (one–two) perceptibly larger than the others. Tergite I with barely perceptible, tergite II large, fully perceptible spinules. Tergite VII comparatively elongate, apically broadly rounded, medially with large acute spinules forming transverse row or transverse (generally slightly recurved) band. Tergite VIII short, with acute spinules forming transverse. Tip of abdomen (in ventral view) obtuse, laterally bound

by U-shaped ridge bearing fully developed or barely perceptible spinules and long bright piliform bristles. Valvifers of female hemispherical, small, with barely perceptible interspace or highly contiguous. Body length 8–10 mm, width of abdomen 1.5–2.0 mm.

Material: Collected in the southern Urals, northern Kazakhstan, Ob' region, and Tuva. Adults 131, larvae 64, pupae 34, larval exuviae with beetles 18.

Distribution: Europe, the Caucasus, northern Asia up to the Yenisey including Tuva, northern and western Asia, northern Mongolia, and northern China.

Biology: Inhabits meadow, often steppe or flood plain open fields, and field-protection forest belts. Ecologically associated with borages (Boraginaceae) and other herbaceous plants. Beetles fly in June and July and remain on host plants. Females make notches on stems at a height of 11–37 cm and oviposit through them. Generally one egg is laid per notch. After hatching, larvae feed on the inner tissues of the stem and move upward or, more often, downward from the notch. They nibble round ventilation holes (up to 1.0 mm diameter) in the stem wall and discard frass through them. Galleries made by larvae remain hollow throughout, with frass loosely piled here and there. Sometimes, in *Rochelia disperma* for example, the larvae penetrate the root from the stem and then migrate to another nearby stem. Gallery in root zone compactly filled with fine frass. Length of gallery in stem 18–42 cm, in root up to 6.0 cm. Width of gallery 2–5 mm. Diameter of infested stem in underground part 4–7 mm, length of stem up to 90 cm. Larvae of late instars, before the second hibernation, nibble stem circularly inside and, consequently, the upper part breaks off; larvae remain in the lower part or 'peg' 4–25 cm long. The terminal part of the gallery thus becomes infundibular and is compactly plugged with coarse fibrous frass. Subsequently, the larva makes a pupal cell in the upper or underground part of the stem and isolates it from above and below by a plug of fibrous frass. Length of upper plug 4–6 mm, of lower plug 4–13 mm. Larvae hibernate in cells during winter and pupate after the second hibernation in spring with the onset of warmth. Pupae lie in cells with head upward. Pupal stage lasts two–three weeks. In the laboratory, at temperatures of 12–18°C ($15.3 \pm 0.2^\circ\text{C}$), two pupae completed development in 20 days. A week after emergence beetles

204 destroy the upper plug and exit the cell through the hole in the terminal part of the stem. Generation—two-year cycle (Table 12). In some cases, the life cycle might be completed in one year. During metamorphosis insect weight reduces by almost one-third. For example, based on eight insects, larvae ready for pupation weigh 340.3 mg (100%), pupae

Table 12. Development of *Phytoecia coerulescens* (Scop.)

Year	April	May	June	July	August	September
1st	L	LP	PAE	AEL	EL	L
2nd	L	L	L	L	L	L
3rd	L	LP	PAE	AEL	EL	L

developed from them 308 mg (90.6%), and beetles developing from these pupae before emergence from cells 231.8 mg (68.1%). Weight of insects in a given population varies widely. For example, weight records for 30 insects indicated that larvae before pupation weigh 15–56 mg (43.7 ± 9.5), pupae 13–48 mg (37.9 ± 1.8), young beetles before emergence from cells 10–39 mg (27.2 ± 1.4).

Phytoecia coerulescens (Scop.) infests various herbaceous plants. From larvae collected in nature, we raised 88 beetles—36 on *Lithospermum officinale*, 28 *Rochelia disperma*, 11 *Cynoglossum officinale*, 10 *Lappula echinata*, 2 *Salvia stepposa*, and 1 on *Echium vulgare*.

4. Tribe TETRAOPINI

More than 15 genera belong to this tribe. Its fauna is richest in the Indo-Malayan region and less so in the Australian, Ethiopian, Neartic, and Palearctic regions. Not a single representative is known in the fauna of Japan. One genus inhabits northern Asia.

1. Genus *Tetrops* Steph.

Stephens, 1831. III. *Brit. Entom. Coleopt.*, 4: 228; — *Polyopsia* Mulsant, 1839. *Coleopt. France, Longic.*, 182; Saalas, 1936. *Ann. Zool. Soc. Zool.-Bot. Fennice*, 4: 164; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 200; Kaszab, 1971. *Cincérek—Ceramb. Coleopt.*, 4, 5: 282; Mamaev and Danilevskii, 1975. *Lichinki zhukov-drovosekov*, 263.

Adult: Characterized by diminutive body. Head short and broad, antennal tubercles highly displaced, eyes completely segregated into upper and lower lobes, and lacertus between them absent. Antennae thick, shorter than body.

Larva: Distinguished by slightly elongate body, perceptibly enlarged in region of abdominal segments VII–VIII. Head half retracted into prothorax. Epistoma merging with background of temporo-parietal lobes, frontal sutures not perceptible. Pronotal shield white, coriaceous, without spinules. Abdominal tergites IV–VI (*Tetrops praeusta* (L.), T.

rosarum Tsher.) or V–VI (*T. gilvipes* Fald.) with spinules. Segments I–VII with dorsal and ventral locomotory ampullae bearing two distinct or faint rows of ampullaceous granules.

Pupa: Body moderately elongate. Head short, with wide-set antennal tubercles, frontally in region of frons convex, laterally with thin bristles (*T. praeusta* (L.), *T. gilvipes* Fald.) or with acicular spinules (*T. rosarum* Tsher.). Antennae flexed laterad, their apices bent ventrad and forward. Pronotum transverse, basally with deep (*T. praeusta* (L.)) or barely perceptible (*T. gilvipes* Fald.) transverse groove, with thin piliform bristles forming dense transversely elongate band anteromedially or medially, only in some individuals (*T. praeusta* (L.)) with solitary bristles or absolutely without bristles. Abdominal tergites I–VI uniformly convex, without spinules. Tergite VII convex, lustrous, apically broadly rounded, disk with two–four barely perceptible spinules forming transverse row (*T. praeusta* (L.), *T. gilvipes* Fald.) or without spinules (*T. rosarum* Tsher.). Tip of abdomen without bristles or spinules.

In the fauna of northern Asia, four species belong to the genus *Tetrops* Steph., of which two are found mainly in Europe, one in southern Kazakhstan, and one in the east up to the coasts of the Sea of Japan.

Type species: *Leptura praeusta* Linnaeus, 1758.

KEY TO SPECIES

Adults

- 1 (2). Elytra straw-yellow with perceptible apex. Europe, Asia up to Altai and the Ob' River..... 1. ***T. praeusta*** (L.)
- 2 (1). Elytra black or red with black spots.
- 3 (6). Elytra black.
- 4 (5). All legs somewhat bright rust or pale yellow. Pronotum with compact large punctation. Mainly the Caucasus, montane regions of central Europe. 2. ***T. gilvipes*** Fald.
- 5 (4). Forelegs somewhat bright rust, mid- and hind legs dark brown. Pronotum with minute punctation. Ussuri-Primor'e region 3. ***T. rosarum*** Tsher.
- 6 (3). Elytra red, in posterior half with black longitudinally elongate spot or without spot. Kazakhstan, west up to Ural'sk 4. ***T. elaeagni*** Plav.

Larvae

- 1 (6). Abdominal tergites IV–VI or V–VI with spinules.

- 2 (5). Abdominal tergites IV–VI laterally and on disk around dorsal locomotory ampullae with dense spinules.
- 3 (4). Abdominal tergite III at posterior margin (in late instar larvae) with spinules. On many deciduous woody and bushy plant species. 1. **T. praeusta** (L.)
- 4 (3). Abdominal tergite III at posterior margin (even in late instar larvae) without spinules. On dog rose . . . 3. **T. rosarum** Tsher.
- 5 (2). Abdominal tergites V–VI laterally only in anterior half with spinules, on disk around dorsal locomotory ampullae and laterally in posterior half without spinules. Tergite IV without spinules. On pear. 2. **T. gilvipes** Fald.
- 6 (1). Abdominal tergites III–V behind dorsal locomotory ampullae with minute dense spinules, in front without spinules. Tergite VI without spinules. On oleaster, sea buckthorn.
. 4. **T. elaeagni** Plav.

Pupae

- 1 (6). Abdominal tergite VII on disk with barely perceptible, acute spinules forming transverse row.
- 2 (3). Pronotum basally with sharp transverse groove.
. 1. **T. praeusta** (L.)
- 3 (2). Pronotum basally with barely perceptible transverse groove.
- 4 (5). Bristles on disk of pronotum rarefied, forming barely perceptible transverse band 2. **T. gilvipes** Fald.
- 5 (4). Bristles on disk of pronotum dense, forming distinct compact transverse band. 4. **T. elaeagni** Plav.
- 206 6 (1). Abdominal tergite VII on disk without spinules.
. 3. **T. rosarum** Tsher.

1. **Tetrops praeusta** (L.)

Linnaeus, 1758. *Syst. Nat.*, ed. 10: 399 (*Leptura*); Linnaeus, 1767. *Syst. Nat.*, ed. 12: 641; — *iocusthus* Voet, 1778. *Catal. Coleopt.*, 2: 20; — *pilosa* Geoffroy, 1785. In Fourer: *Entom. Paris*, 1: 78; — *ustulata* Hagenbach, 1822. *Symb. Faun. Helvet.*, 11; Mulsant, 1863. *Coleopt. France, Longic.*, 2: 345; Yakobson, 1911. *Zhuki Rossii*, tabl. 72, fig. 13; Reitter, 1913. *Fauna Germ.*, 4: 68; Saalas, 1936. *Ann. Zool.-Botan. Fennice*, 4: 164; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 200; Duffy, 1953. *Monogr. Immat. Stag. Brit. and Import. Timb. Beetl., Ceramb.*, 297–298; Panin and Savulescu, 1960. *Fauna Rep. Popul. Romine*, 10, 5: 504; Demelt, 1966. *Die Tierwelt Deutschl.*, 52: 108–109; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 206;

Cherepanov and Cherepanova, 1976. *Novosti fauny Sibiri (Nov. i maloizv. vidy fauny Sibiri, 10)*, 175–177.

Adult (Fig. 132): Readily recognized by bright, somewhat rusty color of elytra and combination of other characters. Body mildly elongate. Head short, with wide-set antennal tubercles produced laterally, between them from frons toward occiput gently rounded, medially with narrow smooth longitudinal groove or without it, with deep, not very dense punctation and long dense erect bright brown setiform hairs. Eyes convex, sharply faceted, bifurcate, between lower and upper lobes without lacertus. Lower ocular lobe round, twice larger than upper, almost more than twice longer than gena. Antennae thickening toward apex, their apices extending (male) or not extending (female) up to hind clivus of elytra, with minute dense punctation, semiadherent short black hairs not masking punctation, on inner side with numerous long black bristles. First antennal segment elongate, longer than 3rd segment, with coarse dense punctation.

Pronotum slightly transverse, basally with deep smooth flange, without punctation or (rarely) with minute punctation, generally with

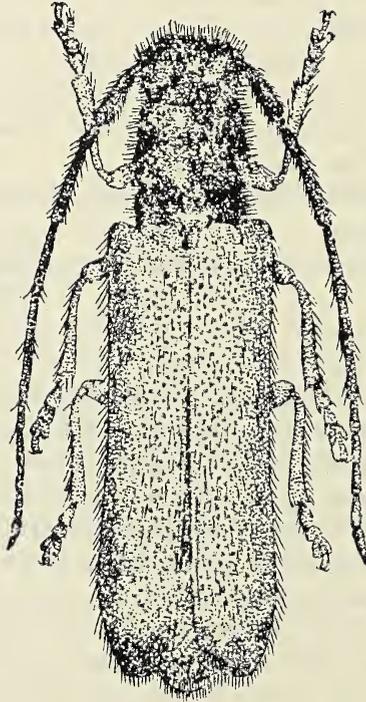


Fig. 132. *Tetrops praeusta* (L.).

recurved posterior margin, in anterior third with faint gentle flange, medially transversely convex, lustrous, with minute sparse punctation, long bright brown or somewhat rusty setiform erect hairs (appearing densely setaceous). Pronotal shield small, posteriorly broadly rounded, with short or, more often, long erect hairs.

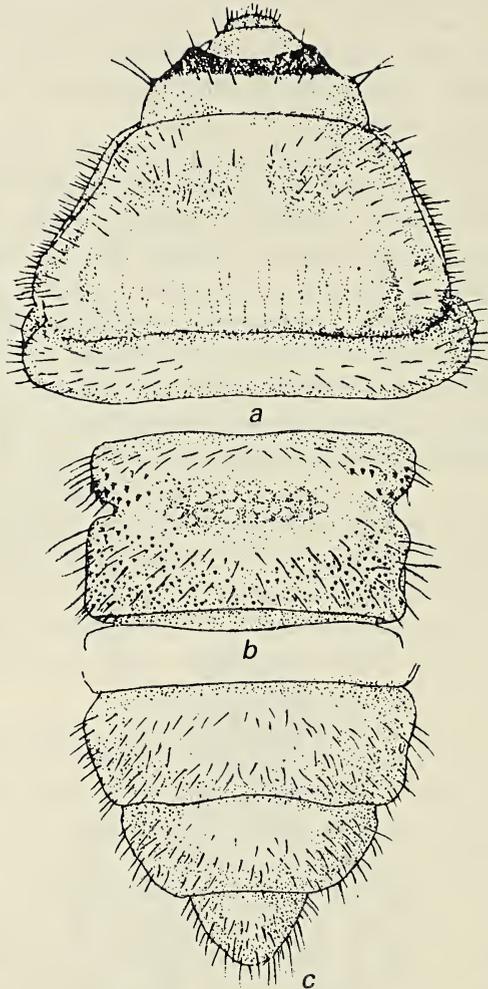
Elytra parallel-sided, basally with projecting smooth humeral tubercle, inner to it with gentle impression, very slightly sloping toward apex, individually gently rounded or slightly obtuse apically, disk moderately and uniformly convex, beyond shield, on suture, slightly depressed, throughout surface with uniform compact punctation, in anterior third with highly erect, long dense bright yellowish hairs. Legs short, femora thickened, midtibiae at outer margin with barely perceptible distal notch. Tarsi broad, 1st segment of hind tarsi slightly shorter than next two together. Body ventrally with adherent, not dense bright hairs. Body black, elytra straw-yellow, apically dark. Antennae black or blackish-brown. Legs bright rust, mid- and hind femora dark brownish. External genitalia of male moderately elongate. Parameres short, narrowly rounded apically, here with pair of long thick bristles. Phallus broad, apically steeply tapering, acute. Body length 4.0–5.5 mm.

Egg: White, moderately elongate, at cranial pole broadly, at caudal pole narrowly rounded. Chorion smooth, with fine sculpture. Length 1.0 mm, width 0.4 mm.

Larva (Fig. 133): Body white, diminutive. Head roundly tapering anteriorly, half retracted into prothorax. Epistoma at anterior margin insignificantly broadly emarginate, with dark rusty fringe, laterally fusing with temporo-parietal lobes (frontal sutures not perceptible), medially divided by longitudinal suture. Hypostoma mildly convex, insignificantly tapering backward, posteriorly broadly emarginate, at anterior margin with dark rust fringe. Temporo-parietal lobes yellowish, [at anterior margin with dark rust fringe,]* in anterior half with solitary bright hairs. Antennae whitish, their apices barely projecting from antennal sockets. Ocelli on lower side ampullaceous, whitish, sometimes brownish, barely perceptible. Clypeus large, trapezoid, lustrous, semitransparent. Labrum whitish, anteriorly broadly rounded, in posterior half glabrous, basally brownish, in anterior half with short rusty bristles. Mandibles black, basally reddish-rust, apically truncate, on inner side flat.

Pronotum tapering anteriorly, insignificantly sloping toward head, in anterior half and laterally with numerous bright, somewhat rusty hairs. Pronotal shield whitish, perceptibly convex, laterally demarcated

*Bracketed part a seeming repetition—General Editor.



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Fig. 133. Larva of *Tetrops praeusta* (L.).

a—head and pronotum; b—abdominal tergite IV with dorsal locomotory ampullae;
c—tip of abdomen.

208 by longitudinal grooves, with longitudinal streaks. Prothoracic presternum convex, disk with short, laterally long, somewhat rusty hairs. Eusternum merging with presternum, in posterior half glabrous, coriaceous. Basisternum laterally with bright hairs, on disk and in anterior half without hairs. Meso- and metasterna on disk with minute ampullaceous granules in two rows.

Abdomen tapering posteriorly from thorax, in region of segment

VII perceptibly enlarged, laterally with very minute, barely perceptible hairs. Dorsal locomotory ampullae of abdomen with ampullaceous granules in two transverse rows separated by transverse groove. Tergites IV–V with dense spinules forming extensive spinous field in which locomotory ampullae distinguished as two oval, transversely elongate, whitish tetrasons. Tergite III at posterior margin, tergite VI laterally and sometimes at anterior margin, with spinules. Remaining tergites without spinules. Ventral locomotory ampullae of abdomen moderately convex, with distinct or faint lustrous granules forming two transverse, generally uneven rows. Tip of abdomen with minute, not very dense hairs. Body length of last instar larvae 5–7 mm, width of head up to 0.8 mm.

Pupa (Fig. 134): Body white, moderately elongate. Head short, roundly tapering anteriorly, with antennal tubercles barely projecting laterally, between them from frons to occiput rounded, frontally on frons convex, laterally with three–four bristles forming cluster on each side, on anterior margin at base of clypeus with six bristles in transverse row interrupted medially. Labrum convex, lustrous, without perceptible bristles. Mandibles on outer side with two minute bristles. Antennae flexed laterad, beyond midfemora bent ventrad and forward.

Pronotum more (female) or less (male) transverse, basally with narrow sharp, in anterior third broad transverse groove, disk convex, laterally rounded, lustrous, with solitary or dense bristles forming transverse band or without bristles. Mesonotum posteromedially saddlelike, transversely depressed, at posterior margin with barely produced, broadly rounded shield. Metanotum convex, lustrous, posteriorly broadly rounded, medially with longitudinal groove.

Abdomen parallel-sided, convex, only in female flat on segment IV. Abdominal tergites convex, with common, barely perceptible, median longitudinal groove. Tergite VII convex, lustrous, posteriorly broadly rounded, on disk with two–four barely perceptible spinules in transverse row. Tip of abdomen obtuse (in posterior view), glabrous without bristles. Valvifers of female small, elongate, contiguous. Body length 5–7 mm, width of abdomen up to 1.0 mm.

Taxonomic notes: In some works (Kemner, 1922; Il'inskii, 1962; and others), the larva of *Pogonocherus* Zett., with a sclerotized, transversely elongate plate at the apex of tergite IX, has been erroneously included in this species. This plate is absent in the larva of *Tetrops praeusta* (L.), but multiple spinules occur on abdominal tergites IV–VI, which are lacking in *Pogonocherus* Zett.

Material: Collected in the southern Urals, Altai and Ob' region. Adults 63, larvae 49, pupae 17 (males and females), larval exuviae with

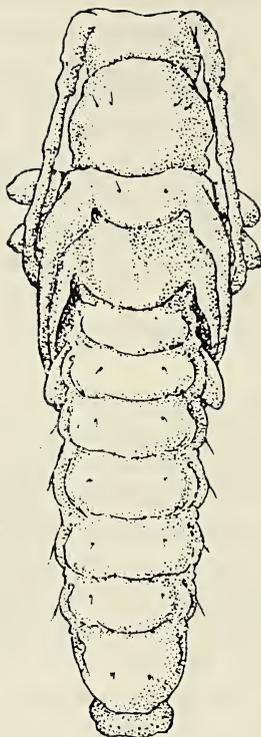


Fig. 134. Pupa of *Tetrops praeusta* (L.).

