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**Immature Stages and Biology of *Drapetes biguttatus* (PILLER)  
(Coleoptera, Lissomidae)**

[With 30 figures in the text]

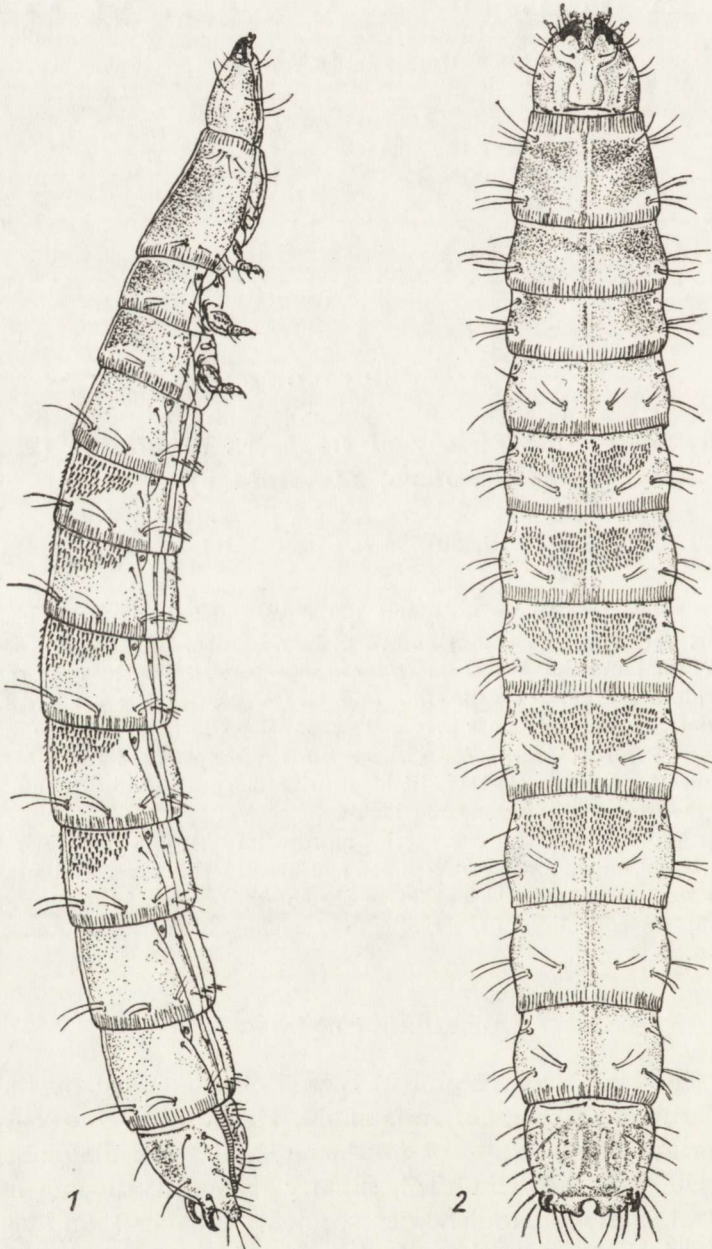
The family *Lissomidae* comprises about 130 species distributed in all zoogeographical regions, however, only two species are known in larval stage, namely: the European *Drapetes biguttatus* (PILL.) and the American *D. (geminatus* SAY?). The larva of the last species from North Carolina is figured by BÖVING and CRAIGHEAD (1930: p 253, pl. 83, figs. S, X, Y), but no detailed description is given. These authors have placed the species in subfamily *Oestodinae* of family *Elateridae*. The previous description of larva of *D. biguttatus* (PILL.) from France by DENIER (1921) is little known, inaccurate, and inadequate to modern standards. The descriptions of pupae are lacking.

This paper presents descriptions of the mature larva, pupa and their biology. The descriptions are based on the larvae and pupae collected in Hungary, Bulgaria and Poland; some specimens were reared by the author in the laboratory until the imaginal stage. All material is kept in the collection of the Institute of Zoology of the Polish Academy of Sciences in Warszawa.

