

## Description of larva and pupa of *Plagionotus scalaris* (Brullé, 1832) and distinctive host plant for Central Spain populations (Coleoptera, Cerambycidae, Cerambycinae)

José M. Hernández<sup>1</sup> & Juan J. de la Rosa<sup>2</sup>

With 4 figures

### Abstract

The first larval instar, last larval instar and pupa of *Plagionotus scalaris* (Brullé, 1832) are described and illustrations of habitus and structural features are provided. Some notes on natural history and habits of immatures stages are provided. Importance of immature stages in taxonomic review of this group are discussed. Larvae and pupae were found feeding on roots of the Malvaceae *Lavatera triloba* (L.), single host plant observed for Central Spain population of this species, where associated adults feed on flowers. An ecological differentiation with others populations of *Plagionotus scalaris* are indicated.

**Key words:** Immature stages, *Plagionotus scalaris*, *Lavatera triloba*. Iberian Peninsula.

### Introduction

Larvae of some species of genus *Plagionotus* as *P. arcuatus* (L., 1758), *P. pulcher* Blessig, 1872, *P. detritus* (L., 1758) and *P. lugubris* (Ménétrières, 1832) feed subcortically in deciduous trees, such as *Quercus*, *Carpinus*, *Fagus* and others (Svacha & Danilevsky 1988). *P. scalaris* (Brullé, 1832) and *P. floralis* (Pallas, 1773) have been related into herbaceous plants such as *Euphorbia gerardiana* Jacq., *Medicago sativa* L., *Malva sylvestris* L., *Lavatera stenopelata* Coss and *Lavatera triloba* (L.) (Duffy 1957: 152, López-Colon 1994, 1997, Ruiz-García et al. 1994, Villiers 1946, 1978). Larva of *P. floralis* has also been reported as a pest in alfalfa, *Medicago sativa* (Akbari Noushad & Kazemi 1995).

Larvae of *P. arcuatus*, *P. pulcher*, *P. detritus* and *P. lugubris* have been described by Svacha & Danilevsky (op.cit.) and a key of larval characters is provided. In *Plagionotus scalaris* and *P. bobelayei* (Brullé) there is no immature stages described.

The geographical distribution of *P. scalaris* includes North Africa from Tunisia to Morocco, Asia Minor, Greece, South of Italy, Balearic Islands and centre and south-east of Iberian Peninsula.

It is remarkable that a considerable amount of confusion about the group *P. scalaris* – *P. bobelayei* – *P. floralis* has been caused by the closed taxonomic relationship between these species and by repeated citation of individuals of *P. scalaris* and *P. bobelayei* under the name of *P. floralis*. Sama (1994) judge that the group *P. scalaris* – *P. bobelayei* – *P. floralis* can be established as a single species and, in fact, must be reviewed conjunctly. Recently, López-Colon (1997) has described a new species from Central Spain, *Plagionotus marcae*, ascribing to this new species populations usually assigned to *P. scalaris*, which was closely related to the group named above. Until this group will be revised according with Sama (op.cit.), we have used the traditional taxonomic position, ascribing Central Spain populations to *P. scalaris*.

The purpose of this paper is to describe and illustrate larva and pupa of *Plagionotus scalaris* (Brullé) and verify the ecological differentiation between Central Spain populations and others European and North African populations

### Material and methods

Last instar larvae used for description were collected on *Lavatera triloba* roots in Seseña (Toledo, Spain). First instar larvae and pupae were obtained in laboratory from eggs and

<sup>1</sup> Dpt. Animal Biology (Entomology), Faculty of Biology, Complutense University, 28040-Madrid, Spain.  
E-mail: jmh@eucomax.sim.ucm.es

<sup>2</sup> Dpt. Zoology and Forest plagues, EUIT Forestal, Polytechnic University, 28040-Madrid, Spain.  
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last instar larvae, respectively. They were immediately killed and stored at Sherpeltz's solution (Water, 60%; Alcohol, 39,5% and Acetic acid, 0,5%). Observations about imago and larva breeding habits were made on several populations in Madrid and Toledo provinces (Central Spain). In captivity breeding, artificial diets described in Hernández (1994) were employed. For study habits, several plants were maintained in experimental garden with immature stages and adults.

