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Descriptions of the Egg and First-Instar Larva of *Clytra arida* Weise (Coleoptera : Chrysomelidae)*

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The egg and first-instar larva of *Clytra arida* Weise are described and illustrated for the first time from Japan, and the affinity of the subfamily Clytrinae to the Cryptocephalinae and Chlamisinae is reconfirmed on the larval characters.

INTRODUCTION

The genus *Clytra* is an extremely small genus of the subfamily Clytrinae distributed in America, Europe and Asia, and only one species, *Clytra arida* Weise, is reported to occur in Japan.

The larvae of this genus are known to live in the nests of the ant genera *Formica*, *Camponotus*, *Lasius* and *Cataglyphis* (Medvedev, 1962). According to the study on European *Clytra quadripunctata* by Donisthorpe (1902), the female drops the eggs on to the ground beneath from a tree or shrub above or close to a nest of host ant. The egg is held in the depression of the abdomen and an excrement is coated by rotating it by the hind tarsi before dropping. The covered egg looks like a small plant detritus, and is carried by the ant into the nest. The larva lives in the nest of ant in a case, and feeds on vegetable refuse there. Biology of the Japanese species is not known except for its host plants of the adult.

For the larvae of this genus, *Clytra quadripunctata* was first properly illustrated by Böving and Craighead (1931). Descriptions and a key to genera and species of the Clytrinae by the larvae were presented by Medvedev (1962) including *Clytra quadripunctata* and *C. atraphaxidis*, and another key was made by Gulyarov and Medvedev (1964) by adding *C. laeviuscula* to these two species. The present paper is aimed to provide detailed descriptions of the egg and the first-instar larva of *Clytra arida* as the basic data for the phylogenetic study of the family Chrysomelidae.

MATERIALS AND METHODS

The material used in this study was obtained by rearing the adults in the laboratory. The eggs and larvae were preserved in 70% ethyl alcohol. The larva was macerated in 10% KOH solution for several minutes. The dissection was carried out under a stereoscopic microscope, using a sharp needle and pointed forceps. For

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detailed morphological studies on the minute structure of the larva, the parts were mounted on slides and observed through the compound microscope. The morphological terms used in this study are followed principally after LeSage (1982).

IMMATURE STAGES

Clytra arida Weise

(Figs. 1-3)

Egg. Egg covered by a case like a small pinecone (Fig. 1. C), brown, 1.4-1.8 mm long, 1.1-1.2 mm wide (n=10); egg stalk absent.

Larva. Body typically J-shaped, with last five abdominal segments directed forwards (Fig. 1. A). Head brown, prothorax pale brown, meso- and metathorax and abdomen yellowish; legs pale brown, long and slender. Egg bursters present on DLpi of meso- and metathorax.

