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Description of the Larva of *Enoploderes bicolor* OHBAYASHI (Coleoptera, Cerambycidae)

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Abstract The larva of *Enoploderes bicolor* OHBAYASHI is described, illustrated, and compared with that of *Enoploderes sanguineus* FALDERMANN. Larvae of the two species are very similar to each other and different only in minor morphological characters.

The lepturine genus *Enoploderes* FALDERMANN comprises three species: *E. sanguineus* FALDERMANN from Western Palearctic, *E. bicolor* OHBAYASHI from Japan and *E. vitticollis* (LE CONTE) from North America. Although the two generic names, *Pyrotrichus* LE CONTE and *Pyrenoploderes* HAYASHI, were once applied to *vitticollis* and *bicolor*, respectively, KUSAMA and HAYASHI (1971) considered them as junior synonyms of *Enoploderes*.

The larval morphology has so far been described only for *E. sanguineus* (DANILEVSKY & MIROSHNIKOV, 1981; CHEREPANOV, 1985; SVÁCHA & DANILEVSKY, 1989). The host plants of *E. sanguineus* have been widely known to include such various tree genera as *Populus*, *Salix*, *Fagus*, *Acer*, *Alnus* and *Abies*. North American *E. vitticollis* is reported to feed on *Acer*, *Alnus*, *Populus* and *Umbellularia*, though its larva has not yet been found (HARDY, 1944; LINSLEY & CHEMSAK, 1972). Bionomics of the Japanese species, *E. bicolor*, have been gradually made clear in the last twenty years (ITO, 1976; OKUDA, 1984), and are similar to those of the two other foreign species. All the three species of the genus *Enoploderes* are obviously polyphagous on various broadleaved trees, and *E. sanguineus* and *E. bicolor* have been reported also from conifers (*Abies* in the former, *Cryptomeria* in the latter).

In this paper, larval morphology of *E. bicolor* is described and compared with that of *E. sanguineus*. Morphological terminology used herein is based upon that by SVÁCHA and DANILEVSKY (1989). Indications of cranial ratio are based upon 8 specimens measured.

I wish to express my sincere thanks to Dr. Petr SVÁCHA of the Institute of Entomology, Ceské Budejovice, Czech Republic, for comparing the larvae of *E. bicolor* with those of *E. sanguineus* and drawing Figs. 7, 16 and 17, and to Messrs. Tatsuya NIISATO of Tokyo, Masatoshi TAKAKUWA and Haruki KARUBE of Kanagawa Prefectural Museum of Natural History, Tomio KINOSHITA of Kanagawa, Ituro KAWASHIMA of

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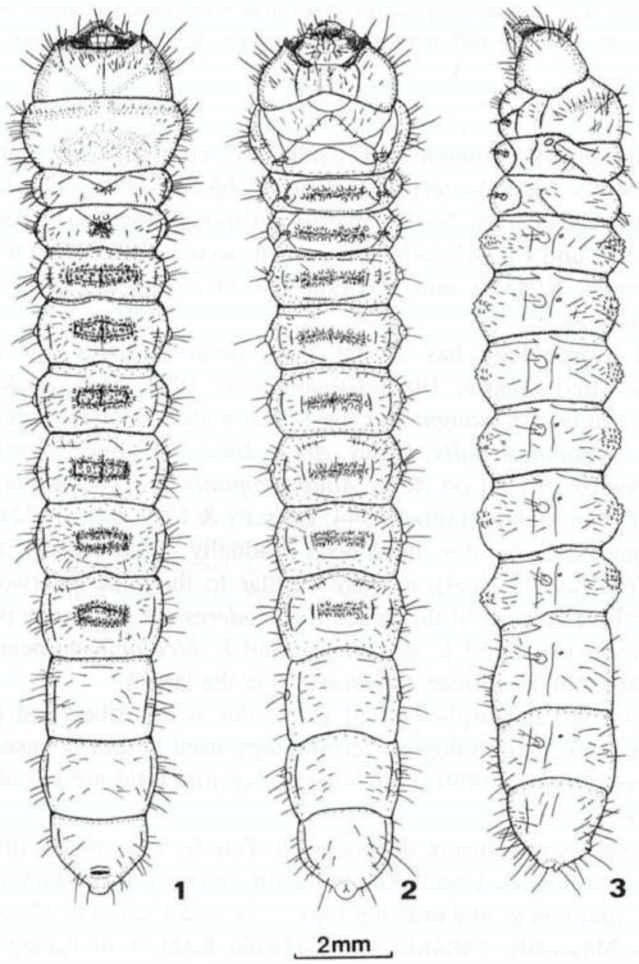
Enoploderes bicolor OHBAYASHI

(Figs. 1–15, 17)

Description. Larva. Body (Figs. 1–3) white, elongate, not flattened, covered with ferrugineous setae. Largest available larva 20 mm in length.

