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**Immature stages and bionomics of *Vadonia livida* (F.)
(Coleoptera, Cerambycidae)**

[With 26 figures in the text]

Vadonia livida (FABRICIUS)¹, previously in *Leptura* LINNAEUS, was originally described in 1776, and, although it is a relatively large and common beetle, little information has been published on its immature stages and bionomics. It occurs in the western Palaearctic Region. The distribution area of this species is wide, covering nearly the whole Europe (excluding Fennoscandia), extending eastward into west Siberia, Caucasus, Transcaucasia, north Iran and Asia Minor. The larva and pupa, their living habitat was briefly mentioned (BURAKOWSKI 1971) by mistake under the name *Vadonia bicarinata* (ARNOLD), but they are not formally described. The larva hitherto described, but not illustrated, by MAMAEV and DANILEVSKIJ (1975) as *Leptura livida* F. This description is not adequate for the accurate identification of the species or for determination of its relationships.

In the present paper the egg, larva, pupa, cocoon and the bionomics of *Vadonia livida* (F.) are described for the first time and pertinent morphological structures are illustrated. During the past years information on the life history of this beetle has been obtained by rearing the immature stages to the adult in the laboratory and by making supplementary observation in the field. Field collections of immature stages of *Vadonia livida* (F.) were made at intermittent times between 1958 and 1974 from various localities in the vicinity of Warszawa (Bielany, Wawer, Kampinos, Grodzisk Mazowiecki) and in the Pieniny Mts.

¹ According to VILLIERS (1974) this species belongs to a separate genus *Pseudoallosterna* PLAVILŠČIKOV, 1934 (type species: *Pseudoallosterna orientalis* PLAV., monobasic).

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All material on which the present paper is based, belongs to and is kept in the collection of the Institute of Zoology of the Polish Academy of Sciences in Warszawa.

Egg (Figs. 1, 2)

Freshly laid egg is smooth, shining, elongate-ovoid and yellowish in colour. It measures up to 1.2 mm in length and up to 0.4 mm in breadth at their greatest width. The chorion is opaque, thick and very finely reticulated; each microscopic polygonal area having minute punctures in the middle (Fig. 2).

The first stage larva (Fig. 3)

Body length up to 1.5 mm, maximum breadth 0.4 mm, head-width 0.35 mm. Cuticle milky-white covered with minute tubercles. Chaetotaxy much more conspicuous than in later instars.

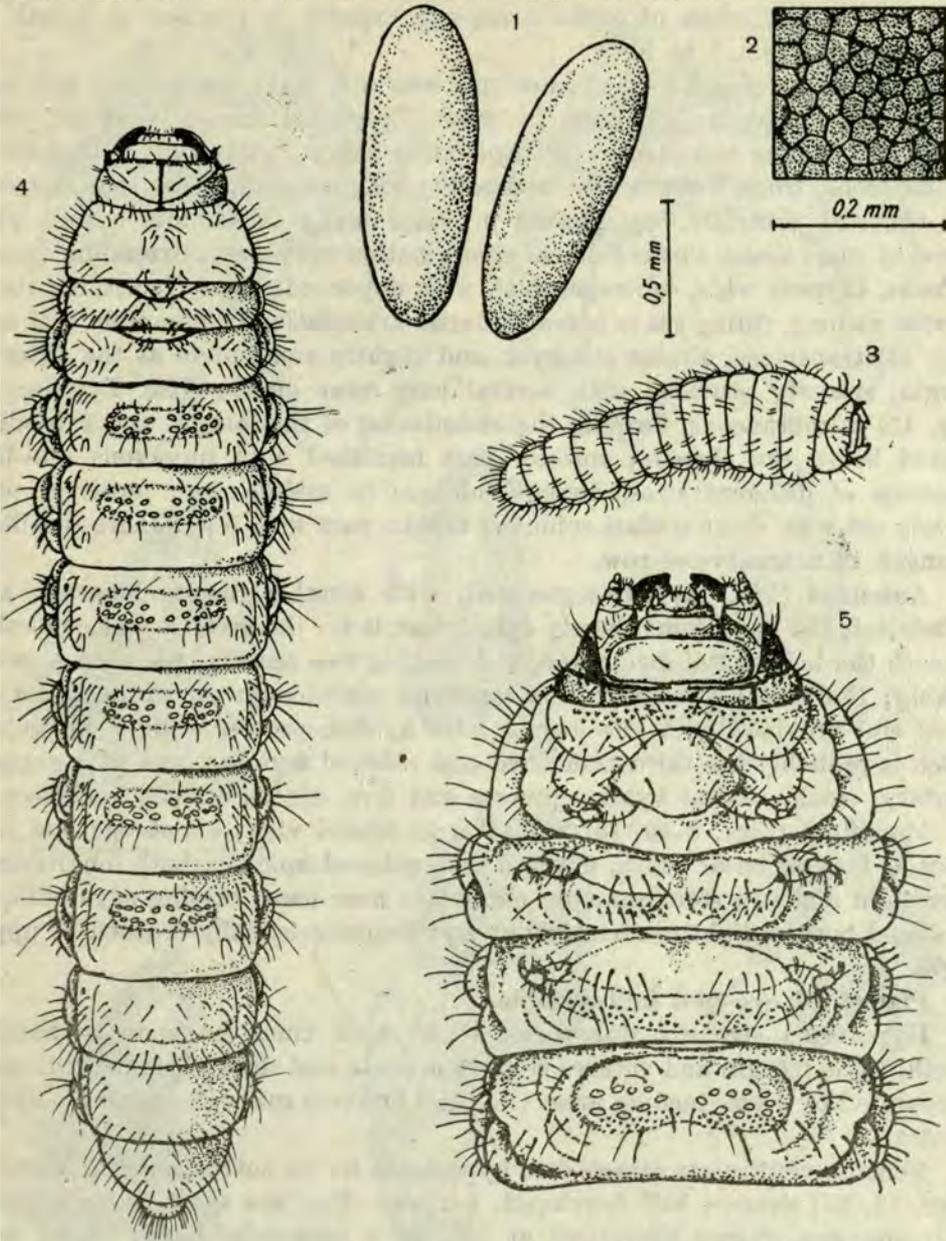
Description of the mature larva (Figs. 4-19)

General. The larva (Fig. 4) is terricolous, fleshy, well characterized by ocelli indiscernible, large ligula, hypostoma about 8-10 times as wide as median length (Fig. 7), shape of mandible (Figs. 8-10), structure of the 1-6 abdominal segments (Figs. 4, 19) and the spiracle with about 12 marginal chambers.

