

New data on morphology and systematics of the larvae of Donaciinae  
(Coleoptera Chrysomelidae) from Palaearctic

Новые данные по морфологии и систематике личинок листоедов Donaciinae  
(Coleoptera Chrysomelidae) Палеарктики

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КЛЮЧЕВЫЕ СЛОВА: листоеды, Donaciinae, *Donacia*, *Plateumaris*, новые личинки, описания, ключи, Палеарктика.

ABSTRACT: The article includes original descriptions of larvae of 3 species: *Donacia thalassina* Germar, *D. sparganii* Ahrens, *Plateumaris discolor* Panzer, and redescription of *D. cinerea* Herbst. Keys to larvae of the mentioned *Donacia* species and close to them ones and all known larvae of Palaearctic *Plateumaris* species are presented.

РЕЗЮМЕ: В статье описываются ранее неизвестные личинки 3 видов: *Donacia thalassina* Germar, *D. sparganii* Ahrens, *Plateumaris discolor* Panzer, и переописывается неверно описанная ранее личинка *D. cinerea* Herbst. Приводятся определительные таблицы личинок упомянутых и близких к ним видов *Donacia* и всех известных личинок палеарктических видов *Plateumaris*.

The immature stages of the chrysomelid-beetles of subfamily Donaciinae are not sufficiently studied up to our days. Larvae of only 20 palaearctic species, less than half of the total number have been described more or less satisfactorily [Böving, 1910; Ogloblin, Medvedev, 1971; Medvedev, Zaitzev, 1980; Zaitzev, 1982; Zaitzev, Pavlov, 1986].

The present article contains original descriptions of larvae of 3 species and redescription of the larva of *Donacia cinerea* Herbst, 1784 (which was erroneously described by A.G. Böving [1910]) on the basis of author's own collection from the European part of Russian Federation. Terminology for the structural details is used after Böving [1910], with several original additions. Some new diagnostical characters are used for distinguishing between species. The keys are made with the use of slides of larval exuviae, taken from the cocoons, contain-

ing beetles of all species, except *Plateumaris affinis* Kunze, 1818 and *P. braccata* Scopoli, 1772, on which the author has not any material; the characters of the latter are taken from the key and figures by Böving [1910], who described the larvae of these species first.

The following abbreviations are used in the article: lf — larva of female; lm — larva of male; ms. — mesothorax; mt. — metathorax. The rows of setae, mentioned in the article are always (in case of absence of special remarks) transverse and irregular.

The materials are in the author's collection, some specimens of the described larvae are sent to the Zoological Institute of Russian Academy of Sciences, St. Petersburg.

*Donacia thalassina* Germar, 1811.

DESCRIPTION. The last instar larva. Body pale cream-coloured; setae, spiracles, abdominal appendages, ocelli, mandibles, claws pale brown; head, legs, 2 chitinized shields of prothorax reddish. Body length 11 mm, cephalic capsule 0.7 mm wide.

Frontale (Fig. 1 A) pentagonal. Width between lateral angles 1.1 times more than length without acutely produced posterior angle. Anterior angles acute, thickened; lateral ones right; posterior angle acutely produced, reaches to occipital margin of parietale between parietal sides. Anterior and lateral margins strongly concave, posterior one almost straight. Frontale with 2 pores and 8 setae. Pore at each side between discal (Fig. 1, A, b) and central marginal (Fig. 1, A, c) setae, nearer to former. Angular setae (Fig. 1, A, a) longer than others. Distance between pores 1.2-1.3 times more than between central marginal setae.

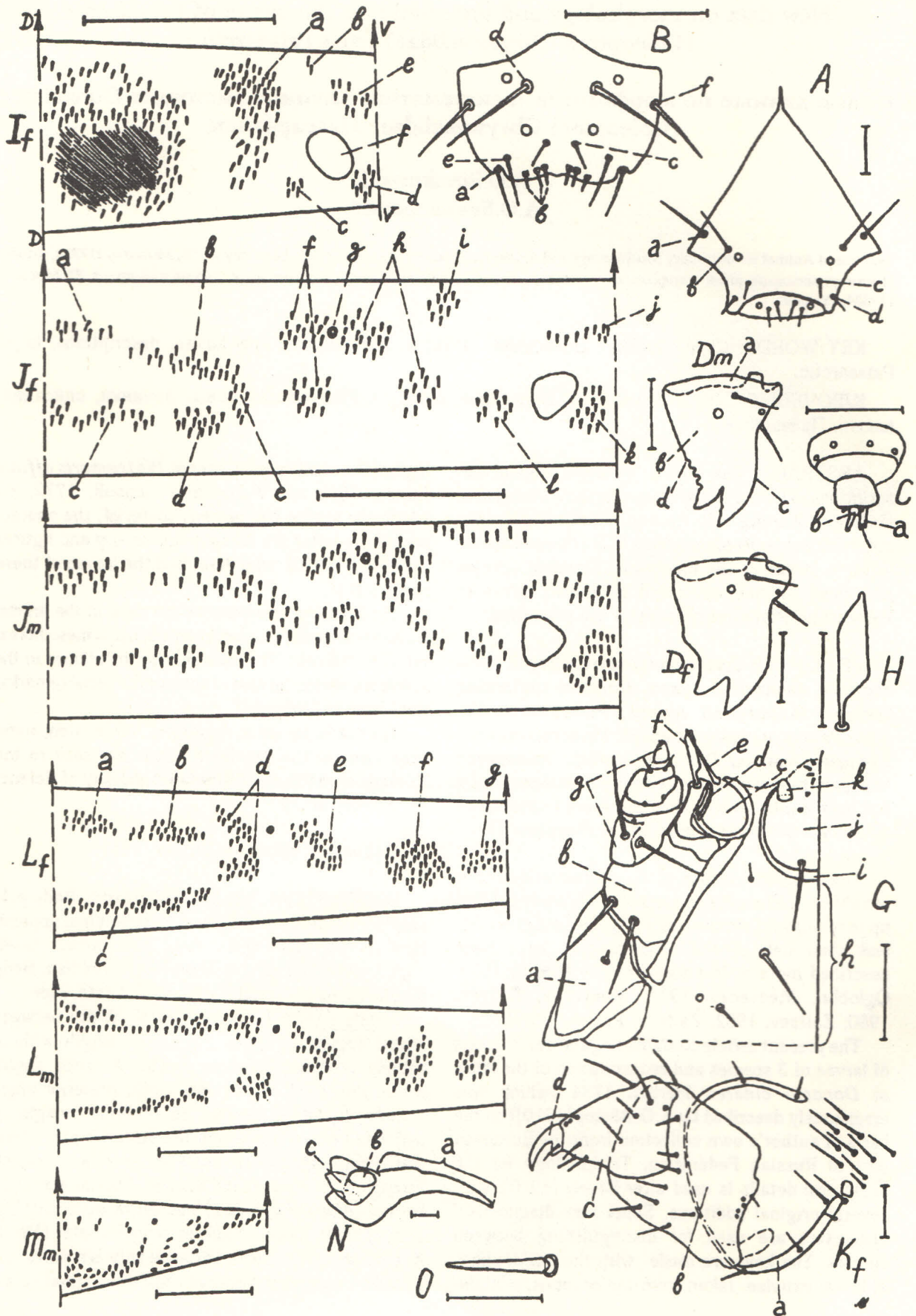


Fig. 1. *Donacia thalassina* Germar, 1811. Abbreviations: A - frontale, clypeus (a-d - setae: a - angular, b - discal, c - central marginal, d - outer marginal); B - labrum (a-f - setae: a - angular, b - marginal, c - distal, d - proximal, e - median, f - lateral); C - antenna (a - sense-process, b - apical joint); D - left mandible (Dm - male, Df - female, a - base, b - face, c - dorsum, d - cutting edge); E - lacinia, blade (galea); F - menthal sclerit, praementum; G - maxilla, labium (a - cardo, b - stipes, c - lacinia, d - emergences, e - needle-shaped process, f - blade (galea), g - maxillar palp, h - mentum, i - menthal sclerite, j - praementum, k - labial palp); H - blade (galea); I - prothorax (Im - male, If - female, a-e - patches of setae: a - epipleural, b - lateral intercalar, c - pedal, d - posterior sternal, e - anterior sternal, f - place for addition of leg, D-D - middle of dorsum, V-V - middle of ventrum); J - mesothorax (Jm - male, Jf - female, a-f, h-l - patches of setae: a - middle anterior tergal, b - lateral anterior tergal, c - middle posterior tergal, d - intermediate posterior tergal, e - lateral posterior tergal, f - supraspiracular, h - infraspicular, i - lateral intercalar, j - anterior sternal, k - posterior sternal, l - pedal; g - spiracle); K - leg of female larva (a - coxa, b - trochanter + femur, c - tibiotarsus, d - claw); L - 2nd abdominal segment (Lm - male, Lf - female, a-g - patches of setae: a - middle anterior tergal, b - lateral anterior tergal, c - posterior tergal, d - supraspiracular, e - infraspicular, f - pedal, g - sternal); M - 7th abdominal segment of male larva; N - abdominal appendage (a - hook-shaped part, b - oval portion, c - basal frame); O - seta. Scale in A-G, K, N, O - 0.1 mm; H - 0.05 mm; I, J, L, M - 1 mm.