Head (Figs. 4–5) moderately retracted into prothorax, exposing more than half the length, slightly narrower than prothorax. Cranium widest just behind middle, trans-



Figs. 1–3. Larval body of *Enoploderes bicolor*; 1, dorsal view; 2, ventral view; 3, lateral view.

verse (width/length 1.5–1.7), depressed (width/height 2.0–2.3), light yellow except for strongly pigmented mouth-frame, not microgranulate. Epicranium smooth, provided with several setae, both epicranial halves touching at one point on posterior portion, forming about 90° angle.

Frontal lines almost vestigial, reaching anterior margin of cranium; transfrontal line indistinct; frons smooth, transverse (width/length ratio about 1.7–1.9), feebly concave behind; postfrons provided with several short setae, praefrons with more numerous short setae intermixed with several longer ones; epistomal margin sclerotized, with pigmentation particularly broad behind mandibular articulations; three pairs of main epistomal setae close to fronto-clypeal border, occasionally accompanied by several shorter ones; medial frontal line distinct, reaching epistomal margin.

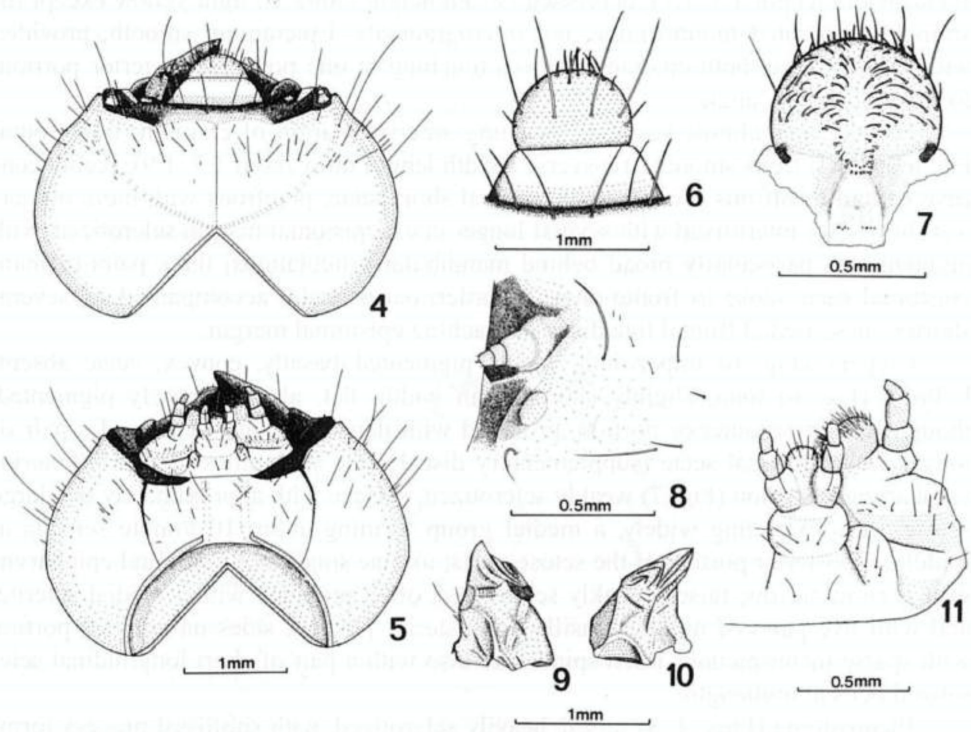
Clypeus (Fig. 6) trapezoidal, feebly pigmented basally, convex; setae absent. Labrum (Fig. 6) long, slightly shorter than width, flat, almost entirely pigmented, though less so on anterior portion, provided with dense marginal setae and a pair of longer isolated discal setae (supplementary discal setae sometimes present). Anterior epipharyngeal region (Fig. 7) weakly sclerotized; surface with approximately two large setose areas extending widely, a medial group forming about 10 minute sensilla at middle of posterior portion of the setose areas; tormae small, oblique. Hind epipharyngeal portion narrow, raised, weakly sclerotized, often provided with a medial sclerite, and with five pairs of minute sensilla on posterior portion; sides on anterior portion with sparse inconspicuous microspines and also with a pair of short longitudinal sclerotized belts at midlength.