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beetles from cells 8.

Distribution: From Atlantic Ocean coasts to Altai and the Ob' River, from the Mediterranean Sea to Sweden and Norway in the north. Often found in the southern Urals and Ob' region.

Biology: Inhabits the forest-steppe zone, parts of the southern taiga, and the montane-forest belt. Ecologically associated with many deciduous woody and bushy plant species. Flight of beetles observed in June–July. Beetles remain on host trees and bushes and feed on bark of young shoots and tissues of green leaves. They infest shoots 3–25 mm diameter. Larvae initially live in bark, then under it, making short sinuous tetragonal or comparatively long galleries gently impressed in wood, and packing them with fine frass consisting of bark and wood. Galleries made by larvae are longitudinal to the shoot and most often directed downward, rarely upward. Larvae of late instars bore into wood at an angle of 15–20°, leave a transversely elongate entry hole (width up to 2.0 mm) on the wood surface, and plug it with fine frass. Immediately beyond the entry hole they make a pupal cell longitudinal

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or oblique to the shoot surface. In thick shoots the cells are made in the upper wood layer, in thin shoots in the heartwood. Length of gallery impressed in wood up to 6.0 cm, initial width 1.5–3.0 mm, terminal width 5–7 mm. Length of cell 5–10 mm, width 2.0–2.5 mm. Larvae pupate with head toward the entry hole. Pupal stage lasts about two weeks. Under laboratory conditions, at temperatures of 21–22°C (average $21.1 \pm 0.2^\circ\text{C}$), a beetle emerged after 10 days, another after 11 days of pupation. Generation—two-year cycle. This is confirmed by the fact that at July-end late instars are found together with beetles which are ready to undergo a second hibernation in winter. Weight indices of insects vary significantly. Based on 41 insects, larvae before pupation weigh 4–18 mg (7.0 ± 0.4), pupae 3–12 mg (6.1 ± 0.3), beetles before emergence from cells 2–10 mg (4.8 ± 0.3).

Tetrops praeusta (L.) damages thin shoots of elm, buckthorn, cherry, dog rose, apple, bird cherry, and other plant species. From the larvae collected in nature, 54 beetles were raised—14 on elm, 12 buckthorn, 8 apple, 6 each cherry and dog rose, 4 bird cherry, 2 blackthorn, and 1 each on willow and birch. Density of infestation is comparatively high. For example, from a shoot 27 cm long and 7.0 mm diameter, five beetles were collected; from another shoot 22 cm long and 3–5 mm diameter, four pupae and three beetles were collected. Similar density of infestation has been observed in several instances. Shoots damaged by this species generally die. According to reports in literature (Duffy, 1953; Demelt, 1966; and others), it also attacks *Pyrus*, *Prunus*, *Fraxinus*, *Tilia*, *Armenica*, *Quercus*, *Crataegus*, and other plant species.

2. *Tetrops gilvipes* Fald.

Faldermann, 1837. *Fauna Entom. Transcaus. Coleopt.*, 2: 290; — *nigra* Kraatz, 1859. *Berl. Entom. Zeitschr.*, 3: 57; Mulsant, 1863. *Coleopt. France, Longic.*, 2: 347; Ganglbauer, 1884. *Best.-Tab.*, 8: 152 (586); Reitter, 1913. *Fauna Germ.*, 4: 68 (ab. *nigra* Kr.); Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 200.

Adult (Fig. 135): Closer to *Tetrops praeusta* (L.), but distinguished from it by black elytra, somewhat bright rust legs, and pronotum with more compact punctation. Body comparatively elongate. Head short, with wide-set, extended antennal tubercles, between them with broad impression, medially with narrow longitudinal groove, with minute dense punctation and erect dark brown hairs. Lower ocular lobe very convex, 2.0 (female) or 2.5 (male) times longer than gena. Antennae extending beyond hind clivus of elytra by their apices (male) or not reaching it (female), thickening toward apex, on inner side with solitary bristles. First antennal segment tapering toward base, with coarse

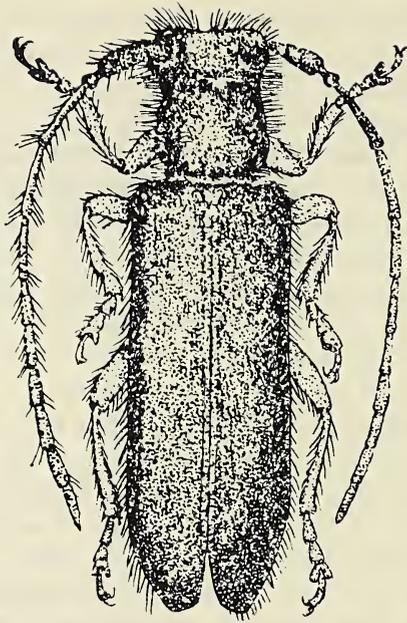


Fig. 135. *Tetrops gilvipes* Fald.

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punctuation, not longer or even slightly shorter than 3rd segment.

Pronotum slightly transverse, basally with deep flange, with raised posterior margin, in anterior third with gentle transverse trough (flange), with compact coarse punctuation and long dense erect bright brownish hairs (in *Tetrops praeusta* (L.) punctuation minute, almost evanescent). Pronotal shield oblong, posteriorly rounded, with deep punctures along margins, here with erect hairs, medially smooth.

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Elytra parallel-sided, with insignificantly projecting humeral tubercle, inner to it with barely perceptible impression, apically slightly obtuse, angles rounded, disk uniformly convex, with uniform deep punctuation, in anterior half with semiadherent or erect and in posterior half adherent light brown hairs. Legs short, femora moderately thickened, midtibiae at outer margin distally with small setigerous plate, with barely perceptible notch. Body ventrally with adherent sparse bright brownish hairs. Body, antennae, and elytra entirely black. Legs bright rust or bright yellow. Body length 4–5 mm.

Egg: White, elongate, almost uniformly rounded at poles. Chorion smooth, semitransparent. Length 1.0 mm, width 0.4 mm.

Larva (Fig. 136): Well distinguished from the larva of *Tetrops praeusta* (L.) by spinules only laterally on abdominal tergites V and VI. Body white, diminutive. Head parallel-sided, half retracted into

prothorax. Epistoma slightly convex, with yellowish tinge, at anterior margin with sharply distinct rusty-brown fringe, divided longitudinally by median suture, laterally merging with background of temporo-parietal lobes (frontal sutures not perceptible). Hypostoma mildly convex, parallel-sided, bright rust. Temporo-parietal lobes yellowish, at anterior margin with broad, somewhat rusty fringe, behind it with three thin hairs in transverse row. Antennae short, whitish, barely projecting from antennal sockets. Ocelli below antennae, ampullaceous, with translucent pigmented spotlet. Clypeus semitransparent, lustrous, at anterior margin gently rounded. Labrum transverse, apically broadly rounded, with somewhat rusty tinge, in anterior half with short, somewhat rusty bristles. Mandibles short, thick, black, apically truncate, with rounded, barely perceptible ventral and dorsal denticles.

Pronotum insignificantly tapering anteriorly, rounded at anterior margin, on disk, before shield, and laterally with somewhat rusty dispersed hairs. Pronotal shield mildly convex, laterally demarcated by short longitudinal grooves, without perceptible longitudinal streaks. Prothoracic presternum convex, with sparse short rusty hairs. Euster-

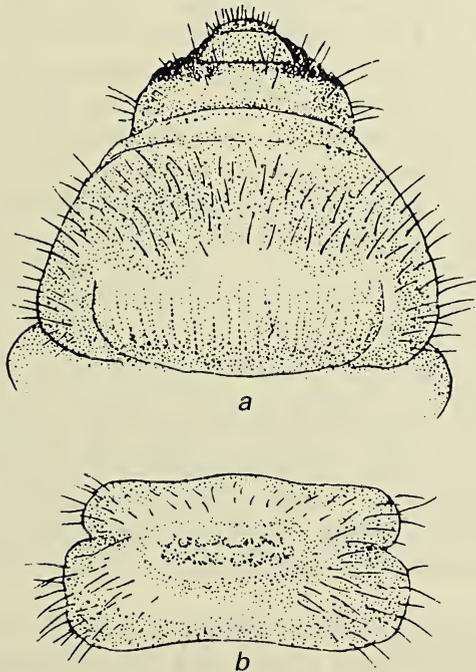


Fig. 136. Larva of *Tetrops gilvipes* Fald.

a—head and pronotum; b—abdominal tergite IV with dorsal locomotory ampulla.

num coriaceous, poorly demarcated from presternum, in posterior half glabrous, in anterior half sparsely pilose. Basisternum only laterally with sparse rusty hairs. Meso- and metasterna with barely perceptible ampullaceous granules forming one or two irregular rows.

Abdomen tapering posteriorly from thorax, in region of segment VII slightly enlarged, laterally with numerous bright hairs. Dorsal locomotory ampullae moderately convex, with ampullaceous lustrous granules forming two transverse, slightly forward bent rows. Abdominal tergites V–VI laterally in anterior half with minute, distinctly projecting spinules, on disk and in posterior half without spinules. Remaining tergites without spinules. Ventral locomotory ampullae with
211 barely perceptible lustrous granules forming two or one interlacing transverse row. Tip of abdomen with bright, not very dense hairs. Body length 5.0–6.5 mm, width of head 0.8 mm.

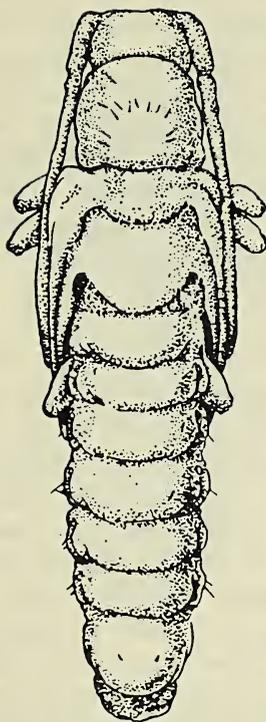
Pupa (Fig. 137): Distinguished from the pupa of *Tetrops praeusta* (L.) by poorly developed transverse groove at base of pronotum. Body white, elongate. Head broad, between antennae entire, from frons toward occiput uniformly rounded, frontally moderately convex; laterally with solitary bright bristles forming longitudinal row, on anterior margin at base of clypeus with six bristles forming regular transverse, medially interrupted row. Labrum lustrous, convex, apically rounded. Mandibles on outer side without bristles. Antennae flexed laterad, in posterior third bent ventrad with apices directed forward.

Pronotum slightly transverse, parallel-sided, basally with narrow, barely perceptible transverse groove, in anterior third without distinct transverse groove, anteromedially with short, somewhat rusty bristles forming transverse band enlarged laterad. Mesonotum convex, posteriorly with broadly rounded shield. Metanotum broad, lustrous, moderately convex, medially with barely perceptible longitudinal groove, at posterior margin broadly rounded.

Abdomen elongate, parallel-sided, tapering at tip, in region of segments IV–V sometimes slightly enlarged. Tergite VII convex, lustrous, apically broadly rounded, length not more than width, on disk with two–four minute, barely perceptible spinules forming transverse row. Tip of abdomen obtuse, bound by barely perceptible hyaline ridge devoid of bristles or spinules. Valvifers of female small, hemispherical, inclined toward each other. Body length 5.5–6.0 mm, width of abdomen up to 1.1 mm.

Material: Collected in the Caucasus. Adults 12, larvae 7, pupae 4 (males and females), larval exuviae with beetles from cells 5.

212 *Distribution*: Central Europe, the Caucasus, Crimea. Occurrence possible in the southern Urals. Common in northern Caucasus.

Fig. 137. Pupa of *Tetrops gilvipes* Fald.

Biology: According to our observations in the environs of Kislovodsk, ecologically associated with pear (*Pyrus communis*). Beetles appear in April and found up to July. They feed on bark of young shoots, infesting thin shoots 3–15 mm diameter. Larvae live in or under bark and make longitudinal galleries in the shoot impressed in wood. Galleries on the wood surface have gentle or, more often, acute margins and are compactly filled with fine frass. Before the second hibernation, larvae bore into the wood and there in the upper layer make a pupal cell longitudinal to the shoot, plug the entry hole with fine frass, and hibernate in the cell during winter. Entry hole up to 1.5 mm in width, elongate, and longitudinal to the shoot. Length of pupal cell 7–8 mm, width 1.5 mm. Length of larval gallery impressed in wood up to 6.0 cm, width 3–4 mm.

Pupation of larvae in the Caucasus (Kislovodsk region) begins in March and is completed in April. Thus, 19 specimens were collected March 23–24, which included 10 pupae and 9 larvae. Emergence of beetles from pupae began in the first week of April. Beetles remain in

cells for up to two weeks or more. After this, they scrape frass from the entry hole, nibble a flight opening (1.8–2.0 mm diameter) on the bark surface and exit the cell through it. Mating of beetles commences soon after their emergence from wood. Complete life cycle is concluded in two years. This is partly confirmed by the fact that beetles, pupae, and larvae of late and midinstars appear simultaneously early April. The possibility is not ruled out that part of the population develops through a two-year cycle and part through a one-year cycle.

We found *Tetrops gilvipes* Fald. on pear. It infests thin shoots of growing trees which subsequently die.

3. *Tetrops rosarum* Tsher.

Cherepanov (Tsherepanov), 1975. *Taksonomiya i ekologiya zhivotnykh Sibiri (Nov. i maloizv. vidy fauny Sibiri, 9)*, 34–37.

Adult (Fig. 138): In color of elytra similar to *Tetrops gilvipes* Fald. Well distinguished from it by dark color of legs, minute punctation of pronotum, and other characters. Body moderately (in females less) elongate. Head short, with wide-set, barely produced antennal tubercles, medially between them with longitudinal groove, with minute punctation, on temples and frontally in region of frons with dense adherent (masking punctation) bright brown pubescence, on sinciput and occiput with almost or fully erect long hairs. Eyes sharply finely faceted, lower lobes highly convex, round, in diameter 2.0 (female) or 2.5 (male) times longer than gena. Antennae extending beyond two-thirds (female) or reaching hind clivus (male) of elytra, with adherent short, on 1st segment with long setiform raised hairs, on inner side with sparse long bristles; 3rd antennal segment equal to 4th, distinctly longer than 5th segment; 7th–10th segments short, equal in length; 11th segment terminally acute, slightly longer than 10th.

Pronotum transverse, basally with smooth narrow flange, in anterior third with a gentle transverse groove, lateromedially slightly rounded, disk convex, with minute punctation and erect bright brown long thin hairs. Pronotal shield small, length not more than width, with minute punctation and bright sparse erect hairs.

Elytra more (male) or less (female) elongate, parallel-sided, basally with straight humeri and barely projecting humeral tubercle, inner to it with small impression or without it, apically with gently rounded outer and narrowly rounded inner angle, disk uniformly convex, with large deep uniform punctation (spaces between punctures not smaller than punctures) with long dense erect or highly raised bright brown hairs. Hairs beyond shield along suture much longer, thin, perceptibly brighter than the others. Legs short, with not very dense long hairs,

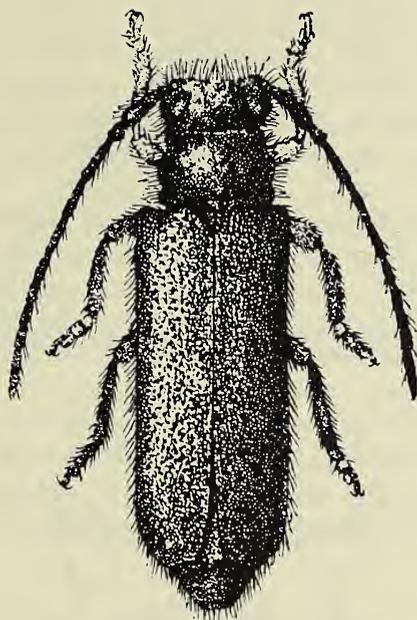
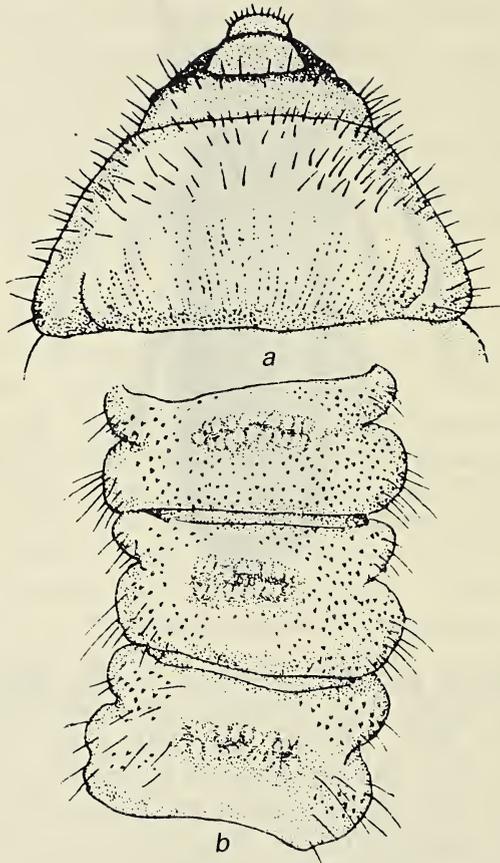


Fig. 138. *Tetrops rosarum* Tsher.

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femora moderately thickened, midtibiae at outer margin with distal brush of short bristles. Body ventrally with bright adherent and long semierect hairs. Body, antennae, and elytra black. Forelegs bright, somewhat rusty, mid- and hind legs dark brown. Body length 4–5 mm.

Larva (Fig. 139): In general habits and features as well as location of spinules on abdominal tergites quite similar to the larva of *Tetrops praeusta* (L.). Distinguished from it by minor characters. Body diminutive, white. Head parallel-sided, half retracted into prothorax. Epistoma slightly convex, bright yellowish, at anterior margin with narrow rusty-brown fringe, divided longitudinally by median suture, laterally fusing with temporo-parietal lobes. Frontal sutures not developed. Hypostoma somewhat rusty, convex, transverse, at posterior margin broadly emarginate, at anterior angles rounded. Temporo-parietal lobes bright yellowish, at anterior margin with somewhat rusty fringe, on posterior edge of this fringe with three setiform hairs forming transverse row. Antennae whitish, short. Ocelli below antennae. Clypeus trapezoid, comparatively long, length barely less than basal width, lustrous. Labrum transverse, gently rounded apically, here with minute bright rust bristles, in posterior half glabrous, with brownish tinge. Mandibles short, comparatively thick, black, basally with reddish-rust tinge, apically steeply and obliquely truncate, on inner side flat, without ridge,



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Fig. 139. Larva of *Tetrops rosarum* Tsher.

a—head and pronotum; b—abdominal tergites IV–VI with dorsal locomotory ampullae.

with angularly produced ventral and dorsal denticles.

Pronotum transverse, slightly sloping toward head, trapezoid, tapering toward apex from posterior angles, in anterior half on disk and laterally with long bright hairs. Pronotal shield mildly convex, laterally demarcated by longitudinal grooves, with longitudinal, sometimes barely perceptible, thin streaks. Meso- and metanota laterally with long hairs, on disk without hairs and ampullaceous granules. Prothoracic presternum and eusternum convex, weakly demarcated from each other, laterally and on disk with minute sparse hairs.

Abdomen tapering posteriorly from thorax, in region of segment

VII insignificantly enlarged, laterally with minute, very thin bright hairs. Dorsal locomotory ampullae insignificantly convex, with two transverse rows of ampullaceous granules separated by transverse groove. Ventral locomotory ampullae slightly convex, on disk divided by transverse groove recurved at ends, near it with one or two rows of ampullaceous granules. Body length 5.0–5.5 mm, width of head 0.8 mm.