Body shape: elongate, subcylindrical, constricted between segments, these broader than long, tapering feebly anteriorly, broadest at the second abdominal segment, and then uniformly broad, but abruptly narrowed at the ninth segment, which is connected with small anal segment. Rather firm in texture of integument, which sparsely clothed with thin, moderately long and short setae.

Dimensions: body length of fully distended larvae varying from 12 to 15 mm, greatest breadth about 3 mm. Shortly in the winter period and before the pupation the larva is robustest and contracts its body, thus becoming up to 1-3 mm shorter, and bends slightly downwards. Colouring: body dirty white with somewhat yellowish tinge, with caudal part dark in colour when food is present in alimentary tract; feebly sclerotized except head, pronotum, spiracles and setae, which are yellowish and moderately sclerotized; mandibles, mouthframe and median band of frons dark brownish to pitchy and firmly sclerotized.

Head (Figs. 5-7) mostly retracted within prothorax, with roundish sides and gradually narrowing backwards, oval in cross-section, moderately transverse, with a length-breadth ratio of about 3:4. Head-width approximaly



Figs. 1-5. *Vadonia livida* (F.): 1 - eggs; 2 - microsculpture of egg; 3 - first stage larva, dorsal view; 4 - mature larva, dorsal view; 5 - head, thorax and first abdominal segment, ventral view.

1.5–1.8 mm, coefficient of cephalic capsule breadth in relation to length of body varying from 6 to 8.

Frons well defined from epicranium, with a distinct median line and pigmented band, bearing six pairs of setae. Epistomal margin provided with three pairs of long and stout setae. Epicranial halves nearly entirely separated behind frons. Gena bears a few moderately long, straight setae, one dorsally and the rest ventrally. Epicranium provided along the frontal suture with a row of short setae. Postero-dorsal emargination very deep, extending nearly to frons. Clypeus wide, subtrapezoidal, with upper side more than three times as wide as long, filling space between dorsal articulating of mandible. Labrum (Fig. 14) transverse, almost semioval, and slightly emarginate at the anterior margin, sparsely provided with several long setae on the disc. Epipharynx (Fig. 15) membranous, forming the underlining of the labrum and extending caudad below the clypeus; anterior part furnished with numerous seta-like filaments of different sizes, directed oblique to middle line; posterior part densely set with short conical spinules; middle part with few minute sensillae, arranged in a transverse row.

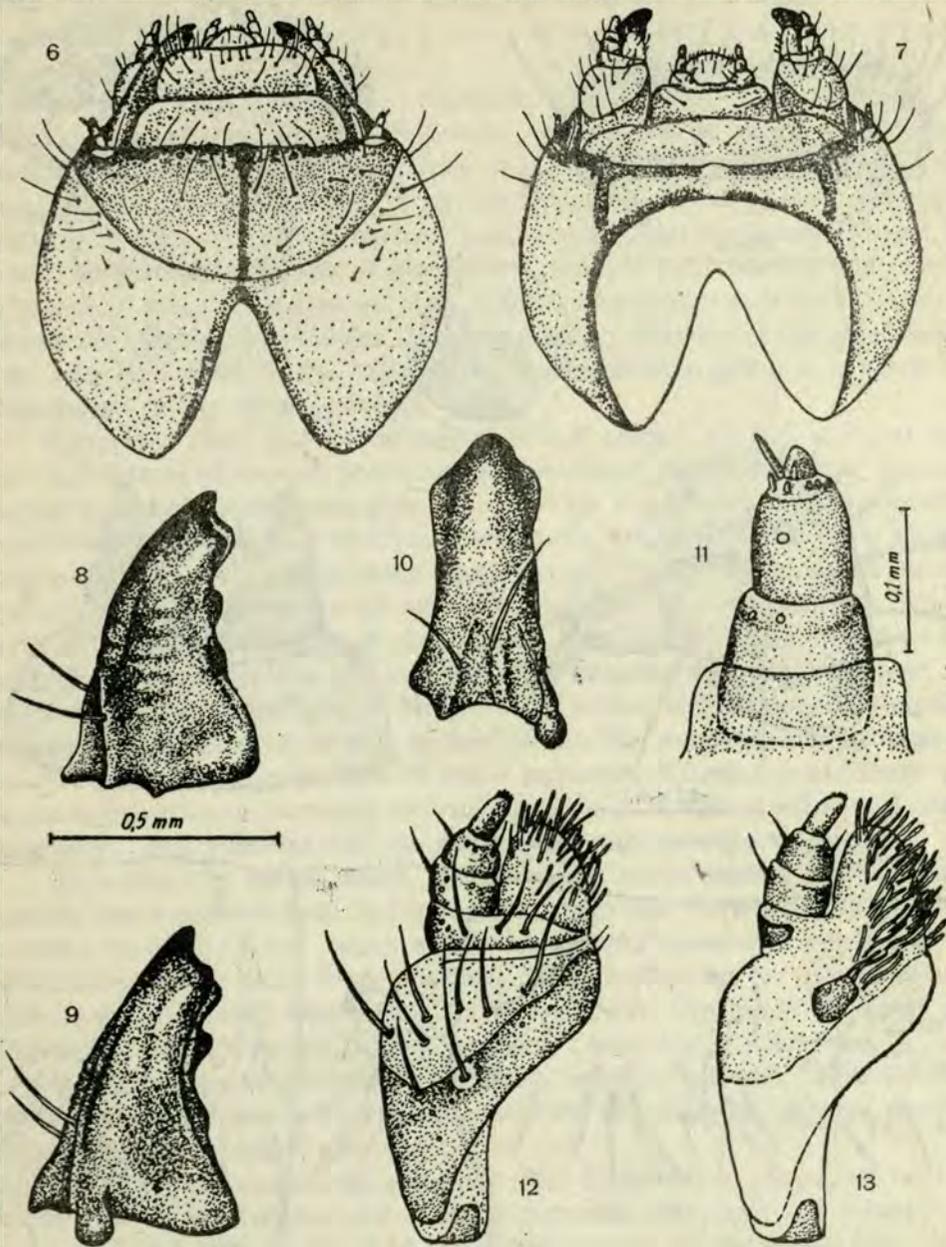
Antennae (Fig. 11) two-segmented, with distal segment elongated and cylindrical; the basal joint shortly cylindrical, is for the greater part concealed beneath the large basal membrane, and bearing two sensillae placoideae, setae lacking; the apical joint with one sensillum placoideum on surface, and on distal end provided with one long slender hyaline process oblique projected, which is probably the third transferred and reduced segment, and with supplementary, small, conical hyaline process and five minute sensory processes.