Head (Fig. 2. A, C). Hypognathous, oval, well sclerotized. Epicranial suture well developed, Y-shaped; coronal suture about one-third the length of head, frontal sutures broadly divergent and weakly bisinuate. Stemmata (Fig. 2. C) well developed, 6 in number, distributed in 2 groups, 4 pairs of posterior stemmata behind antennae and 2 pairs of anterior stemmata below antennal bases; 3 pairs of stemmatal setae (ss) present, **ssl** below posterior group of stemmata, **ss2-3** in anterior group of stemmata. Epicranium (Fig. 2. A, C) with 4 pairs of posterior minute epicranial setae (pesl-4) arranged in oblique row beside posterior epicranial sensillum (pesm); 5 pairs of dorsal epicranial setae (des); **desl** papillate, **des2** and **3** simple, **des4** and **5** filiform and weakly papillate; **desl** before **desml**, **des2** more lateral in position, **des3** long, **des4** short and between **desm2** and **desm3**, **des5** rather long and above posterior stemmata; 3 pairs of lateral epicranial setae (les); **lesl** simple between **lesml** and **lesm2**, **les2** simple and beside posterior stemmata, **les3** simple and beside **lesm2**; ventral epicranial sensilla (**vesm**) below **desml**. Frons (Fig. 2. A, C) with 6 pairs of papillate frontal setae (**fs**) arranged in 3 transverse rows: **fsl** located in basal fifth above frontal sensilla **fsm** forming first row; **fs2** and **fs3** corresponding to second row; **fs4-6** filiform and weakly papillate in line at apex of frons, making third row. Frons, clypeus and labrum completely fused, without their boundaries. One pair of filiform and weakly papillate clypeal setae (**cs1**) and 1 pair of sensilla (**csm**) located medially in fusion area of frons and clypeus. Three pairs of labral setae (**lbs**) present; **lbs1** simple, on disc below **cs1**, **lbs2** filiform and weakly papillate, along lateral margins, **lbs3** papillate, along lateral margins. Labrum (Fig. 1. F and Fig. 2. A) transverse; anterior margin sinuate with 3 weak protrusions, median part of anterior margin double edged dorso-ventrally, its ventral edge produced semicircularly. Epipharynx (Fig. 1. B, F) with 7 pairs of anterior epipharyngeal spiniform setae (**esl-7**), of which outermost one short; epipharyngeal sensilla (**epsm**) grouped in 2 clusters: 2 in anterior cluster, 10 in posterior cluster on U-shaped line. Antenna (Fig. 2. B) 2-segmented, segment 1 with 2 sensilla, segment 2 with a membranous dome-like sensory papilla and 8 minute and one long seta at apex. Mandible (Fig. 1. E) with 4 teeth, without mola, penicillus and retinaculum, with 2 mandibular setae (**ms**) and 1 sensillum (**msml**) located dorsoventrally, and 1 sensillum (**msm2**) near base of innermost tooth. Labium (Fig. 3. B, C) with prementum and postmentum not fused together; postmentum with 3 pairs of postmental setae (**pos1-**

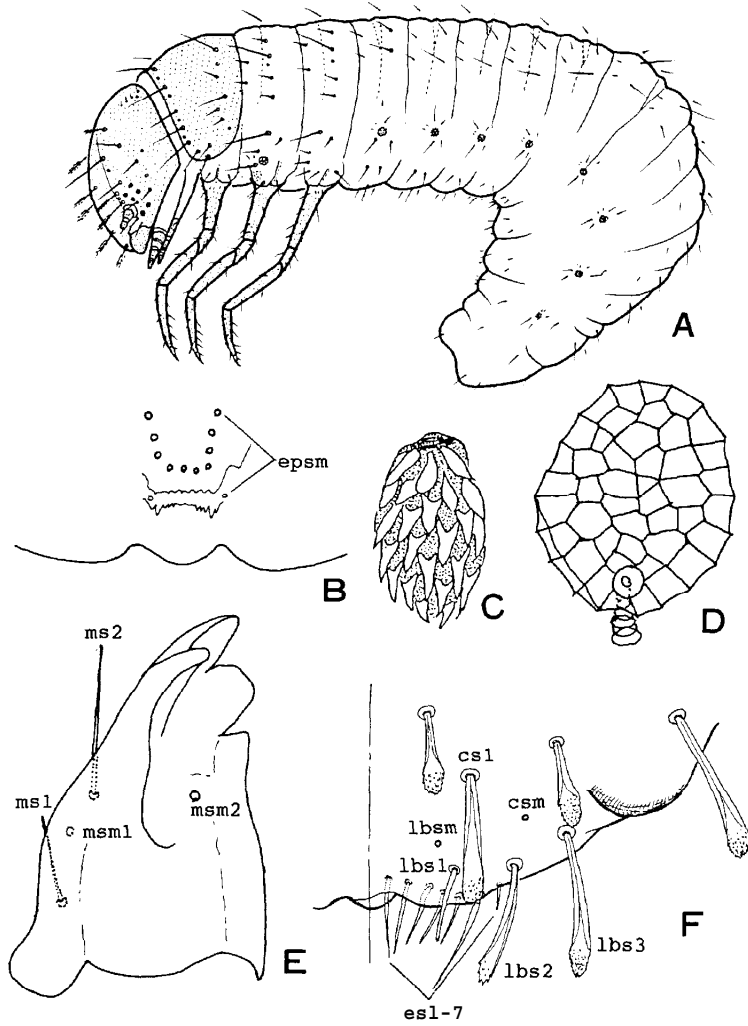


Fig. 1. *Clytra arida* Weise. A, larva, case removed, lateral view ; B, epipharynx ; C, egg ; D, 1st abdominal spiracle ; E, mandible, ventral view ; F, clypeus, labrum and epipharynx, dorsal view.