Description of larva

General: The larva (Fig. 1 and 2) is well characterized by its very large and strong, corniform prongs of urogomphi, structure of the 2-6 abdominal tergites, tentorium, intersternite of prothorax, and tenth abdominal segment. Body shape: elongate, subcylindrical, slightly flattened; dorsum more convex than the ventral side; subparallel, with segments broader than long, becoming narrower toward the extremities. Median dorsal suture transverses thoracic and first 8 abdominal segments. Dimensions: full-grown, distended larvae measure up to 11 mm in length, and 1.5 mm in greatest width. Head width about

0.9 mm. Before pupation the larva contracts its body thus becoming up to about 2 mm shorter. Colouring: body yellowish, feebly sclerotized except head, prothorax, mesothorax, legs, ninth abdominal segment, spines and setae, which



Figs. 1, 2. *Drapetes biguttatus* (PILL.), mature larva: 1 – lateral view, 2 – dorsal view.



are yellow and moderately sclerotized and shining; ventral side much paler; mandibles, nasale, talus, hypostoma, postgula, tentorium, intersternite of prothorax, and prongs of urogomphi, dark brownish and firmly sclerotized; membranes white or creamy white.

Head (Figs. 1, 2, 15) subquadrangular, about equal in length and width, with arcuate sides, flattened above and below, with depressed gular area, in lateral view tapering for about one-half its length from base of mandible.

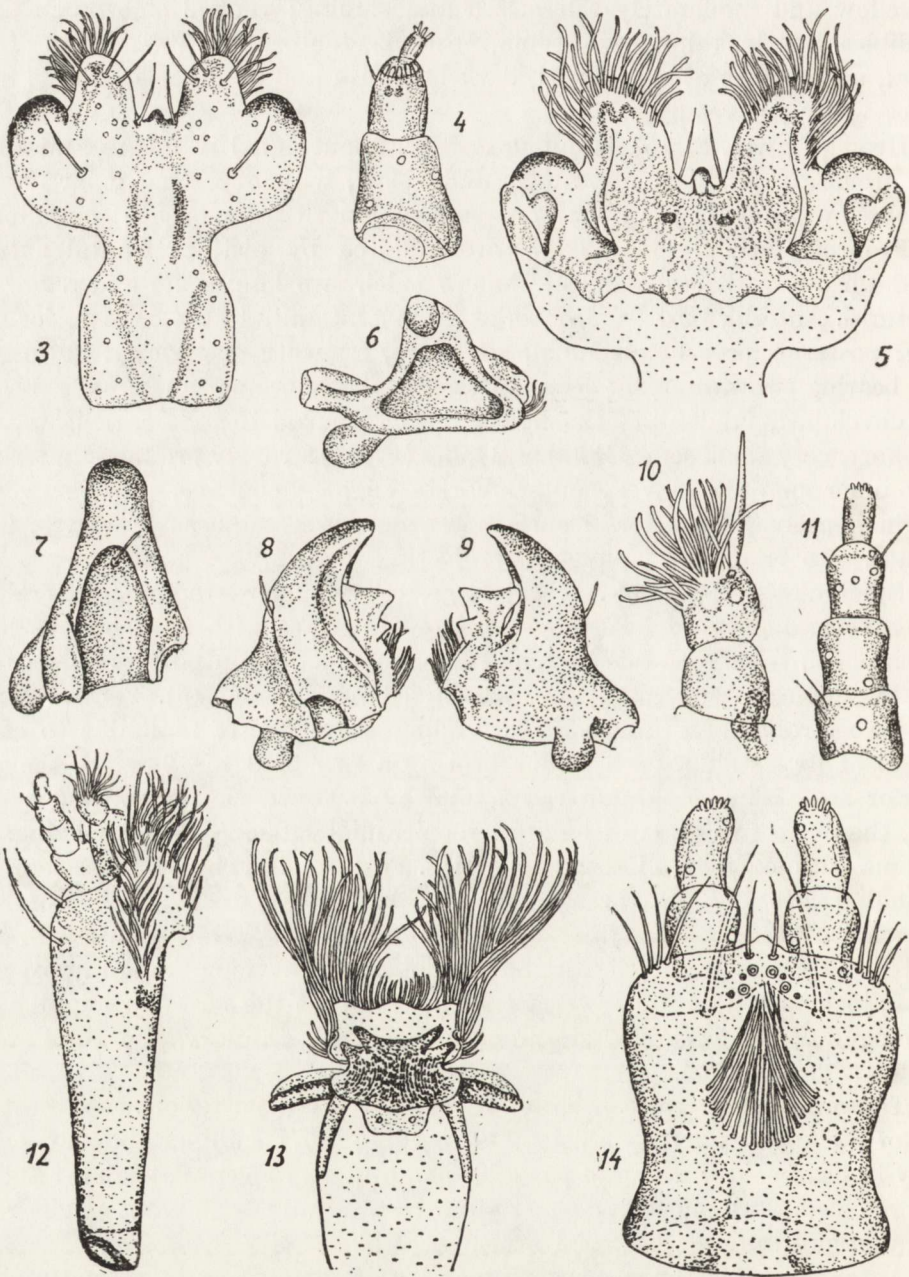
Frontoclypeal region (Fig. 3) well limited by distinct frontal sutures; dorsal surface with two pairs of shallow sulci, two long setae and a few fine punctures. Anterior part transverse, extending laterally to the condyle for mandible; posterior part longitudinal, spatulate, truncate posteriorly. Two nasal sulci bearing two prominent setae anteriorly. Anterior margin mesally bearing well developed, unidentate nasale. Subnasale ventral to nasale, delicate, with two short, very small setae, Paranasal lobes (Fig. 4) strongly produced anteriorly, their inner margin convex, outer margin slightly concave, anterior ventral margin densely pilose, dorsal surface bearing three setae as in Fig. 3. Talus arcuate, two triangular apodemes projecting ventrally.

