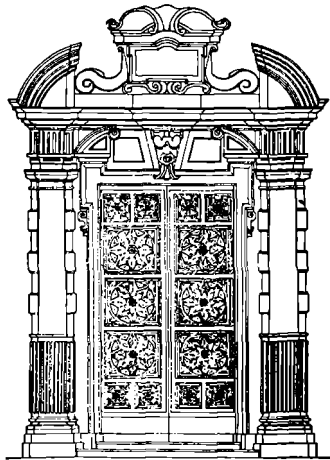


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A key to the genera  
of the Ground-beetle larvae  
(Coleoptera, Carabidae)  
of the Palearctic region

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INTRODUCTION

It is necessary to use the data about the preimaginal stages, especially larvae, for the successful decision of many taxonomic and ecological questions, but it's rather difficult, because of the little knowledge on the larvae biology and morphology as well as the absence of modern identification keys. So, van Emden's monograph (1942) appears hitherto the most complete generalizing work. The available keys for the USSR (Sharova, 1958, 1964) and Middle Europe carabid larvae (Hurka, 1978; Arndt, 1991) do not contain a number of larval descriptions, published from 1942-1991. Besides, the fine morphological investigations of Y. Bousquet and H. Goulet (Goulet, 1979; Bousquet and Goulet, 1984) produced on new opportunities for larval descriptions. Unfortunately, this method is currently poorly used (Arndt, 1989a, b; Arndt and Hurka, 1990; Bousquet, 1985a, b; 1986; Hurka, 1986; Makarow and Shilenkov, 1991 etc.) and can not be considered as a basis of the practical keys.

The present work contains a key for determination of the main Palearctic carabid groups and takes into account most of the works that followed van Emden's monograph. Poorly studied larvae of some genera (Gardner, 1936; van Emden, 1942; Habu and Sadanaga, 1963 et al.), known from southeastern sector were not included in it. The genus *Nomius* (tribus *Psydrini*), known only by incomplete description (Jeannel, 1942) also is not in the table. The data

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about the larval morphology of several non-palaearctic species, were used for the characteristics of some taxa (for example *Calleidini*). Diagnoses of a number of the genera (*Callisthenes*, *Harpalodema*, *Daptus*, *Callistus*, *Discoptera*, *Charopterus* etc.) are given for the first time on the basis of the materials of the author and other investigators. Compiling the keys first of all we used the common features, known to the majority of carabidologists. The morphology essay in the next part contains all necessary explanations.

We should stress, that as a main supergeneric taxonomic unit we use tribes, because relations between taxa of another rank (subfamilies and others) are not clear from the larval morphology view. Positions of the Genera in the table do not characterize their relationships. Most of the taxa are accepted here according to the O.Kryzhanovsky's system (1983) with a few modifications corresponding to our approach on larval systematic. So, we do not consider *Trachipachinae* and *Cicindelinae* in the *Carabidae*.

## THE MORPHOLOGY OF CARABID LARVAE

### Body Structure

The classical works on carabid larval morphology (Verhoeff, 1921; van Emden, 1942; Hurka, 1978 etc.) were used as a basis of this part. We also took into consideration several chaetotaxy details, proposed by Y.Bousquet and H.Goulet (1984), which are necessary for determination. Only two terms must be explained. Sigillotaxy means a complex of the data on the shape, pigmentation and disposition of the sigillae, i.e. the imprints of the muscle attachments (see for example Chaudonneret, 1964) which can be well noticed in the reflected light. The term "neotrichia" is used in the case of the significant increase of the secondary setae (in the meaning of Y.Bousquet and H.Goulet), especially of all the tergites setae.

The habitus of a typical carabid-beetle larvae is shown in Fig. 1.