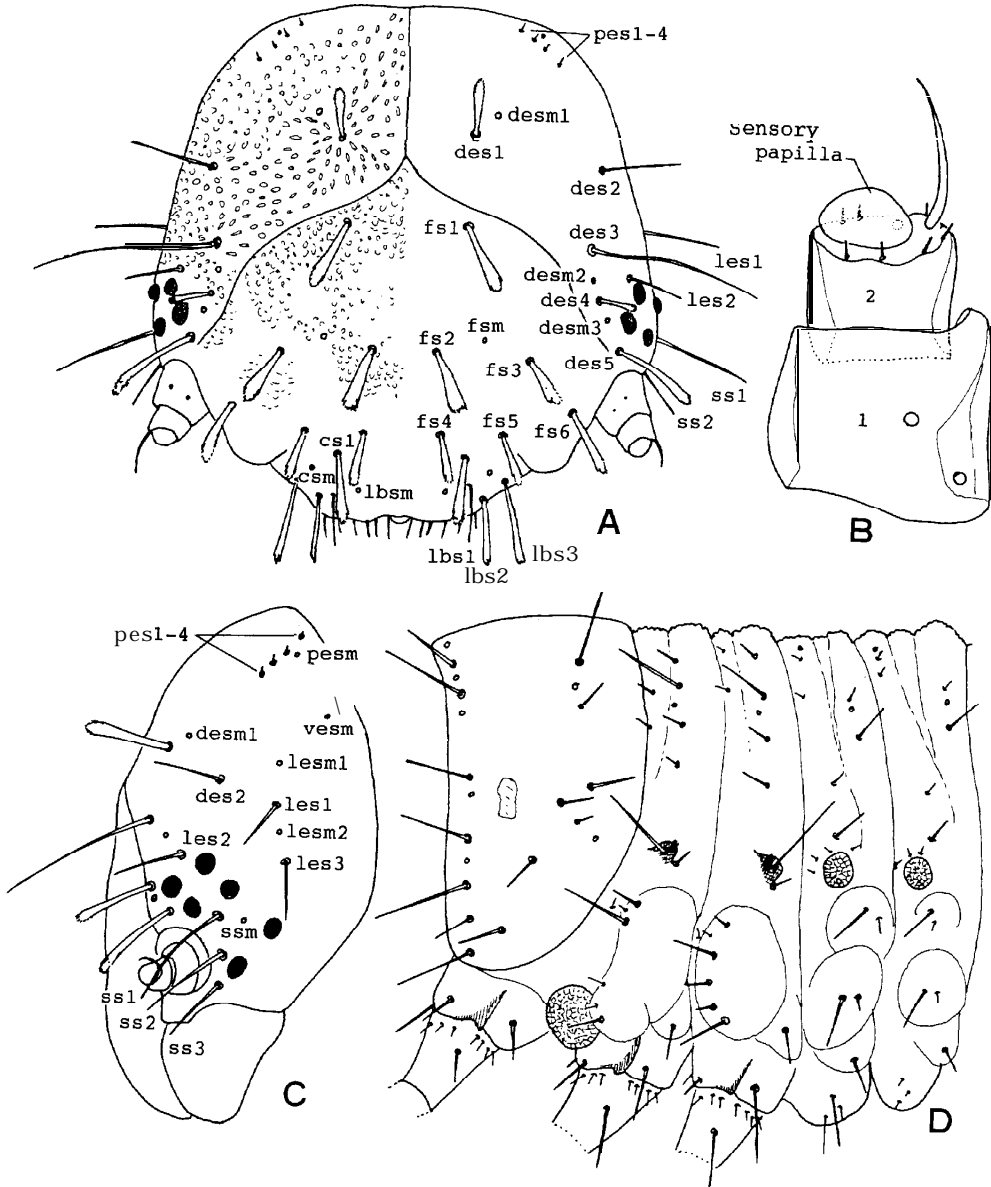


Fig. 2. *Clytra arida* Weise, larva. A, head, dorsal view; B, antenna; C, head, lateral view; D, thorax and abdominal segments 1 and 2, lateral view.