Рис. 1. *Donacia thalassina* Germar, 1811. Обозначения: А - лоб и наличник (а-d - хеты: а - угловые, б - дискальные, с - внутренние маргинальные, d - наружные маргинальные); В - верхняя губа (а-f - хеты: а - угловые, б - маргинальные, с - дистальные, d - проксимальные, е - медиальные, f - боковые); С - усик (а - сенсорный придаток, б - третий членик усика); D - левая мандибула (Dm - самца, Df - самки, а - основание, б - наружная сторона, с - дорзальный край, d - режущий край); E - лациния, лопасть (галея); F - ментальный склерит, прементум; G - максилла и нижняя губа (а - кардо, б - стипес, с - лациния, d - волоски, е - игловидный отросток, f - лопасть (галея), g - максиллярный щупик, h - ментум, i - ментальный склерит, j - прементум, k - нижнегубной щупик); H - лопасть (галея), I - переднегрудь (Im - самца, If - самки, а-е - группы хет: а - эпиплевральная, б - боковая интеркалярная, с - педалярная, d - задняя стерральная, е - передняя стерральная, f - место прикрепления ноги, D-D - середина спинной, V-V - брюшной стороны); J - среднегрудь (Jm - самца, Jf - самки, самки, а-f, h-l - группы хет: а - внутренняя претергальная, б - наружная претергальная, с - внутренняя посттергальная, d - промежуточная посттергальная, е - наружная посттергальная, f - супраспиракулярная, h - инфраспиракулярная, i - боковая интеркалярная, j - передняя стерральная, k - задняя стерральная, l - педалярная; g - дыхальце); K - нога личинки самки (а - тазик, б - вертлуг+бедро, с - голенелатка, d - коготок); L - второй брюшной сегмент (Lm - самца, Lf - самки, а-g - группы хет: а - внутренняя претергальная, б - наружная претергальная, с - посттергальная, d - супраспиракулярная, е - инфраспиракулярная, f - педалярная, g - стерральная); M - седьмой брюшной сегмент личинки самца; N - серповидный придаток (а - шиповидная часть, б - овальное отверстие, с - базальный остов); O - хета. Длина масштабной линейки на рис.: А-Г, К, N, O - 0.1 мм; H - 0.05 мм; I, J, L, M - 1 мм.

Parietale with 4 pores, 1 curved long and 6 short setae (4 of latter form longitudinal row) and 5 ocelli at each side.

Clypeus (Fig. 1, A) with 2 pores and 4 setae, latter situated at nearly equal distance from each other. Anterior margin almost straight.

Labrum (Fig. 1 B) pentagonal, 1.4 times wider than long, with 4 pores and 16 setae. Anterior margin widely depressed. Anterior angles widely rounded, with narrow depression near angular setae (Fig. 1 B, a), lateral ones right, slightly rounded. Median (Fig. 1 B, e) and angular setae long, marginal ones (Fig. 1 B, b) short, of nearly equal length, 3.3-4.0 times shorter than angular ones. Outer marginal seta slightly separated from central ones. Distal setae (Fig. 1 B, c) 1.5 times longer than marginal ones, distance between them 2 times less than between anterior pores. Length of proximal setae (Fig. 1 B, d) nearly equal to length of labrum, distance between them 1.5 times less than between posterior pores. Lateral setae (Fig. 1 B, f) 2 times nearer to base of lateral margin than to its apex.

Antennae (Fig. 1, C) of 3 joints. Basal joint broad, cylindrical, with 4 pores, 2nd one wider than long, cylindrical, slightly broadened at apex, 2 times narrower than basal one, with 2 small and 1 large sense-processes (Fig. 1, C, a), latter furnished with

seta, which 2 times longer than apical joint (Fig. 1, C, b). Apical joint small, with conical sense-process, which 2.7-4.0 times longer than this joint.

Mandibles (Fig. 1, Dm, and Df) slightly elongated (length from apex to middle of base (Fig. 1, Dm, a) 1.2 times more than base width), with 2 pores at face (Fig. 1, Dm, b) and 2 setae: one at face, another at dorsum (Fig. 1, Dm, c). Dorsum widely depressed near base, convex between apex and depression. Base slightly convex, with rounded condyle. Inner tooth noticeably projects over cutting edge (Fig. 1, Dm, d). Cutting edge slightly convex near base, with 1 large triangular projection and sometimes 1 small denticle (If, Fig. 1, Df) or 3 denticles, nearest one to base small, sharp, others longer, well circumscribed, with parallel sides and rounded at apex (Im, Fig. 1, Dm). Teeth with 1-2 flat denticles at inner side (Im).

Maxillae (Fig. 1, G, a-g, and H). Cardo (Fig. 1, G, a) large, trapeziform, with 1 short seta; stipes (Fig. 1, G, b) triangular, with 2 long setae. Lacinia (Fig. 1, G, c) ear-shaped, with emergences (Fig. 1, G, d). Needle-shaped process (Fig. 1, G, e) narrow, with parallel sides, slightly sharpened at top, its length equal to width of lacinia. Blade (galea) (Fig. 1, G, f, and H) 5.3-5.6 times longer than wide at middle and somewhat longer than needle-shaped process. Maxillar palps (Fig. 1, G, g) of 4 joints. Basal joint with

2 ordinary long setae and 1 pore; 2nd one with 2 pores; 3rd one with 2 setae and 1 pore; apical one with 1 pore and sense-process at apex.

**Labium** (Fig.1, G, h-k). **Mentum** (Fig.1, G, h) with 2 long, 4 short setae and 2 pores. **Menthal sclerite** (Fig.1, G, i) horseshoe-shaped or arched, slightly broadened at middle, almost not projects backward. **Praementum** (Fig.1, G, j) with 2 long setae at its base, 2 labial palps (Fig.1, G, k) of 1 joint and 4 pores at its middle, group of 6 short setae at its front.

**Prothorax** (Fig.1, I) with 2 feebly chitinized shields on upper side, which surrounded with: 6 rows of setae at front, 2-3 longitudinal rows at outer and inner sides and individual setae at base. **Epipleural patches** (Fig.1, I, a) large, broad-crescent, their setae more dense at anterior, than posterior part. **Lateral intercalar patches** (Fig.1, I, b) rudimental, with 2-3 (lm) or 1-2 (lf) setae. **Pedal patches** (Fig.1, I, c) of 6 (lm) or 4-5 (lf) setae. **Anterior sternal patch** (Fig.1, I, e) of 4 (lm) or 3 (lf) rows, **posterior sternal ones** (Fig.1, I, d) of 18 (lm) or 10 (lf) setae.