214 *Pupa* (Fig. 140): In location of bristles on pronotum, close to the pupa of *Tetrops gilvipes* Fald. Well distinguished from it by acicular hairs frontally on head. Body white, slightly elongate. Head short, roundly tapering anteriorly, with insignificantly projecting antennal tubercles, between them with barely perceptible longitudinal groove, frontally, at level of eyes, with three acicular spinules on each side forming regular transverse row, on anterior margin at base of clypeus with six acicular spinules in transverse row. Labrum lustrous, convex, apically gently rounded. Mandibles on outer side with pair of short bristles. Antennae flexed laterad, apically bent ventrad and forward.

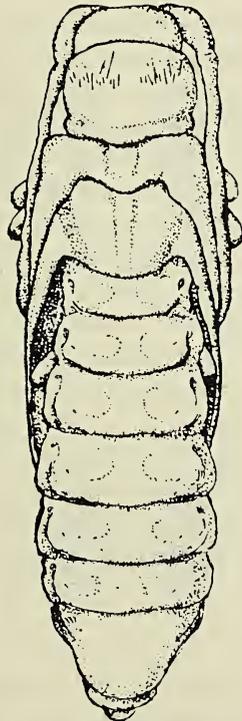


Fig. 140. Pupa of *Tetrops rosarum* Tsher.

Pronotum transverse, basally and apically with narrow transverse groove, disk convex, with minute dense bright piliform bristles forming transverse band. Mesonotum transverse, laterally in posterior half with deep transverse impression, at posterior margin with gently rounded raised shield. Metanotum uniformly convex, medially with longitudinal groove, at posterior margin broadly rounded.

Abdomen parallel-sided, tapering at tip. Abdominal tergites uniformly convex, with barely perceptible, common median longitudinal groove. Tergite VII lustrous, convex, apically broadly rounded, without spinules. Tip of abdomen obtuse, without bristles. Valvifers of female slightly elongate, contiguous. Body length 4.8–5.5 mm.

Material: Collected in the Ussuri-Primor'e region (Kabanii Klyuch). Adults five, larvae six, pupae two (male and female), larval exuviae with beetles from cells five.

Distribution: Ussuri-Primor'e region. Mongolia.

Biology: Inhabits deciduous and mixed plantations. Occupies biotopes along forest fringes, found in rarefied forests and sparse thickets of various bushes. Vitally associated with dog rose, possibly with other plant species also. Beetles found from May-end to July. They require supplementary feeding. Females oviposit at apex of shoots of dog rose. Larvae live under bark, make galleries downward, and pack them with fine frass. Galleries are impressed as troughs in the upper layer of wood. Larvae make a cell at end of gallery under bark and pupate in it. Some larvae (mainly those from which females develop) bore into wood before pupation and there, sometimes in heartwood, make a cell longitudinal to the shoot. Pupation commences in May and is completed in June. Pupae lie in cells with head upward. Development of pupae from the moment of last larval ecdysis to emergence of beetles at room temperature takes less than three weeks. Developed beetles nibble a flight opening (1.5 mm × 2.0 mm) on the bark surface and escape through it. Generation—two-year cycle. Larvae before pupation weigh 3.0–5.9 mg (4.3 ± 0.4), pupae 2.0–5.5 mg (3.8 ± 0.4), young beetles before emergence from wood 1.8–4.6 mg (3.2 ± 0.3).

Tetrops rosarum Tsher. develops on dog rose shoots 3.8–15.0 mm diameter. *Chlorophorus diminutus* (Bat.) often coinfects on these shoots. Shoots damaged by the larvae tend to wither (Cherepanov and Cherepanova, 1975).

4. *Tetrops elaeagni* Plav.

Plavil'shchikov (Plavilstshikov), 1954. *Zoologicheskii zhurnal*, 33, 2: 474–476; — ssp. *plavilstshikovi* Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 206 (comb. nov.); Breuning, 1965. *Catal. Lamiaires*

(*Coleopt.*, *Ceram.*), 8: 651 (*T. eleagri*).

Adult (Fig. 141): Body slightly elongate. Head short, broad, on frons bulging anteriorly, between antennae, from frons to occiput, gently rounded, with fully extended antennal tubercles, not very dense, distinct deep punctation, sparse decumbent white and long erect dark brown hairs, and smooth median longitudinal line. Eyes convex, finely faceted, completely divided, with lower lobe twice size of upper. Antennae barely extending (male) or not extending (female) up to hind clivus of elytra, slightly thickening toward apex, with minute adherent gray hairs, on inner side with black solitary bristles. First antennal segment thick, highly tapering toward base, with coarse deep punctation and semierect long hairs, not shorter or even longer than 3rd segment.

Pronotum slightly transverse, parallel-sided, basally with narrow transverse groove, with recurved posterior margin, in anterior third with barely perceptible or not perceptible transverse troughlike groove, with fine punctation, sparse grayish decumbent and erect blackish-brown hairs. Pronotal shield parallel-sided, flat, posteriorly broadly rounded, with long thin gray hairs.

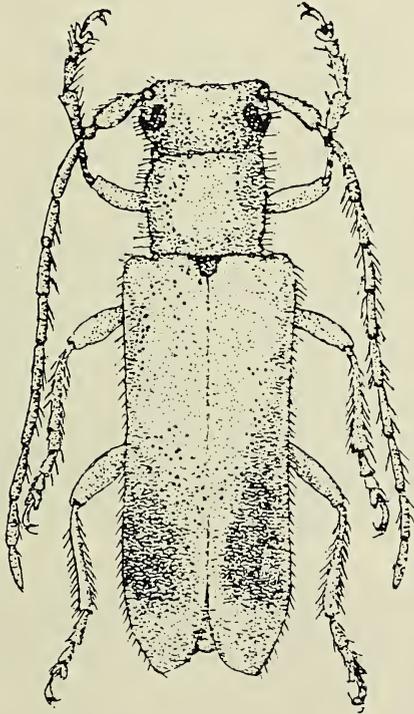


Fig. 141. *Tetrops elaeagni* Plav.

Elytra parallel-sided, basally with straight humeri, with barely projecting humeral tubercle, inward from it with barely perceptible impression or without it, apically broadly rounded or slightly obtuse, disk flat, with minute, comparatively uniform punctation, minute sparse adherent grayish and semierect black (in lateral view) hairs, beyond shield on suture with long thin bright hairs forming basally together with hairs of the shield and pronotal disk a unified longitudinal bright pilose band. Legs short, femora moderately thickened, mid- and hind tibiae at outer margin with black setigerous brush occupying entire distal half. Body ventrally with grayish adherent pubescence. Head, pronotum, legs, and abdomen in region of segments III–V red. Thorax, shield, eyes, and base of abdomen in region of sternites I–II black. Antennae rusty-red, basally (1st segment) black. Elytra red, on disk in posterior half with large distinct or indistinct, longitudinally extended black spot or without it. Body length 3.8–6.0 mm.

Egg: White, elongate, slightly curved, at cranial pole broadly, at caudal pole narrowly rounded. Chorion smooth, semitransparent. Length 1.4 mm, width 0.3 mm.

Larva (Fig. 142): Distinguished from other species by absence of spinules on abdominal tergite VI. Body white. Head highly retracted into prothorax, roundly tapering anteriorly. Epistoma convex, medially divided by longitudinal groove-like suture, lustrous, bright, laterally fusing with temporo-parietal lobes (frontal sutures not perceptible), at anterior margin with sharply projecting dark brown (almost black) fringe. Hypostoma convex, at anterior margin barely, at posterior margin more emarginate, with rounded anterior angles, somewhat rusty, toward posterior angles much brighter, medially with narrow bright longitudinal groove. Temporo-parietal lobes whitish, lustrous, somewhat rusty in anterior half, here with long thin bright hairs forming transverse row. Antennae barely perceptible, wartlike. Clypeus trapezoid, basally highly enlarged, semitransparent, hyaline. Labrum comparatively small, transversely oval, at anterior margin broadly rounded, somewhat rusty, with bristles. Mandibles black, basally with somewhat rusty tinge, apically steeply sloping, in region of dorsal and ventral denticles rounded, with extended cultrate edge, on inner side with entire tetragon.

Pronotum tapering anteriorly, insignificantly sloping toward head, at anterior margin with whitish matte fringe, behind it on disk and laterally with short bright hairs. Pronotal shield poorly convex, matte, at anterior margin rounded, laterally with barely perceptible short grooves. Presternum convex, with minute rusty hairs, eusternum basally glabrous, lustrous.

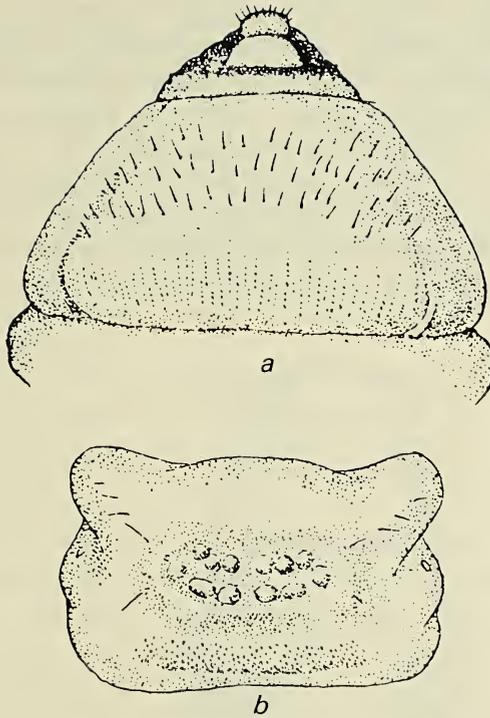


Fig. 142. Larva of *Tetrops elaeagni* Plav.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

Abdomen sharply tapering backward from thorax, posteriorly in region of segments VII–VIII often enlarged, laterally with short rusty hairs. Dorsal locomotory ampullae on abdominal tergites I–VII slightly convex, with distinct ampullaceous granules forming two rows separated by transverse groove. Ventral locomotory ampullae similar. Abdominal tergites III–V in posterior half with minute dense spinules forming sclerotized transverse band behind dorsal locomotory ampullae. Spinules not present in front of these ampullae. Spiracles on sides of abdomen round, sharply edged with rusty tinge. Tergites VIII–IX with bright hairs, only on disk basally glabrous, lustrous. Body length of last instar larvae 6–8 mm, width of head up to 1.0 mm.

Pupa (Fig. 143): Characterized by thin rusty bristles on pronotum forming narrow dense median transverse band. Body white. Head short, broad, highly tapering anteriorly, medially with broad longitudinal trough, lateral to it, inner to antennae, with minute acicular bristles forming small longitudinally elongate cluster, at anterior margin with

two–four bristles in transverse row. Labrum convex, thick, glabrous, without bristles. Antennae flexed laterad, in second half bent forward arcuately or semicircularly, their apices adjoining midtibiae.

Pronotum transverse, disk convex, basally at posterior angles slightly flat, without transverse groove, with short, somewhat rusty bristles forming dense transverse band anteromedially (in *Tetrops gilvipes* Fald., this band less distinct, appearing rarefied). Mesonotum slightly convex, at posterior margin with angularly produced shield. Metanotum lustrous, with barely expressed median longitudinal groove, at posterior margin broadly rounded.

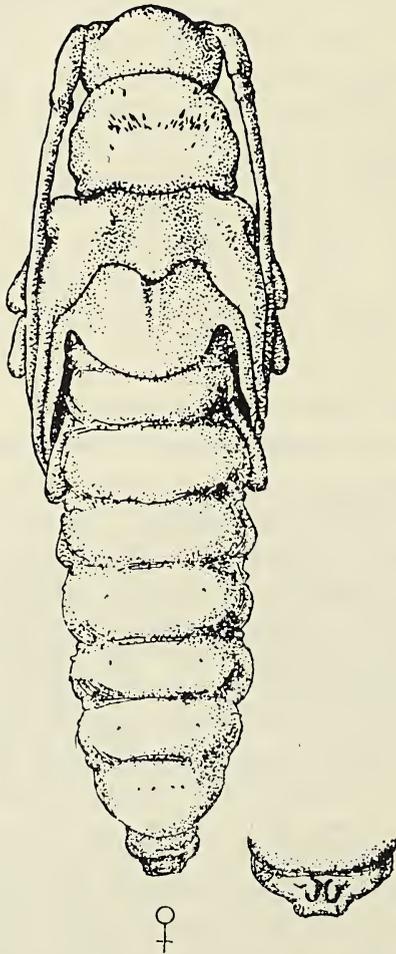


Fig. 143. Pupa of *Tetrops elaeagni* Plav.

Abdomen moderately elongate. Abdominal tergites I–VI uniformly convex, with narrow median longitudinal groove, glabrous, without bristles. Tergite VII tapering toward apex, posteriorly broadly rounded, disk convex, medially with barely perceptible spinules in transverse row. Tip of abdomen (in ventral view) rounded, laterally without perceptible ridge. Valvifers of female hemispherical, tapering toward base, highly contiguous. Body length 4.0–7.5 mm.

Material: Collected in Kazakhstan (Ili River and environs of Alma-Ata); a large series of larvae from which pupae and adult insects were raised. Collections of the Zoological Museum, Moscow State University and the Zoological Institute, Academy of Sciences, Kazakh SSR were also examined.

218 *Distribution:* From the southern Urals to Alma-Ata. Large number found along the banks of rivers falling into Lake Balkhash.

Biology: Inhabits biotopes of rarefied forest belts in floodplains of rivers. Ecologically associated with oleaster (*Elaeagnus angustifolia*) and sea buckthorn (*Hyppophae rhamnoides*). Flight of beetles from May to June. Beetles found on thin shoots, feed on bark, and leave specklike injuries. They mate after maturation of gonads and females then oviposit. For this purpose, a transversely elongate notch is made on shoot surface, the ovipositor introduced into it, and an egg laid under the bark. Generally, one egg is laid per notch. Fecundity of females high. In the ovaries of a female before commencement of oviposition, we found 22 eggs. Under laboratory conditions, at temperatures of 16.8–21.0°C (average 18.3°C), larvae hatched from eggs 14–18 days after oviposition.

Larvae live under bark, make galleries longitudinal to the stem, which are deeply impressed in wood, and pack them with fine frass. Sometimes they destroy the wood of thin shoots to such an extent that only the frass-packed bark remains. Diameter of infested shoots 5–10 mm, rarely up to 20 mm. Larvae of late instars bore into wood, make a pupal cell there longitudinal to the shoot, turn head toward the entry hole, and pupate. Pupation commences in spring with the onset of warmth. Width of larval gallery under bark 3–4 mm, width of entry hole into wood up to 2.0 mm. Length of cell 5–11 mm, width 1.5–2.0 mm. Pupae complete development in just over two weeks. In the laboratory, at temperatures of 9.0–19.4°C, the pupal stage lasted for 15–17 days (average 15.8). After one week, developed beetles nibble a round flight opening (1.5–2.0 mm diameter) on the shoot surface and escape through it. Weight indices during metamorphosis, based on 47 insects, revealed: larvae before pupation weigh 3.1–20.2 mg (8.2 ± 0.8), pupae 2.6–16.0 mg (7.4 ± 0.7), beetles before emergence from cells

2.3–12.8 mg (6.2 ± 0.6).

Tetrops elaeagni Plav. belongs to the group of serious pests of oleaster and sea buckthorn in the riparian forests of Kazakhstan. Density of infestation comparatively high. Often, up to four or more larvae were found per 10 cm in a shoot 5–10 mm diameter. Most of the thin shoots damaged by larvae wither. *Turanium scabrum* (Kr.) was often found with this species on the same oleaster trees.

ADDENDUM

V. Subfamily Cerambycinae

18. Tribe MOLORCHINI

1. Genus *Molorchus* F.

4. *Molorchus kiesenvetteri semenovi* Plav.

Plavil'shchikov (Plavilstshikov), 1940. *Fauna SSSR*, 22, 2: 167–168; Kostin, 1943. *Zhuki-dendrofagi Kazakhstana*, 165–167.

Adult (Fig. 144): Similar to *Molorchus kiesenvetteri* Muls. and Rey. Distinguished from it by stocky body and comparatively thick antennae. Head short, retracted up to eyes into prothorax, with extended antennal tubercles and broad longitudinal trough between them, with moderately deep punctation and erect rusty hairs. Antennae extending beyond middle (female) or beyond apex of body, from base toward apex more (female) or less (male) thickened, with very minute, barely perceptible hairs, at apex of segments with long (female) or short (male) bristles. Eyes large, finely faceted, on inner upper side deeply incised.

Pronotum slightly oblong (male) or almost square (female), tapering gradually toward apex, steeply toward base, at posterior margin with narrow transverse groove, with compact large punctation, erect setiform bright brown hairs, and distinct smooth ampullae (two ampullae set in anterior half and one longitudinally extended on hind clivus) or without them. Shield small, posteriorly narrowly rounded, with bright erect hairs.

Elytra short, their apices barely covering base of abdominal tergite I, markedly tapering posteriorly, individually rounded apically, with projecting humeral tubercle, dense, comparatively uniform punctation and sparse short bright erect hairs. Legs long, femora short, sharply clavate, clubs of hind femora slightly shorter than stalk, with long erect hairs. Abdomen moderately elongate, tapering toward base and toward tip. Abdominal sternites with minute smooth punctation and erect bright brown hairs. Body black. Antennae and legs dark brown. Elytra bright yellow (f. *typica*), often with dark apex (ab. *apicesignatus* Plav.). Body length 5.0–7.5 mm.

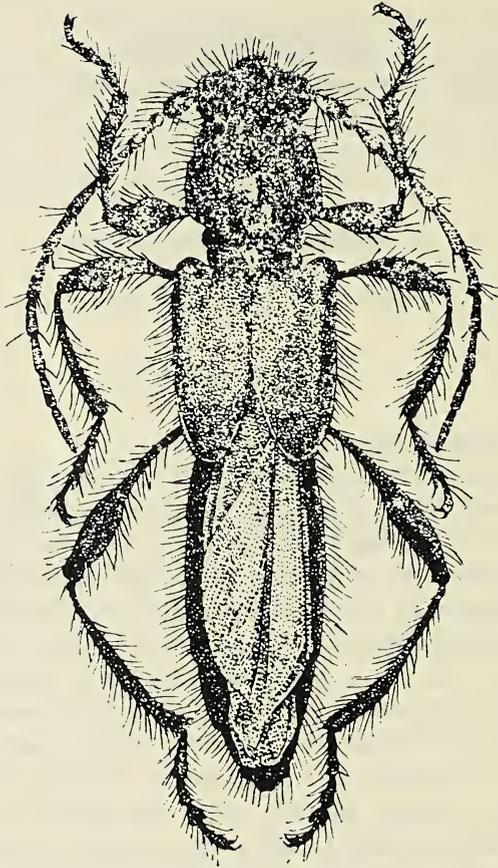


Fig. 144. *Molorchus kiesenvetteri semenovi* Plav.

Egg: White, elongate, tapering gently toward one pole, steeply toward the other, narrowly rounded at poles. Chorion smooth, semi-transparent. Length 1.4 mm, width 0.4 mm.

Larva (Fig. 145): Distinguished from the larva of *Molorchus kiesenvetteri* Muls. and Rey by much denser, somewhat rusty hairs on pronotum and by other characters. Body white, elongate. Head half retracted into prothorax. Epistoma perceptibly convex, bright, lustrous, with dark brown broad fringe, here with setiform hairs forming transverse row, divided by longitudinal (median) suture, laterally fusing with temporo-parietal lobes. Hypostoma short, highly tapering anteriorly, medially divided by broad gular plate. Temporo-parietal lobes bright yellowish, at anterior margin with brownish fringe, in anterior half with rusty hairs forming vast field. Antennae short, barely projecting from antennal sockets. Clypeus

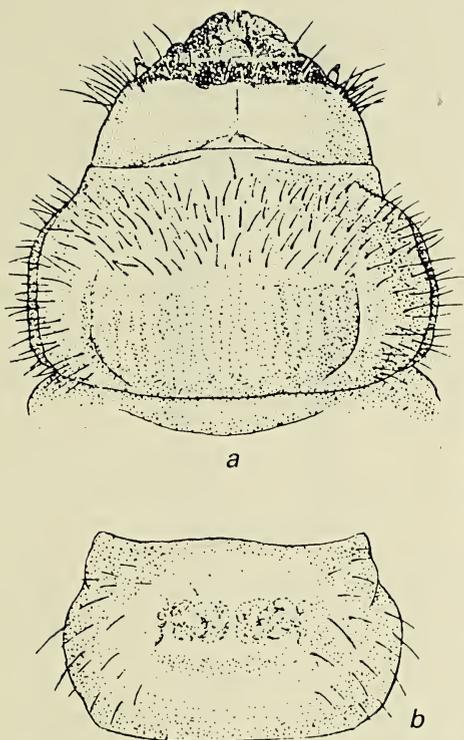


Fig. 145. Larva of *Molorchus kies. semenovi* Plav.