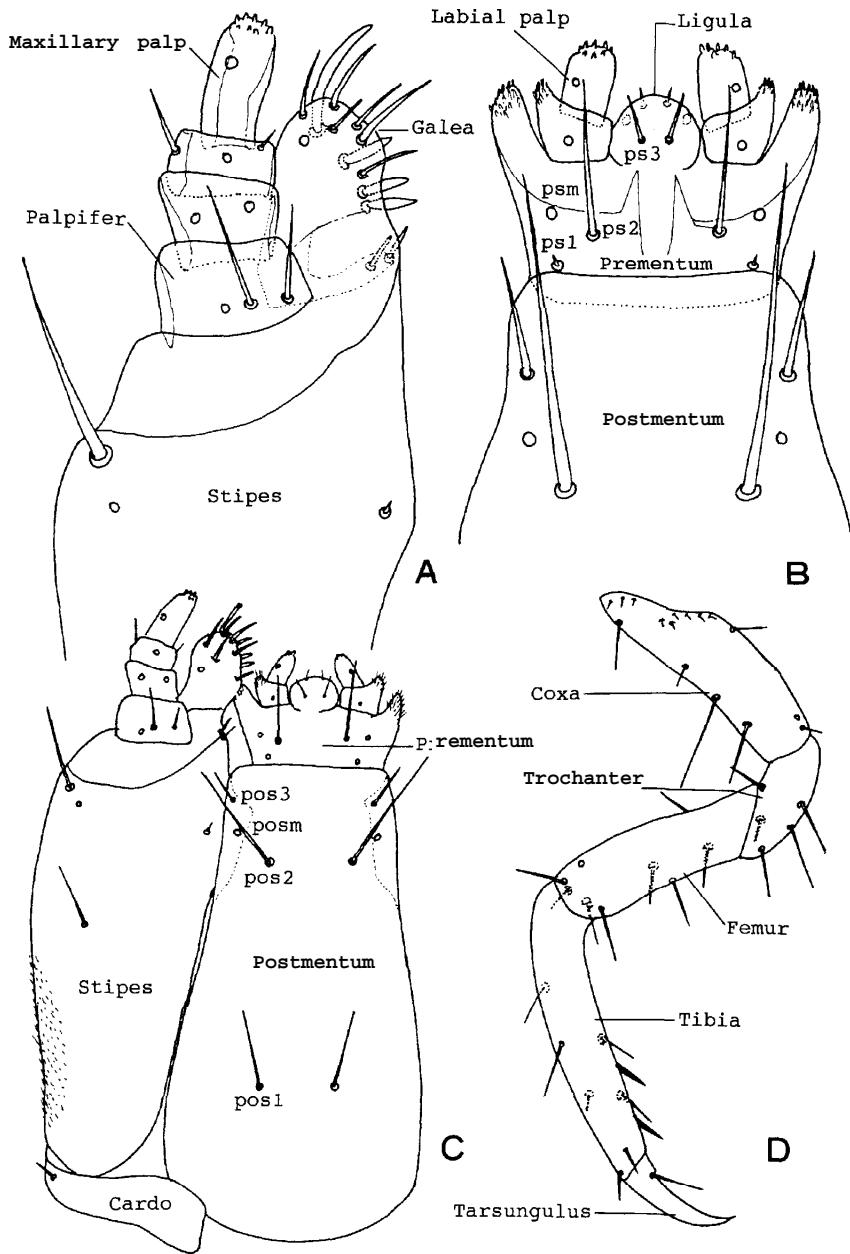


Fig. 3. *Clytra arida* Weise, larva. A, maxilla ; B and C, labium, ventral view ; D, fore leg, lateral view.