Pleurostoma (Figs. 4, 8) raised, heavily sclerotized, with subfossal process forming a small tubercle. Gena (Fig. 8) smooth, weakly pigmented, with a pair of large convex main stemmata (Fig. 8), other stemmata usually indistinct, though sometimes provided with two small pigment spots of dorsal stemmata.

Ventral sclerite forming a combined plate of gula and hypostoma (Fig. 5), which is moderately long (width/medial gular length 2.5–2.9), widest just before the middle, not darker than epicranium, almost flat and smooth, and provided with more than 10 setae on each side; gular line slightly raised; anterior margin almost straight, infuscate except for medial area, and distinctly separated from labio-maxillary base; hypostomal lines narrow, gently curved, reaching postoccipital lines, usually subparallel on posterior sides; metatentorial pits distinct, with medial extremities abruptly curved forwards; medial gular line indiscernible.

Antennae (Fig. 8) two-segmented, remarkably directed ventrad; basal membrane slightly pigmented; antennal ring a little raised, widely connecting membrane; segments slightly pigmented, exposed part of segment 1 distinctly wider than long, segment 2 almost as long as wide, main sensillum conical.

Mandibles (Figs. 9–10) with strong keels running from dorsal angle; border zone indistinctly striate; apex prolonged and sharp, with three distinct inner keels reaching apex; apical part with outer surface distinctly microsculptured; basal part almost smooth, somewhat gibbous laterally, with several setae.



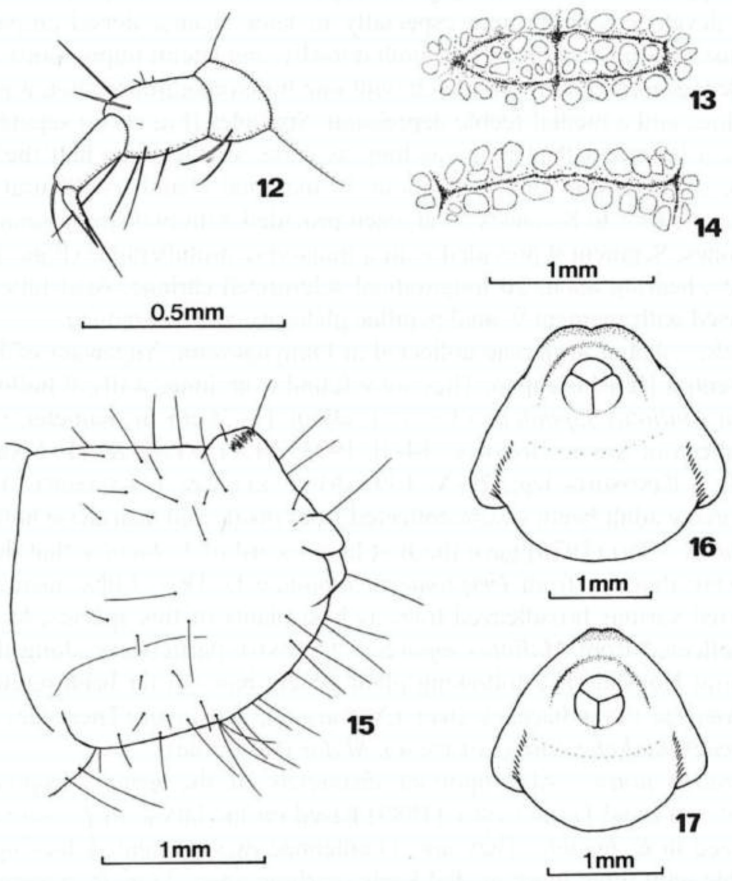
Figs. 4–11. Larval character of *E. bicolor*. —— 4–5. Head: 4, dorsal view; 5, ventral view. —— 6, Clypeus and labrum; 7, epipharynx; 8, left pleurostoma, antenna and genal portion. —— 9–10. Left mandible: 9, dorsolateral view; 10, medial view. —— 11, Labium and left maxilla in ventral view.