The whole individuals used in this study are deposited at Animal Biology I Department, Faculty of Biology, Complutense University of Madrid (Coll. UCME).

## Results

### Host plants

Adults are observed feeding exclusively on flowers of *Lavatera triloba*, although other Malvaceae species was near. *Malva sylvestris* is particularly abundant in studied area, but never was observed any *Plagionotus scalaris* on this plant. Likewise, oviposition only occurs on *Lavatera triloba* and, following, larval instar only was collected on roots of this Malvaceae.

### Last larval instar

Figs 1–2

General body form elongate, robust. Color light yellow, particularly dorsal side of pronotum. To-

tal length, 20–26 mm; maximum width, 4–6 mm (at pronotum).

Short setae on all body segments, more dense on pronotum, lateral plates of thoracic and abdominal segments and dorsal surface of abdominal ampullae.

Head (Fig. 2a–d): General color light yellow-brown with strongly pigmented dark brown mouthframe and apical fourth part, external and esclerotized. Three basal part let into prothorax.

General head form more or less quadrate, almost as longer as wide. Sides diverging posteriorly and rounded behind middle. Posterior margin straight with a small concavity medially. Anterior margin straight, procurved behind antennae and clipeus. Several short setae along the anterior margin, particularly two behind each one of antennal fossae and 2–3 in lateral margin.

Dorsal surface with pigmented dark brown and inverted "Y"-shaped area; with a depression where head upper retractor muscle attaches posteriorly.

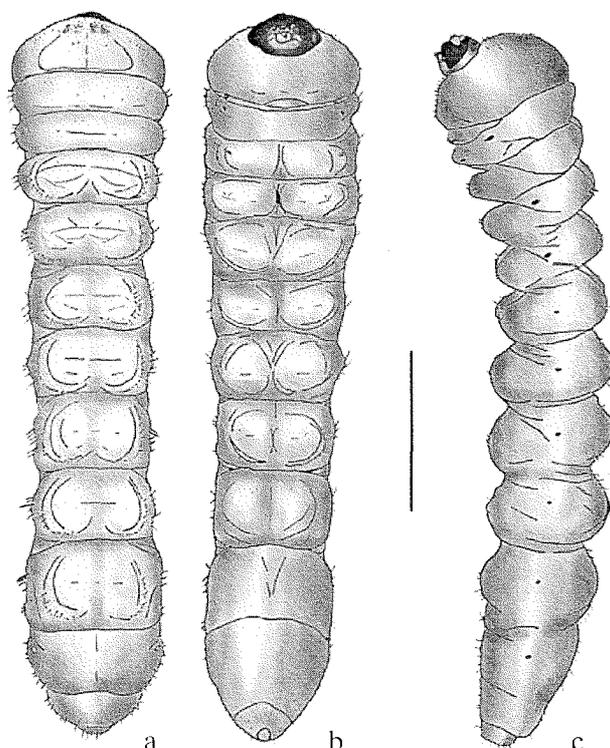


Fig. 1. Last larval instar of *Plagionotus scalaris*. a. Dorsal view. b. Ventral view. c. Lateral view. Scale line: 6 mm.