Mandibles (Figs. 8–10) subtriangular in lateral view, about one and half times as long as basal width, notched and widened apically, with longitudinal impression and two stout setae on outer face near base; cutting edge oblique, its dorsal border slightly emarginated and characteristically toothed at upper angle.

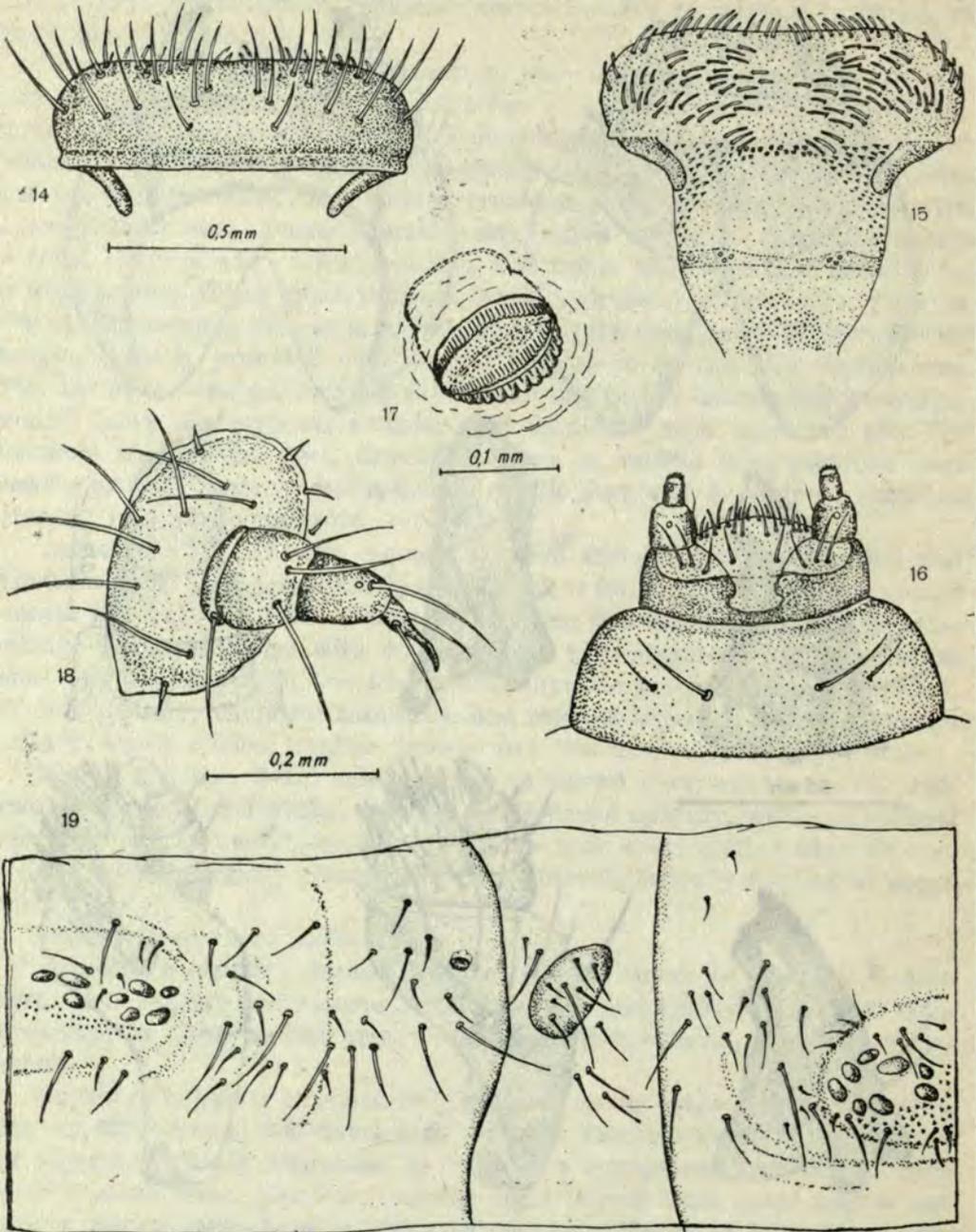
Pigmented eye-spot indiscernible.

Hypostoma strongly transverse, about 8–10 times as wide as median length, front margin and sutures slightly arcuate and darkly pigmented. Gula represented by a pale median area. Occipital foramen suboval, opening postero-ventral.

Ventral mouthparts attached to hypostoma for its entire breadth. Maxillae (Figs. 12, 13) slender, well developed, movable. Cardines short, subtriangular, well separated. Stipes sclerotised at base in a triangular band, armed with a row of stout setae. Maxillary palpifer light brown, with outer margin not strongly protuberant, bearing three stout setae. Maxillary lobe apparently borne on palpifer, shorter than maxillary palp; anterior margin and ventral surface bearing numerous hair-like filaments. Maxillary palpi three-jointed, pigmented at base. The first joint small, slightly larger than second, with three pores and one seta at outer face; the second joint about as long as wide,



Figs. 6-13. *Vadonia livida* (F.), larva: 6 - head, dorsal view; 7 - head, ventral view; 8 - left mandible, dorsal view; 9 - right mandible, ventral view; 10 - right mandible, lateral view; 11 - left antenna, dorsal view; 12 - right maxilla, ventral view; 13 - left maxilla, dorsal view.



Figs. 14-19. *Vadonia livida* (F.), larva: 14 - labrum, dorsal view; 15 - labrum and epipharynx, ventral view; 16 - mentum, labial palpi and ligula, ventral view; 17 - spiracle; 18 - left leg of mesothorax, ventral view; 19 - right half of fourth abdominal segment.

with two pores and two setae at apex; the third one just about twice as long as its basal width, tapering distally, and with a group of minute sensory papillae on apex.

Labium (Figs. 5, 16, 17) composed of submentum and mentum. Submentum distinct, narrow and transverse, with a pair of short setae. Mentum well defined, protuberant, wider than long, bearing two pairs of setae, situated just behind the bases of the palpi. Basal part of labial palpifer sclerotized, with three pairs of setae at anterior part. Labial palpi two-jointed; basal joint with one pore and one seta at inner face; terminal joint bearing one pore and a group of minute papillae on apex. Ligula membraneous is rather more enlarged than ordinarily (broader than labial palpi), rounded at the apex, bearing two long rigid setae in the middle, and a considerable group of sensory setae distributed on its distal portion.