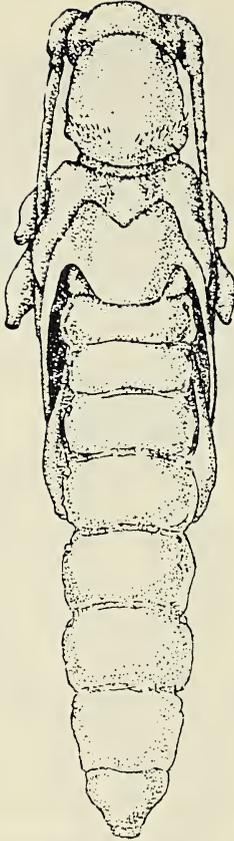
a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

broad, lustrous, trapezoid. Labrum whitish, transversely oval, with short bright bristles. Mandibles black, basally with somewhat rusty tinge, apically broadly rounded.

Pronotum transverse, laterally broadly rounded, at anterior margin with whitish glabrous fringe, on disk and laterally with comparatively dense rusty hairs. Pronotal shield insignificantly convex, laterally demarcated by longitudinal folds, with faint longitudinal streaks. Thoracic legs absent.

Abdomen elongate, barely tapering posteriorly, laterally with short sparse, barely perceptible bright hairs. Locomotory ampullae of abdomen barely convex, medially divided by common longitudinal groove. Body length of last instar larvae 7–11 mm, width of head up to 1.1 mm.

Pupa (Fig. 146): Characterized by bristles on pronotum forming two transversely extended fields located laterally on hind clivus. Body elongate, white. Head broad, with insignificantly produced antennal tubercles, frontally slightly convex, almost flat, laterally with short



solitary bristles. Antennae thin, straight, flexed laterad, their apices directed backward.

Pronotum convex, lustrous, laterally rounded, in posterior half more enlarge, beyond middle on hind clivus laterally with dense rusty bristles on somewhat rusty base forming two transversely elongate, contrastingly distinct, somewhat rusty bands (in the pupa of *Molorchus kiesenvetteri* Muls. and Rey, these bands are formed by setigerous spinules). Mesonotum convex, at posterior margin with angularly produced shield. Metanotum convex, lustrous, posteriorly broadly rounded, medially with barely perceptible longitudinal groove.

Abdomen elongate, barely tapering toward base, more steeply toward tip. Tergites I–VI convex, lustrous, glabrous, without bristles. Tergite VII convex, lustrous, apically broadly rounded, at posterior margin with two–six (more often three–four) short, sometimes barely

perceptible, setiform spinules bent forward. Tip of abdomen (in ventral view) rounded, without bristles. Valvifers of female elongate, digitate, contiguous. Body length 6–8 mm, width of abdomen up to 1.0 mm.

Taxonomic notes: *M. semenovi* Plav. and *M. kiesenvetteri* Muls. and Rey are morphologically in all developmental stages (adult, larval, pupal) and ecologically in the niche occupied by them, identical. Differences between them consist only of density of hairs on pronotum in larvae and structure of spinules (bristles) forming transversely extended rusty band laterally on hind clivus of pronotum in pupae. All this provides a basis, following I.A. Kostin (1973), to consider them two quite distinct subspecies of the same species.

Material: Collected near Alma-Ata (Novoalekseevka) and in the region of Ili River (tributary Kury). Adults 133, larvae 14, pupae 8, larval and pupal exuviae from cells 9. All adult insects were raised from larvae collected in nature.

Distribution: Kazakhstan (Alma-Ata, Ili River and its tributaries, Syr-Dary River), Kirghizia (Frunze, Chu River).

Biology: Inhabits riparian foothill and floodplain forests. Infests biotopes occupied by deciduous and bushy plant species in floodplains of rivers along forest fringes, forest glades, and so on. Flight of beetles from May to July. Beetles emerge from development sites with mature gonads and do not require supplementary feeding. In a female dissected on the second day after emergence from the pupal cell, 37 fully mature eggs were found in the ovaries. After mating, females lay eggs in cracks of bark or under the scale layer. Shoots 4–10 mm diameter are infested. Egg development from oviposition to hatching of larvae is completed in three–four weeks. Under laboratory conditions, at temperatures of 17.2–21.8°C ($19.9 \pm 0.1^\circ\text{C}$), this took 22–25 days (24.3 ± 0.1). We kept 58 eggs under observation.

Larvae break the chorion while hatching, bore into bark, make galleries under it longitudinal to the stem and impressed in wood, and pack them with fine frass. Larvae of late instars bore into wood, plug the entry hole compactly with fine frass, make a longitudinal gallery through the heartwood, fashion a pupal cell in it, and isolate it from the rest of the hollow gallery by a plug of fine frass. Width of larval gallery under bark up to 3.0 mm. Length of gallery in wood 7–20 mm, width 1.5 mm. Length of cell 7–11 mm. Length of plug separating cell up to 5.0 mm. Larva pupates with head toward the entry hole. Pupation concludes in early spring. Pupal stage lasts about three weeks. Under laboratory conditions, at temperatures of 16.8–21.0°C ($18.3 \pm 0.2^\circ\text{C}$), a larva pupated on December 27th and the beetle emerged from this pupa on January 15th. Total duration of pupal stage was 19 days.

Developed beetles scrape frass from the entry hole, nibble a round or oval (transversely extended) flight opening (diameter up to 1.0 mm) in the bark, and escape. Weight indices (based on 41 insects) during metamorphosis vary as follows: larvae before pupation 2.9–13.0 mg (7.1 ± 0.4), pupae 2.5–12.0 mg (6.5 ± 0.4), beetles before emergence from cell 2.2–10.5 mg (5.3 ± 0.3).

We raised beetles of *Molorchus kiesenvetteri semenovi* Plav. from larvae collected from sea buckthorn (*Hippophae rhamnoides*)—99, oleaster (*Elaeagnus angustifolia*)—30, and cherry plum (*Prunus divaricata*)—4. According to reports in literature (Plavil'shchikov, 1940; Kostin, 1973), it infests thin shoots of willow, turanga, apple salt tree, and other plant species. Density of infestation comparatively high. According to our calculations, up to two–three larvae develop per 10 cm of shoot 5–10 mm diameter.

22. Tribe CALLIDIINI

8. Genus *Turanium* Baeckm.

1. *Turanium scabrum* (Kr.)

Kraatz, 1882. *Deutsch. Entom. Zeitschr.*, 26 :115 (*Callidium*); Plavil'shchikov, 1940. *Fauna SSSR*, 22, 2: 268–269; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 170; Cherepanov and Cherepanova, 1984. *Nasekomye i gel'minty (Nov. i maloizv. vidy fauny Sibiri)*, 45.

Adult (Fig. 147): Close to *Pronocera brevicollis* (Gebl.). Well distinguished from it by smooth glabrous longitudinal band on lower side of hind tarsi. Body insignificantly elongate, slightly flat. Head broad, appearing transverse, highly retracted into prothorax, with barely raised, wide-set antennal tubercles, medially between them with faint longitudinal groove, with compact minute punctation and grayish-yellow hairs. Genae short, with gray dense hairs, temples gently rounded. Eyes highly convex, finely faceted, on inner side deeply emarginate. Antennae barely longer (male) or shorter (female) than body, with sparse short hairs (almost glabrous), on inner side with long dark brown bristles; 3rd antennal segment distinctly longer than 4th.

Pronotum more (female) or less (male) transverse, laterally rounded, tapering more toward base, less toward apex, at posterior margin more, at anterior less recurved, disk insignificantly convex, with compact minute punctation and bright, somewhat rusty, semiadherent (not dense) hairs. Pronotal shield small, posteriorly broadly rounded, with adherent hairs.

Elytra parallel-sided, with barely projecting rounded humeral tubercle, individually rounded apically, on disk anteromedially with more (female)

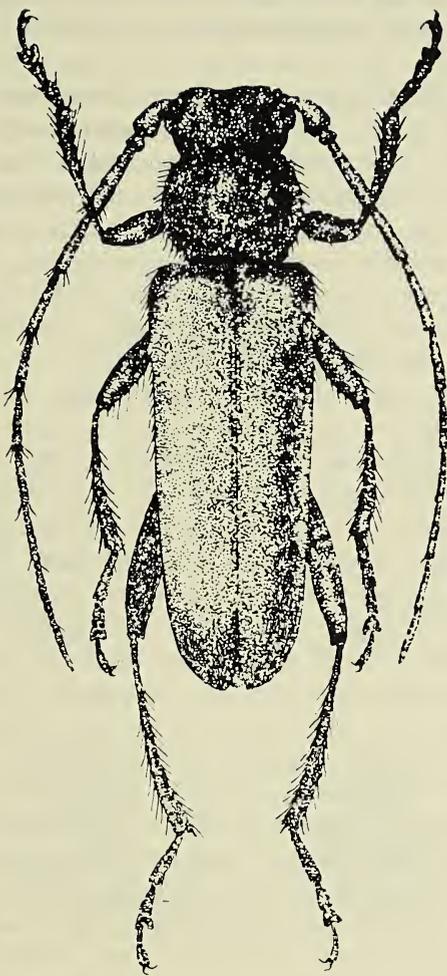


Fig. 147. *Turanium scabrum* (Kr.).

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or less (male) perceptible transverse depression, with compact minute striate punctation, adherent bright, somewhat rusty, not very dense hairs. Femora slightly thickened, with adherent hairs; tibiae with long setiform (erect projecting) hairs. Hind tarsi on lower side of one-two segments with glabrous groove-like longitudinal band, 1st segment longer than next two together. Body ventrally with dense grayish or grayish-yellow adherent pubescence and semierect setiform hairs.

223 Body, antennae, and legs monochromatic, dark brown or black (f. *typica*) or with somewhat rusty tinge (*m. simplarium* Heyd.). Body length 8–11 mm.

Egg: White, tapering toward poles, here narrowly rounded, almost acute. Chorion smooth, semitransparent. Length about 1.5 mm, width up to 0.5 mm.

Larva (Fig. 148): Characterized by prosternum and sides of abdomen bearing dense rusty hairs on sharply sclerotized base and fully perceptible thoracic legs. Body white, moderately elongate, virgate. Head half retracted into prothorax, roundly tapering anteriorly. Epistoma barely convex, hyaline, at anterior margin with sharp dark brownish fringe, laterally fusing with temporo-parietal lobes, frontal and medial sutures not perceptible. Hypostoma mildly convex, whitish, at anterior margin with somewhat rusty fringe, medially divided by gular plate highly tapering anteriorly. Sclerites of hypostoma sloping from anterior inner angles toward posterior angles. Temporo-parietal lobes whitish, at anterior margin with somewhat rusty fringe covering ocular-antennal zone, behind it with short hairs forming transverse row. Antennae comparatively long, with somewhat rusty tinge, their apices extending beyond anterior margin of cephalic capsule. Whitish ampullaceous ocelli located in depression below antennae. Clypeus short, narrow, barely projecting from anterior margin of epistoma. Labrum small, brownish, with bright short bristles masking joint of mandibles only basally. Mandibles black, basally somewhat rusty, apically broadly rounded, on inner side depressed, with extended cultrate edge.

Pronotum transverse, almost 2.5 times wider than long, laterally roundly tapering anteriorly, disk convex, sloping anteriorly, at anterior margin with broad whitish fringe, behind it with transversely elongate yellow spot interrupted medially by narrow bright interspace, before shield and laterally with thin rusty hairs on sclerotized base. Pronotal shield laterally demarcated by short longitudinal striae, coriaceous, slightly convex, with barely perceptible longitudinal striae, basally with four barely perceptible bristles in transverse row. Prosternum convex, in anterior half and laterally with dense rusty hairs on sclerotized base, in region of eusternum and at base glabrous. Meso- and metasterna on disk glabrous, laterally with long dense hairs. Thoracic legs developed, comparatively short, somewhat rusty, at apex with barely perceptible claw.

224 Abdomen barely tapering toward tip, laterally with somewhat dense, short thin rusty hairs on sclerotized base. Abdominal tergites convex, disk glabrous. Dorsal locomotory ampullae coriaceous, not sclerotized, medially divided by deep longitudinal groove. Ventral locomotory ampullae slightly convex, medially with longitudinal troughlike groove. Tip of abdomen with short thin rusty hairs. Anal pore triradiate. Body length of last instar larvae 11–13 mm, width of head 1.8 mm.

Pupa (Fig. 149): Similar to the pupa of *Pronocera brevicollis*

(Gebl.). Distinguished from it by much darker spinules on abdominal tergites. Characterized by spinules on hind clivus of pronotum, in posterior half of metanotum, and on abdominal tergite I. Body white, comparatively elongate. Head moderately protracted, short, with insignificantly raised antennal tubercles, between them with broad longitudinal groove, sinciput uniformly sloping (female) or with transverse impression (male), occiput broadly rounded; entire surface of head lustrous, glabrous, without bristles or spinules. Labrum triangular, api-

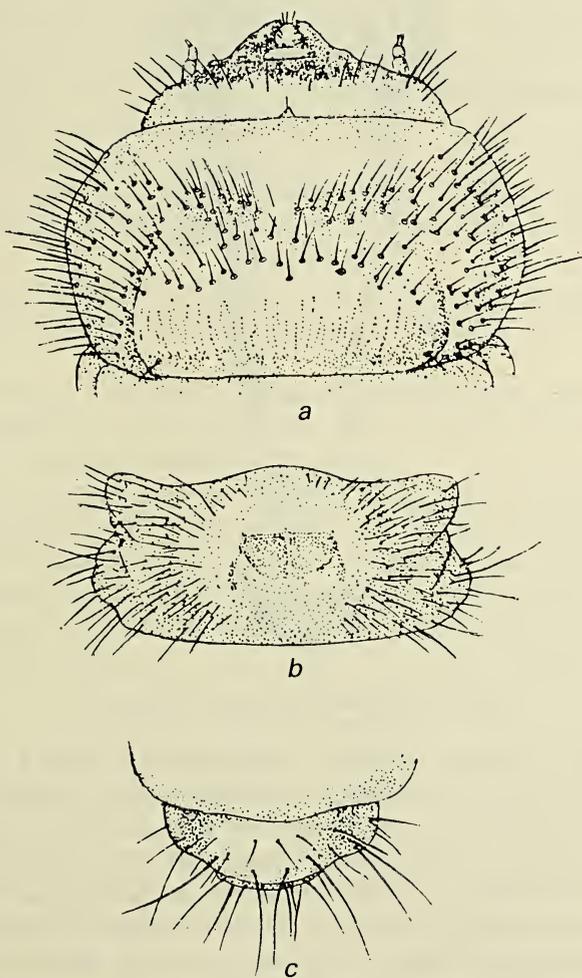


Fig. 148. Larva of *Turanium scabrum* (Kr.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

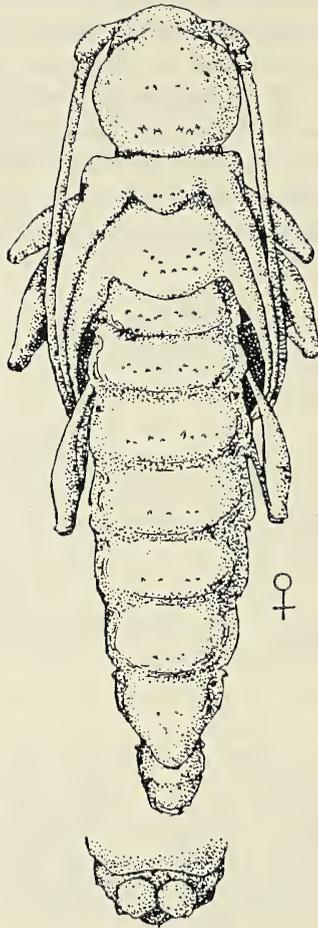


Fig. 149. Pupa of *Turanium scabrum* (Kr.).

cally narrowly rounded, hyaline. Antennae flexed laterad, in second half curved ventrad, here bent annularly, their apices adjoining forelegs.

225 Pronotum transverse or not longer than wide, laterally and at posterior angles broadly rounded, disk convex, lustrous, hind clivus with somewhat rusty spinules (located on barely produced coriaceous base) forming entire or slightly interlacing transverse row. Mesonotum convex, lustrous, basally slightly depressed transversely, posteriorly broadly rounded, shield with minute, barely perceptible, acute spinules or without them. Metanotum broad, moderately convex, lustrous, medially with narrow longitudinal groove, posteriorly broadly rounded, in posterior half with not many, somewhat rusty, acute or transversely

extended spinules forming transverse row.

Abdomen elongate, gently tapering toward tip from tergite IV, barely toward base. Abdominal tergites convex, with median longitudinal groove. Tergite I with more distinct, acute (female) or transversely extended (male) spinules forming transverse row. Tergites II–VI with very minute, barely perceptible (under high magnification) spinules or (especially on tergites V–VI) without them. Tergite VII elongate, tapering posteriorly, apically rounded, disk uniformly convex, lustrous, with very minute, barely perceptible, acute (not numerous) spinules forming transverse row posteromedially or without them. Tergite VIII transverse, at posterior margin transversely truncate or broadly rounded, disk convex, hyaline, with barely perceptible spinules forming transverse row or without them. Tip of abdomen obtuse, more or less rounded, glabrous, without bristles or spinules. Valvifers of female very large, almost spherical, tapering toward base, apically broadly rounded, highly contiguous. Body length up to 8.0 mm, width of abdomen 3.0 mm.

Material: Collected in region of the Kurty River (tributary of Ili): adults 105, larvae 13, pupae 8 (males and females), larval and pupal exuviae 5.

Distribution: Occupies regions of Soviet central Asia including southern regions of Kazakhstan, Uzbekistan and Tadzhikistan, within limits of the natural occurrence of oleaster.

Biology: Inhabits riparian forests of Kazakhstan. Ecologically associated with oleaster woody plant species. Flight of beetles commences May-end and is completed in July to early August. Beetles do not require supplementary feeding after emergence from their development sites and start to breed immediately. After mating, females lay eggs in cracks of bark under the larger scales. They infest shoots 4–20 mm diameter. Fecundity of females comparatively high. For example, on dissecting a female before commencement of oviposition, 33 mature eggs were found. Egg development from oviposition to hatching of larvae takes more than two weeks. Under laboratory conditions, at temperatures of 16.8–21.5°C ($19.1 \pm 0.2^\circ\text{C}$), larvae hatched after 14–19 days (average 16.5 ± 0.2). Larvae break the chorion while hatching, bore into bark, and under it make longitudinal (sometimes sinuous) galleries deeply impressed in wood, packing them with fine frass consisting of bark and wood. Length of gallery under bark 5.0–17.5 cm, width up to 2.0 mm initially and up to 9–12 mm terminally. Larvae of late instars bore into wood and there generally make a longitudinal gallery through the heartwood. Length of gallery in wood 1.2–6.3 cm, width 2.5–3.0 mm. Entry hole elongate longitudinal to the stem, its

width 2–4 mm. Larvae make pupal cell in wood and isolate it at both ends by a plug of fine or fibrous frass. Length of cell 10–18 mm, width 3.0–3.3 mm. Larvae pupate with head toward the entry hole. Pupal stage lasts two–three weeks. Under laboratory conditions, at a temperature of 16°C, pupae completed development in 18 days. Developed beetles leave the pupal cell through the entry hole. Generation—two-year cycle. Weight indexes (based on 24 insects) vary as follows: larvae before pupation 9.5–61.0 mg (32.7 ± 2.8), pupae 9.0–56.0 mg (30.0 ± 2.6), beetles before emergence from cells 7.0–46.0 mg (24.7 ± 2.9).