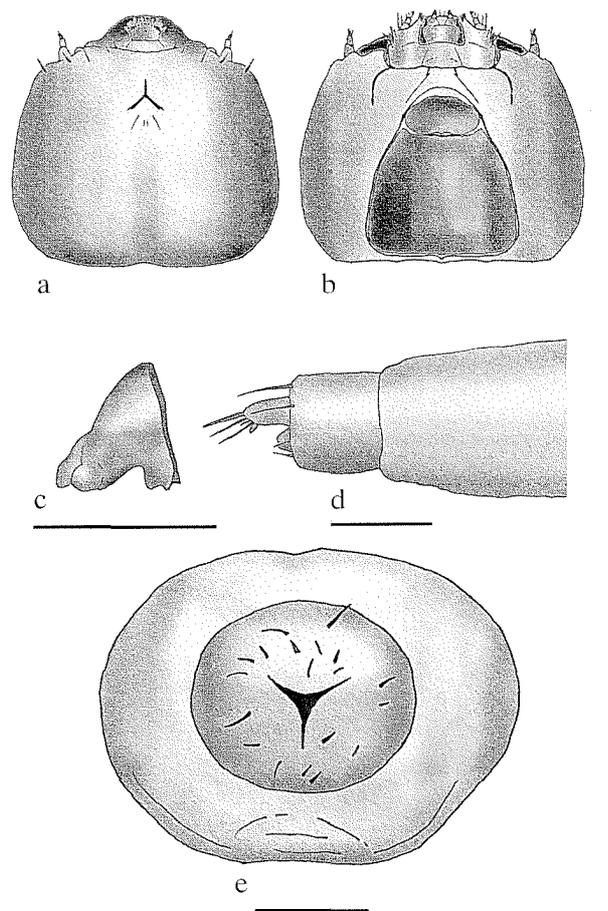


Fig. 2. Larva of *Plagionotus scalaris*. a. Head, dorsal view. b. Head, ventral view. c. Right mandible. d. Antenna. e. Segments IX and X with anus in posterior view. Scale line, a, b, c, e: 1 mm. d: 0.2 mm.

Antennal ring closed. Antennae with three segments. First segment elongates, longer than wide. 2<sup>nd</sup> segment shorter, almost as long as wide in some larvae, with truncated sensillum cone-shaped and some short peripheral setae. 3<sup>rd</sup> segment elongate, with truncate apex and eccentrically inserted in 2<sup>nd</sup> segment; with two small sensillum and three setae almost as long as the 3<sup>rd</sup> segment.

Dorsal and ventral stemmata absent. Three pairs of lateral stemmata present surrounded by gena pigmentation. Corneae convex. Poststemmatal protuberance absents. Gena finely rugose, pigmented, with a row of long setae and with some short setae. Subfossal process absent.

Ventral esclerite with some short setae, anterior margin straight and pigmented. Gula brown, transverse. Hipostomal and gular lines present, overcoming occipital margin. Hipostoma smooth and yellow, except for anterior margin brown.

Clipeus strongly transverse. Labrum oval, transverse and with long peripheral setae.

Labiomaxillary complex attached to ventral sclerite by about 3–4 widths of gula. Maxillas with long lateral setae. Upper margin of maxillary palpiger with long setae. Mala prominent, with apex rounded and long setae.

Maxillary palpe with three segments, Every one more wider than the next one. 3<sup>rd</sup> segment with apex rounded. All segments with short setae.

Submentum slightly pigmented, with two basal setae. Mentum and Praementum with basal pigmentation and with long setae. Labial palpiger strong; labial palpes with two segments, 1<sup>st</sup> longer and wider than 2<sup>nd</sup>, both with setae. Ligula rounded, with setae and longer than 1<sup>st</sup> palpal segment.

Three-cornered mandible, strong, with one dorsal lateral salient, one ventral apophysis with spherical head and one lower concavity where epicranial apophysis is articulated. Mastication area wide, slightly concave in apical middle. Mandibles each with three short setae on external side.

**Thorax (Fig. 1):** Prothorax transverse, with yellow pigmentation, more orange-coloured on pronotum and alar lobes. Numerous short setae dorsally, especially on pleural region. Posterior area of pronotum shining, with two lateral grooves convergent medially in posterior third part and one basal groove shortly distinct. Episternum slightly delimited ventrally near hind margin. Mediopraesternum fused with lateropraesternum. Spinasternum distinct.

Coxal lobes distinct on all thoracic segments. Legs present and short, trochanter absent, femur with two setae and tibia with one short seta.

Mesothorax shorter than prothorax and similar width. Mesothorax tergum smooth, with numerous short setae, longer on lateral margin. "X"-shaped groove absent, only one transversal groove slightly distinct. Three divisions of epipleurum distinct, with lateral spiracle more than twice longer than wide. Sterna of mesothorax divided by one transversal groove slightly distinct.

Metathorax more straight than pro- and mesothorax, less pubescent. Tergum and sternum of metathorax divided by transverse grooves. Epipleurum without spiracle.

Surface of three thoracic segments microgranulate.

**Abdomen (Fig. 1):** Segments I–VII similar in length and width, longer last two. Each dorsal ampulla with lateral longitudinal grooves and one transverse groove, generally discontinuous. Some ampullae with fragments of 2<sup>nd</sup> transverse groove.