Pronotum (Fig. 4) subtrapezoidal, widest behind, at last twice as broad as long; lateral regions of prothorax, anterior and posterior part of pronotum rather densely covered with pale yellow setae. Presternum (Fig. 5) anteriorly microscopically spiculate, with the row of setae across posterior edge, arranged in a continuous band. Eusternum large, rounded on the anterior and posterior margin, bearing four pairs of setae. Sternellum transverse, entirely smooth, with numerous short hairs. Mesothorax at least four times as broad as long, with mesonotum bearing rows of setae on anterior and posterior part. Eusternum entirely smooth, with five pairs of setae; sternellum microscopically spiculate, with transverse row of few setae. The mesothoracic spiracles are easily visible, larger than those of other segments. Metathorax similarly developed as mesothorax, however, without spiracles. Mesonotum without X-shaped impression, but prenotal fold on metathorax and mesothorax present.

Legs (Fig. 8) rather short, five-jointed; coxae fleshy, slightly protuberant, bearing seven long and few short setae: the prothoracic coxae almost meeting medially, other coxae widely separated; trochanter small with one seta; femur wider than long, provided with three setae on the distal edge; tibio-tarsus distinctly longer than femur, with two tiny setae on distal part; unguiculus slightly curved, with a long stout seta arising near base.

Spiracles (Fig. 17) conspicuous, oblique, broadly oval, with narrow, strongly sclerotized and pigmented peritreme, and with about 12-15 marginal chambers forming a characteristic crescent.

First to eight abdominal segments (Fig. 4) similar in shape; all segments wider than thick. Tergites and sternites provided with long and minute setae arranged as on Figs. 4, 5 and 19. Ampullae present on abdominal tergites and sternites one to six, each consisting of glabrous tubercles scattered irregularly in transverse two rows. Posterior part of ampullae bordered with transverse band of microscopically spicules when viewed under medium power ($\times 60$). Epipleurum markedly protuberant, bearing few long and short setae. Pleural disc distinct, elongate oval, bearing five to eight long and minute setae, but

without pit. Ninth abdominal segment (Fig. 4) coniform, sparsely fringed with setae. Urogomphi absent. Anal segment rather salient, divided into three lobes around anus, beset with numerous setae.

The prepupa much white, more shorter and thicker as preceding stage.

Description of the pupa (Figs. 20–23)

Body longitudinally oval with abdomen tapering posteriorly, length up to 10 mm, maximum breadth about 3.5 mm. Body whitish with somewhat yellowish tinge, covered with sparse, both shorter and longer setae.

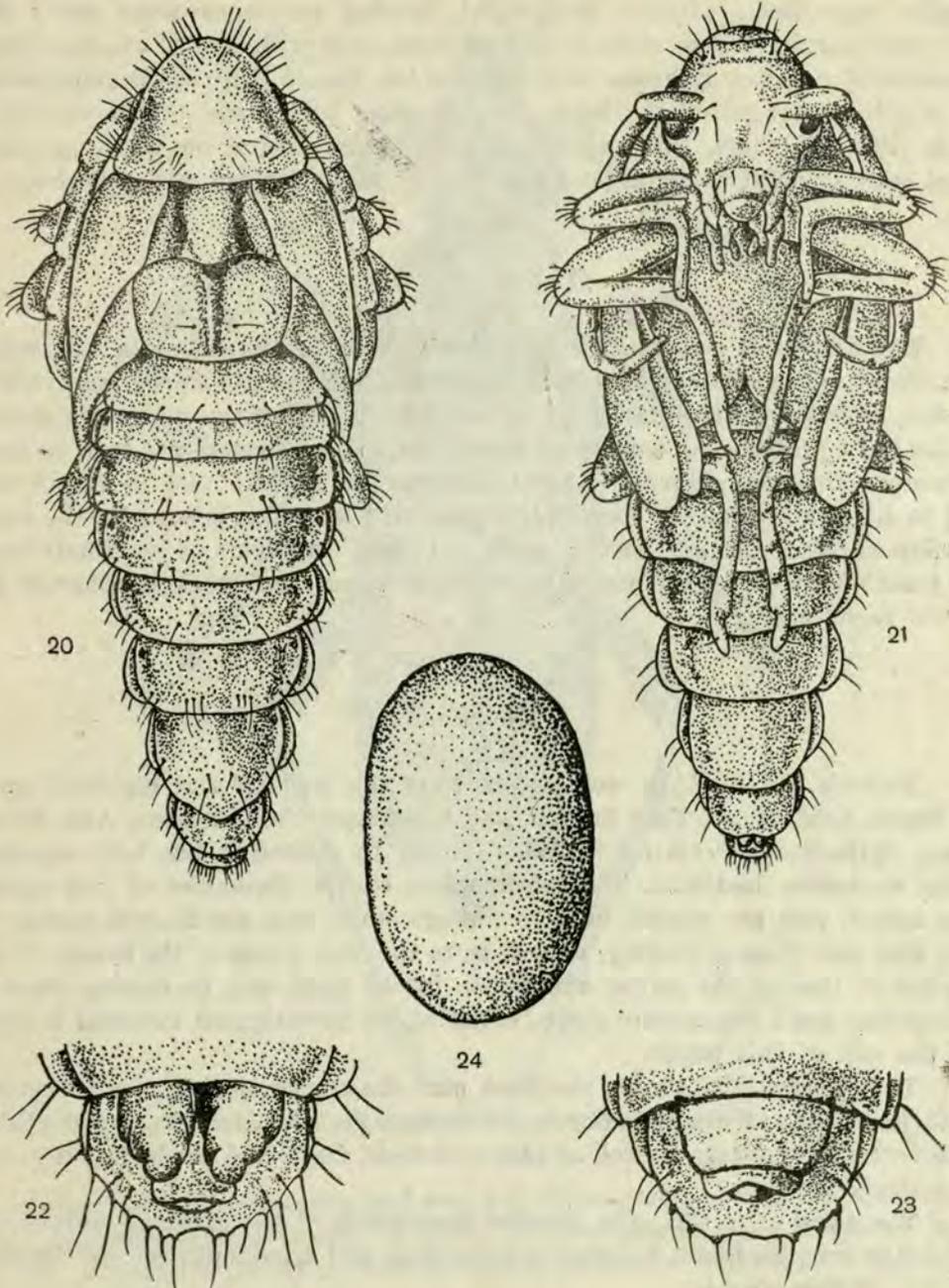
Head strongly bent beneath prothorax so that vertex is totally concealed from above; subtriangular and rather elongate, with sides strongly rounded. Vertex of head with two pairs of long setae; frons with four moderately stout setae near base of each antenna, and with a shallow depression above. Eyes feebly convex and glabrous. Antennae filiform, short, recurved downward and terminating alongside outer faces of tarsi of mid legs. Clypeus with a transverse row of six setae near basal margin. Labrum subtriangular, without setae. Mandibles each with one seta near middle of outer face. Maxillary palpi cylindrical and rounded apically.