Labiomaxillary complex (Fig. 11) not flattened. Basal parts well separated from each other, especially in later instars; submentum tending to fuse with mentum, with a pair of setae; connecting lobe weakly sclerotized, provided with several setae; cardo large, occasionally with a pair of short setae at outer sides. Distal maxilla short, robust; stipes feebly pigmented in basal half; maxillary palpiger short, pigmented basally, provided with some setae; maxillary palpus pigmented; both palpiger and segment 1 without latero-dorsal process, segment 1 about as long as wide, segment 2 longer and slenderer than segment 1, segment 3 slenderest; mala extremely broad (inserted above labium when maxillae are closed), pigmented, medial and apical surface covered with dense setae. Mentum provided with a pair of long setae and some shorter ones. Labial palpigers each provided with a pair of long setae, pigmentation tending to fuse; basal apodeme of praelabium unpigmented; ligula small, sparsely with stout setae, base of ligula not reaching a part between bases of labial palpi, located more dorsally than labial palpus.

Prothorax (Figs. 1–2) tapered towards base; protergal band pale yellow, without

anterior notches, interrupted medially, pigmentation still paler on posterior alar lobes; pronotum roughly irregularly rugose, without lateral furrows, provided with 2 to 5 short discal setae on each side; epipleuron and venter almost unpigmented; latero- and medio-praesterna with many setae; anterior praesternal lobe and sternellar fold without setae, though the former is sometimes provided with 1 or 2 minute setae; coxosternum with several setae; microscopic spines restricted, inconspicuous microspines occasionally present on coxosternum.

Meso- and metathoraces (Figs. 1–2) covered with granules both dorsally and ventrally, of which the dorsal ones are smaller especially on mesonotum, and the ventral ones are along the sides of transsternal line, the ventral granules similar to those of ab-



Figs. 12–17. Larval character of *Enoploderes*. —— 12, Right fore leg of *E. bicolor*; 13–14, ambulatory ampulla (abdominal segment 2) of *E. bicolor*: 13, dorsal view; 14, ventral view; 15, abdominal segments 9 to 10 of *E. bicolor* in lateral and slightly posterior view. —— 16–17. Abdominal end of *Enoploderes* in posterior and slightly ventral view (showing the shape of caudal protuberance, setae omitted): 16, *E. sanguineus*; 17, *E. bicolor*.

domen; alar lobes protuberant; basisternum undivided; coxae poorly defined anteriorly; mesothoracic spiracle (Fig. 3) a little less than twice as long as wide, ferrugineous, with more than 20 small marginal chambers; metathoracic spiracles almost indiscernible; praescutum, scutum and venter covered to some extent with inconspicuous microscopic spines.

Legs (Fig. 12) well developed, slender; hind legs distinctly shorter than half the length of their basal distance; trochanter well developed, provided with several setae; femur and tibiotarsus unpigmented, the former almost as long as the latter, more densely setose; praetarsus shorter than femur, seta arising slightly before the middle.

Ambulatory ampullae of abdomen (Figs. 13–14) present on both dorsal and ventral sides of segments 1 to 6, strongly granulate with microscopic spines restricted and very poorly developed, discernible especially in later instars; dorsal ampullae each with two transverse impressions, a pair both dorsally, and lateral impressions and a medial feeble depression; ventral ones each with one transverse impression, a pair of lateral impressions and a medial feeble depression. Spiracles (Fig. 3) on segments 1 to 8 ferrugineous, a little less than twice as long as wide, smaller than half the length of mesothoracic spiracle, provided with about 10 marginal chambers. Pleural tubercles (Fig. 3) on segments 1 to 8 convex, oval, each provided with two strong setae and several shorter ones. Segment 9 provided with a transverse protuberance (Figs. 15, 17) on dorsal surface, bearing about 20 longitudinal sclerotized carinae. Anal tube (Fig. 15) somewhat fused with segment 9; anal papillae glabrous; anus tri-radiate.

Materials. About 40 larvae collected at Okuyugawara, Yugawara of Kanagawa Prefecture, central Honshu, Japan. They were found from inner walls of hollows of living trunks of *Mallotus japonicus* (THUNB.), about 15–25 cm in diameter. Collecting data and collectors are as follows: 14–II–1993, M. TAKEDA & H. KARUBE leg.; 17–XI–1993, T. KINOSHITA leg.; 29–V–1994, M. TAKEDA & T. KINOSHITA leg. In the spring time, many adult beetles were collected from inside and near these hollows.