3) and 1 pair of sensilla (posm) ; prementum with 3 pairs of premental setae (ps1-3) and 1 pair of sensilla (psm), with numerous microtrichia on protrudent parts ; ligula with 1 pair of setae and 1 pair of sensilla. Labial palp 2-segmented, segment 1 with 1 sensillum and numerous microtrichia externally, segment 2 with 1 sensillum. Maxillary palp 3-segmented, segment 1 with 2 sensilla, segment 2 with 2 setae and 1 sensillum, segment 3 with 1 sensillum. Palpifer with 2 setae and 1 sensillum. Stipes with 2 rather large outer marginal setae, 1 minute inner seta, 1 sensillum and numerous microtrichia on latero-posterior surface ; lacinia fused with stipes, forming elongate process at inner apical corner of stipes, bearing 2 spiniform apical setae ; galea with 6 ventral and 4 dorsal setae and 1 ventral sensillum. Cardo with 1 seta.

Thorax (Fig. 2. D). Pronotum well sclerotized, pale brown, with 14 pairs of setae and 7 pairs of sensilla. Meso- and metanotum yellowish, not sclerotized, bearing a few setae. Mesothoracic spiracle (Fig. 1. A, D) uniform, situated on epipleural anterior (EPa) part ; peritreme oval, convex, reticulate ; spiracular opening round. Legs (Fig. 3. D) elongate, without pulvillus. Pro-, meso-, and metathoracic legs similar in color, shape and chaetotaxy ; coxa with 15 setae (9 of them minute), trochanter with 5 setae, femur with 8 setae and 1 sensillum, tibia with 9 setae (2 of them stout and spiniform) ; tarsungulus slightly curved, falciform, with 1 seta at base.

Abdomen. Strongly bent forwards (Fig. 1. A), J-shaped, not sclerotized. Spiracles present on segments 1-8 similar to mesothoracic spiracles but smaller. Epipleuron and pleuron each with 2 setae on each side ; pedal area with 1 seta on each side ; eusterium with 3 setae on each side.

Larval case. Shape pinecone-like, 1.8-2.0 mm long, 1.2-1.3 mm at widest diameter (n = 10). Color dark brown. The larval case is essentially similar in shape and color to eggs.

Body length: 1.8 mm.

Head width : 0.53 mm.

Material examined. Togakushi, Nagano Pref., 17. VII. 1988, larvae collected and reared on leaves of *Lespedeza cyrtobotrya* Miq.

DISCUSSION

The larva of this species is separable from the other known species by the surface sculpture of the head, and number and arrangement of the papillate setae on the epicranium. Though Böving and Craighead (1931) figured only five stemmata (= ocelli) on the larva of *Clytra quadripunctata*, they probably overlooked one stemma in the ventral group, which has always two stemmata in Japanese species. These stemmata are black and shiny like the head capsule itself, and consequently difficult to see.

The larvae of the subfamily Clytrinae show many affinities with those of the Cryptocephalinae and Chlamisinae on the following points : The abdomen bends J-shapedly, with the last five abdominal segments directing forwards for an adaptation of the life in a case. The frons and clypeus are fused and their boundary suture is absent. The endocarina is absent. The maxillary palp is three-segmented excluding palpifer. The lacinia is fused with the stipes. The egg-bursters are present on the dorso-lateral postero-interior (DLpi) part of the meso- and metathorax. But this subfamily is characteristic in the antenna, which is two-segmented, and its sensory

papilla is a broad and pillbox-shaped. The chaetotaxy of the head, thorax and abdomen has not been properly described nor compared on the larvae of these sub-families. The spiracle of *Clytra arida* is remarkable by the convex and reticulate peritreme.

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