Pronotum subtriangular, with front margin strongly rounded, broadest at base and with hind angles obtuse; front and lateral margins bearing numerous erect setae; front region of disc with three pairs of setae; basal part of pronotum with two groups of minute setae. Mesonotum trapezoidal, glabrous; scutellum protuberant, rounded at the margin. Metanotum subrectangular, with two short setae on each side of scutellar groove.

Elytra and wings in a live specimens fitting obliquely at both sides of body and passing to the underside; apices of elytra and wings extending to fourth abdominal sternum.

Anterior and middle legs perfectly visible, posterior ones partly covered with wings. Femora each with 5–6 setae near apex, each tarsal claw with a single subapical minute seta. Tibiae directed toward mid-line, each with apical, tuberculate spurs. Tarsi turned backward almost parallel to body axis and widely separated. Distal parts of anterior tarsi extending to mid tibiae, those of median ones reaching beyond posterior edge of the metasternum, and posterior tarsi — strongly elongated — extending to sixth abdominal sternum.

Nine abdominal segments are visible; the external genitalia being seen in their pupal sheaths in apposition to the ventral surface of ninth segment. Abdominal tergite one to six, similar in shape, each with a row of eight to ten setae situated on posterior part. Seventh tergite strongly produced posteriorly, with an irregular row of eight setae. Eighth tergite with hind margin strongly rounded, with a single row of four pairs of setae near posterior edge. Ninth



Figs. 20-24. *Vadonia livida* (F.). 20-23, pupa: 20 - dorsal view, 21 - ventral view. 22, 23 - last abdominal segment, ventral view; 22 - female, 23 - male. 24 - cocoon.

tergite very short, without urogomphi, bearing numerous setae along the posterior margin. Pleura strongly protuberant, each with two short, fine setae. Abdominal sternites glabrous. Gonopods in the female (Fig. 22) is represented by a pair of elongate fleshy tubercles projecting backwards. Gonopods in the male (Fig. 23) short, subrectangular, feebly emarginated on posterior edge. Anal cone situated between posterior part of ninth tergum and gonotheca.

Cocoon (Fig. 24)

The cocoon is constructed by mature larva for pupation in excavated chamber in the surrounding soil. It is commonly subovate, shiny, pale yellow, elastic, of parchment consistency, its structure being infirm and easily dented under light pressure. When teased apart, the wall of cocoon was seen to have numerous fine, pale fibres. Cocoon measures 7.5 to 10.5 mm in length and 4.3 to 4.8 mm in breadth. The inner surface of the cocoon is smooth, the outer surface covered with particles of earth and small fragments of inanimate roots of grass mixed with mycelium of saprophytic fungus, and stuck together by the arval secretion.

Bionomics

Vadonia livida (F.) is well known from the lowland and highland areas of South, Central and East Europe, and noted from the Caucasus, Asia Minor, Iran, Syria and Siberia up to Lake Baical. In Poland it has been reported from numerous localities. The informations on the bionomics of this species are scarce, and are related only to mature stage, and are limited mainly to the date and place of finding, as well as to the food plants of the imago. I succeeded in finding the larvae and pupae in the field, and in rearing them in laboratory until the mature stage. A list of the investigated material is given at the end of this paper.

This species inhabits for the most part the sunny open spaces overgrown with low plants: mainly on dry meadows and pastures, fallows, forest glades, cutovers and openings, as well as edge of forests, fields and roads, but it avoids the shady forests.

The adult (Fig. 25). The detailed description of the external morphology of imago may be found in many publications and handbooks for the identification of *Cerambycidae*.

Emergence of adults from underground pupal cells begins in late May, reaches in middle June, and continues until the beginning of July. These appear till the beginning of August, and lead a diurnal life. In the field the beetles were most active during warm and sunny days, they were hiding under the

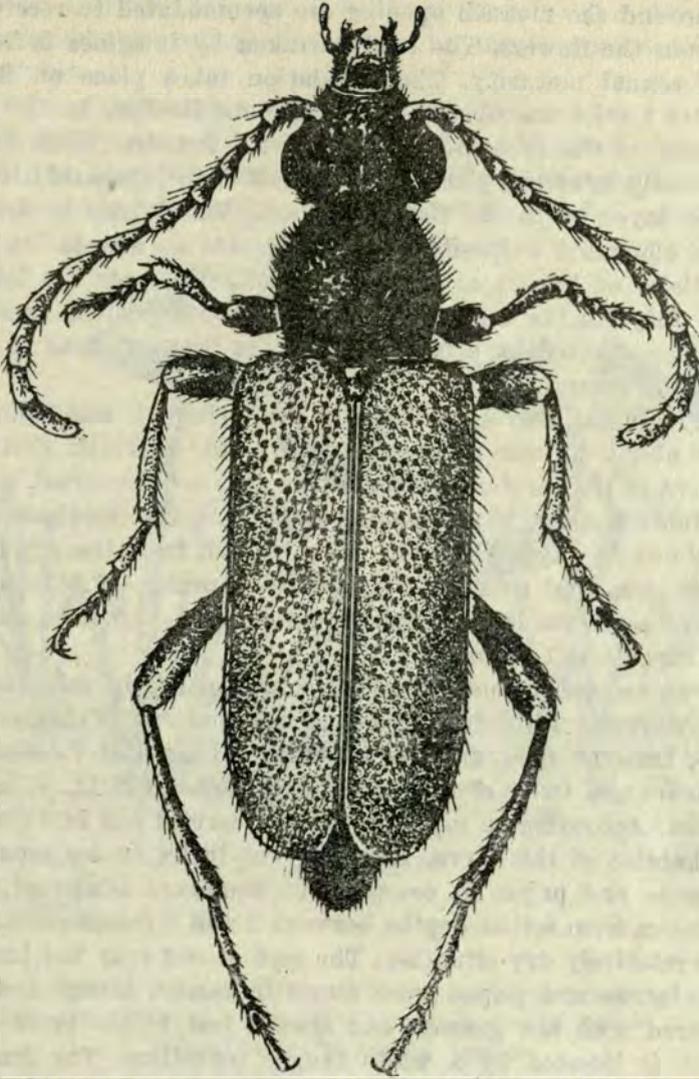


Fig. 25. *Vadonia livida* (F.), imago, dorsal view.