Epicranial plates (Figs. 2, 15) large, covering posterodorsal, lateral and posteroventral parts of head capsule. Dorsal surface with two shallow, longitudinal sulci, each with one long and five small setae; on posterior margin internally there are two long, fine, sclerotized plates (Fig. 16). Ventral surface with two strong ridges and sulci extending from base of mandible to caudal margin of hypostoma, each sulcus bearing a row of 8 to 10 setae, the most anterior seta being long. Laterally, midway between the dorsal and ventral sulci, there are two pairs of long lateroepicranial setae. Eye-spot lacking. Hypostoma with strongly sclerotized margins. Postoccipital ridge dark, sclerotized, expanding laterally into arcuate, long, thin plates directed inside of head. Postgenal areas expanded mesad, widely separated. Gula short, small, invaginated. Postgula unpaired, distinct, situated on the membrane in post-gular region, just anterior to intersternite. I suppose that the postgula might be the homologue of the postgular sternite which present the larvae of the Cardinal Beetles (*Pyrochroidae*).

Tentorium (Fig. 16) consisting of well-developed posterior arms; posterior part of each arm is arcuate, laterally extending in a semilunar apodeme ending freely in head cavity near the posterior end of dorsal epicranial sulcus; anterior part reduced. Two short apodemes situated ventrally from talus might represent vestigial anterior tentorial arms.

Antennae (Fig. 4) three-segmented; first joint as long as second and terminal combined, surface with a few small pores, setae lacking; second joint bearing on its inner surface one minute apical seta, on surface a few small pores, and on distal end several small sensory processes; terminal joint very small, one-half as wide as long, its apex provided with a few small sensory setae.

Mandibles (Figs. 6-9) very characteristic, with triangular base (Fig. 6),



Figs. 3-14. *Drapetes biguttatus* (PILL.), mature larva. 3 - frontoclypeal region, dorsal view; 4 - left antenna, ventral view; 5 - dorsal aspect of preoral cavity; 6-9 - left mandible: 6 - base, 7 - lateral view, 8 - dorsal view, 9 - ventral view; 10 - left galea, ventral view; 11 - left maxillary palpus, ventral view; 12 - left maxilla, dorsal view; 13 - posterior portion of hypopharynx, dorsal view; 14 - first prementum, dorsal view.



about as long as wide; outer side convex, with profound antennal fossa and one seta (Fig. 7); dorsal surface (Fig. 8) slightly concave, base with a socket for reception the mandibular condyle on frontoclypeus; ventral surface (Fig. 9) flat, with well developed condyle for articulation with the epicranial plate; inner face concave, consisting of two cutting edges, the superior of which occupying the whole mandible length, whereas the inferior edge running from apex to a half of mandible length; retinaculum ax-shaped, strongly developed, with a triangular, acuminate tooth at its base; penicillus scarce, reaching the base of the retinaculum.