**Meso-** (Fig.1, Jm, and Jf) and **metathorax**. **Middle anterior tergal patch** (Fig.1, Jf, a) of 3 (lm, lf:mt.) or 2 (lf:ms.) rows of setae; **lateral anterior tergal patches** (Fig.1, Jf, b) of 3 rows; **middle posterior tergal patch** (Fig.1, Jf, c) of 1-2 (lm) or 2 (lf) rows; **intermediate posterior tergal patches** (Fig.1, Jf, d) of 6-8 (lm:ms.), 9-11 (lm:mt.) or 13-15 (lf) setae; **lateral posterior tergal patches** (Fig.1, Jf, e) of 8-9 setae. **Lateral anterior and posterior tergal patches** connected at body sides. **Supraspiracular patches** (Fig.1, Jf, f) divided into anterior and posterior portions of equal size; **infraspiracular ones** (Fig.1, Jf, h) divided or not divided. **Anterior supra- and infraspiracular portions** wide connected (lm, lf:mt.). **Lateral intercalar patches** (Fig.1, Jf, i): rounded, of 3 rows, or transversal, of 2 rows of 7-15 (lf) setae; or with 1-1.5 rows of 8-11 (lm) setae. **Middle intercalar patch** absent. **Pedal patches** (Fig.1, Jf, l) of 9-10 (ms.), 13-16 (mt.) setae. **Right and left posterior sternal patches** (Fig.1, Jf, k) separated with narrow space, of 26-32 (lm) or 15 (lf) setae. **Anterior sternal patch** (Fig.1, Jf, j) of 2-3 (lm) or 2 (lf) rows of setae, sometimes 4-5 outer setae form isolated patch.

**Legs** (Fig.1, K). **Coxa** (Fig.1, K, a) flat, with chitinized arc at its base, and 14-20 setae. **Trochanter** fused with femur (Fig.1, K, b), with 5 pores and 5-9 setae. **Tibiotarsus** (Fig.1, K, c) short, conical, with 2 long and 5 short setae and 1 pore at apex (lm) or 3 long, 5 short setae and 3 pores (1 at base, 2 at apex) (lf). **Claw** (Fig.1, K, d) strongly curved, with large right denticle and seta at base.

**Abdomen** (Fig.1, Lm, Lf, M). **Lateral** (Fig.1, Lf, b) and **middle** (Fig.1, Lf, a) anterior tergal patches of 1-6 segments of 3 rows of setae, adjoin (lm) or near to each other (lf); **posterior tergal patches** (Fig.1, Lf, c) of 1-2 (lm) or 2 (lf) rows with individual setae at front. **Supraspiracular patches** (Fig.1, Lf, d) divided (sometimes not clear) into anterior and posterior portions; **infraspiracular ones** (Fig.1, Lf, e) not divided; **pedal ones** (Fig.1, Lf, f) large, rounded, slightly larger than infraspiracular ones; **right and left sternal ones** (Fig.1, Lf, g) adjoin or connected to each other, of 3-4 rows of setae. **Anterior tergal, supraspiracular and sternal patches** of 7th segment (Fig.1, M) reduced, **posterior tergal one** broadened. **Abdominal appendages** (Fig.1, N) of 8th segment evenly curved. **Hook-shaped part** (Fig.1, N, a) 3 times longer than height of its base and 5.4 (lm) or 4.7 (lf) times longer than oval portion (Fig.1, N, b). **Basal frame** (Fig.1, N, c) with 11-13 pores. There are 18-19 setae and 7 pores between abdominal appendages, and 4-6 setae, 7 pores and 2 triangular sclerites on each side of them. 9th and 10th segments small, covered with setae.

**Spiracles** normally developed at mesothorax and 1-8 abdominal segments (at 8th one they are in oval portion of abdominal appendages), rudimental at metathorax. **Atrium of spiracles** with emergences.

**Setae** (Fig.1, O), covering body, broadened at base, rectilinearly narrowed apically, of 0.02-0.15 mm long. At 6-7 abdominal segments they somewhat longer, than at anterior ones.

**MATERIAL**. Slides: Moscow region, Zelenograd, pool, at roots of *Eleocharis*, 22.09.1991: 4 larval exuviae from cocoons with imagines (1 ♂, 3 ♀♀), 3 larvae. In alcohol: from same place, among roots of *Carex vesicaria*, 14.06.1991: 4 larvae; at roots of *Eleocharis*, 08.08.1991: 16 larvae (including 7 ones of young instar), 3 cocoons with larvae; 22.09.1991: 1 cocoon with imago and larval exuvium, 4 larvae; 13.05.1992: 7 cocoons with imagines (3 ♂♂, 4 ♀♀) and larval exuviae.

**REMARKS**. Differences between larvae of males and females ascertained in *D. thalassina* by analysis of some specimens of exuviae from cocoons containing imagines (4 ♀♀, 7 ♂♂) request following investigations.

*D. thalassina* belongs to the species group with not numerous setae in posterior tergal patches at ms. and mt., (1-2 rows of setae), and is distinguished from them by the following characters:

- 1(4). Setae of tergal patches of ms., mt. and anterior abdominal segments different: among more or less equal, short setae numerous long (2-3 times

- longer) ones situated. Frontal pore on outside of line between discal and outer marginal setae. Labrum strongly angularly projects backward. Mental sclerit arched, strongly broadened at middle and angularly projects backward.
- 2(3). Middle posterior tergal patch of ms. of 1 row; lateral intercalary ones of 16-19 setae. Posterior tergal patch of 2nd abdominal segment of 1 row; lateral anterior tergal ones of 1-1,5 rows of setae. All marginal setae of labrum short, situated close to each other. Both mandibular teeth more or less sharp ..... *Donacia versicolore* Brahm, 1790.
- 3(2). Middle posterior tergal patch of ms. of 2 rows; lateral intercalary ones of 22 setae. Posterior and lateral anterior tergal patches of 2nd abdominal segment of 2 rows of setae. Longer outer marginal seta somewhat distant from central ones. Outer mandibular tooth sharp, inner one rounded ..... *Donacia dentata* Hoppe, 1795.
- 4(1). All setae of tergal patches of ms., mt. and anterior abdominal segments short, more or less equal. Frontal pore between discal and outer marginal setae or on inside of this line. Labrum moderately projects backward. Mental sclerit horseshoe-shaped or arched, slightly broadened at middle, almost not projects backward.
- 5(8). Lateral anterior tergal patches of 2nd abdominal segment of 1-2 rows of setae. Lateral intercalary patches of ms. broad, transversal, of 13-16 setae.
- 6(7). Lateral intercalary patches of ms. of 13 setae; anterior sternal ones of 3-4 rows of setae. Lateral anterior tergal patches of 2nd abdominal segment of 1-1.5 rows. Outer tooth of mandible sharp, inner one is rounded; cutting edge with 3 rounded denticles ..... *Donacia semicuprea* Panzer, 1796.
- 7(6). Lateral intercalary patches of ms. of 14-16 setae; anterior sternal ones of 2 rows of setae. Lateral anterior tergal patches of 2nd abdominal segment of 2 rows. Both tooth of mandible thick, rounded, situated close to each other, cutting edge flat ..... *Donacia clavipes* Fabricius, 1793.
- 8(5). Lateral anterior tergal patches of 2nd abdominal segment of 3 rows of setae. Lateral intercalary patches of ms. of 1-1.5 rows with 8-11 setae (lm) or of 2-3 rows with 7-15 setae (lf); middle posterior tergal ones of 1-2 (lm) or 2 (lf) rows of setae. Both teeth of mandible more or less sharp; cutting edge with 3 denticles (lm) or with large projection and sometimes with 1 small denticle (lf) ..... *Donacia thalassina* Germar, 1811.

*Donacia sparganii* Ahrens, 1810.

**DESCRIPTION.** The last instar larva. Body is pale cream-coloured; setae, spiracles, abdominal appendages, ocelli, mandibles, claws pale brown; head, legs, 2 chitinized shields of prothorax reddish. Body length 12 mm, cephalic capsule 0.7 mm wide.

**Frontale** (Fig. 2, A) pentagonal. Width between lateral angles equal to length. Anterior angles acute, strongly thickened; lateral ones right; posterior angle almost right. Anterior and lateral margins strongly concave, posterior ones almost straight. Frontale with 2 pores and 8 setae. Pore at each side between discal and angular setae, 2 times nearer to former. Angular setae not longer than others. Distance between pores 1.3-1.4 times more than between central marginal setae.

**Parietale** with 6 pores, 1 curved long and 6 short setae (4 of latter form longitudinal row) and 5 ocelli at each side.