Host plants. ITO (1976) gave the first host record of *E. bicolor* that dead adults specimens were dug out from *Cryptomeria japonica* D. DON. Subsequently, OKUDA (1984) reported various broadleaved trees as host plants of this species. Many adults have been collected from *Mallotus japonicus* (THUNB), particularly along the Pacific coast of central Honshu. The following plant genera have so far been reported as its hosts: *Cryptomeria* (Taxodiaceae), *Acer* (Aceraceae), *Stewartia* (Theaceae), *Mallotus* (Euphorbiaceae), *Rhdodendron* (Ericaceae), *Malus* (Rosaceae).

Comparative notes. All important characters of the genus *Enoploderes* described by SVÁCHA and DANILEVSKY (1989) based on the larvae of *E. sanguineus* are also recognized in *E. bicolor*. They are: 1) antennae two-segmented, lacking segment 3; 2) mandible with three inner medial keels reaching apex; 3) mala extremely broad; 4) submentum tending to fuse with mentum; 5) base of ligula not reaching a part between bases of labial palpi, located more dorsally than labial palpus; 6) both dorsal and ventral abdominal ambulatory ampullae present on segments 1 to 6 only; 7) abdominal tergum 9 provided with slightly sclerotized transverse protuberance; 8) anal tube al-

most fused with abdominal segment 9. The combination of the above characters will readily distinguish the genus from other known lepturine larvae.

The larvae of *E. bicolor* and *E. sanguineus* are closely related to each other, but they can be distinguished by the following key:

1 (2) Caudal protuberance broader, rather distinctly bilobed, weakly sclerotized and microsculptured, with rather vestigial longitudinal striation (Fig. 16); Caucasus, Transcaucasia, North Iran, ?Asia Minor, Balkan Peninsula . . . . . *E. sanguineus.*

2 (1) Caudal protuberance narrower, gently bilobed, usually more heavily sclerotized, with rather distinct longitudinal striation (Figs. 15, 17); Japan . . . . . *E. bicolor.*

Some additional, less pronounced and less reliable differences are as follows: ventral cranial sclerite longer in *E. bicolor* (2.5–2.9) than in *E. sanguineus* (about 3–3.1); hypostomal lines subparallel in *E. bicolor*, slightly divergent posteriad in *E. sanguineus* (this character is usually variable); anterior praesternal lobe provided with distinct setae in *E. sanguineus*.

要　約

武田雅志：ヒラヤマコブハナカミキリの幼虫の記載．—— Svácha & Danilevsky (1988)が，ユーラシア大陸西部に分布する同属の*Enoploderes sanguineus* Faldermann に基づいて示した，ヒラヤマコブハナカミキリ属*Enoploderes*の幼虫の特徴である，1）触角が2節，2）大顎の内側中央に先端に達する3本の溝がある，3）葉節がとくに幅広い，4）下唇節が下唇基節と融合する傾向がある，5）舌の基部は下唇肢の基部の間に届かず，背面寄りに位置している，6）腹節の歩行隆起が背面，腹面とも第1~6節にある，7）第9腹節背面に横長の隆起がある，8）肛門管が第9腹節とやや融合する，などを，日本のヒラヤマコブハナカミキリも同様にそなえていた．ヒラヤマコブハナカミキリと*E. sanguineus*は，第9腹節背面の横長の隆起がヒラヤマコブハナカミキリの方で小さく，節片化がより進み，*E. sanguineus*にはみられない縦のすじ状となっていることで区別できる．

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A Host Record of *Oligoenoplus rosti* (Coleoptera, Cerambycidae)

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Kalopanax pictus NAKAI is the only known larval host plant of *Oligoenoplus rosti* (PIC). Recently, I have found out that *Quercus mongolica* FISCHER is an additional larval host plant of this cerambycid species. The collecting data are as follows:

Hinoemata-mura, Minamiaizu-gun, Fukushima Prefecture, central Honshu of Japan, 1 ex., 3–V–1993, 2 exs., 18–VI–1995, M. TAKEDA leg.

In the former case, I obtained an adult beetle in the pupal cell made in the bark of a newly fallen trunk more than 50 cm in diameter, with tunnel and frass made by larva. It is certain that this beetle fed on *Quercus mongolica* for its immature stage. In the latter case, I obtained two adult beetles gathering on the living trunk more than 50 cm in diameter. It is most probable that the beetles gathered for mating or laying eggs. Consequently, it is certain that *Oligoenoplus rosti* feeds on the bark of living trunk of *Quercus mongolica*.

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