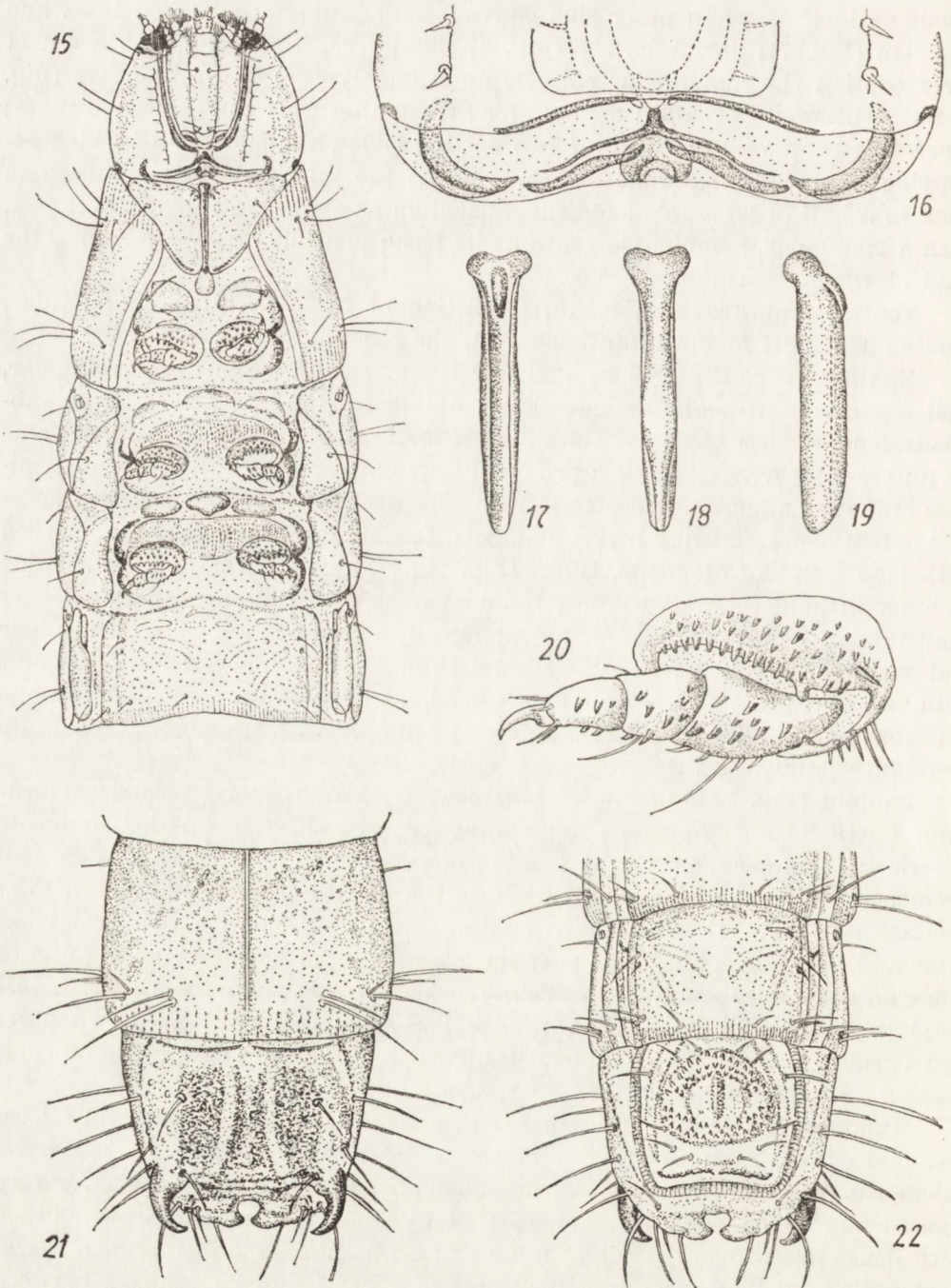
Ventral mouthparts (Fig. 15) consisting of fused labium and maxillae, moving as a unit forward and backward, the cardines acting as hinges.

Maxillae (Fig. 12) slender, well developed. Cardines short, subtriangular, well separated, with one arcuate brace, obliquely situated. Stipes large, subquadrangular, base truncate, sides almost straight, with two prominent setae on antero-lateroventral aspect; proximal part ending anteriorly in small semi-membranous palpiger, supported dorsally by a large triangular sclerite; anterior dorsal aspect bearing a few filaments. Lacinia reduced, triangular, clothed with long seta-like filaments. Galea (Fig. 10) two-jointed; basal joint as wide as long, without setae and pores; terminal joint with the outer margin longer than the inner one, bearing four pores; apically there is one long setaceous hair and a tuft of filaments. Maxillary palpi (Fig. 11) four-jointed; the first joint with two pores and two setae; the second joint with two pores; the third one with four pores and two apical setae; the fourth joint with two pores and a group of minute papillae on apex.

Labium (Fig. 15) consists of postmentum, and first and second prementum. Postmentum elongate, subquadrangular, the sides subparallel, truncate anteriorly, rounded posteriorly, bearing one long seta at each corner. Second prementum trapezoid, invaginated within the distal end of postmentum. First prementum (Fig. 14) with concave sides, its lower face with two prominent setae and four pores, anterior upper surface with 8 pores, four setae at anterior angle on each side, and a tuft of seta-like filaments in the middle part. Labial palpi two-jointed; basal joint with one pore, terminal joint with two pores and a group of minute papilla on apex. Ligula small, semicircular, membranous, bearing two rigid setae on its upper side.