low plants or in litter during bad weather. These beetles are also perfect flyers, and are anthophilous insects. Already at description of this longhorn beetle I. Ch. FABRICIUS (1776) mentioned that it "Habitat in floribus". The adults feed on flower pollen and nectar of plants belonging mostly to the *Umbelliferae* and *Compositae*, frequently on *Aegopodium podagraria* L., *Chrysanthemum leucanthemum* L. and *Achillea millefolium* L. In the laboratory a solution of honey and strawberries was the only food offered to the adults. They readily accepted it. The elongated anterior part of body, their numerous setae and

appendages around the mouth opening are accommodated to receive of pollen and nectar from the flowers. The food partaken by imagines is indispensable for attaining sexual maturity. The copulation takes place on flowers. The mating of these beetles was observed from the middle June to the end of July in the field and in the laboratory. Inseminated females flit from flowers to grass-zone, usually in sunny places, and deposit their eggs, exclusively straight in the humus layer or in the fissures of soil. The female is equipped with a narrow and elongated ovipositor, which suggests an adaptation to lay eggs between particles of humus or granules of soil. The eggs are laid from the beginning of July till the early August; these are deposited usually close to grassland humus infected by a fungus mycelium between dead or dying roots or root stalks of grasses.

The early stages. The eggs (Fig. 1) are yellowish and spindle-shaped; they measure about 1.2 mm in length and 0.4 mm in width. Soil and humus particles adhere to the chorion as soon as the eggs are deposited, making them difficult to find. Under the laboratory conditions the incubation period of eggs lasted about 10 days. The white larvae hatch from the egg mean length of body — 1.5 mm, and mean width of head capsule — 0.35 mm, while the mean length of a mature larva before pupation is of 13.5 mm, and the width of the head capsule — 1.75 mm.

The larvae are terricolous, and lead a hidden life in soil, therefore they have not been found hitherto. All other informations (PICARD 1929, HEYROVSKÝ 1955, DEMELT 1966, and others) on life of larva of *Vadonia livida* (F.) in dead branches and twigs of *Quercus* L. and *Castanea* MILL. — are erroneous in that respect. According to my observations carried out in Poland it is not the natural habitat of this larva. In soil I was lucky to see repeated several times the larvae and pupae in company of immature adults of this species. These were taken from soil at depths between 2 and 6 centimeters. They apparently prefer relatively dry situation. The sort of soil may not have a greater significance: larvae and pupae were found in sandy, loamy and mould soil sparsely covered with low grasses, but always just in the layer of grassland humus, which is infested by a white fungus mycelium. The fruit bodies of a saprophytic fungus — *Marasmius oreades* (BOLT.) Fr. growing from the same soil in the field, as well as in the laboratory. It just is particularly characteristic habitat, in which the larva lives.

The larvae roam easily through the humus. They are perfectly able to bore into earth, and seem to use their shovel-shaped mandibles and short legs, during the process. The softness of the larva body is adapted for tunneling in ground between granules of soil or fragments of humus. It is obvious that ampullae and minute spines and granules on upper and lower surface of body, by virtue of their divergence and upward direction, are useful in travelling in the soil. They feeding externally between dead or dying roots and root stalks of grasses, and among hyphae on underground parts of fungus. The fragments

of humus, roots and hyphae, as well as the diminutive granules of sand were found in the alimentary canal. The larvae having stopped feeding after the 4th or 5th moult.

This species apparently requires two years to be mature, since in late autumn or in early spring I have taken larvae of different sizes in the same place of soil. The mature larva in autumn, before the second overwintering, excavates an oval characteristic earthen pupal cell (Fig. 26), which is at depth

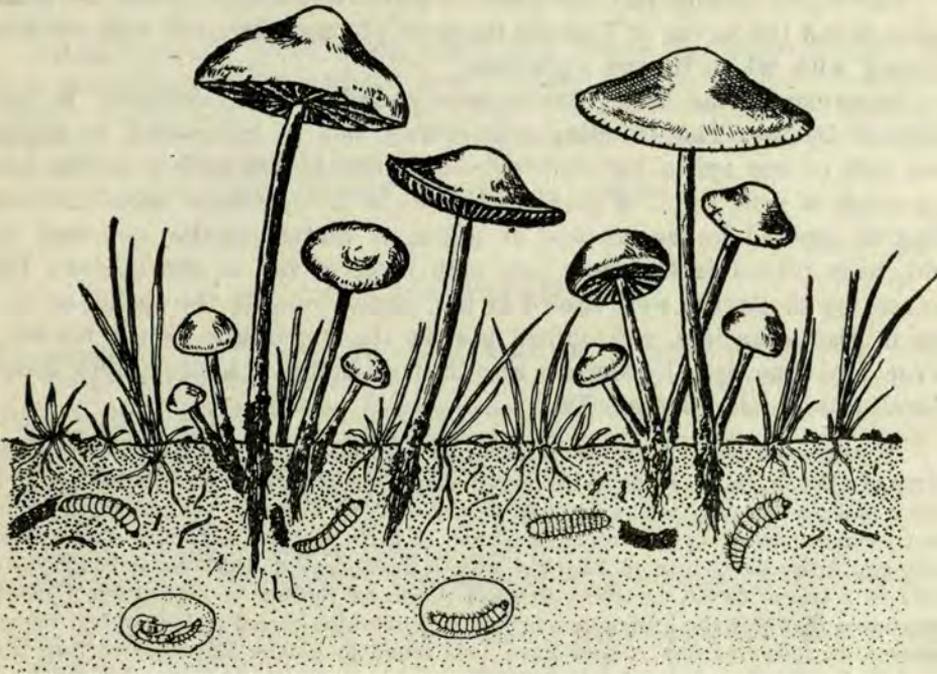


Fig. 26. Larvae of *Vadonia livida* (F.) living in humus and feeding among hyphae between mycelia on underground parts of a saprofitic fungus *Marasmius oreades* Fr.; pupae and mature larvae in earthen cocoon.

from 2 to 5 cm under the surface. In the next spring this larva prepared the parchment cocoon in the earthen cell, in which pupates and transforms to the adult. This cocoon made of a tough, fragile material measured about 9 mm by 4.5 mm. Pupation usually started during the late April or the early May. The live pupa lies on its back in a horizontal position. Under laboratory conditions the pupal period lasted about 10 days, and the process of adult colouring lasts for 5–7 days. The adults emerge from underground pupal cells usually in late May or early June, and fly to flowers. These by feeding on flowers of herbaceous plant, mainly of the families *Umbelliferae* and *Compositae*, pollinate them and thus play a positive role in biocoenosis.