226 *Turanicum scabrum* (Kr.) belongs to the group of pests of oleaster and riparian forests of Kazakhstan. In 1982, in the floodplains of the Kurty (tributary of the Ili River), almost 50% of the thin shoots of oleaster were damaged by it. Once three larvae ready for pupation were found on a single shoot (31 cm long, 10 mm diameter). Similar density of infestation was observed on other shoots as well. There are reports (Plavil'shchikov, 1940; Kostin, 1973) that this species develops on dog rose, salt tree, tamarisk, and apple trees. *Tetrops elaeagni* Plav. and *Molorchus kiesenvetteri semenovi* Plav. often coinfect oleaster with this species.

23. Tribe CLYTINI (+ Tillomorphini)

12. Genus *Cleroclytus* Kr.

1. *Cleroclytus collaris* Jak.

Jakovlev, 1885. *Horae Soc. Entom. Ross.*, 19: 290; Plavil'shchikov, 1940. *Fauna SSSR*, 22, 2: 546–548; Kostin, 1973. *Zhuki-dendrofagi Kazakhstana*, 186.

Adult (Fig. 150): Readily recognized by bright bent ridge on elytra. Body elongate. Head with gray, not very dense hairs, on frons with vanishing minute (sinciput much denser, deep) punctation, and medially, especially between antennae, with sharp narrow groove. Antennae thin, slightly shorter (female) or longer (male) than body, on inner side with long bristles. Third antennal segment 1.5 times longer than 4th. Eyes finely faceted, very convex, in upper half broadly emarginate inward.

Pronotum oblong, laterally gently rounded, with minute uneven punctation, at places (on disk, in anterior half or on hind clivus) with minute streaks, laterally and near apex with dense adherent white hairs, disk glabrous. Pronotal shield small, apically broadly rounded, with dense compact adherent grayish pubescence.

Elytra moderately elongate, parallel-sided, jointly narrowly rounded apically, on suture tubercularly convex basally, here and in middle third with coarse (sharp), on hind clivus vanishing punctation, anteromedial-

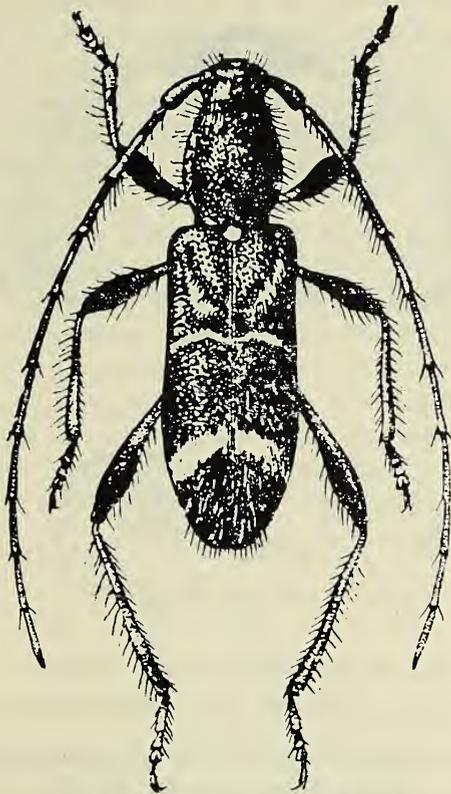


Fig. 150. *Cleroclytus collaris* Jak.

ly with bright curved (as if dilated) transverse ridge, with dense gray (white), closely adherent hairs forming transverse band before hind clivus and oblique band (in anterior third), with long erect bristles in posterior half. Body black or dark brown (f. *typica*), often head and pronotum red or reddish-brown (ab. *manifestus* Jak.). Antennae and legs rusty, clubs of femora generally dark brown. Elytra black or dark brown, basally red or reddish-rust. Body length 6–9 mm (Fig. 150 after Plavil'shchikov).

- 227 *Larva* (Fig. 151): In general appearance quite similar to the larvae of the genus *Clytus* Laich. Body poorly elongate, tapering posteriorly from thorax, whitish. Head highly retracted into prothorax, roundly tapering anteriorly. Epistoma insignificantly convex, almost flat, whitish, at anterior margin with narrow, somewhat rusty-brown, lustrous fringe, divided by longitudinal (medial) suture, laterally fusing with temporo-parietal lobes, frontal sutures not perceptible. Hypostoma somewhat rusty, medially divided by broad gular plate into two separate triangular

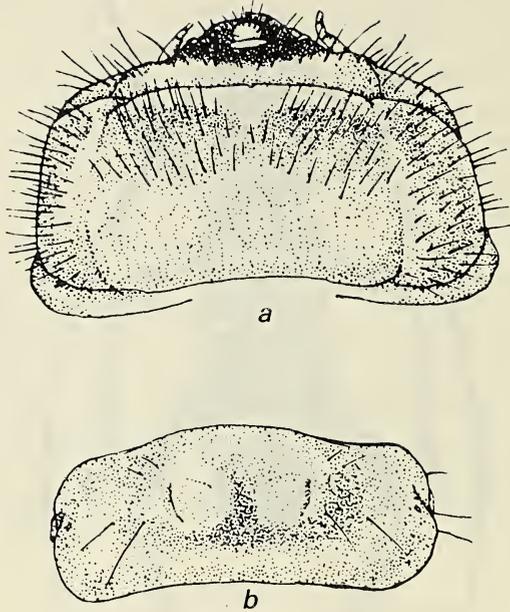


Fig. 151. Larva of *Cleroclytus collaris* Jak.

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla.

sclerites. Temporo-parietal lobes whitish, at anterior margin with somewhat rusty fringe. Antennae comparatively long, their apices projecting beyond anterior margin of temporo-parietal lobes, with somewhat rusty tinge. Clypeus small, trapezoid, barely projecting beyond anterior margin of epistoma. Labrum small, whitish, in second half with minute bright bristles.

Pronotum transverse, disk moderately convex, from base roundly tapering anteriorly, apically rounded gently, with yellowish tone, at anterior margin with whitish fringe, behind it (on disk and sides) with short uniform thin hairs. Pronotal shield moderately convex, whitish, coriaceous, laterally demarcated by deep longitudinal folds, at anterior margin insignificantly emarginate paramedially, without hairs. Prothoracic presternum uniformly convex, with even bright rusty hairs. Eusternum glabrous, coriaceous; basal part (sternellum) glabrous, only laterally with short hairs. Thoracic legs absent.

Abdomen tapering posteriorly, laterally with sparse, barely perceptible, bright hairs. Dorsal locomotory ampullae coriaceous, not sclerotized, on first four segments more, on next three segments less convex, medially divided by broad troughlike longitudinal groove, laterally with short lon-

itudinal fold. Body length up to 12 mm, width of head 1.8 mm.

228 *Pupa* (Fig. 152): Characterized by small body, oblong pronotum with barely perceptible minute spinules, and other characters. Body elongate. Head insignificantly protracted, without bristles, in frontal region mildly convex, on sinciput distinctly depressed. Labrum apically narrowly rounded, convex, without bristles. Antennae in second half curved annularly.

Pronotum lustrous, oblong, laterally gently rounded, disk convex, with straight, not produced, posterior angles, basally slightly depressed transversely, with minute spinules forming transverse band medially and a small cluster along each side on hind clivus. Mesonotum longitudinally convex, lustrous, glabrous, in posterior half depressed saddlelike, with angularly produced shield. Metanotum lustrous, slightly convex, with deep median longitudinal groove, glabrous, without bristles, at posterior margin broadly rounded.

Abdomen in region of segment IV enlarged toward base and con-

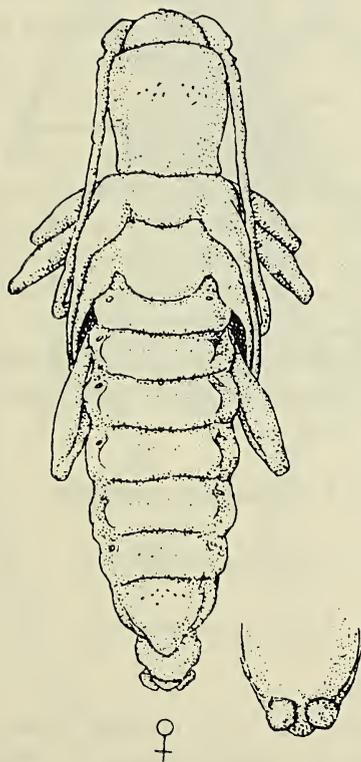


Fig. 152. Pupa of *Cleroclytus collaris* Jak.

siderably tapering toward tip. Abdominal tergites uniformly convex, with barely perceptible, minute specklike spinules forming transverse row posteromedially. Tergite VII triangular, apically narrowly rounded, disk convex, lustrous, with more distinct specklike spinules forming narrow median transverse band. Tergite VIII barely wider than long, posteriorly broadly rounded, disk convex, without spinules. Valvifers of female large, hemispherical, with barely perceptible space between them. Body length 7.5 mm, width of abdomen 2.0 mm.

Material: Collected in region of Novoalekseevka near Alma-Ata: adults three, larvae two, pupa one female, larval exuviae from cells two.

Distribution: Southeast Kazakhstan including regions adjacent to Alma-Ata. Northwest China in Kuldzhi region.

Biology: Inhabits foothill and montane-forest plantations. Ecologically associated with sea buckthorn, apple, possibly with oleaster, and other deciduous woody and bushy plant species. We found it on sea buckthorn. Infests shoots 8–16 mm diameter. Larvae initially live under bark, make longitudinal galleries deeply impressed in wood, and fill them with fine frass consisting of bark and wood. Larvae of late instars move deeper into wood and there make a gallery longitudinal to the shoot, plug the entry hole with frass, make a cell at the end of gallery, and pupate in it with head toward the entry hole. Pupation occurs in second half of summer. Under laboratory conditions, at room temperature, pupae completed development in three weeks. A beetle emerged from a pupa after 22 days of pupation. Beetles remain in the cell for hibernation during winter and commence breeding in spring with the onset of warmth in April and May. Length of larval gallery under bark up to 16 cm, maximum width 4.0 mm. Width of entry hole into wood 3.5 mm. Length of pupal cell 15 mm, width 3.5 mm. Changes in weight indexes during metamorphosis are illustrated by one insect: weight of larva before pupation 18 mg, pupa developed from it 16.1 mg, beetle before hibernation 12.9 mg.

VI. Subfamily Lamiinae

29. Tribe MESOSINI

1. Genus *Mesosa* Latr.

6. *Mesosa nebulosa* (F.)

Fabricius, 1781. *Spec. Ins.*, 1: 218 (Lamia); Kemner, 1922. *Zur Kenntnis . . . der Schwedischen Cerambyciden*, 103; Duffy, 1953. *Monogr. Immat. Stag. Brit. and Import. Timb. Beetl.*, 228 (Cerambycidae);

Plavil'shchikov, 1958. *Fauna SSSR*, 23, 1: 557-559; Demelt, 1966. *Die Tierwelt Deutschl.*, 52: 86.

- 229 *Adult* (Fig. 153): Distinguished from other species of the genus *Mesosa* Latr. by compact adherent pubescence forming characteristic pattern of longitudinal bands on head and pronotum, and broad white transverse band on elytra. Head slightly protracted, with extended antennal tubercles, medially from anterior margin of frons up to posterior margin of occiput with longitudinal groove, with compact adherent grayish-golden pubescence forming three longitudinal bands on occiput. Genae broad and long, 1.5 times longer than lower ocular lobe. Eyes finely

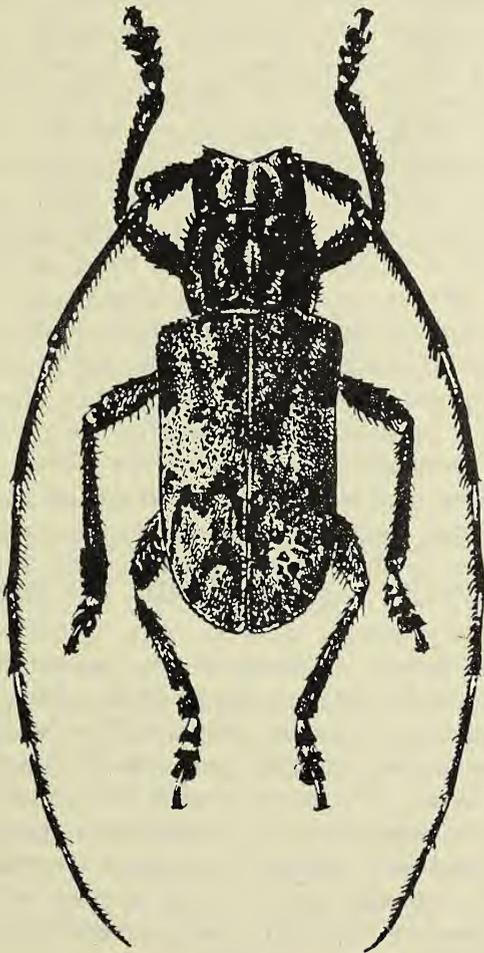


Fig. 153. *Mesosa nebulosa* (F.).

faceted, deeply emarginate, upper lobe slightly smaller than lower, space between them very narrow. Antennae longer (male) or not longer (female) than body, with adherent hairs, on inner side with numerous erect bristles.

Pronotum transverse, roundly tapering more anteriorly, less posteriorly, basally with barely perceptible, narrow transverse groove, with grayish-golden pubescence forming three longitudinal bands on disk corresponding to those on occiput, with sparse deep punctures. Pronotal shield tapering toward apex, rounded posteriorly, with dense adherent hairs forming median longitudinal band.

Elytra comparatively elongate, parallel-sided, with rounded humeral tubercle, disk uniformly convex, at posterior margin steeply sloping, apically jointly rounded, with large deep punctation, with somewhat dense adherent pubescence forming on dark brownish background a white median transverse band that enlarges laterally and perceptibly tapers at suture on disk. Body ventrally with uniform grayish-yellow pubescence. Abdominal sternite V entire, insignificantly convex (male) or medially with longitudinal groove (female). Head, body, legs, and elytra black. Antennae black, at bases of 3rd–11th segments somewhat rusty. Body length 9–14 mm (Fig. 153 after Plavil'shchikov).

Larva (Fig. 154): In structure of head quite similar to the larva of *Mesosa hirsuta* Bat. Distinguished from it by more developed (in any case fully perceptible) apical spinule on abdominal tergite IX, structure of pronotal shield, and other characters. Body white. Head half retracted into prothorax. Epistoma rusty, at anterior margin with brownish fringe, laterally demarcated by sharp whitish frontal sutures, longitudinally divided by dark brownish streaklike median suture, on posterior edge of brownish fringe with wide-set bristles forming transverse row, beyond them on sides with deep longitudinal streaks, between latter and median suture with broad flat, fully perceptible impression. Hypostoma laterally broadly rounded, rusty, medially with narrow longitudinal whitish band, distinctly convex transversely, in anterior half appearing somewhat bright, with pair of short paramedial bristles. Temporo-parietal lobes rusty, at anterior margin with brown-toned fringe. Antennae rusty-brown, their apices barely projecting from antennal sockets. Ocelli close below sockets, convex, brownish-black. Clypeus trapezoid, highly tapering toward apex, basally somewhat rusty, in second half much brighter. Labrum at anterior margin broadly rounded, whitish, with short rusty bristles, in posterior half glabrous, basally somewhat rusty. Mandibles elongate, reddish-brown or black, apically obliquely truncate.

Pronotum transverse, twice wider than long, slightly tapering anter-

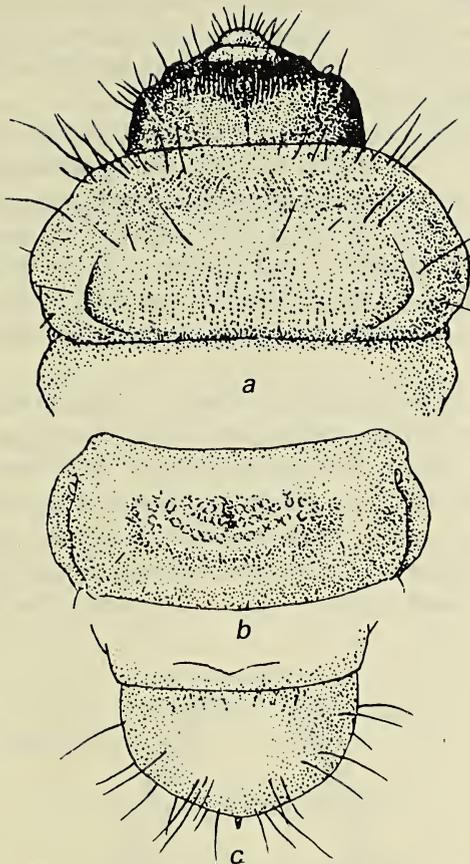


Fig. 154. Larva of *Mesosa nebulosa* (F.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

iorly, at anterior margin with whitish fringe, behind it somewhat rusty, medially with narrow longitudinal groove, on posterior edge of whitish fringe with rusty hairs forming transverse band interrupted on disk, laterally with numerous, before shield with sparse hairs forming transverse row. Pronotal shield insignificantly convex, laterally demarcated by short faint longitudinal folds, basally with longitudinal striae. Prothoracic presternum with sparse short hairs, eusternum glabrous.

Abdomen elongate, slightly tapering posteriorly, laterally with sparse solitary hairs. Dorsal locomotory ampullae poorly convex, medially divided by common longitudinal groove, with minute ampullaceous granules forming transversely extended cluster. Ventral

locomotory ampullae with granules forming two transverse rows separated by groove. Tergite IX apically with sparse long thin hairs, with small acute brownish-rust spinule. Length of last instar larvae up to 23 mm, width of head 2.5 mm.

Pupa (Fig. 155): Characterized by much larger spinules on abdominal tergites V–VII and on ridges bordering tip of abdomen. Body moderately elongate. Head broad, with insignificantly raised antennal tubercles, on occipital side from them with pair of close-set bristles. Labrum on disk with bristles forming dense transversely elongate band. Antennae extending beyond midfemora laterally, bent semicircularly ventrad, their apices adjoining foretarsi. Pronotum with very minute sparse spinules.

Abdomen gradually tapering toward tip. Abdominal tergites with numerous, comparatively minute (on I–IV) or large (on V–VII) setigerous spinules. Tip of abdomen (in ventral view) bound by distinct U-shaped ridge set with large setigerous spinules (five spinules on each side). Body length up to 24 mm, width of abdomen 4.5 mm.

Material: Collected in northern Caucasus: Goryachii Klyuch, village Kaluginsk. Adult insect one, larvae five, pupal exuviae with beetle

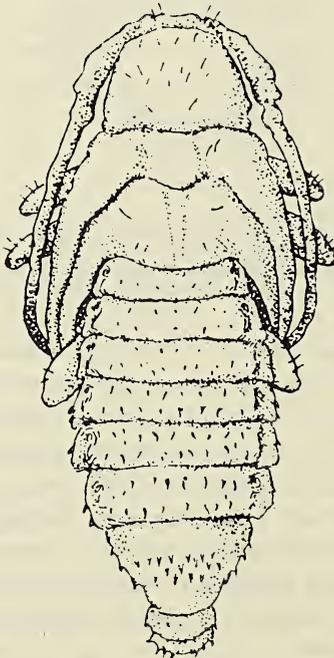


Fig. 155. Pupa of *Mesosa nebulosa* (F.).

from cell one. Collections of beetles in the Zoological Institute (Leningrad) and the Zoological Museum, Moscow State University (Moscow) were also examined.