**Clypeus** (Fig. 2, A) somewhat shorter than labrum, of 2 pores and 4 setae, latter situated at nearly equal distance from each other. Anterior margin concave.

**Labrum** (Fig. 2, B) pentagonal, 1.8 times wider than long, with 4 pores and 16 setae. Anterior margin with wide depression at middle and small ones at sides near angular setae. Anterior and lateral angles clear, slightly rounded. Median and angular setae long, marginal ones short, of equal length, 2-5 times shorter than angular ones; outer marginal seta slightly separated from central ones or all of them adjoin at bases. Distal setae somewhat longer than marginal ones, distance between them 2.3-2.7 times less than between anterior pores. Length of proximal setae somewhat less than length of labrum, distance between them 2 times less than between posterior pores. Lateral setae 4 times nearer to base of lateral margin than to its apex.

**Antennae** (Fig. 2, C) of 3 joints. Basal joint broad, cylindrical, with 4 pores, 2nd one of equal length and width, cylindrical, narrowed at apex, 1.5 times narrower than basal one, with 2 small and 1 large sense-processes, latter furnished with seta, which 2 times longer than apical joint. Apical joint small, with conical sense-process, which 2.5 times longer than this joint.

**Mandibles** (Fig. 2, D) slightly elongated (length from apex to middle of base 1,2 times more, than base width), with 1 pore at face and 2 setae: one at face, another (short) at dorsum. Dorsum wide depressed near base, convex between apex and depression. Upper part of base projects, lower one with rounded condyle. Inner tooth noticeably projects over cutting edge. Cutting edge almost straight, one of right mandible with 3 rounded well circumscribed

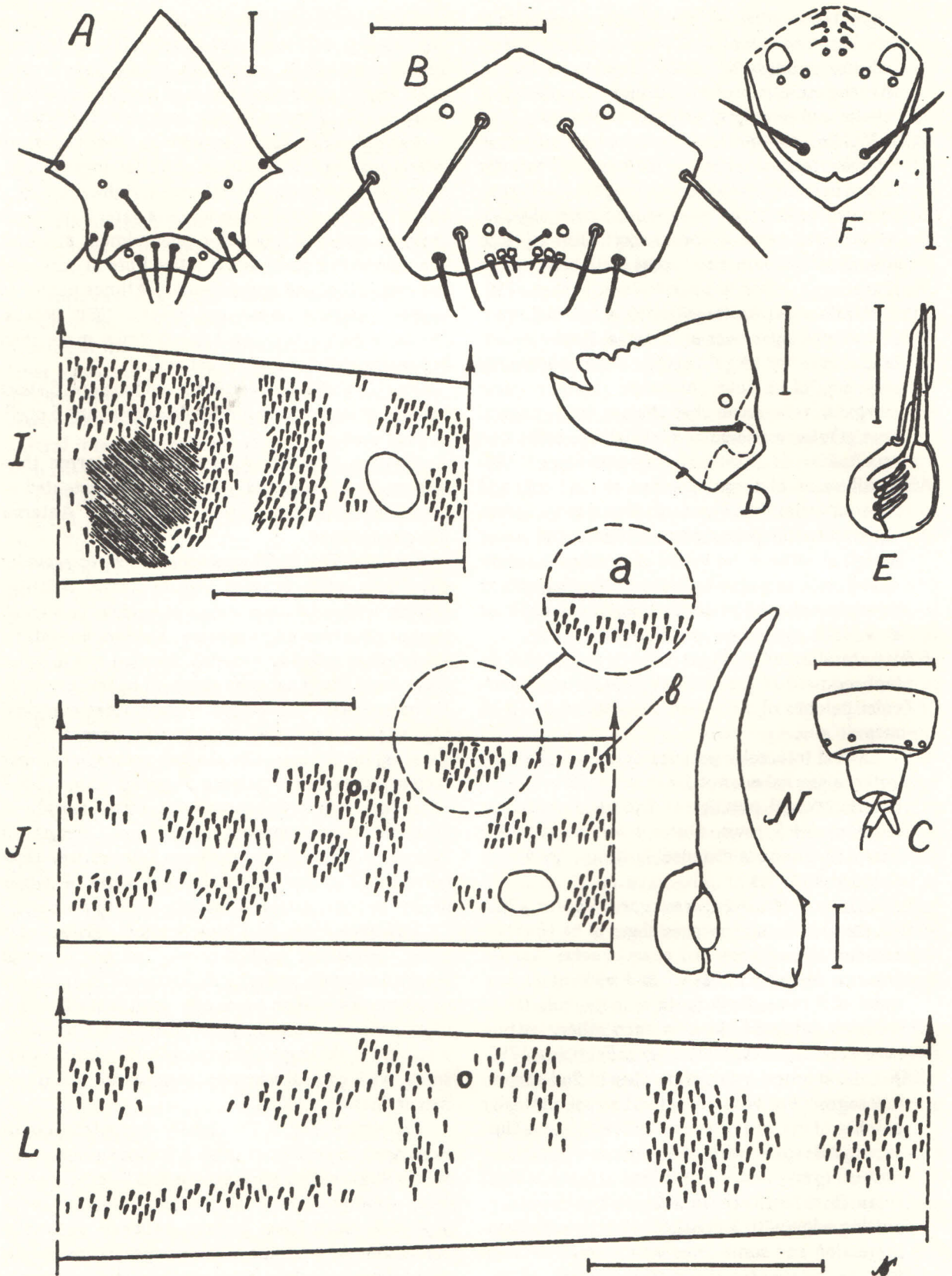


Fig.2. *Donacia sparganii* Ahrens, 1810. Abbreviations and scale as in Fig.1.

Рис.2. *Donacia sparganii* Ahrens, 1810. Обозначения и масштаб как на рис.1.

denticles, one of left mandible with 2 same denticles. Outer tooth with 2 flat denticles or almost straight, inner one with 1 denticle at inner side.

**Maxillae.** Cardo large, trapeziform, with 1 short seta; stipes triangular, with 2 long setae. Lacinia (Fig. 2, E) ear-shaped, with emergences. Needle-shaped process with parallel sides, sharpened at apex, its length 1.4 times more than width of lacinia. Blade (galea) 4.6 times longer than its width at middle and somewhat longer than needle-shaped process. Maxillar palps of 4 joints. Basal joint with 2 ordinary long setae and 1 pore; 2nd one with 2 pores; 3rd one with 2 setae and 1 pore; apical one with 1 pore and sense-process at apex.

**Labium** (Fig. 2, F). Mentum with 2 long, 4 short setae and 2 pores. Mental sclerite narrowly arched, strongly broadened at middle and angular projects backward. Praementum with 2 long setae at its base, 2 labial palps of 1 joint and 4 or 6 pores at its middle, group of 6 short setae and 2 pores at its front.

**Prothorax** (Fig. 2, I) with 2 feebly chitinized shields on upper side, which surrounded with: wide zone of setae at front, 4 longitudinal rows at outer side and individual setae at inner side and base. Epipleural patches large, almost rectangular with rounded angles, their setae not dense or somewhat dense at anterior than posterior part. Lateral intercalary patches rudimental, of 0-4 (lm) or 0-2 (lf) setae. Pedal patches of 10-12 (lm) or 6-7 (lf) setae. Anterior sternal patch of 21 (lm) or 13-17 (lf) setae, posterior sternal ones of 3 rows of setae.

**Meso-** (Fig. 2, J) and **metathorax.** Middle anterior tergal patch adjoined (ms.), or separated (mt.), of 2 (ms.) or 3 (mt.) rows of setae; lateral anterior tergal and lateral posterior tergal patches of 3-4 rows of setae; middle posterior tergal ones wide separated, of 3 rows; intermediate posterior tergal patches not circumscribed. Lateral anterior and posterior tergal patches connected at body sides (ms.) or narrow separated (mt.). Supraspiracular patches divided into anterior and posterior portions, formers somewhat larger than latters; infraspicular ones not divided. Anterior supra- and infraspicular portions wide connected. Lateral intercalary patches large, rounded, of 3-4 rows of setae, short row of setae goes from it and sometimes connects with middle intercalary patch (ms.), or of 2-3 rows of setae (mt., Fig. 2, J, a). Middle intercalary patch (Fig. 2, J, b) of 5-9 setae. Pedal patches of 8-15 (ms.), 19-20 (mt.) setae. Right and left posterior sternal patches separated with narrow space, of 22-31 (ms.), 34-36 (mt.) setae. Anterior sternal patch of 2-3 rows of setae, broadened at sides and middle.