Hypopharynx (Fig. 13) composed of a transverse hypopharyngeal sclerome, jointed ventrally to anterior and of hypostoma by a pair of transverse, thickened membranous bracons, and dorsally passing into pharynx by very fine membranous rods; anterior part of hypopharynx membranous, clothed with dense forward projecting seta-like filaments. Maxillule membranous, clothed with long filaments; a median tuft of short filaments projects between the maxillulae.

Epipharynx (Fig. 5) consisting of sclerotized subnasale and of soft subnasal flaps, each with anterior margin drawn out into long seta-like filaments; epipha-



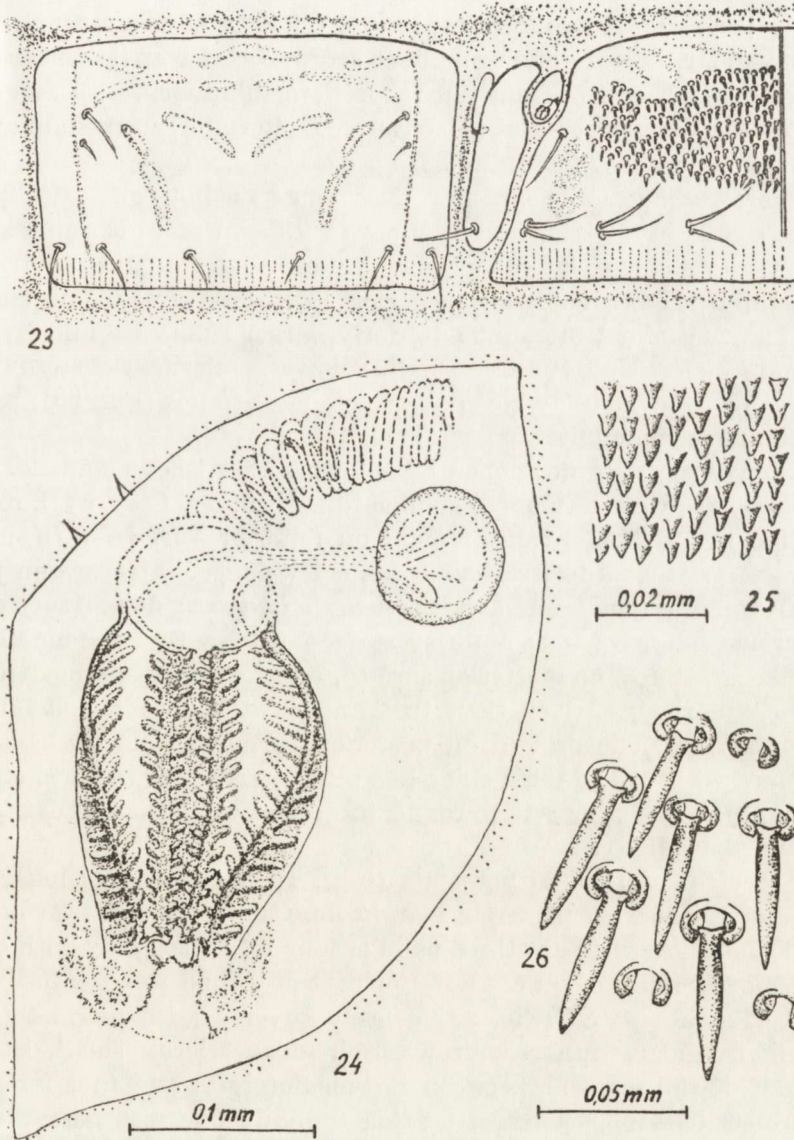
Figs. 15-22. *Drapetes biguttatus* (PILL.), mature larva. 15 - head, thorax and first abdominal segment, ventral view; 16 - posterior part of head, dorsal view; 17-19 - intersternite sclerite of presternal area: 17 - ventral view, 18 - dorsal view, 19 - lateral view; 20 - right leg of mesothorax, anterior aspect; 21 - eighth and ninth abdominal segment, dorsal view; 22 - eighth, ninth and tenth abdominal segment, ventral view.



rynax covered by conical sensillae and bearing two brown, small, oval sensory plates.

Thorax (Figs. 1, 2, 15) length equalling about one fifth of the total body length.