Distribution: Europe, from Sweden to the Mediterranean Sea, from the Atlantic Ocean to the southern Urals, the Caucasus, Asia Minor, Turkey, northern Africa.

Biology: Occupies biotopes of deciduous plantations. Develops on trees of many deciduous species. Beetles fly in first half of summer and found up to August. Stems and thin knots of physiologically weakened and drying trees are infested. Larvae initially live (not for long) under bark, then bore into wood, there make irregular longitudinal galleries in the upper layer, and fill them compactly with fine frass. Width of gallery in wood up to 6.0 mm. After hibernation (June–July), larvae make at end of gallery a pupal cell in the upper wood layer longitudinal to the stem. Length of cell 21 mm, width 6.5 mm. Thickness of layer of wood remaining between cell and bark up to 1–2 mm. Pupation begins in July and is completed in August. Young beetles emerge from pupae mainly in August. They remain in pupal cell throughout winter and emerge from it the following spring. Generation—two-year cycle. Initially larvae hibernate, subsequently the adult.

Mesosa nebulosa (F.) was found by us on hazelnut and oak. It also infests chestnut, linden, poplar, alder, willow, elm, beech, acacia, apple, pear, walnut, and mulberry (Plavil'shchikov, 1958).

36. Tribe POGONOCHERINI

1. Genus *Pogonocherus* Zett.

8. *Pogonocherus* (s. str.) *hispidus* (L.)

Linnaeus, 1758. *Syst. Nat.*, ed. 10: 391 (*Cerambyx*); — *dentatus* Geoffroy, 1785. *Entom. Paris*, 1: 76; — *pilosus* Fabricius, 1787. *Mant. Ins.*, 1: 134; m. *rufescens* Pic, 1917. *Echange*, 33, 6 (No. 380); Kemner, 1922. *Zur Kenntnis . . . der Schwedisch. Ceramb.*, 108–110; Plavil'shchikov, 1948. *Opredelitel' zhukov-drovosekov Armenii*, 155; Demelt, 1966. *Die Tierwelt Deutschl.*, 52: 89 (*Cerambycidae*); Mamaev and Danilevskii, 1975. *Lichinki zhukov-drovosekov*, 240.

Adult (Fig. 156): Characterized by small body and aciculary produced outer angle and narrow oblique white band of elytra. Body slightly elongate. Head short, with adherent brownish-golden pubescence, with large antennal tubercles produced laterally, between them with broad deep longitudinal trough, medially with smooth longitudinal groove extending from anterior margin of frons up to posterior margin

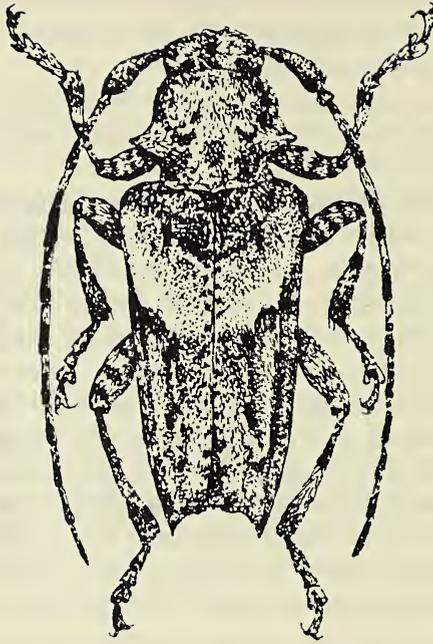


Fig. 156. *Pogonocherus hispidus* (L.).

of occiput. Eyes moderately convex, finely faceted, with deep broad notch. Upper ocular lobes barely smaller than lower, space between them narrow, taenioid. Antennae barely longer than body, extending beyond apex of elytra by 10th–11th segment, with brownish and white adherent hairs forming narrow white ringlet at base of segments, on inner side with long black bristles. First antennal segment thick, apically uniformly rounded, toward base barely tapering, 3rd segment equal to 4th, notably longer than 5th.

Pronotum not wider or barely wider than long, medially with longitudinal groove, on sides and on disk paramedially with conically produced tubercles (tubercles on sides and on disk forming common transverse row), with minute compact punctation, and adherent, not very dense, golden-gray hairs. Pronotal shield barely tapering posteriorly, apically rounded, with compact punctation and sparse hairs.

Elytra distinctly tapering posteriorly, enlarged at humeri, apically incised, with acicularly produced outer and narrowly rounded inner angles, anteromedially broadly depressed (depression extending from suture toward inner side of humeral tubercle), with longitudinal ridges, on disk along inner ridge with three black pilose tubercles (one basally, two in posterior half) forming longitudinal row, with irregular puncta-

tion, minute compact adherent golden-brown and white hairs forming on brownish background a white oblique band extending from suture toward humeral tubercle, along suture with black specks forming longitudinal row. Legs comparatively thick, femora clavate, with gray adherent hairs forming transverse bands. Mid- and hind tibiae at outer margin with dense distal brush of long black bristles. Hind tarsi considerably shorter than tibiae, their 1st segment not longer than 2nd. Body length 4.0–5.5 mm.

Larva (Fig. 157): Similar to the larva of *Pogonocherus hispidulus* (Pill.). Distinguished from it by smaller body, structure of sclerotized plate apically on abdominal tergite IX, and other characters. Body moderately elongate, white with yellowish tinge. Head half retracted into prothorax. Epistoma flat, divided longitudinally by medial suture, laterally merging with common background of temporo-parietal lobes

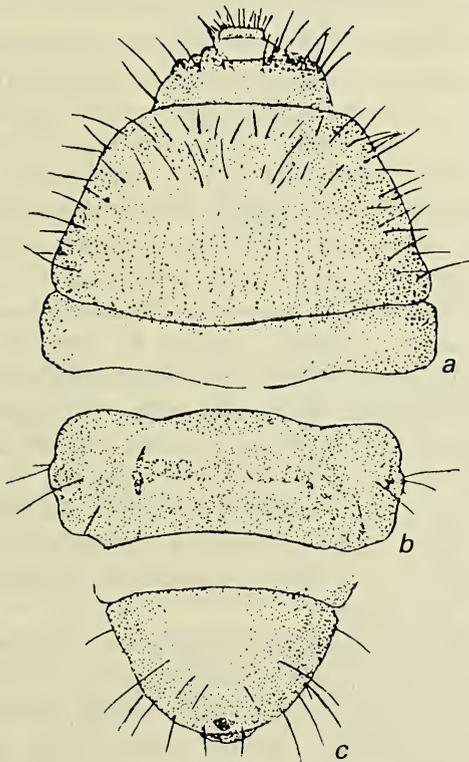


Fig. 157. Larva of *Pogonocherus hispidus* (L.).

a—head and pronotum; b—abdominal tergite with dorsal locomotory ampulla;
c—tip of abdomen.

(frontal sutures barely perceptible or absolutely not perceptible), at anterior margin with narrow, somewhat rusty-brown fringe, along its posterior margin with six long piliform bristles in transverse row. Hypostoma tapering anteriorly, at anterior angles rounded, with bright yellowish tinge, at anterior margin and medially in region of gular plate somewhat rusty or rusty-brown. Temporo-parietal lobes bright, slightly yellowish, at anterior margin with broad rusty or rusty-brown fringe and here with setiform hairs forming transverse row. Antennae whitish, very short, barely projecting from antennal sockets. Ocelli below antennae usually pigmented, black. Clypeus large, trapezoid, whitish. Labrum appearing thick, apically broadly rounded, whitish, sometimes with somewhat rusty tinge, in anterior half with bright bristles. Mandibles moderately elongate, apically steeply incised, black or blackish-brown.

233 Pronotum transverse, insignificantly tapering anteriorly, on disk flat, barely slanting forward, at anterior margin with narrow whitish fringe and here with thin hairs forming transverse band, behind band somewhat rusty, laterally and before shield with thin rusty hairs. Pronotal shield white, coriaceous, laterally with longitudinal folds. Mesonotum lustrous, on sides with dense, somewhat rusty hairs. Metanotum on disk glabrous medially, with transverse groove, laterally with dense hairs. Prosternum laterally and in anterior half with uniform rusty hairs, in posterior half in region of eusternum and basisternum glabrous. Meso- and metasterna on disk with transverse groove, laterally with very sparse bright hairs. Spiracles round. Dorsal locomotory ampullae insignificantly convex, medially divided by common longitudinal groove, on disk with triradial fold comprising a transverse groove with barely perceptible granules. Abdominal tergite IX apically with small transversely extended plate provided with thin median transverse ridge that in some individuals (especially in late instars) is replaced by a small spinule. Longitudinal extension of sclerotized plate not perceptible (in *Pogonocherus hispidulus* (Pill.) it is sharply perceptible in the form of deep coarse streaks). Body length of late instar larvae 5–7 mm, width of head up to 1.0 mm.

234 *Pupa* (Fig. 158): Distinguished from the pupa of *Pogonocherus hispidulus* (Pill.) by weak development of urogomphus at tip of abdomen. Body small, comparatively elongate. Head short, roundly tapering anteriorly, with raised antennal tubercles, medially between them with broad longitudinal trough, before antennal tubercles with six bristles (three on each side) forming transverse row, at anterior margin with six (or five–seven) bristles forming anterior transverse row. Labrum lustrous, apically narrowly rounded. Antennae flexed laterad, bent annularly ventrad.

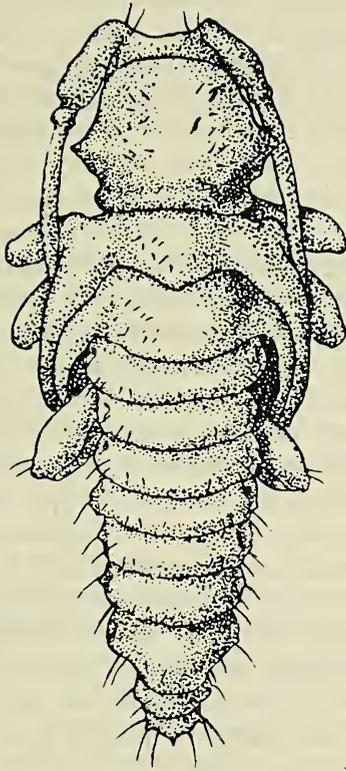


Fig. 158. Pupa of *Pogonocherus hispidus* (L.).

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Pronotum on disk convex, lustrous, laterally with large acute tubercle, tapering anteriorly more, posteriorly less (but steeply), with thin rusty bristles forming transverse band medially, rarefied cluster in anterior half and two small clusters on hind clivus. Sometimes bristles dispersed randomly. Mesonotum transverse, at posterior margin with angularly produced shield, with short bristles forming cluster at base of each elytron. Metanotum convex, medially with longitudinal groove, paramedially with thin rusty bristles forming small cluster.

Abdomen elongate, gradually tapering posteriorly. Abdominal tergites more convex in posterior half, here along sides with three thin, barely perceptible, bright bristles forming transverse row. Tip of abdomen obtuse, bound laterally by U-shaped ridge bearing long thin bright bristles and solitary, barely perceptible spinules. Urogomphus at tip of abdomen barely elongate or almost not perceptible, but here always with a small spinule. Hind femora extending up to posterior margin of abdominal tergite III or IV, apically on outer side with pair

of close-set, minute dark rust bristles. Valvifers of female small, almost contiguous. Body length 5.0–6.5 mm, width of abdomen up to 1.1 mm.

Material: Collected in northern Caucasus: adult insects nine, larvae nine, pupae three (male, female), larval exuviae from cell one.

Distribution: Europe, from Sweden to the Mediterranean Sea. Caucasus, northern Africa. Possibly the southern Urals.

Biology: Inhabits rarefied deciduous and mixed forests and ascends up to 1,000 m above mean sea level in mountains. Ecologically associated with pear and other deciduous plant species. Flight of beetles commences in May and continues up to July. Beetles infest thin shoots up to 0.5–3.0 cm diameter of drying or growing trees. Larvae live under bark, make irregular enlarging as well as tapering galleries not impressed or slightly impressed on sapwood. After hibernation, they bore into wood and the late instar plugs the entry hole with fibrous frass, then usually in the heartwood, makes an ovoid cell in which it pupates during the second half of summer (July). Pupae lie in cells with head toward the entry hole or in the opposite direction. Entry hole elongate longitudinal to the shoot, maximum diameter 1.5–2.5 mm.

Developed beetles nibble a round flight opening (diameter up to 1.5 mm) on the bark surface and leave the cell through it. They undergo hibernation and commence breeding the following spring. Some individuals hibernate in the adult stage in the cell. Length of cell 4–5 mm, width up to 2.5 mm. Length of plug of entry hole up to 5.0 mm. Generation—two-year cycle. Initially larvae hibernate, subsequently the adult insect. Weight indexes of five specimens were as follows: larvae before pupation 4.7–9.0 mg, pupae 4.0–8.5 mg, adults before hibernation 3.1–7.4 mg.

We found *Pogonocherus hispidus* (L.) on pear, though comparatively rarely. According to reports of other authors (Kemner, 1922; Demelt, 1966), it develops on *Sobrus*, *Cotoneaster*, *Quercus*, *Ulmus*, *Juglans*, *Tilia*, and *Carpinus*, as well as on *Rosa*, *Prunus*, *Cornus*, *Corylus*, and *Viburnum*.

CONCLUSION

235 Field and laboratory experimental investigations of cerambycid beetles of northern Asia were conducted by us during 1939–1941 and 1947–1983. In the last 15 years investigations were conducted year-round. These multiyear field and laboratory studies enabled us to determine the species composition, geographic distribution, terrestrial-biotope distribution, host relations (especially in the larval stage), interstadeal development, comparative morphological differences among preimaginal stages, duration of life cycle, and many other aspects of longicorn beetles (Cerambycidae) inhabiting northern Asia. We have worked out identification keys for subfamilies, tribes, genera, and species based on different stages of development. A complete monograph on cerambycid beetles has been published in six books during 1979–1985.

Within the boundaries of northern Asia, 386 species have been detected and the biology and preimaginal stages ascertained and identified for 325 (84.2%). The remaining species (61, or 15.8%) are known only through type or solitary adult insects. These belong to the group of rarely found insects. Furthermore, additional investigations are required to confirm the validity of some species (*Clytus hypocrita* Plav., *Pogonocherus tristichus* Kr., and others).

The cerambycid beetles of northern Asia inhabit mainly forest and very rarely steppe habitats. Among them, 76 (19.6%) species are ecologically associated with conifers, 198 (51.4%) with deciduous woody plants, 32 (8.2%) with bushy, and 48 (12.4%) with herbaceous plants. This provides evidence that the cerambycid fauna evolved mainly in deciduous plantations during the Tertiary period when riparian flora dominated the continent. Only later did individual derivatives adapt themselves to coniferous plantations and even fewer numbers of herbaceous and bushy plants, with both types migrating to open steppes. This process of adaptation from woody plant species to herbaceous plants developed parallelly in various taxonomic groups. For example, in the subfamily Lepturinae, of the 13 species of the genus *Anoplodera* Muls., broadly speaking, 10 develop on woody plants and 2 on herbaceous plants (*A. bipunctata* (F.), *A. livida* (F.), possibly other species of the subgenus *Vadonia* Muls.). In the subfamily Cerambycinae, of

the 19 species of the genus *Xylotrechus* Chev., 18 are vitally associated with woody plants and only 1 species (*X. arnoldi* Kost.) adapted to the herbaceous plants of steppe fields. Finally, in the subfamily Lamiinae, all the species of *Dorcadion* Dalm. and *Eodorcadion* Breun. adapted to life on herbaceous plants and migrated to open steppe areas. This confirms the fact that in some taxa the evolutionary process of transition from woody to herbaceous plants began earlier and has been completed today with the formation of large groups (*Dorcadion* Dalm., *Eodorcadion* Breun.), while in others it obviously began much later and has been completed with the adaptation of life to open areas at the level of individual species (*Xylotrechus arnoldi* Kost., and others). In this context, the biological characteristics of species in each genus are more or less distinctly monotypic (*Brachyta* Fairm., *Leptura* L., *Dorcadion* Dalm., *Eodorcadion* Breun., and others). This monotypic character is observed in the range of host plants of the larvae, stage in which hibernation occurs, site of pupation, and some other features (see Table 13). For example, larvae of the genus *Acmaeops* Leconte live under the bark of various woody plants but for pupation fall to the soil, make a cell there, and pupate in it. A similar phenomenon is observed in species of the genera *Gaurotes* Leconte, *Pidonia* Muls., and others. Larvae of the genus *Pachyta* Zett. live in the roots of conifers, whereas those of the genus *Stenocorus* F. live in the roots of deciduous woody plants; in both cases, however, the last instar larvae emerge from the roots and pupate near them in the soil. Larvae of *Saperda* F., *Eumecocera* Sols., and others live in the wood, make a pupal cell in its upper layer, and do not migrate to the soil. Species of *Phytoecia* Muls. are vitally associated only with herbaceous plants and make a pupal cell in the stem, generally in its underground part or more often, in the roots.

Species of the genus *Oberea* Muls. comprise a special group in which the larvae live in thin growing shoots of bushy and woody plants or in the stems of herbaceous plants, make longitudinal hollow galleries through the heartwood, nibble ventilation holes in the wall and discard through them frass consisting of an amorphous mass (*O. transbaicalica* Suv., and others) or minute granular concretions—excrements of the gut (*O. inclusa* Pasc., *O. linearis* (L.), and others). Larvae of the genus *Monochamus* Guér. live under bark and in wood of stems and thick knots and throw out frass from their galleries through ventilation holes. But this frass is of a different type, consisting of individual fibrous particles of wood that are removed by means of the mandibles. Such fibrous frass accumulates in small heaps on trees infested by the larvae.

The life cycle of the majority of species comprises two, rarely one

or three, and still more rarely, more than three years. Hibernation occurs mainly in the larval stage. Some species in the year before flight hibernate in the pupal stage (*Pseudocalamobius japonicus* (Bat.), *Clytus arietis* (L.), *C. arietoides* Reitt.) or as an adult (most of the species of *Phytoecia* Muls., and others) or in different stages (*Molorchus umbellatarum* (Schreb.)). For example, in April, 1983, 19 larvae of *Molorchus umbellatarum* (Schreb.), which had undergone hibernation, were collected in nature. Of these later (by November), one went into hibernation in the larval stage (just before pupation), seven in the pupal stage, and one as an adult. The remaining larvae died of a parasitic infection.

Similar ecological investigations showed that *Prionus insularis* Motsch., *Stenocorus amurensis* Kr., *Phymatodes ermolenkoi* Tsher., *Plagionotus christophi* Kr., *P. pulcher* Bless., *Anaethetis confossicollis* Baeckm., and others inhabiting broad-leaved forests of the Ussuri-Primor'e region are taxonomically closer to the ecological analogues *Prionus coriarius* (L.), *Stenocorus meridianus* (L.), *Phymatodes alni* (L.), *Plagionotus detritus* (L.), *P. arcuatus* (L.), and *Anaethetis testacea* (F.), respectively occupying broad-leaved forests of the southern Urals and Europe, which are quite some distance apart. This provides evidence that ecological groups of cerambycid beetles evolved mainly in the Tertiary and preserved themselves in that form to the present day. Fauna that evolved later tended toward new species on the basis of morphological variability, i.e., in the post-Tertiary period, ecological groups stabilized or were subject to insignificant changes, but the species composition of the fauna changed considerably with a change in morphological characters. As a result, the fauna of individual territories remained monotypic in ecological characteristics but in species composition acquired marked differences.

237 The fauna of cerambycid beetles of northern Asia is not homogeneous with respect to geographic distribution. It includes 117 species common to the fauna of Europe, more than 150 species common to the fauna of Japan, and only 8 species common to the fauna of North America. The cerambycid fauna is most diverse in the Ussuri-Primor'e region where 223 species are known, of which more than 100 belong to the group of relicts ecologically associated mainly with broad-leaved forests.