**Legs.** Coxa flat, with chitinized arc at its base,

and 21-24 setae. Trochanter fused with femur, with 17-27 setae. Tibiotarsus short, conical, with 3 long and 4 short setae, with 1 pore at base (lm), or 2 pores at apex (lf). Claw strongly curved, with large denticle and seta at base.

**Abdomen** (Fig. 2, L). Lateral and middle anterior tergal patches of 1-6 segments wide separated, of 3-4 rows of setae; posterior tergal ones of 2.0-2.5 rows. Supraspiracular patches divided (sometimes not clear) into anterior and posterior portions; infraspicular ones not divided; anterior supra- and infraspicular patches not connected. Pedal patches large, rounded, 2 times larger than infraspicular ones; right and left sternal ones wide connected at 1-5 segments, of 5-6 rows of setae, separated at 6th segment, of 9-20 setae. Anterior tergal, supraspiracular and separated sternal patches of 7th segment reduced, posterior tergal one broadened. Abdominal appendages (Fig. 2, N) of 8th segment evenly curved. Hook-shaped part 4 times longer than height of its base and 5.2-5.5 (lm) or 4,4 (lf) times longer than oval portion. There are 20 setae and 5 pores between abdominal appendages, and 9-11 setae, 4 pores and 2 triangular sclerites on each side of them. 9th and 10th segments small, covered with setae.

**Spiracles** normally developed at mesothorax and 1-8 abdominal segments (at 8th one they are in oval portion of abdominal appendages), rudimental at metathorax. Atrium of spiracles with emergences.

**Setae**, covering body, broadened at base, rectilinearly narrowed apically, of 0.04-0.25 mm long. At 6-7 abdominal segments they longer, than at anterior ones.

**MATERIAL.** Slides: Moscow region, 23 km W of Zwenigorod, Lake Glubokoe, at roots of *Sparganium affine*, 01-02.08.1991: 2 larval exuviae from cocoons containing imagines ( $\sigma$ ,  $\rho$ ); 13.08.1991: 1 larva. In alcohol: from same place, 02.08.1991: 1 cocoon containing imago and larval exuviae, 4 larvae (1 is of young instar); 13.08.1991: 2 cocoons containing imagines and larval exuviae, 2 larvae, 15.08.1991: 12 larvae (4 are of young instar).

**REMARKS.** *D. sparganii* is easily distinguished from all of known larvae of Palaearctic *Donacia* by the following combination: middle posterior tergal patch at ms. and mt. are with 3-4 rows of setae; anterior tergal patches at 1-6 abdominal segments are wide separated; posterior tergal patches are with 2-2.5 rows of setae; and also middle intercalary patch at ms. and mt. well developed, consist of 5-9 setae. *D. sparganii* is close only to *D. crassipes* by the latter character, and is distinguished from it with many other characters:

1(2). Middle anterior tergal patches of 3 (ms.) or 4-

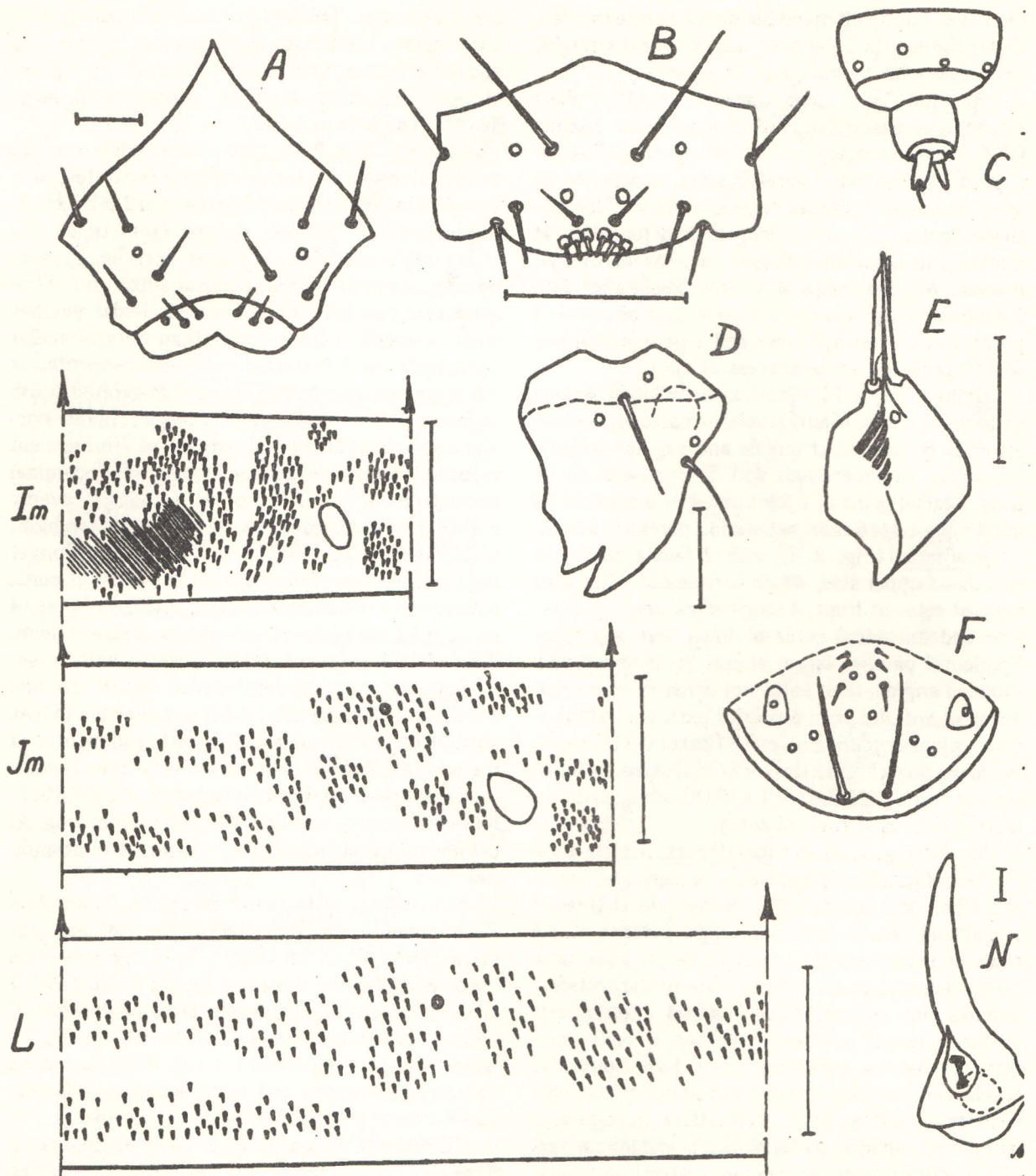


Fig.3. *Donacia cinerea* Herbst, 1784. Abbreviations and scale as in Fig.1.  
 Рис.3. *Donacia cinerea* Herbst, 1784. Обозначения и масштаб как на рис.1.

5 (mt.) rows of setae; posterior tergal ones at 1-6 abdominal segments of 4-5 rows of setae. Marginal setae of labrum slightly shorter than angular ones, outer marginal seta widely separated from central ones and closed to angular ones. Hook-shaped part of abdominal appendages 12.3 times longer than oval portion.....

.....*Donacia crassipes* Fabricius, 1775. 2(1). Middle anterior tergal patches of 2 (ms.) or 3 (mt.) rows of setae; posterior tergal ones at 1-6 abdominal segments of 2 rows of setae. Marginal setae of labrum 2-5 times shorter than angular ones, outer marginal seta slightly separated from central ones or all of them ajointed at their bases.



Hook-shaped part of abdominal appendages 4.4-5.5 times longer than oval portion .....  
 .....*Donacia sparganii* Ahrens, 1810.

*Donacia cinerea* Herbst, 1784.