Prothorax barely as long as mesothorax and metathorax combined; tergites with anterior and posterior margins membranous and longitudinally stria-



Figs. 23-26. *Drapetes biguttatus* (PILL.), mature larva. 23 - sternum, laterotergites and left mediotergite of fourth abdominal segment; 24 - spiracular sclerite and spiracle; 25 - minute spines of eusternum of mesothorax; 26 - spinelike setae of mediotergite of fourth abdominal segment.

ted; sides of pronotum strongly upturned, each half of pronotum with four setae on each anterior and posterior margins; prosternal area (Fig. 15) large, triangular, consisting of four sclerites as follows: a small, posterior median sclerite; two large subtriangular sclerites which dorsally bear fine slats on posterolateral aspect, and anteriorly with one large seta and a pair of very small setae on anteromedial angle; very characteristic is a long claviform intersternite sclerite (Figs. 17-19) connecting lateral sclerites of prosternum. Episternum subtriangular, bearing one prominent seta, posterior angle with a condyle for articulation with costa. Epimeron reduced, membranous, with arcuate sclerite reaching the posterior end of episternum. Eusternum, sternellum and poststernellum, membranous, indefinite.

Mesothorax about twice broader than long; mediotergite with posterior margin longitudinally striate, posterior part with two pairs of setae and with a minute seta visible in lateral aspect. Anterior laterotergite subtriangular, without seta, bearing a spiracle; posterior laterotergite with one large seta; spiracles (Fig. 24) bifore, broadest anteriorly, larger than abdominal spiracles; presternal area consisting of three small, subovate sclerites; eusternum membranous, each surface densely covered with minute spines (Fig. 25); remaining part membranous, indefinite.

Metathorax similarly developed as mesothorax, without spiracle.

Legs (Fig. 20) well developed, similar to each other. Coxa oval, excavated for reception of trochanter and femur; on anterior surface with numerous spine-like setae arranged in irregular rows, a few longer setae are on posterior surface. Trochanter about one-half the length of coxa; dorsal surface short, ventral surface long, convex; anterior surface with 8 to 10 spine-like setae, several setae scattered on posterior surface, one long seta on median aspect. Femur subcylindrical, shorter than trochanter, with 6 to 8 spine-like setae on anterior surface, one or two on posterior surface. Tibio-tarsus about as long as femur, with two to three spine-like setae on anterior surface, one or two on posterior one, and four setae around the distal end. Ungula dark, curved, base expanded medially.

First to eight abdominal segments (Figs. 1, 2) subequal, similar to each other. Mediotergites with posterior margin longitudinally striated; posteriorly on each mediotergite there are three pairs of long setae, laterally with one small seta near spicular sclerite. On the anterior part of second to sixth mediotergites there is a subovate patch (Fig. 23) densely covered with prickles (Fig. 26), arranged in irregular, transverse rows. Spiracular sclerite small, situated in anterior half of the segment between the mediotergite and first laterotergite. First laterotergite large, elongate, bearing caudally one seta near the ventral margin. The second laterotergite narrow, articulating with anteroventral aspect of first laterotergite. Tergal and sternal areas separated by a dorsosternal fold. Pleurites lacking. Sternum large, subquadrate; posterior margin faintly longitudinally striated; mediosternite with four setae on posterior margin and



two ones near the lateral edge, and each surface bearing a few pairs of faint impressions; laterosternite narrow, with one seta on the posterior margin.

Ninth abdominal segment (Figs. 21, 22) about as long as wide; dorsum convex anteriorly, flattened posteriorly, sloping downwards from front to back. Dorsal plate (Fig. 21) irregularly wrinkled and scarcely punctured, with four shallow longitudinal impressions and anteriorly with a transverse, narrow slit. Urogomphi bifide, short; inner prongs projecting either toward each other; outer prong corniform, projecting caudally and terminating in sharp, horny point, curving slightly inward. Pleural area narrow, transversely, striate. Sternum posteriorly with a transversal, narrow slit, Caudal notch small, subcircular. Tenth abdominal segment covered with short, triangular spines; anal aperture linear, surrounded by minute spines. Setae on ninth and tenth abdominal segments as in Fig. 21 and 22.

#### Description of pupa

The pupa has not been described so far. Similar to the pupa of species of the family *Elateridae*

Body (Figs. 27, 28) fairly slender, about 5.5 mm long, maximum width about 1.5 mm. Body whitish with somewhat yellowish tinge, entirely without setae.

Head without supraorbital styli. Antennae situated on the outer sides of mandibles, fitting the pronotum sides and reaching up to the posterior margin of prosternum. Pronotum almost trapezoid in shape, about as broad as long, its length equalling combined length of meso- and metanotum. There are two styli at its anterior angles, two styli at posterior ones, and two styli on disc near the posterior margin of pronotum. Mesonotum almost rectangular, about twice shorter than pronotum. Metanotum a little longer than mesonotum, otherwise similar in shape.