Cerambycid beetles constitute a significant link in the biocenosis and are no less important in the economics of nature. Among dendrophagous insects inhabiting forest formations, three main groups are distinguishable, each occupying a different tier in plant stands. One group (*Prionus* F., *Pachyta* Zett., *Stenocorus* F.) develops in the larval stage on roots, the

second group (*Leptura* L., *Xylotrechus* Chev., *Clytus* Laich., and others) on stems, and the third group (*Anaesthetis* Muls., *Pogonocherus* Zett., *Tetrops* Steph.) on the crown of thin shoots. Many species (mostly Lepturinae) live on dead wood, a large number of species (of Cerambycinae and Lamiinae) develop on physiologically weakened, drying trees, and very few species (some species of Cerambycinae and Lamiinae) attack growing, healthy trees, rendering them dry. Therefore, cerambycids are of varying importance to forestry. Those of the first group, by destroying wood in dead trees, accelerate biotransformations in the forest. Those of the second group often infest prepared wood/logs in felling areas, destroy the wood, and downgrade its commercial value; hence these species belong to the category of technical pests. The second and third groups constitute primary and secondary forest pests and hence preventive and protective measures have to be taken against them.

Some species of cerambycid beetles, given favorable conditions, appear in large numbers, cause notable, sometimes intensive changes in plant (forest) associations, often resulting in considerable losses to forestry. Deciduous plantations suffer largely from attacks by *Xylotrechus altaicus* (Geb.), *Monochamus impluviatus* Motsch., *M. sutor* (L.), *M. urussovi* (Fisch.), *Acanthocinus carinulatus* (Geb.), and *Tetropium gracilicorne* Reitt. Pine forests wither at places due to the infestation of *Monochamus galloprovincialis* (Oliv.), *Acanthocinus aedilis* (L.) (*A. aedilis* (L.); Cherepanov, 1984), and *Pachyta quadrimaculata* (L.). The group of serious pests of spruce, fir, and cedar forests includes the following: *Monochamus sutor* (L.), *M. urussovi* (Fisch.), *M. saluarius* Geb., *Clytus arietoides* Reitt., and *Tetropium castaneum* (L.).

Pests of deciduous plantations are the richest in species composition. In birch forests they include: *Xylotrechus ibex* (Geb.), *X. rusticus* (L.), *Chlorophorus herbsti* (Brahm), *Amarysius sanguinipennis* (Bless.), and others; in willow forests: *Lamia textor* (L.), *Saperda similis* Laich., *S. alberti* Plav., *Oberea oculata* (L.), and *Aromia moschata* (L.); and in poplar and aspen plantations: *Saperda carcharias* (L.), *S. populnea* (L.), *S. alberti* Plav., *Xylotrechus rusticus* (L.), and others. An extensive group is formed by species that damage trees in broad-leaved forests. This group comprises: *Mallambyx raddei* (Bless. and Sols.), *Moechotypa diphysis* (Pasc.), *Acalolepta ussurica* (Plav.), *Plagionotus detritus* (L.), *P. christophi* Kr., *Xylotrechus arvicola* (Oliv.), *Clytus raddensis* Pic, *Chlorophorus sexmaculatus* (Motsch.), *Purpuricenus kaehleri* (L.), *Rhopalopus clavipes* (F.), *Menesia flavotecta* Heyd., and others. Amur grape is considerably damaged by: *Brachyclytus singularis* Kr., *Teratoclytus plavilstshikovi* Zaitz., *Phy-*

matodes maaki (Kr.), and others. The introduction of these species into regions of grape cultivation can cause adverse consequences. Hence, they must be placed under strict quarantine. Brief information about the distribution and biology of cerambycid beetles is given below (Table 13).

Table 13. Basic indexes of biology and distribution of cerambycid beetles of northern Asia

Taxa	Occurrence of larvae on host plants				Number of genera-tions per year	Stage at which hibernation pupation occurs	Site of pupation	Distribution	Reference Volume (Part)
	Coni-ferous	Deci-duous	Bushy	Herba-ceous					
1	2	3	4	5	6	7	8	9	10
I. SUBFAMILY PRIONINAE									
1. Tribe CALLIPOGONINI									
1. Genus <i>Callipogon</i> Serv.									
1. <i>C. relictus</i> Sem.					4(5?)	L	W	PCh Kp	1
2. Tribe PRIONINI									
1. Genus <i>Prionus</i> F.									
1. <i>P. insularis</i> Motsch.		cm			3	L	Sl	PSk Ch Kp J	1
2. <i>P. coriarius</i> (L.)		cm			3	L	Sl	E Urs	1
3. Tribe TRAGOSOMINI									
1. Genus <i>Tragosoma</i> Serv.									
1. <i>T. deparium</i> (L.)	cm				3	L	W	Ea Amn	1
II. SUBFAMILY DISTENININAE									
4. Tribe DISTENIINI									
1. Genus <i>Distenia</i> Serv.									
1. <i>D. gracilis</i> Bless.		sp			2	L	W	P Sk Kp J	1

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
	cm				3	L	Sl	P Sk Ch Kp	1
2. <i>P. bicuneata</i> Motsch.	cm				3	L	Sl	Ha	1
3. <i>P. lamed</i> (L.)									
6. Genus <i>Brachyta</i> Fairmi.									
1. <i>B. interrogationis</i> (L.)				ab	2	L	Sl	Pa	1
2. <i>B. bifasciata</i> (Oliv.)				ab	2	L	Sl	Sbe P Sk Ch Kp J	1
3. <i>B. variabilis</i> (Gebl.)				ab	2	L	Sl	Sbw Sbe P M	1
4. <i>B. eurinensis</i> (Tsher.)				rr	2	L	Sl	Sbw Sbe Tv	1
7. Genus <i>Evodinus</i> Leconte (- <i>Evodinellus</i> Plav.)									
1. <i>E. borealis</i> (Gyllh.)	ab				2	L	Sl	Pa	1
8. Genus <i>Sachalinobia</i> Jacobs.									
1. <i>S. koltzei</i> (Heyd.)	cm				3	AL	W Rt	P Ch Kp J	1
9. Genus <i>Gaurotes</i> Leconte									
1. <i>G. virginea</i> (L.)	cm				2	L	Sl	E As	1
2. <i>G. kozhevnikovi</i> Plav.	sp				2	L	Sl	P Ch Kp	1
3. <i>G. splendens</i> B. Jak.								Sbe	1
4. <i>G. magnifica</i> Plav.								P	1
5. <i>G. superba</i> (Ganglb.)								P Ch	1
6. <i>G. ussuriensis</i> Bless.		ab			2	L	Sl	P Ch Kp	1
7. <i>G. suworovi</i> Sem.		ab			2	L	Sl	Sk J	1

10. Genus *Lemula* Bat.1. *L. decipiens* Bat.

P Sk Ch Kp J 1

11. Genus *Acmaeops*

Leconte

1. *A. pratensis* (Laich.)

L Sl Ha 1

2. *A. marginata* (F.)

L Sl Ea 1

3. *A. angusticollis* (Gebl.)

L W Sb M Ch Kp 1

4. *A. septentrionis* (Thoms.)

L Sl E As 1

5. *A. smaragdula* (F.)

L Sl Ea 1

6. *A. sachalinensis* Tsher.

L Sl Sk 1

7. *A. minuta* (Gebl.)

L Sl Sbe Ch Kp 1

8. *A. anthracina* (Mannerh.)

L Sl Sbe M Ch Kp 1

9. *A. collaris* (L.)

L Sl E Sbw 1

12. Genus *Sieversia*

Ganglb. (-Sivana Str.)

1. *S. bicolor* Ganglb.

L Sl P Ch Kp 1

13. Genus *Pseudostieversia* Pic1. *P. rufa* (Kr.)

L Sl P Ch Kp 1

14. Genus *Pidonia* Muils.1. *P. debilis* (Kr.)

L Sl P Sk Ch Kp J 1

2. *P. suvorovi* Baeckm.

L P SkJ 1

3. *P. armentata* (Bat.)

L Sl P 1

4. *P. quercus* (Tsher.)

L Sl P 1

5. *P. similis* (Kr.)

L Sl P 1

6. *P. gibbicollis* (Bless.)

L P Ch Kp J 1

(continued)

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
7. <i>P. amurensis</i> Pic	rr	ab			2	L	Sl	P Ch Kp	1, 2 (II)
8. <i>P. alticolis</i> (Kr.)		cm			2	L	Sl	P Ch Kp	1
9. <i>P. puziloi</i> (Sols.)		ab			2	L	Sl	P Sk Ch Kp J	1
15. Genus <i>Pseudallossterna</i> Plav.									
1. <i>P. orientalis</i> Plav.		sp			?	L	W	P	1
7. Tribe LEPTURINI									
1. Genus <i>Cortodera</i> Muls.									
1. <i>C. humeralis</i> (Schall.)								E Ur	1
2. <i>C. femorata</i> (F.)								E Ur	1
3. <i>C. ussuriensis</i> (Tsher.)								P	1
4. <i>C. analis</i> (Gebl.)								Al	1
5. <i>C. semenovi</i> Plav.								Al	1
6. <i>C. ruthena</i> Plav.								Ur	1
2. Genus <i>Grammoptera</i> Serv.									
1. <i>G. gracilis</i> Brancs.		sp			2	L	W Bk P		1
2. <i>G. erythropus</i> (Gebl.)								Al	1
3. <i>G. coerulea</i> Juréc								P	1
4. <i>G. plavitschikovi</i> Heyr.								P Kp	3 (I)
3. Genus <i>Allosterna</i> Muls.									
1. <i>A. tabacicolor</i> (Deg.)	rr	ab			2	L	W Bk Ea		1
2. <i>A. elegantula</i> (Kr.)		sp			2	L	Bk	P Sk Ch Kp J	1
3. <i>A. chalybella</i> (Bat.)	rr	sp			2 (?)	L	W Bk P Sk J		1

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
		cm			2	L	Sl	E Sbw	1
2. <i>J. erratica</i> (Dalm.)			cm		2	L	W	Sbw Tv	1
3. <i>J. orthotricha</i> Plav.		sp			2	L	W	Sbw Sbe P Sk	
4. <i>J. longipes</i> (Gebl.)								Ch Kp	1
5. <i>J. cometes</i> (Bat.)	sp				2	L	Sl	Sk J	1
9. Genus <i>Judolidia</i> Plav.									
1. <i>J. bangi</i> (Pic)		sp			2	L	W	P Ch Kp J	1
10. Genus <i>Oedecnema</i> Thoms.									
1. <i>O. dubia</i> (L.)		ab			2	L	W Sl	Pa	1
11. Genus <i>Leptura</i> L.									
1. <i>L. nigripes</i> Deg.		ab			2	L	W	Pa	1
2. <i>L. melanura</i> L.		ab			2	L	W	E Sbw	1
3. <i>L. bifasciata</i> Müll.		cm			2	L	W	E Sbw Sbe	1
4. <i>L. vicaria</i> (Bat.)	sp				2	L	W	Sk J	1
5. <i>L. circumocularis</i> (Pic)	sp				2	L	W	Sk	1
6. <i>L. regalis</i> (Bat.)	rr				2 (?)	L	W	Sk J	1
7. <i>L. thoracica</i> Creutz.		cm			2	L	W	Pa	1
8. <i>L. quadrifasciata</i> L.		ab			2	L	W	Pa	1
9. <i>L. arcuata</i> Panz.	rr				2	L	W	Pa	1
10. <i>L. aethiops</i> Poda		cm			2	L	W	Pa	1
11. <i>L. duodecimguttata</i> (F.)		cm			2	L	W	Asn	1
12. <i>L. ochraceofasciata</i> (Mensch.)		ab			2	L	W	Sk J	1
13. <i>L. latipennis</i> Matsush.		sp			2	L	W	Sk J	1

14. <i>L. femoralis</i> (Motsch.)	sp		2	L	W	Sbe P Sk Ch	Kp J	1
12. Genus <i>Sirangalia</i> Serv.								
1. <i>S. attenuata</i> (L.)	cm	rr	2	L	W	Pa		1
13. Genus <i>Eustrangalis</i> Bat.								
1. <i>E. distenoides</i> Bat.	sp		2	L A	W	Sk J		1
8. Tribe NECYDALINI								
1. Genus <i>Necydalis</i> L.								
1. <i>N. major</i> L.	cm		2	L	W	Pa		1
2. <i>N. ebenina</i> Bat.	rr		3 (4 ?)	L	W	P Sk J		1
3. <i>N. morio</i> Kr.	sp		3 (?)	L	W	P		1
4. <i>N. sachalinensis</i> Mats. and Tam.						P Sa		1
IV. SUBFAMILY ASEMINAE (+ SPONDYLINAE)								
9. Tribe SPONDYLINI								
1. Genus <i>Spondylis</i> F.								
1. <i>S. buprestoides</i> (L.)	cm		3	L	W	Pa		1
10. Tribe ASEMINI								
1. Genus <i>Nothorhina</i> Red.								
1. <i>N. punctata</i> (F.)	sp		2	L	Bk	E Sbw J		1
2. Genus <i>Arhopalus</i> Serv.								
1. <i>A. rusticus</i> (L.)	ab		2	L	W	Ha		1
2. <i>A. tristis</i> (F.)	sp		2	L	W	Pa		1, 2 (1)

(continued)

V. SUBFAMILY CERAMBYCINAE

12. Tribe HESPEROPHANINI

1. Genus *Trichoferus* Woll.1. *T. campestris* (Fald.)rr
2 L W As (Sbw Sbe
P M Ch) 2 (I)

13. Tribe CERAMBYCINI

1. Genus *Mallambyx* Bat.1. *M. raddei* (Bless. and Sols.)rr
3 L W P Ch Kp J 2 (I),
3 (II)

14. Tribe CALLIDIOPINI

1. Genus *Stenygrinum* Bat.1. *S. quadrinotatum* Bat.

15. Tribe GRACILINI

1. Genus *Gracilia* Serv.1. *G. minuta* (F.)rr
1 L W E Urs J Amn 2 (I)

16. Tribe OBRINI

1. Genus *Obrium* Curt.1. *O. cantharinum* (L.)2. *O. brevicorne* Plav.3. *O. gracile* Plav.cm
2 L W Pa 2 (I)
2 L W P 2 (I)
2 L W P Sk 2 (I)2. Genus *Stenhomalus* White1. *S. vulcanus* Tsher.rr
2 L W Sk 2 (I)

20. Tribe CALLICHROMINI

1. Genus *Aromia* Serv.

1. *A. moschata* (L.)

sp 3 L W Pa 2 (1)

2. Genus *Chloridolum* Thoms.

1. *C. sieversi* Ganglb.

sp 2 L W P Ch Kp 2 (1), 3 (1)

3. Genus *Chelidonium* Thoms.

1. *C. zaitzevi* Plav.

rr 2 L W P 2 (1)

4. Genus *Leontium* Thoms.

1. *L. viride* Thoms.

ab 2 L W Sk J Ta 2 (1)

5. Genus *Polyzonus* Cast.

1. *P. fasciatus* (F.)

sp 2 L W Sbe P Ch Kp M 2 (1)

21. Tribe ROSALIINI

1. Genus *Rosalia* Serv.

1. *R. coelestis* Sem.

rr 2 L W P Ch Kp 2 (1)

22. Tribe CALLIDIINI

1. Genus *Hylotrupes* Serv.

1. *H. bajulus* (L.)

rr 3 (?) L W E Sbw Af Ch Amn 2 (1)

2. Genus *Rhopalopus* Muls.

1. *R. clavipes* (F.)

sp 2 L W E Urs 2 (1)

2. *R. signaticollis* Sols.

sp 2 L W P Ch Kp J 2 (1)

3. *R. speciosus* Plav.

rr 2 L W P Ch 2 (1)

(continued)

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
18. <i>X. villioni</i> Vill.								Sk J	2 (II)
19. <i>X. altaicus</i> (Gebl.)	ab				2	L	W	Sbw Sbe P Sk M	2 (II)
2. Genus <i>Clytus</i> Laich.									
1. <i>C. arietoides</i> Reitt.	ab				2	L P	W	Asn	2 (II)
2. <i>C. nigrifolius</i> Kr.								P Ch Kp	2 (II)
3. <i>C. venustulus</i> Plav.								P	2 (II)
4. <i>C. arietis</i> (L.)		rr			2	L P	W	E Urs	2 (II)
5. <i>C. melaeus</i> Bat.		sp			2	L	W	Sk J	2 (II)
6. <i>C. raddensis</i> Pic		cm			2	L	W	Sbe P Ch Kp J	2 (II)
7. <i>C. hypocrita</i> Plav.								P	2 (II)
8. <i>C. fulvohirsutus</i> Pic		sp			2	L	W	P	2 (II)
3. Genus <i>Brachyclytus</i> Kr.									
1. <i>B. singularis</i> Kr.			ab		1 (?)	A	W	P Sk Ch Kp J	2 (II)
4. Genus <i>Cyrtoclytus</i> Ganglb.									
1. <i>C. capra</i> (Germ.)		ab			2	L	W	Pa	2 (II)
2. <i>C. caproides</i> Bat.		sp			2	L	W	Sk J	2 (II)
5. Genus <i>Epiclytus</i> Gress.									
1. <i>E. ussuricus</i> (Pic)		sp			2	L	W	P	2 (II)
6. Genus <i>Plagionotus</i> Mujs.									
1. <i>P. deirritus</i> (L.)		sp			2	L	Bk	E Urs	2 (II)
2. <i>P. christophi</i> Kr.		sp			2	L	W	P Ch J	2 (II)

3. <i>P. pulcher</i> Bless.	sp		2	L	BK	P Sk Ch Kp J	2 (II)
4. <i>P. arcuatus</i> (L.)	sp		2	L	W	E Urs	2 (II)
5. <i>P. floralis</i> (Pall.)		cm	2	L	Rt	E Sbw	2 (II)
7. Genus <i>Chlorophorus</i> Chevr.							
1. <i>C. varius</i> (Müll.)	sp		2	L	W	E Urs	2 (II)
2. <i>C. ubsanurensis</i> Tsher.						Tv M	2 (II)
3. <i>C. sexmaculatus</i> (Moisch.)	cm		2	L	W	P Sk Ch Kp J	2 (II)
4. <i>C. herbsti</i> (Brahm.)	cm		2	L	W	E Urs	2 (II)
5. <i>C. japonicus</i> (Chevr.)	sp		2	L	W	Sk J Ch Kp (?)	2 (II)
6a. <i>C. moischulskyi</i> (Ganglb.)	cm		2	L	W	Sbe P Ch Kp	2 (II)
6b. <i>C. m. chasanensis</i> Tsher.	sp		2	L	W	Ps	2 (II)
7. <i>C. figuratus</i> (Scop.)	rr					E Sbw	2 (II)
8. <i>C. diadema</i> (Moisch.)	sp		2	L	W	P Ch Kp J	2 (II)
9. <i>C. gracilipes</i> (Fald.)	ab	rr	2	L	W	Sb P Sk M Ch Kp J	2 (II)
10. <i>C. diminutus</i> (Bat.)	cm		2	L	W	P Sk J	2 (II)
11. <i>C. sartor</i> (Müll.)	rr					E Sbw Sbe (?)	2 (II)
8. Genus <i>Rhaphuma</i> Pasc.							
1. <i>R. acutivittis</i> (Kr.)	ab		2	L	W	P Sk Ch Kp J	2 (II)
9. Genus <i>Teratoclytus</i> Zaitz.							
1. <i>T. plavilstshikovi</i> Zaitz.		cm	2	L	W	P Sk Ch Kp J	2 (II)
10. Genus <i>Paraclytus</i> Bat.							
1. <i>P. excultus</i> Bat.	sp		2 (3 ?)	L A	W	Sk J	2 (II)

(continued)

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
11. Genus <i>Aglaophis</i> Thoms.									
		sp			2	L A	W	P Sk Ch Kp J	2 (II)
1. <i>A. colobothoides</i> Bat.									
12. Genus <i>Clerocyclus</i> Kr.									
		rr			2	L	W	Kaz s	3 (III)
1. <i>C. collaris</i> Jak.									
24. Tribe STENASPINI									
1. Genus <i>Purpuricenus</i> Dejean									
		cm			2	L	W	E Urs	2 (II)
		rr						Sbw	2 (II)
		rr						P Ch Kp J	2 (II)
3. <i>P. petasifer</i> Faim.									
2. Genus <i>Asias</i> Sem.									
			cm		2	L	W	Asn M Ch Kp	2 (II)
1. <i>A. halodendri</i> (Pall.)									
			rr		2	L	W	E Sbw M	2 (II)
2. <i>A. ephippium</i> (Stev. and Dalm.)									
			sp		2	L	W	Tv	2 (II)
3. <i>A. tuvensis</i> Tsher.									
3. Genus <i>Amarysius</i> Faim.									
		cm	rr		2	L	W	Asn	2 (II)
1. <i>A. altajensis</i> (Laxm.)									
		sp	sp		2	L	W	Al	2 (II)
2. <i>A. duplicatus</i> Tsher.									
		sp	sp		2	L	W	Asn	2 (II)
3. <i>A. sanguinipennis</i> (Bless.)									
								P	2 (II)
4. <i>A. grallator</i> (Baeckm.)									