**DESCRIPTION.** The last instar larva. Body milk-white coloured; setae, head, abdominal appendages, mandibles, legs pale brown; 2 chitinized shields of prothorax pale reddish; ocelli, spiracles, claws dark brown. Body length 13-14 mm, cephalic capsule 0.7 mm wide.

**Frontale** (Fig. 3, A) pentagonal. Width between lateral angles 1.2-1.3 times more than length. Anterior angles almost right, thickened; lateral ones right; posterior angle acute, somewhat produced. Anterior and lateral margins strongly concave, posterior ones smoothly «S»-formed. Frontale with 2 pores and 8 setae. Pore at each side between angular and central marginal setae, somewhat nearer to latter. Angular setae not longer than others. Distance between pores 1.8-1.9 (seldom 1.4) times more than between central marginal setae.

**Parietale** of 4 pores, 1 curved long and 6-7 short setae (3-4 of latters with 1 pore form longitudinal row) and 5 ocelli at each side.

**Clypeus** (Fig. 3, A) somewhat shorter than labrum, with 2 pores and 4 setae, length of latters hardly reach to length of labrum. Anterior margin angular concave.

**Labrum** (Fig. 3, B) almost quadrangular, 1.7 times wider than long, with 4 pores and 16 setae. Anterior margin straight at middle, with small depressions on sides, bearing angular setae. Anterior angles rounded, lateral ones almost right, posterior angle feebly projected. Median and angular setae long, marginal ones short, of almost equal length, 1.5-2.0 times shorter than angular ones, adjoined at bases. Distal setae 1.5 times longer than marginal ones, distance between them 1.3-1.5 times less than between anterior pores. Length of proximal setae equal to length of labrum, distance between them 1.5-1.9 times less than between posterior pores. Lateral setae somewhat nearer to base of lateral margin than to its apex.

**Antennae** (Fig. 3, C) of 3 joints. Basal joint broad, cylindrical, with 4 pores, 2nd one wider than long, slightly broadened at apex, 2.2-2.4 times narrower than basal one, with 2 small and 1 large sense-processes, latter furnished with seta, which 1.5 times longer than apical joint. Apical joint small, with conical sense-process 2-3 times longer than the joint.

**Mandibles** (Fig. 3, D) slightly elongated (length

from apex to middle of base 1.1-1.2 times more than base width), with 3 pores at face and 2 setae: one at face, another at dorsum. Dorsum wide depressed near base, convex between apex and depression. Upper part of base projects, lower one with rounded condyle. Inner tooth noticeably projects over cutting edge. Cutting edge straight, with wide more or less smoothed projection near teeth, sometimes slightly corrugated, but without clear denticles.

**Maxillae.** Cardo large, trapeziform, with 1 short seta; stipes triangular, with 2 long setae and 1 pore. Lacinia (Fig. 3, E) ear-shaped, with emergences. Needle-shaped process very narrow, with parallel sides, sharpened at apex, its length 1.1 times less than width of lacinia. Blade (galea) 9 times longer than wide at middle. Maxillar palps of 4 joints. Basal joint with 2 ordinary long setae and 1 pore; 2nd one with 2 pores; 3rd one with 2 setae and 1 pore; apical one with 1 pore and sense-process at apex.

**Labium** (Fig. 3, F). Mentum with 2 long, 4 short setae and 2 pores. Mental sclerite wide-arched, slightly broadened at middle, sometimes projects forward. Praementum with 2 long setae at its base, 2 labial palps of 1 joint (with 1 pore at each one) and 6 pores at its middle, group of 2 pores and 6 short setae at its front.

**Prothorax** (Fig. 3, Im) with 2 feebly chitinized shields on upper side, which surrounded with: wide zone of setae at front, 3 longitudinal rows at outer side, individual setae at base and inner side. Epipleural patches large, longitudinal, their setae more dense at anterior, than posterior part. Lateral intercalary patches of 5-14, pedal ones of 2-7 setae, anterior sternal ones of 3-4 rows of setae, posterior sternal ones of 24-30 (Im) or 18 (If) setae.

**Meso-** (Fig. 3, Jm) and **metathorax.** Middle anterior tergal patch of 3 (If, Im:ms.) or 3-4 (Im:mt.) rows of setae; lateral anterior tergal ones of 2-3 (If:ms.), 3 (If:mt; Im:ms.), 3-4 (Im, mt.) rows; middle posterior tergal patch of 2-3 (If), or 3 (Im) rows; intermediate posterior tergal patches of 8-19 setae; lateral posterior ones of 6-10 setae. Lateral anterior and posterior tergal patches connected at body sides. Supraspiracular patches divided into anterior and posterior portions of equal size; infraspicular ones divided or not divided. Anterior supra- and infraspicular portions wide connected. Lateral intercalary patches large, of 3-4 rows of setae; middle intercalary patch rudimental, of 0-4 setae. Pedal patches of 8-10 (ms.) or 10-15 (mt.) setae. Right and left posterior sternal patches separated with narrow space, larger on mt. than on ms., of 6 rows of setae. Anterior sternal patch widened at middle, where one of 3 rows of setae.

**Legs.** Coxa flat, with chitinized arc at its base, and 23-35 setae. Trochanter fused with femur, with 5 pores and 11-14 setae. Tibiotarsus short, conical, with 2 long, hook-formed curved at its apex and 4-5 short setae. Claw strongly curved, with large straight denticle and seta at base.

**Abdomen** (Fig. 3, L). Lateral and middle anterior tergal patches of 1-6 segments of 4-5 rows of setae, near to each other; posterior tergal patches of 3-4 rows, 1-2 posterior rows more clear, than anterior ones, with more dense setae; anterior tergal patches more or less connected with supraspiracular ones; supra- and infraspicular ones not divided; pedal ones rounded, slightly larger than infraspicular ones; right and left sternal ones wide connected to each other at 1-5 segments, of 3-4 rows of setae, separated at 6th segment, of 10-15 setae. Anterior tergal, supra- and infraspicular, separated sternal patches of 7th segment reduced. Abdominal appendages (Fig. 3, N) of 8th segment evenly curved. Hook-shaped part 4.8 times longer than height of its base and 4.7-5.1 times longer than oval portion. Basal frame with 12 pores. There are 16-17 setae between abdominal appendages, and 9-10 setae, 3-5 pores and 2 triangular sclerites on each side of them. 9th and 10th segments small, covered with setae.

**Spiracles** normally developed at mesothorax and 1-8 abdominal segments (at 8th one they are in oval portion of abdominal appendages), rudimental at metathorax. Atrium of spiracles with emergences.

**Setae** covering body broadened at bases, rectilinearly narrowed to apex. Most of them short (0.03-0.05 mm), but among them long setae (0.10-0.24 mm) situated mostly on posterior segments.

**MATERIAL.** Slides: Moscow region: 23 km W of Zwenigorod, Lake Glubokoe, on roots of *Typha latifolia*, 01.08.1991: 1 exuvium from cocoon, containing imago (♂); Zelenograd, pool, on roots of *Typha latifolia*, 08.1991: 1 exuvium from cocoon, containing imago (♀), 15.06.1991: 1 larva; near Zelenograd, Chashnikovo, pond, on roots of *Typha latifolia*, 16.06.1991: 1 larva. In alcohol: Moscow region: near Zelenograd, Chashnikovo, pond, on roots of *Typha latifolia*, 16.06.1991: 1 cocoon with remains of dead imago and larval exuvium; Zelenograd, pool, on roots of *Typha latifolia*, 08.1991: 1 cocoon containing imago and larval exuvium; near Odintsovo, Dubki, pond, on roots of *Carex* sp., 05.08.1991: 1 cocoon with remains of dead imago and larval exuvium.