Abdominal ampullae with short setae, specially on lateral posterior area. All abdominal ampullae coarsely microgranulate, shining. Pleural discs indistinct.

Segment VIII longer and wide than others, tergum and sternum smooth, without ampullae and divided by medial longitudinal groove dorsally. Pleural discs indistinct.

Segment IX short, transverse, smooth and with numerous short setae.

Segment X small and rounded behind middle. Anus three radiated. Short setae on surface of segment.

**Tracheal system (Fig. 1c):** Nine pairs of functional spiracles without marginal chambers, 1 pair in mesothorax and 1 pair in each abdominal segments I–VIII. Thoracic spiracle nearly 3 times longer than wide and about 1.5 times longer than abdominal spiracles.

### First larval instar

Fig. 3

General body form elongate. Color white–light yellow. Total length, 1.5–2.0 mm; maximum width, 0.5 mm (at pronotum).

Similar structure to last larval instar, with ten visible segments. Head proportionally larger than posterior instars and most of head outside pro-

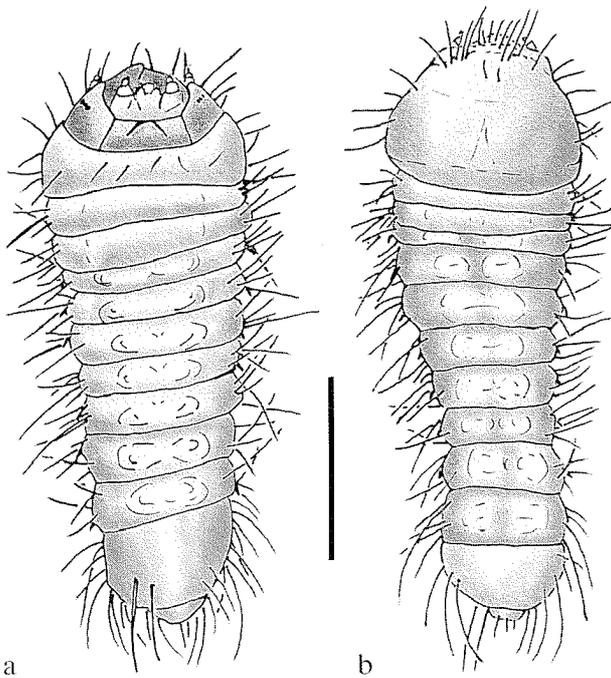


Fig. 3. First larval instar of *Plagionotus scalaris*. a. Ventral view. b. Dorsal view. Scale line: 0.5 mm.

notum (about middle part external). Setae with similar distribution and longer than posterior instars, especially in last abdominal segments.

Three pairs of main stemmata present. Labio-maxillary complex and other mouthparts like last larval instar.

Like other Cerambycinae (Hinton 1981), there is no present special egg-buster structures, only one short and robust spine on each side of first 8

abdominal segments, absent in posterior larval instar. Several authors have attributed only an ambulatory function to these structures (Pavan 1948), however, longitudinal chorion hatching is in agreement with an egg-buster role of these spines (Duffy 1953, Hinton 1981).

### Pupa

Fig. 4

Exarate. Length 20–23 mm. Color light yellow-brown.

Head: Without setae, clipeus distinct and eyes developed. Antennal tubercles shortly distinct, with basal grooves. Antennal thecae fit backward, overcoming the metathorax or, sometimes, first abdominal segments.

Thorax: Pronotum rounded, transverse and smooth, with posterior margin raised. Middle part of posterior margin with a short tubercle fit backward.

Mesothorax transverse. Elytral theca long and without setae, procurved behind anterior leg. Some short setae on posterior third part. Sternal side smooth, with two rows of short setae and divided by longitudinal and transversal grooves.