Abdomen convex dorsally, composed of 9 segments. Abdomen length equalling half of the total body length; Ist-VIth abdominal terga almost equal in length; VIIth abdominal tergum the longest, its length equalling that of metanotum; length of VIIIth abdominal segment only half of that of the preceding one; IXth segment provided posteriorly with four long cerci. Third to sixth abdominal segments with a short stylus on each side. Surface of styli and of cerci covered by small, short spines (Figs. 29, 30).

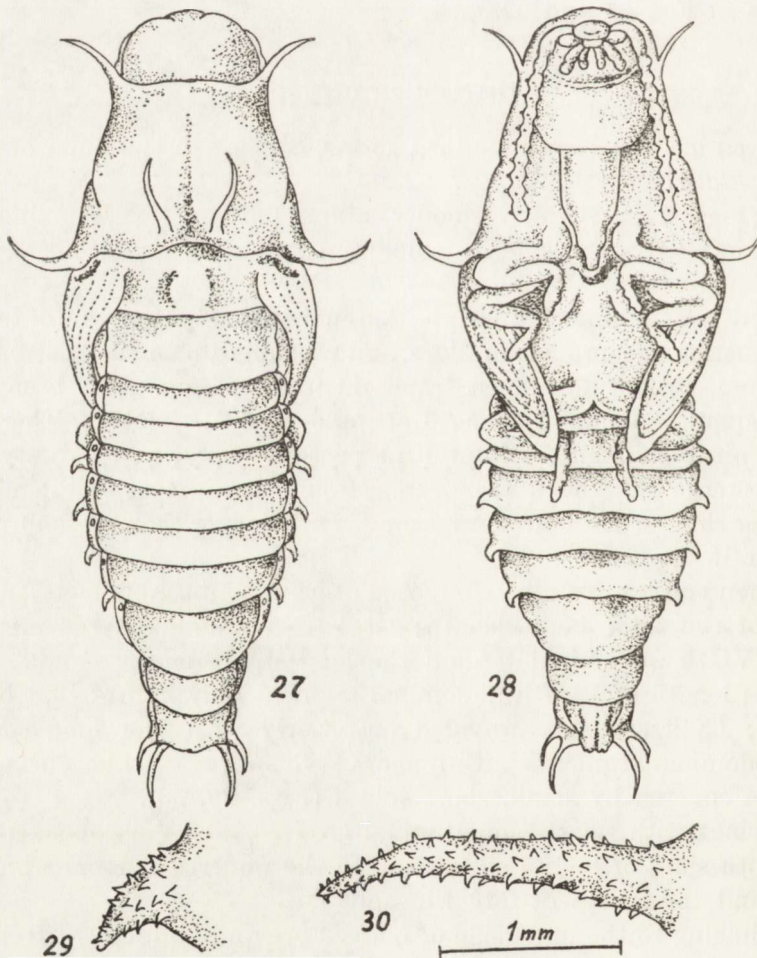
Fore wings with several longitudinal grooves, well developed, fitting obliquely at both sides of body and passing to the underside. Hind wings slightly visible behind the apices of fore wings.

Legs clinging to the underside of body. Fore and mid legs perfectly visible, hind legs partly covered by the wings.

Nine pairs of spiracles situated on antero-lateral surface of mesothorax and each of Ist-VIIIth abdominal segments.

## Biology

Very little is known about the biology of *Drapetes biguttatus* (PILL.). The larva is recorded by DENIER (1921) from France in the bank of sawdust near a saw-mill, but it is not the right natural habitat of the species. PALM (1959) collected larvae and adults in Yugoslavia (Slavonia, near Našice) from decayed stumps of *Quercus* and *Fagus*, where they were associated with the fungus *Polyporus* sp. According to HORION (1953) the adults in Europe were found on deciduous trees: *Fagus*, *Quercus*, *Populus*, *Ulmus* and *Betula*. I found the adults in Poland (Warszawa-Dąbrówka) under the bark of a trunk of *Salix*, and the larvae in a decayed stump of *Fagus*, the adults and larvae under the



Figs. 27-30. *Drapetes biguttatus* (PILL.), pupa. 27 - dorsal view; 28 - ventral view; 29 - stylus of fourth abdominal segment; 30 - cercus of ninth abdominal segment.



bark of a stump of *Quercus* in Hungary, and the larvae in a fallen rotten trunk of a *Ulmus* in Bulgaria.