**REMARKS.** Detailed morphological description of the larva of *D. cinerea* has been absent to our days; but Böving [1910] was the first who applied himself

to the taxonomy of the larva of this species. He has pointed out the following for *D. cinerea*: «Sternal patches with from three or four rows of setae. The intercalary setae form a continuous band across the sternal parts of meso- and metothorax. Cutting edge of mandibles without denticles». Subsequently these characters, mainly the form of the intercalary patch, are used as diagnostical ones for this species [Ogloblin, Medvedev, 1971; Medvedev, Zaitzev, 1978; Warchalowski, 1985]. However, a number of the important characters in larvae and exuviae, collected from the different places and examined by me, are distinguished from those, described and pictured by Böving [1910]. Namely: sternal patches at ms. and mt. with 3 rows of setae at middle and 2 rows on sides, intercalary patches are of 3 portions, strongly separated from each other: 2 large lateral and 1 rudimental median ones; posterior supraspiracular patch well separated from lateral anterior tergal one; larva has other proportions and form of frontale and labrum. All those permits to maintain that A.G. Böving had the larvae of some other species or the very deviated, abnormal specimen.

*D. cinerea* belongs to the species group, in which posterior tergal patches at ms., mt. and 1-6 abdominal segments are of 3-4 rows of setae, middle anterior tergal patches are well separated from lateral ones, all of marginal setae at labrum are short, outer marginal seta considerably nearer to central ones than to angular one, and is distinguished from them by the following key:

- 1(6). Labrum 1.4-1.6 times wider than long; anterior margin depressed at middle, outer marginal seta separated from central ones. 2nd antennal joint slightly longer than wide or of equal length and width. Cutting edge of mandibulae with 2-3 denticles, without projection. Lateral anterior and posterior tergal patches at ms., mt. more or less separated from each other.
- 2(3). Labrum with wide shallow depression; posterior pores slightly nearer to base than proximal setae. Cutting edge of mandibulae with 3 clear denticles (and with 1-2 ones at inner tooth). Coxa with 18 setae and numerous small thornes .....  
.....*Donacia bicolor* Zschach, 1788.
- 3(2). Posterior pores almost 2 times nearer to base of labrum than proximal setae. Cutting edge of mandibulae with 2 denticles (and sometimes with 1 denticle at inner tooth).
- 4(5). Labrum with wide shallow depression. 2nd antennal joint slightly longer than wide. Mental sclerite narrowly arched. Coxa with 13-22 setae and numerous small thornes. Middle intercalary patch of ms. and mt. with 0-4 setae.....

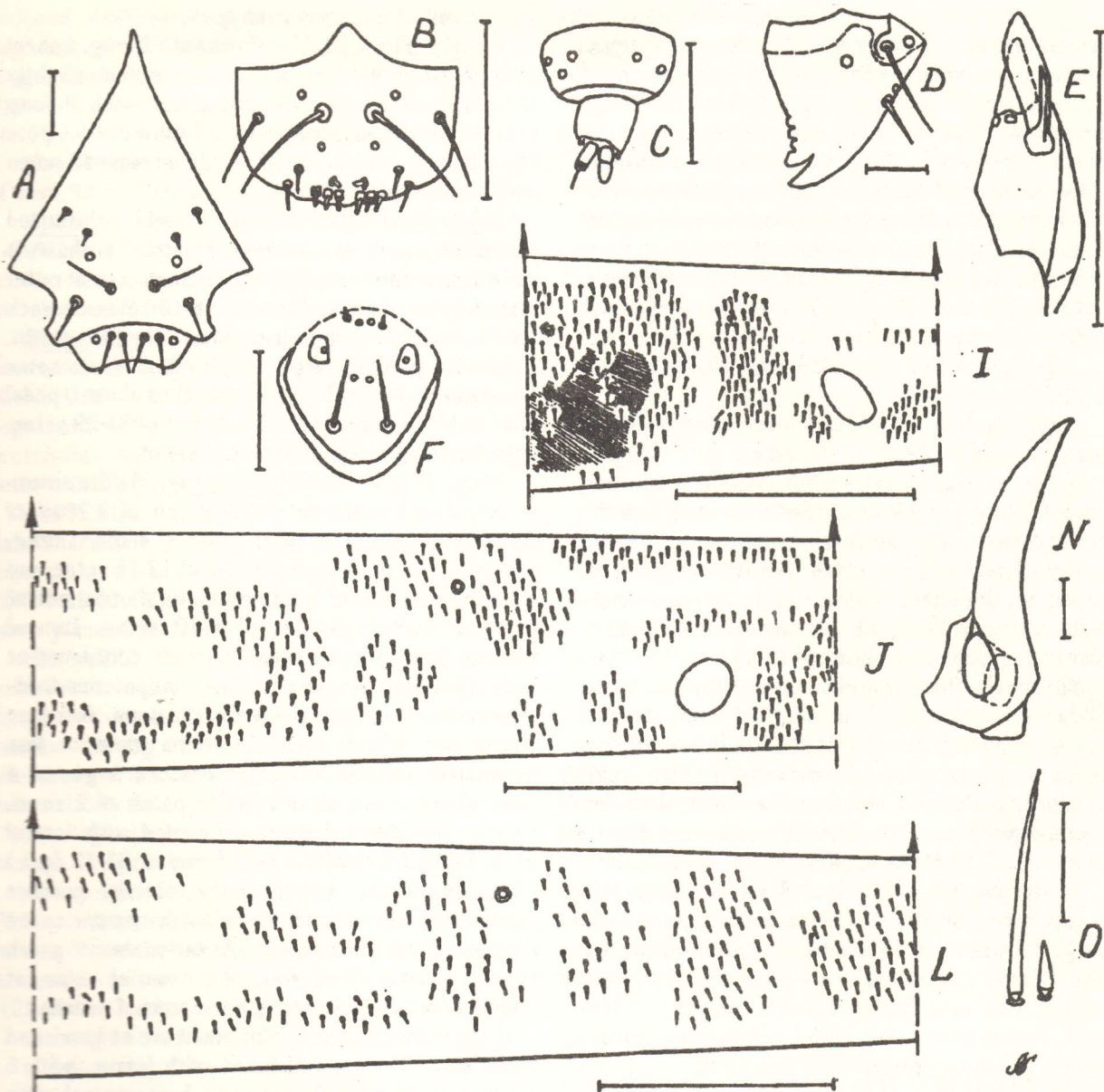


Fig.4. *Plateumaris discolor* Panzer, 1795. Abbreviations and scale as in Fig.1.

Рис.4. *Plateumaris discolor* Panzer, 1795. Обозначения и масштаб как на рис.1.

- .....*Donacia vulgaris* Zschach, 1788.
- 5(4). Labrum with narrow depression. 2nd antennal joint of equal length and width. Mental sclerite wide arched. Coxa with 25-28 setae, without small thorns. Middle intercalar patch of ms. and mt. with 1-3 setae.....
- .....*Donacia simplex* Fabricius, 1775.
- 6(1). Labrum 1.7 times wider than long; anterior margin straight at middle, all of marginal setae adjoin at bases. 2nd antennal joint slightly wider than long. Cutting edge of mandibulae with wide, somewhat smoothed projection, sometimes slight-

ly corrugated, but without clear denticles. Lateral anterior and posterior tergal patches at ms. and mt. connected at body sides.....  
 .....*Donacia cinerea* Herbst, 1784.

*Plateumaris discolor* Panzer, 1795.

DESCRIPTION. The elder instar larva. Body pale-cream coloured; setae, spiracles, abdominal appendages, ocelli, mandibles, claws pale brown; 2 chitinized shields of prothorax, head, legs reddish. Body length 10 mm, cephalic capsule 0,6 mm wide.

Frontale (Fig. 4, A) pentagonal. Width between lateral angles 1.2 times less than length. Anterior angles acute, strongly thickened; lateral ones right; posterior angle acute, drawn out. Anterior margin smoothly concave, lateral ones strongly concave, posterior ones straight. Frontale with 2 pores and 8 setae. Outer and central marginal setae long, discal and angular ones very short, latter widely separated from lateral angles. Pore at each side between discal and outer marginal setae, nearer to former. Distance between pores 2.4 times more than between central marginal setae.

Parietale with 2 pores, 2 curved short setae and 5 ocelli at each side.

Clypeus (Fig. 4, A) with depressed anterior margin, with 2 pores and 4 setae.