The rapacious wireworms of *Adelocera murina* (L.) and *Cidnopus minutus* (L.) were stated as principal predators of moulted larvae and pupae of the discussed species.

Collecting and rearing data

The whole of material has been collected in Poland. In all the localities I have found the larvae of *Vadonia livida* (F.) being associated with soil heavily infected with white fungus mycelium.

In captivity the larger larvae were reared with no difficulty in fungus-infected humus. The breeding was carried out in laboratory in stoppered glass jars of one and a half-litre capacity filled in 1/3 with soil. The humus, fragments of dead roots of grass with a white living fungal mycelium and feeding or reposed larvae, as well as pupae or mature adults, collected in the field, were placed in the glass jars with layer of soil at the bottom. During the rearing the larvae were cooled in the winter time. In the spring or in summer in also glass jars, ascertained besides the pupae and adults reared from larvae, and ovae layed by females, also the fruit bodies of a saprophytic fungus — *Marasmius oreades* (BOLT.) Fr.

Warszawa-Wawer, November 9, 1958; on edge of leafy forest, in a sunny place near stump of old oak, in soil at depth from two to six centimetres, in earthen cells — 14 hibernating mature larvae, 6 younger larvae, length of body 5–8 mm, part of which preserved, the remainder reared in laboratory; 8 pupae in their cocoons have been found April 20, 1959, and 6 imagines emerged May 2–6, reared until June 2, 1959. Same locality, July 5, 1970; in a mixed forest, in sunny exposed place, on flowers of umbellifere *Peucedanum oreoselinum* (L.) MOENCH., numerous imagines, 8 of which reared in laboratory, the mating observed on following day, 4 eggs have been found in humus deposited on July 10, and 2 young hatched larvae on July 26, 1970.

Kampinos Forest: Kampinos, April 12, 1959, on dry meadow, on the outside of road, under the tuft of withered grass, in a humus infected by a white fungus mycelium, at depth from two to five centimeters — a dozen or so younger and mature larvae, from which 8 imagines emerged May 30 (3 specimens were yet in cocoons), reared until June; the fruit bodies of fungus in laboratory observed on May 25, 1959.

Warszawa-Bielany, June 3, 1962, edge of leafy forest, just near stump of an old big oak infested with larvae of longhorn beetle *Cerambyx cerdo* L., in litter made of sawdust removed by ants of *Lasius brunneus* (LATR.) from the old galleries of larvae of longhorn beetles, between roots of scarce grass, as well as among fallen leaves, acorns, tin twigs and little fragments of bark, all of them infected by a white mycelium — numerous larvae, 5–9 mm long, and 6 pupae in cocoons, from which imagines emerged June 8–16; several larvae reared until May 1963, two imagines taken out May 15, 1963. Same locality and place, July 24 and September 13, 1962, several larvae, one adult emerged May 24, 1963; the fungus fructifyigs ascertained on June 20, 1963. In the same spot, May 30, 1963, in association with wireworms of *Cidnopus minutus* (L.), numerous larvae accompanied by seven pupae, from which four imagines emerged June 11–17, 1963.

Grodzisk Mazowiecki — Piaskowa, June 23, 1974, grassy fallow, in the fungus-white

soil, under toad stools of *Marasmius oreades* (BOLT.) FR., between dead roots of grass, two larvae; not far away, great number of adults on flowers of *Achillea millefolium* L.

Pieniny Mountains: All material of larvae were found on dry pastures for sheep and cows, also in spots which were distinguished from others in that the soil was infected by white fungus mycelium. Wżar Mt. (about up to 760 m above sea level), June 19, 1972, under toad stools of *Marasmius oreades* (BOLT.) FR. growing in a "fairy ring", 8 larvae in association with wireworms of click beetle *Cidnopus minutus* (L.). Near Jaworki, valley of the river Biała Woda, June 12, 1972, under toad stools, four larvae and one immature imago in cocoon. Same locality and place, July 5, 1974, two larvae, which one devoured by wireworm of *Adelocera murina* (L.). Podłaźce, July 7, 1974, xerothermic pasture, three larvae under toad stools in a "fairy ring".

Gdańsk-Wrzeszcz, July 27, 1978, mixed forest meadow, on beaten footpath, under a group of fruitbodies of *Marasmius*, in grass humus at depth about 2 cm – 2 larvae, and on surface – one oogamous female; July 24–31, in the field observed the copulation of several pairs of imagines on flowers of *Umbelliferae*; August 12, 1978, in laboratory ascertained the fungus fructifying on sample of white-soil.

All the material were collected and reared by the author.

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STRESZCZENIE

[Tytuł: Młodsze postacie rozwojowe i bionomia *Vadonia livida* (F.) (Coleoptera, Cerambycidae)]

Praca zawiera omówienie wyników badań nad dotychczas nie znaną morfologią młodszych postaci rozwojowych oraz bionomią *Vadonia livida* (F.) na podstawie materiałów zebranych przez autora w Polsce. Z licznych larw zebranych w terenie zostały wyhodowane poczwarki i postacie dojrzałe, co pozwoliło na bezbłędną identyfikację gatunku; nadto w hodowli imagines uzyskano jaja i larwy pierwszego stadium.

Podano dokładne opisy jaja, larwy, poczwarki oraz kokonu wytworzonego przez dorosłą larwę przed przepoczwarczeniem. Wymienione opisy zilustrowano oryginalnymi rysunkami.

Larwy charakteryzują się głównie następującymi cechami morfologicznymi: oczy niedostrzegalne, wargę górną bez głębokiego wycięcia, języczek krótszy i szerszy od głąszczków wargi dolnej, hypostom 8–10 razy szerszy od swej długości pośrodku, 1–6 segment odwłoka na grzbietowej i brzusznej stronie z poduszkami ruchowymi opatrzonymi małutkimi guzkami i drobnymi kolcami, przetchlinki z 12–15 komorami bocznymi.