According to my own observations in field and laboratory, the life-cycle is completed in two or three years. The larvae feed usually in the sapwood of old dead deciduous trees. These larvae prefer decidedly moist, decaying or rotten wood, formed owing to the activity of parasitic fungi, and especially that which previously become partly decayed through ravage of other larvae of *Coleoptera*. The tunnels of larva is parallel to the grain of the wood, making a more or less straight gallery, they are tightly packed with powdery wooden particles and fine pellets of frass. Galleries are up to 20 cm long. In the spring the mature larva after wintering in two consecutive years, tunnels into the outer sapwood or into the inner wall of the bark, and excavates an oval cell at the end of the gallery. The pupal chamber is elongate, about 10 mm long and 3 mm wide, and parallel to the grain of the wood. Pupation occurs during May and June. The pupal period lasts about ten days. The adults emerge in the period from May to the beginning of July. There are many records of adults collected by sweeping under trees.

#### Collecting and rearing data

Hungary, Mecsek Mts., near Pécs, June 5, 1957; in a sunny exposed place, stump of *Quercus* L. associated with a fungus *Bulgaria polymorpha* (OED.) WETT. and infested with *Cerambyx cerdo* L., under the bark: one adult and its larval skin; two immature adults in the pupal chamber; six larvae, three younger larvae (length of body 3.3, 4.5 and 5.5 mm respectively) (preserved in alcohol); the remainder reared in laboratory; pupa and larval skin — June 17, 1957; pupa taken out June 24, 1957, imago emerging July 2, 1957; one larva moults on July 16, 1957, found dead on August 17, 1957.

Bulgaria, prov. Burgas, Ropotamo near Primorsko, September 7, 1969; in shady situation, a fallen trunk of *Ulmus laevis* POLL. partly barkless, decayed with a fungus *Pleurotus ulmarius* (BULL.) FR. and infested with larvae of *Dorcus parallelopipedus* (L.), at a depth from one to four centimeters in the rotting, moist sapwood, in the gallery — fourteen larvae, body length from 7.5 to 11 mm, some larvae were found near their exuviae, three larvae preserved, the remainder reared in laboratory; 4 pupae observed on March 25–April 9, 1970; 7 imagines emerged on March 31–April 17, 1970.

Poland, Bobrowniki (Nowa Sól distr.), April 23, 1971; in a sunny exposed place, a big stump of *Fagus sylvatica* L., partly barkless, associated with a fungus *Sternum hirsutum* (WILLD.) PERS. and infested with larvae of *Tomoxia biguttata* (GYLL.) (*Mordellidae*), in the sapwood under the fungus on the bark —

three larvae; two larvae reared in a decayed wood, one larva died on May 17, 1971, one adult emerging on June 11, 1971.

All the material were collected and reared by the author.

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#### REFERENCES

- BÖVING A. G., CRAIGHEAD F. S. 1930. An Illustrated Synopsis of the Principal Larval Forms of the Order *Coleoptera*. Ent. amer. Brooklyn, N. Y., 11 (N. S.): 1-256, pls. 1-84.
- DENIER P. 1921. Description sommaire et biologie de la larve du *Drapetes biguttatus* Piler (*Col. Throscidae*). Bull. Soc. ent. France, Paris, 1921: 299-302, figs. A-F.
- HORION A. 1953. Faunistik der mitteleuropäischen Käfer. Band III: *Malacodermata, Sternoxia (Elateridae bis Throscidae)*. Ent. Arb. Mus. Frey München, München, Sonderband, XVIII + 340 pp.
- PALM T. 1959. Die Holz- und Rinden-Käfer der süd und mittelschwedischen Laubbäume. Opusc. ent., Lund, Supplementum XVI, 374 pp., 93 figs., 3 tab.

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#### STRESZCZENIE

[Tytuł: Młodsze postacie rozwojowe i biologia *Drapetes biguttatus* (PILLER) (*Coleoptera, Lissomidae*)]

Praca zawiera omówienie wyników badań nad morfologią młodszych postaci rozwojowych i biologią *Drapetes biguttatus* (PILLER) na podstawie materiałów zebranych przez autora na Węgrzech, w Bułgarii i Polsce. Podano dokładne opisy larwy i poczwarki, które zilustrowano rysunkami. W części biologicznej pracy omówiono charakterystykę ekologiczną i cykl rozwojowy zbadanego gatunku.



[Заглавие: Ювенальные стадия развития и биология *Drapetes biguttatus* (PILLER) (*Coleoptera*, *Lissomidae*)]

Работа содержит обсуждение результатов исследований по морфологии ювенальных стадий развития и биологии *Drapetes biguttatus* (PILLER) на основании материалов собранных автором в Венгрии, Болгарии и Польше. Даны точные описания личинки и куколки, которые иллюстрированы рисунками. В биологической части работы рассмотрено экологическую характеристику и стадия развития исследованного вида.

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