Labrum (Fig. 4, B) 1.5 times wider than long, with 4 pores and 16 setae. Anterior margin feebly convex, with small depressions near outer, central marginal and angular setae. Anterior angles not expressed, lateral ones almost right, posterior angle right, strongly drawn out. Median and angular setae short, marginal ones short, of equal length, 1.4-1.7 times shorter than angular ones, adjoin on bases. Distal setae shorter than marginal ones, distance between them 2 times less than between anterior pores. Proximal setae 1.6 times shorter than length of labrum, distance between them 1.9 times less than between posterior pores. Lateral setae situated at middle of lateral margin.

Antennae (Fig. 4, C) of 3 joints. Basal joint broad, cylindrical, with 5 pores, 2nd one wider than long, 2-3 times narrower than basal one, with 2 small and 1 large cylindrical sense-processes, latter furnished with seta, which equal to length of apical joint. Apical joint small, with conical sense-process, which 1.4 times longer than this joint.

Mandibles (Fig. 4, D) of equal length and width, with 4 pores at face and 2 setae: one at face, another at dorsum. Dorsum almost right. Upper part of base projecting, lower one with rounded condyle. Inner tooth noticeably projecting over cutting edge, with 1 flat denticle. Cutting edge feebly convex, with 2 well circumscribed denticles.

Maxillae. Cardo and stipes trapeziform, former somewhat less, with 1 short seta; latter with 2 long setae and 1 pore. Lacinia (Fig. 4, E) very small, its width 0.03 mm, without emergences. Needle-shaped process wide, conical, sharpened at apex, its length 1.3 times less than width of lacinia. Blade (galea) short and wide, 3.8 times longer than its width at middle. Maxillar palps of 4 joints. Basal joint with 2 ordinary long setae and 1 pore; 2nd one with 1 pore; 3rd one with 2 setae and 1 pore; apical one with

1 pore and sense-process at apex.

Labium (Fig. 4, F). Mentum with 2 long, 4 short setae and 2 pores. Mental sclerite arched, slightly broadened at middle. Praementum with 2 long setae at its base, 2 labial palps of 1 joint (with 1 pore at each one) and 2 pores at middle, group of 2 pores and 2 short setae at front.

Prothorax (Fig. 4, I) with 2 feebly chitinized shields on upper side, which surrounded with: wide zone of setae at front, 3-4 longitudinal rows at outer side, 3 setae at base. There are 8-10 setae on each shield, bases of them surrounded with thin chitin. Epipleural patches large, longitudinal, their setae mostly long, dense. Intercalar patches absent, pedal ones of 11-16, posterior sternal ones of 21-29 setae, anterior sternal one of 1 row of setae.

Meso- (Fig. 4, J) and metathorax. Middle anterior tergal and posterior tergal patch of 3 rows of setae; lateral anterior tergal ones of 4 rows; intermediate posterior tergal patches of 12-15 setae, not clear separated from middle and lateral ones; lateral posterior tergal patches of 8-10 setae. Lateral anterior and posterior tergal patches connected at body sides. Supra- and infraspicular patches divided into anterior and posterior portions. Anterior supra- and infraspicular portions more or less connected. Lateral intercalar patches large, of 4 rows of setae; middle intercalar patch of 2 rows, narrow, at sides adjoin or connected with lateral ones. Pedal patches of 17-18 (ms.) or 11-12 (mt.) setae. Right and left posterior sternal patches connected forward, separated with narrow space backward, of 7 rows of setae. Anterior sternal patch formed of transversal zone of 3 rows of setae, at middle connected with posterior sternal patches.

Legs. Coxa flat, with chitinized arc at base, and 20-21 setae. Trochanter fused with femur, with 6 pores and 9-11 setae. Tibiotarsus short, conical, with 4 long and 3 short setae. Claw strongly curved, with large straight denticle and seta at base.

Abdomen (Fig. 4, L). Middle anterior tergal patches of 1-6 segments of 3-4 rows of setae; posterior tergal ones of 2 rows; lateral anterior tergal ones of 2-3 rows (17-22 setae), separated from middle anterior tergal patch on 1-3 segments, narrowly connected with one on 4-6 segments. Supra- and infraspicular ones not divided; pedal ones rounded, larger than infraspicular ones, of 46 setae on 4 segment, of 35 - on 5 one, of 24-27 - on 6 one; right and left sternal ones wide connected to each other at 1-4 segments, of 32 setae on 4 segment, of 21 - on 5 one, of 13-17 - on 6 one. Anterior and posterior tergal, supra- and infraspicular, separated sternal patches of 7th segment

reduced. Abdominal appendages (Fig. 4, N) of 8th segment evenly curved. Hook-shaped part 5 times longer than height of its base and 4.4 times longer than oval portion. Basal frame with 13 pores. There are 10 setae between abdominal appendages, and 3-4 setae, 4 pores and 2 triangular sclerites on each side of them. 9th and 10th segments small, covered with setae.

Spiracles normally developed at mesothorax and 1-8 abdominal segments (at 8th one they are in oval portion of abdominal appendages), rudemental at metathorax. Atrium of spiracles with emergent setae.

Setae (Fig. 4, O) covering body broadened at bases, rectilinearly narrowed apically. Most of them short, 0.02 - 0.05 mm long, at 6-7 abdominal segments not longer than at anterior ones, at prothorax and sides of other body segments long setae (till 0.16 mm) situated.

MATERIAL. Slides: Murmansk region, Kandalaksha Distr., 12 km SE of Poyakonda, *Sphagnum-Carex* swamp, among roots of *Carex*, 25.07., 26.07. 28.07.1990: 3 larvae. In alcohol: from the same place, 25.07., 26.07.1990: 3 larvae.

REMARKS. Larvae have been attributed to the genus *Plateumaris* owing to typical to this genus shape of frontale, labrum, mandibles, structure of maxillae [Böving, 1910; Zaitzev, 1982]. They were attributed to *P. discolor* as in the locality, where they were collected, only the single species of the genus inhabits, and it was a single species of Donaciinae at *Sphagnum-Carex* swamps. Imagines were found on *Carex* in June.

Interspecific differences between known larvae of *Plateumaris* are expressed considerably less clearly than between those of *Donacia*. Key to all known Palaearctic larvae of *Plateumaris* is proposed forth below.

1(2). Lateral anterior tergal patches of 1-6 abdominal segments round, of 4-5 rows of setae. Pedal and sternal patches contain on 4th, 5th and 6th abdominal segments respectively on each side 40 pedal (p) + about 50 sternal (st) setae, 21 p + 30 st, 18 p + 9 st. Labrum wider than long 1.1 times. All marginal setae of labrum at equal distance from each other, equal to distal ones. Mandibulae 1.3 wider than long.....  
..... *Plateumaris affinis* Kunze, 1818.

2(1). Lateral anterior tergal patches of 1-6 abdominal segments elongate, transversal, of 2-3 rows of setae.

3(4). Pedal and sternal patches contain on 4th, 5th and 6th abdominal segments respectively on each side 60 p + 75 st, 47 p + 50 st, 30 p + 5 st. Frontale 1.4 times longer than wide. Outer marginal setae of labrum separated from central ones; distal setae shorter than marginal ones.....  
..... *Plateumaris braccata* Scopoli, 1772.

4(3). Pedal and sternal patches of 4th abdominal segment contain less setae: 34-46 p + 32-40 st, but sternal patches of 6th segment more setae: 11-17 st. Frontale 1.2-1.3 times longer than wide.

5(6). Discal and angular setae of frontale long, angular ones near to lateral angles. Labrum 1.3 times wider than long. Mandibulae 1.2 times longer than wide. Mentum with 4 long and 2 short setae. Distal setae of labrum somewhat longer than marginal ones. Pedal and sternal patches contain on 4th, 5th and 6th abdominal segments respectively on each side 34-38 p + 40 st, 34-36 p + 26 st, 19 p + 11-15 st.....  
..... *Plateumaris weisei* Duvivier, 1885.

6(5). Discal and angular setae of frontale very short, angular ones far backward from lateral angles. Labrum 1.5 times wider than long. Mandibulae of equal length and width. Mentum with 2 long and 4 short setae. Distal setae of labrum shorter than marginal ones. Pedal and sternal patches contain on 4th, 5th and 6th abdominal segments respectively on each side 46p + 32 st, 35 p + 21 st, 24-27 p + 13-17 st.....  
..... *Plateumaris discolor* Panzer, 1795.

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