W części bionomicznej pracy przedstawiono cykl rozwojowy oraz ekologię *Vadonia livida* (F.). Gatunek ten zasiedla głównie nasłonecznione miejsca otwarte, przeważnie na suchych łąkach i pastwiskach, ugorach, pobrzeżach dróg, pól i lasów, polanach i porębach leśnych, rzadziej w głębi świetlistych lasów. Postacie dorosłe po wylęgnięciu się z komór poczwarkowych w końcu maja lub początku czerwca żyją do końca lipca lub początku sierpnia. Prowadzą one dzienny sposób życia. Większą aktywność przejawiają w czasie bezwietrznej i słonecznej pogody. Pobierają pokarm z pyłków i nektaru kwiatów, głównie roślin baldaszkowatych (*Umbelliferae*) i złożonych (*Compositae*) na których odbywa się również kopulacja. Zapłodnione samice wywędrówują do przyziemnej warstwy murawowej. Składają one jaja wyłącznie do gleby próchnicznej między obumierającymi trawami. Rozwój zarodkowy trwa około dwu tygodni. Larwy po wylęgnięciu mają około 1,5 mm długości. Okres całkowitego rozwoju gatunku co najmniej dwuletni.

Dotychczas liczni autorzy podawali, że larwa kózki *Vadonia livida* (F.) żyje w martwym drewnie gałęzi dębu i kasztana. Według spostrzeżeń autora niniejszej pracy pogląd ten nie jest słuszny. Larwy zasiedlają wyłącznie przegrzybiałą glebę próchniczną pokrytą roślinnością trawiastą. Żerują one wśród martwych fragmentów roślin znajdujących się w glebie, głównie korzeni i podziemnych pędów traw, pokrytych białymi strzępkami grzybni, z których w okresie wegetacyjnym wyrastają owocniki saprofitycznego grzyba twarżoszka przydrożnego — *Marasmius oreades* (BOLT.) FR. Uprzednio opublikowana krótka wzmianka (BURAKOWSKI 1971: 239, 271, 272) o sposobie życia *Vadonia bicarinata* (ARN.) odnosi się właściwie do *V. livida* (F.).

Larwy w pierwszym roku życia, na jesieni osiągają długość 5–8 mm, w drugim roku 12–15 mm. Dorosłe larwy na jesieni na głębokości 2–5 cm budują komorę poczwarkową, w której zimują, następnie na wiosnę wytwarzają kokon o konsystencji pergaminowej. Przepoczwarczenie następuje w kokonie w końcu kwietnia lub w maju. Stan poczwarki trwa około 10 dni. Wybarwione imagines wydobywają się nad powierzchnię ziemi w końcu maja lub w czerwcu.

Populację *V. livida* (F.) ograniczają drapieżne larwy sprzążków (*Elaterydae*), głównie *Adelocera murina* (L.) napadające na larwy kózki zwłaszcza w czasie ich linienia i po przezimowaniu.

W końcowej części pracy podano krótko metodę hodowli i jej przebieg w warunkach laboratoryjnych, nadto przedstawiono wykaz użytego do badań materiału, przechowywanego w Instytucie Zoologii PAN w Warszawie.

РЕЗЮМЕ

Заглавие: Ювенильные стадии развития и бионимия *Vadonia livida* (F.) (*Coleoptera*, *Cerambycidae*)

Работа содержит обсуждение результатов исследований, а также бионию *Vadonia livida* (F.) на основании материалов собранных автором в Польше. Из многих личинок собранных в почве, выращено куколки и взрослые особи, что позволило на безошибочную идентификацию вида; кроме того в выращивании взрослых жуков получено яйца и личинки первой стадии.

Даны точные описания яйца, личинки, куколки и кокона сделанного взрослой личинкой перед окуклением. Указанные описания иллюстрированы оригинальными рисунками.

Личинки характеризуются главным образом следующими морфологическими признаками: глаза незаметные, верхняя губа без глубокого выреза, язычок короче и шире лабиальных щупиков нижней губы, гипостом 8-10 раз шире в середине своей длины, 1-6 сегмент туловища на спинной и брюшной стороне с двигательными мозолями снабженными маленькими гранулами и мелкими шипиками, дыхальца с 12-15 краевыми камерами.

В бионимической части работы представлено цикл развития и экологию *Vadonia livida* (F.). Вид этот заселяет главным образом солнечные открытые места преимущественно на сухих лугах и пастбищах, парах, по краям дорог, полей и лесов, на полянах и лесосеках, реже в глубине светлых лесов. Взрослые особи после вылупления из кукольных колыбелек в конце мая или в начале июня живут до конца июля или начала августа. Они ведут дневной образ жизни. Большую активность они проявляют во время безветренной и солнечной погоды. Кормятся цветочной пыльцой и нектаром цветов главным образом цветков зонтичных (*Umbelliferae*) и сложноцветных (*Compositae*) на которых происходит тоже копуляция. Оплодотворенные

самки переселяются в приземную мураву. Откладывают яйца исключительно в почве между обумирающими травами. Развитие зародыша длится около двух недель. Личинки после вылупления имеют около 1,5 мм длины. Цикл полного развития вида не менее двугодний.

Многие авторы утверждают до сих пор, что личинка усача *Vadonia livida* (F.) живет в древесине ветвей дуба и каштана. По наблюдениям автора настоящей работы, этот взгляд неправильный. Личинки заселяют исключительно перегнойную грибковую почву покрытую травянистой растительностью. Они находят пищу среди мёртвых фрагментов растений находящихся в почве главным образом на корнях и подземных побегах трав покрытых слоем плотного беловатого мицелия из которого во время вегетации вырастает плодовое тело сапрофитного гриба лугового опёнка — *Marasmius oreades* (BOLT.) Fr. Раньше опубликована короткая заметка (BURAKOWSKI 1971: 239, 271, 272) о способе жизни *Vadonia bicarinata* (ARN.) относится собственно к *V. livida* (F.).

Личинки в первом году жизни достигают осенью 5-8 мм длины, во втором году 12-15 мм. Взрослые личинки строят осенью кукольную колыбельку на глубине 2-5 см в которой зимуют, затем весной изготавливают кокон пергаментной консистенции. Окукливание наступает в коконе в конце апреля или мая. Стадия куколки длится около 10 дней. Окрашенные взрослые особи вылетают на землю в конце мая или в июне.

Популяцию *V. livida* (F.) ограничивают хищные личинки щелкунов (*Elateridae*) главным образом *Adelocera murina* (L.) нападающие на личинки усачов особенно во время их линки по зимовке.

В концевой части работы даны кратко, метод выращивания и его процесс в лабораторных условиях, кроме того приведено список использованного к исследованиям материала, хранящегося в Институте Зоологии ПАН в Варшаве.



Redaktor pracy — prof. dr J. Nast

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