Metathorax more long than mesothorax, slightly transverse. Wing theca without setae, smooth and with apex rounded; procurved behind medial legs. Tergum of metathorax divided by one large and smooth elevation longitudin-

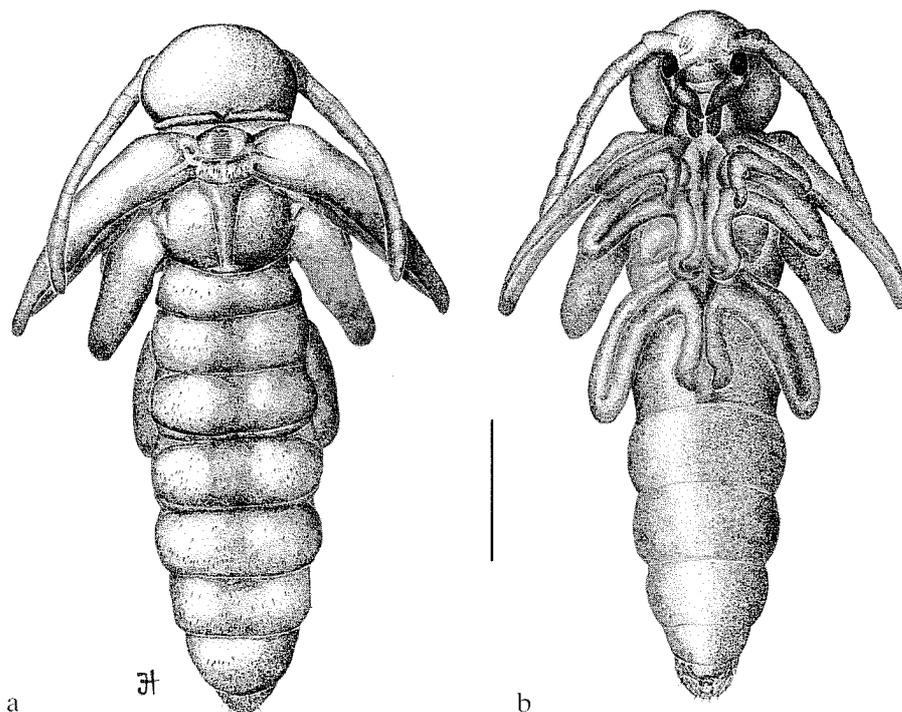


Fig. 4. Pupa of *Plagionotus scalaris*. a. Dorsal view. b. Ventral view. Scale line: 5 mm.

ally. Some transversal grooves laterally. Sternum divided by one longitudinal groove.

**Abdomen:** Nine visible segments. Segments I–VI transverse. Terga I–VI with short setae. Sterna I–VI smooth, only some short setae on lateral sides. Segment VII longer than I–VI and rounded behind middle, with short setae more abundant on tergum. Segment VIII short, with posterior margin rounded and with short setae on both tergal and sternal sides. Segment IX small, rounded, and visible only in ventral view (covered dorsally by segment VIII); with two strong setae on posterior margin.

**Sexual dimorphism distinct:** male with venter of sternum VIII entire and with one transverse protuberance; female with venter of sternum VIII prolonged as two apically rounded papillae.

**Tracheal system:** Nine pairs of functional spiracles without marginal chambers, on each side in dorsolateral region: 1 pair in mesothorax, near prothorax, and 1 pair in each abdominal segments I–VIII.

## Discussion

Literature about immatures of the family Cerambycidae is abundant in those species with economical importance. However, immatures of most innocuous species are unknown. Genus *Plagionotus* is only known by Svacha & Danilevsky (1988), where larvae of four species of this genus are described. Results shown in this paper are according with general description of genus *Plagionotus* provided by Svacha & Danilevsky (1998).

Because of inadequate knowledge on species of *Plagionotus*, it is premature to discuss in detail differences and phylogenetic relationships in known larvae. However, several differences between larvae of known species, specially concerning to abdominal ampullae microgranulation and grooves, indicate that immature stages can be employed in phylogenetic research of this genus, particularly jumbled in some groups of species.

The group of *P. scalaris*, *P. bobelayei* and *P. floralis* serves to illustrate last point, as we are considered above. *Plagionotus scalaris* is the first species of this group where immature stages are described, and a further complication is that *P. scalaris* shows a wide geographical distribution with several local forms.

The results about host plant obtained in this study are in disagree with observations on others

*Plagionotus scalaris* populations (see "Introduction"), and can indicate an ecological differentiation of Central-Spain communities, according with others morphological particularities, principally corporal colour lines (López Cólón 1994, 1997).

It is obvious that further studies about different populations of *P. scalaris*, *P. bobelayei* and *P. floralis* must be developed before we can discuss the taxonomic validity of these species and its phylogenetic relationships.

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