VI. SUBFAMILY LAMIINAE

25. Tribe DORCADIONINI
(+ PARMENINI)

1. Genus *Plectirura* Mannh.
(Tribe Parmenini)

1. *P. metallica* Bat. cm sp 2 L A W Sk J Ta 3 (I)

2. Genus *Dorcadion* Dalm.
(Tribe Dorcadionini)

1. *D. politum* Dalm. sp 3 L A Sl Urs Sbw 3 (I)
 2. *D. cephalotes* Jak. rr 3 L A Sl Kaz 3 (I)
 3. *D. elegans* Kr. rr 2 L A Sl Urs Vr 3 (I)

3. Genus *Eodorcadion* Breun.

1. *E. humerale* (Gebl.) sp 2 (?) L Sl Sbe P Tv M Ch 3 (I)
 2. *E. carinatum* (F.) cm 2 L L Sl Sbw Kaz Tv Sbe 3 (I)
 3. *E. lutschniki* (Plav.) cm 2 L L Sl Tv 3 (I)
 4. *E.-gruni* (Suv.) sp 2 L L Sl Tv M Ch 3 (I)
 5. *E. pyralopterum* (Suv.) sp 2 L L Sl Tv 3 (I)
 6. *E. leucogrammum* (Suv.) cm 2 L L Sl Tv 3 (I)
 7. *E. quinquevittatum* (Hamm.) sp 2 L L Sl Tv 3 (I)
 8. *E. brandii* (Gebl.) rr Al 3 (I)

26. Tribe LAMIINI

1. Genus *Lamia* F.

1. *L. textor* (L.) sp 3 L A W Pa 3 (I)

2. Genus *Lamiomimus* Kolbe

1. *L. gottschei* Kolbe sp 3 L (A ?) W P Ch Kp 3 (I)

(continued)

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
27. Tribe MONOCHAMINI									
1. Genus <i>Monochamus</i> Guér.									
	ab				2	L	W	Pa	3 (1)
1. <i>M. sutor</i> (L.)					2	L	W	Pa	3 (1)
2. <i>M. galloprovincialis</i> (Oliv.)	ab				2	L	W	Pa	3 (1)
3. <i>M. urusovi</i> (Fisch.)	ab				2	L	W	Pa	3 (1)
4. <i>M. grandis</i> Waterh.	sp				2	L	W	Sk J	3 (1)
5. <i>M. saltuarius</i> Gebl.	ab				2	L	W	Pa	3 (1)
6. <i>M. impluviatus</i> Motsch.	sp				2	L	W	Asn	3 (1)
7. <i>M. nitens</i> (Bat.)								Sk J	3 (1)
8. <i>M. guttatus</i> Bless. (= <i>M. guttulatus</i> Gress.)		cm	rr		2	L	W	P Ch Kp	3 (1)
2. Genus <i>Acalolepta</i> Pasc.									
1. <i>A. luxuriosa</i> (Bat.)		sp			2 (3 ?)	L	W	Sk Ch Kp J	3 (1)
2. <i>A. cervina</i> (Hope)		rr						P Ch Kp J	3 (1)
3. <i>A. sejuncia</i> (Bat.)	sp	cm			2	L	W	Sk J	3 (1)
4. <i>A. ussurica</i> (Plav.)		cm			2	L	W	P	3 (1)
5. <i>A. degenera</i> (Bat.)				cm	2	L	Rt	P Ch Kp J	3 (1)
28. Tribe ANCYLONOTINI									
1. Genus <i>Palimna</i> Pasc.									
1. <i>P. liturata</i> (Bat.)		rr			2	L	W	P Ch Kp J	3 (1)

29. Tribe MESOSINI

1. Genus *Mesosa* Latr.

1. <i>M. myops</i> (Dalm.)	ab	2	L A	Bk	Pa	3 (I)
2. <i>M. japonica</i> Bat.	sp	2	L A	Bk	Sk J	3 (I)
3. <i>M. curculionoides</i> (L.)	rr	2 (?)	L A	Bk	E Urs	3 (I)
4. <i>M. senilis</i> Bat.	sp	2	L A	W	Sk J	3 (I)
5. <i>M. hirsuta</i> Bat.	cm	2	L A	W	P Kp J	3 (I)
6. <i>M. nebulosa</i> (L.)	sp	2	L A	W	E Urs Afn	3 (III)

30. Tribe DORCASHEMATINI

1. Genus *Olenecamptus* Chevr.

1. <i>O. octopustulatus</i> (Motsch.)	cm	2	L	W	Sbe P Sk Ch Kp J	3 (I)
2. <i>O. clarus</i> Pasc.	sp	2	L	W	P Ch Kp J	3 (I)

31. Tribe HECYRINI

(= *Grossitini*)1. Genus *Moechothypa* Thoms.

1. <i>M. diphysis</i> (Pasc.)	ab	2 (3 ?)	LA	Bk	P Sk Ch Kp	3 (I)
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32. Tribe PTEROPLIINI

1. Genus *Pterolophia* New.

1. <i>P. ussuriensis</i> Plav.	ab	2	L	W	Sbe P	3 (I)
2. <i>P. maacki</i> (Bless.)	sp	2	L	W	P Ch Kp	3 (I)
3. <i>P. jugosa</i> Bat.	cm	2	L	W	Sk Ch K J	3 (I)

2. Genus *Egesina* Pasc.

1. <i>E. bifasciana</i> (Matsush.)	ab	2	L	W	P Sk Ch Kp J	3 (I)
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(continued)

2. Genus *Optosia* Muls.1. *O. suvorovi* Pic 2 L W Sbe P Sk Ch Kp J 3 (II) sp3. Genus *Miccolamia* Bat.1. *M. verrucosa* Bat. 2 L A W SK J 3 (II) cm2. *M. clerooides* Bat. Sk J 3 (II)4. Genus *Clyosemia* Bat.1. *C. pulchra* Bat. Sk J 3 (II)5. Genus *Araesthetis* Muls.1. *A. confossicollis* Baeckm. 2 L W P Ch Kp J 3 (II) cm2. *A. testacea* (F.) W E Afrn Urs 3 (II) cm3. *A. flavipilis* Baeckm. Sbw 3 (II)6. Genus *Saphronica* Blanch.1. *S. obrtoides* (Bat.) P J 3 (II)7. Genus *Cylindilla* Bat.1. *C. grisescens* Bat. 2 L A W P Sk Ch Kp J 3 (II) cm

36. Tribe POGONOCHERINI

1. Genus *Pogonocheirus* Zeit.1. *P. dirnidiaius* Bless. 2 LA W P Ch Kp 3 (II) sp2. *P. seminivens* Bat. 2 L A W SK J 3 (II) cm3. *P. tristiculus* Kr. Sbe 3 (II)4. *P. hispidulus* (Pill.) E Afrn Ur 3 (II) ir5. *P. fasciculatus* (Deg.) L A W Pa 3 (II) ab6. *P. costatus* Motsch. L A W Sb 3 (II) cm7. *P. decoratus* Faimm. L A W E Ur 3 (II) ir

(continued)

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
8. <i>P. hispidus</i> (L.)		sp			2	L A	W	E Cau Urs (?) Afn	3 (III)
37. Tribe ACANTHODERINI									
1. Genus <i>Acanthoderes</i> Serv.									
1. <i>A. clavipes</i> Schr.		cm			2	L	W	Pa	3 (II)
38. Tribe ACANTHOCININI									
1. Genus <i>Leiopus</i> Serv.									
1. <i>L. femoratus</i> Fairm.		rr			2	L	W	E Urs	3 (II)
2. <i>L. nebulosus</i> (L.)		rr			2	L	Bk	E Ur	3 (II)
3. <i>L. stillatus</i> Bat.		cm			2	L	Bk	P Sk J	3 (II)
4. <i>L. albivittis</i> Kr.		cm			1-2	L	W Bk	Sbw Sbe P Ch Kp J	3 (II)
5. <i>L. malaisei</i> Auriv.								Kam	3 (II)
2. Genus <i>Acanthocinus</i> Guér.									
1. <i>A. aedilis</i> (L.)	ab				2	L A	W	Pa	3 (II)
2. <i>A. griseus</i> (F.)	cm				2	L	Bk	Sb P Sk M Ch Kp J	3 (II)
3. <i>A. carinulatus</i> (Gebl.)	ab				2	L	W	Asn	3 (II)
3. Genus <i>Eryssamena</i> Bat.									
1. <i>E. saperdina</i> Bat.		cm			2	L A	W	P Ch Kp J	3 (II)

2. <i>E. tuberculata</i> Pic	rr	2	L (?)	W	Sk Ch P	3 (II) 3 (II)
3. <i>E. shabliovskiyi</i> Tsher.						
4. Genus <i>Miaenia</i> Pasc.						
1. <i>M. maritima</i> Tsher.	rr				P	3 (II)
2. <i>M. florovi</i> Tsher.					P	3 (II)
5. Genus <i>Exocentrus</i> Muls.						
1. <i>E. stierlini</i> (Ganglb.)	cm	2	L	W	Pa	3 (II)
2. <i>E. lusitanus</i> (L.)	cm	2	L	W	E Ur	3 (II)
3. <i>E. marginatus</i> Tsher.	sp	2	L	W	P	3 (II)
4. <i>E. testudineus</i> Matsush.	sp	2	L	W	Sk J	3 (II)
5. <i>E. conjugatofasciatus</i> Tsher.	sp	2	L	W	P	3 (II)
6. <i>E. ussuricus</i> Tsher.	sp	2	L	Bk	P	3 (II)

39. Tribe HIPPOPSINI

1. Genus *Pseudocalamobius* Kr.1. *P. japonicus* (Bat.)

cm	rr	3	L P	W St	P Sk Ch Kp J Ta	3 (II)
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40. Tribe AGAPANTHINI

1. Genus *Agapanthia* Serv.1. *A. dahlia* (Richt.)

cm		2 (1 ?)	L	St	E Sbw	3 (II)
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2. *A. kirbyi* Gyllh.

sp		2	L	St	Urs Kaz	3 (II)
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3. *A. altaica* Plav.

ab		2 (1 ?)	L	St	Al Dzh	3 (II)
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4. *A. villosoviridescens* (Deg.)

ab		2	L	St	Pa	3 (II)
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5. *A. cardui* (L.)

cm		2 (1 ?)	L	St	Es Urs As Afrn	3 (II)
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6. *A. maculicornis* (Gyllh.)

cm		2	L	St	E Urs Sbw	3 (II)
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7. *A. amurensis* Kr.

cm		2	L	St	Sbe P Sk M Ch Kp J	3 (II)
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(continued)

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
8. <i>A. pilicornis</i> (F.)								Sbe P Sk M Ch Kp J	3 (II)
9. <i>A. violacea</i> (F.)				ab	2 (1 ?)	L	St	E Sbw Asc	3 (II)
10. <i>A. leucaspis</i> (Stev.)				ab	2 (1 ?)	L	St	E Urs Sbw Asc	3 (II)
2. Genus <i>Theophilea</i> Pic									
1. <i>T. cylindricollis</i> Pic				rr	1 (?)	L	St	Cau Urs Ec	3 (II)
41. Tribe SAPERDINI									
1. Genus <i>Saperda</i> F.									
1. <i>S. scalaris</i> (L.)		ab			2	L	W	En Asn	3 (III)
2. <i>S. interrupta</i> Gebl.	cm				2	L	W	Sb Sk M Ch Kp J	3 (III)
3. <i>S. perforata</i> (Pall.)		ab			2	L	W	E Asn	3 (III)
4. <i>S. alberti</i> Flav.		ab			2	L	W	Asn	3 (III)
5. <i>S. octomaculata</i> Bless.		ab			2	L	W	P Sk Ch Kp J	3 (III)
6. <i>S. populnea</i> (L.)		ab			2	L	W	Ha	3 (III)
7. <i>S. balsamifera</i> Motsch.		rr			2	L	W	Sbw Sbe P M Ch Kp J	3 (III)
8. <i>S. carcharias</i> (L.)		ab			2	L	W	Pa	3 (III)
9. <i>S. similis</i> Laich.		cm			2	L	W	Pa	3 (III)
2. Genus <i>Euteirapha</i> Bat.									
1. <i>E. sedecimpunctata</i> (Motsch.)		ab			2	L	W	P Sk Ch Kp J	3 (III)
2. <i>E. metallescens</i> (Motsch.)		ab			2	L	W	P Sk Ch Kp J	3 (III)
3. <i>E. chrysochloris</i> (Bat.)		cm			2	L	W	Sk J	3 (III)

3. Genus *Cagosima* Thoms.1. *C. sanguinolenta* Thoms. cm 2 L W Sk J Ta 3 (III)4. Genus *Thyestilla* Auriv.1. *T. gebleri* (Fald.) cm 2 L Rt P Ch Kp J 3 (III)5. Genus *Menesia* Muls.

1. *M. sulphurata* (Gebl.) ab 2 L W Asn 3 (III)
 2. *M. flavotecta* Heyd. cm 2 L W P Sk Ch Kp J 3 (III)
 3. *M. bipunctata* (Zoubk.) ab 1-2 L W E Urs 3 (III)
 4. *M. albifrons* Heyd. sp 2 (?) L W P Al 3 (III)

6. Genus *Paramenesia* Breun.1. *P. theaphia* (Bat.) cm 2 L W Sk J 3 (III)7. Genus *Eumecocera* Sols.

1. *E. impustulata* (Motsch.) cm 2 L W Bk Al Sbe P Ch Kp J 3 (III)
 2. *E. callosicollis* (Breun.) sp 2 L W Bk Sbe P Ch 3 (III)

42. Tribe GLENEINI

1. Genus *Glenea* New.1. *G. relicta* Pasc. cm 2 L W Sk Ch J 3 (III)

43. Tribe PHYTOECIINI

1. Genus *Nupserha* Thoms.

1. *N. alexandrovi* (Plav.) P Ch 3 (III)
 2. *N. marginella* (Bat.) P Ch Kp J 3 (III)

(continued)

Table 13 (continued)

1	2	3	4	5	6	7	8	9	10
2. Genus <i>Oberea</i> Muls.									
1.	<i>O. oculata</i> (L.)	cm	cm		2	L	W	Pa	3 (III)
2.	<i>O. depressa</i> (Gebl.)	cm	cm		2	L	W	Asn	3 (III)
3.	<i>O. inclusa</i> Pasc.	ab	ab		2	L	W	Sbe P Ch Kp J	3 (III)
4.	<i>O. herzi</i> Ganglb.			rr	2	L	St	P Ch	3 (III)
5.	<i>O. japonica</i> (Thumb.)				2	L	W Rt	P(?) Ch Kp J Ta	3 (III)
6.	<i>O. transbaicalica</i> Suv.		sp		2	L	W	Al Sbe	3 (III)
7.	<i>O. linearis</i> (L.)	sp	rr		2	L	W	E Urs	3 (III)
8.	<i>O. morio</i> Kr.			sp	2	L	St	P Ch Kp	3 (III)
9.	<i>O. chinensis</i> Tsher.			sp	2	L	St	P Ch	3 (III)
10.	<i>O. euphorbiae</i> (Germ.)			rr	2	L	St	E Urs	3 (III)
11.	<i>O. erythrocephala</i> (Schr.)			ab	2	L	St	E Urs Kaz	3 (III)
12.	<i>O. donecei</i> Pic				2	L	St	Sbe M Ch	3 (III)
3. Genus <i>Phytoecia</i> Muls.									
1.	<i>P. affinis</i> (Harr.)			sp	2	L A	St Rt	Es Urs Sbws	3 (III)
2.	<i>P. volgensis</i> Kr.			rr	2	L A	Rt	Cau Vr (Urs ?)	3 (III)
3.	<i>P. rufiventris</i> Gaut.			cm	2	L A	Rt	Sbe P Sk M	3 (III)
								Ch Kp J	
4.	<i>P. pustulata</i> (Schr.)			sp	2	L A	Rt	E Urs Kaz Asm	3 (III)
5.	<i>P. virgula</i> (Charp.)			sp	2	L A	Rt	E Urs Kaz Asm	3 (III)
6.	<i>P. nigricornis</i> (F.)			cm	2	L A	Rt	E Sbw	3 (III)
7.	<i>P. cylindrica</i> (L.)			ab	2 (1)	L A	Rt	E Asn	3 (III)
8.	<i>P. icterica</i> (Schall.)			ab	2	L A	Rt	E Urs Sbw Ch	3 (III)
9.	<i>P. cinctipennis</i> Mannh.			cm	2	L	St Rt	Tv Sbe P M	3 (III)
								Ch Kp	

10. *P. sareptiana* Ganglb.
 11. *P. coeruleascens* (Scop.)

44. Tribe TETRAOPINI

1. Genus *Tetrops* Steph.

1. *T. praeusta* (L.)
 2. *T. glivipes* Fald.
 3. *T. rosarum* Tsher.
 4. *T. elaeagni* Plav.

Legend for Table 13

Occurrence of Larvae on Host Plants: ab—abundant; cm—common; rr—rare; sp—sporadic, found at places
 Stage at which Hibernation Occurs: A—adult insect (beetle); L—larva; P—pupa
 Site of Pupation: Bk—bark; Rt—root; Sl—soil; St—stem; W—wood of shoots
 Distribution: Af—Africa; Am—America, North; Al—Altai; Amn—America, North; Ams—America, South; As—Asia, Asc—Asia, Soviet central; Asm—Asia Minor; Ass—Asia, northern; Ass—Asia, southern; Cau—Caucasus; Ch—China; Dzh—Dzhungarian Alatau; E—Europe; Ea—Eurasia; Ec—Europe, central; En—Europe, northern; Es—Europe, southern; Ha—the Holarctic; J—Japan; Kam—Kamchatka; Kaz—Kazakhstan; Kazs—Kazakhstan, southern; Kp—Korean peninsula; M—Mongolia; P—Primor'e (Ussuri-Primor'e region); Pa—the Palearctic; Ps—Primor'e, southern; Sa—Sakhalin; Sb—Siberia, eastern; Sbe—Siberia, western; Sbw—Siberia, southwest; Sk—Sakhalin and Kuril' islands; Ta—Taiwan; Tv—Tuva; Ur—the Urals; Urm—the Urals, northern; Urs—the Urals, southern; Vr—Volga region.

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A.I. CHEREPANOV

CERAMBYCIDAE OF NORTHERN ASIA

(in 3 volumes)

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Subfamily PRIONINAE: Tribes Callipogonini, Prionini,
Tragosomini

Subfamily DISTENIINAE: Tribe Disteniini

Subfamily LEPTURINAE: Tribes Xylosteini, Stenocorini,
Lepturini, Necydalini

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