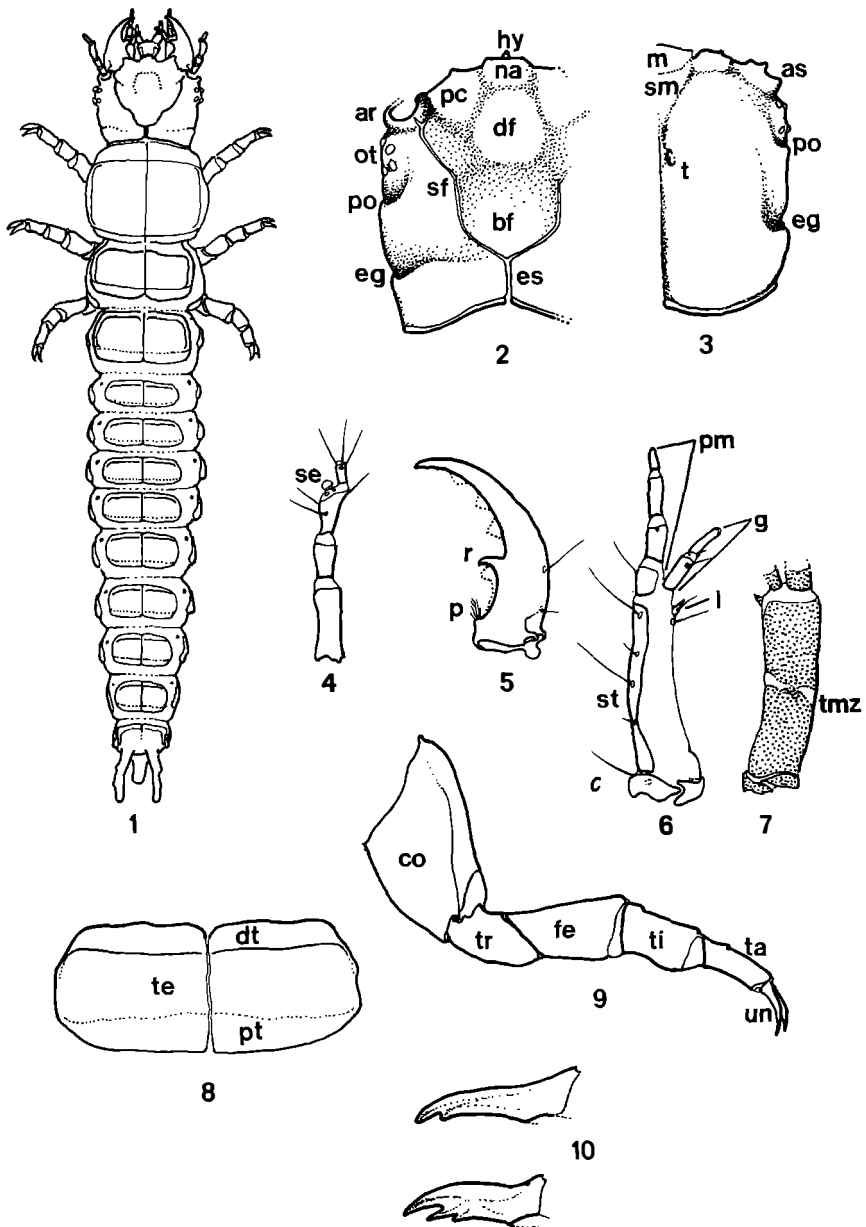
*The head-capsule* (cranium) consists of three sclerites - a frontal piece and paired parietalia, divided by light sutures (Fig. 2, 3) - mediogular, epicranial and paired frontal. The abrupt angles in the basal half of the frontal sutures are called the sinuses. The frontal piece has a complicated relief, where it is possible to distinguish (Fig. 2): frontal disk, frontal grooves (do not confuse with sutures), basal part of the front, nasale, clypeus and paraclypeus. Nasale includes the unpaired median projection - hypodon, situated below total level. Paired parietalia contain an antennal ring, hypostome and ocellar tubercula. Sometimes a protruded extraocellar tubercula and the system of more or less developed grooves - epicranial (occipital), cervical and temporal also occur (Fig. 3).

*Head appendages* are the four-jointed antennae (exceptionally they may be 3-jointed or 5-jointed), besides the third joint has sensorial appendages on the top (Fig. 4). Usually its composition includes one large basiconical and 2-3 small bell-like or conical sensillae. Sometimes they are substituted by 3-15 large bell-like or placoid sensilla. The mandibles presents a middle tooth – retinaculum and, sometimes, - supplementary ones – one basal and 1-3 distal (Fig. 5). At the base of the mandible usually there is a setae bundle – penicillus. The retinaculum is distinguished by a presence of inner cavity, while other tooth are only cuticular thickening of the cutting margin. Lower jaws – maxilles (Fig. 6) consist of cardo, stipes, galea, lacinia and palpus. Palpus is four-jointed, the first joint is often called “palpiger”. Deviations from galea structure are insignificant and can be considered as exceptions. Lacinia is developed variably – from massive sclerotic protrusion to a tiny tubercule. As a determinative feature in some groups the light membranous band on the ventral side of stipes (Fig. 7) is used. Labium includes submentum and mentum, immovably attached to cranion, and prementum carrying the unpaired ligula and paired two-jointed labial palpi. 1-2 sensorial plates are situated on the apex of distal palpi joints.

*Thorax segments* are characterized by developed tergites, as a rule – more wide and sclerotised, than the abdominal tergites. Pleurites are better developed, than ventrites. Along the tergites perimeter there is a small wrinkle, known as a marginal keel (Fig. 8). The frontal part of this keel serves for the attachment of longitudinal muscles and is a border, separating pretergite from tergite (exception – prothorax). The posterior, membranous part of tergite – posttergite – is never defined by a keel. Depending on the developmental degree of the lateral keel, wholly or partly defined tergites are distinguished.

*Legs* (Fig. 9) are 6-jointed (except ectoparasitic forms), the praetarsus appears as a small, often inconspicuous, unpaired sclerite with 1-2 strong claws. Claws often with additional teeth of various shapes (Fig. 10). True setae (= trichoid sensillae) on claws absent, and the formations, showed by E. Arndt for *Lionichus* are microtrichia. For the detailed study of praetarsus structure special preparation and identification under 300-500 magnification in transmitted light should be done in the majority of cases.

*Abdominal segments* heteronome. The 1st has a number of features (chaetotaxy, structure of ventrites and pleurites), similar to those of the thoracic segments; tergite of the 9th segment carries paired cerci, and the last, 10th, is modified as a so-called pygidium. In general, for abdominal segments, greater development of ventrites and pleurites, and noticeable reduction of tergites are characteristic.



Figs. 1-10 - Larval morphology (generalized larva, schematic): 1 - habitus; 2, 3 - left part of cephalic capsule (2 - dorsal aspect: *as* - antennal segment, *bf* - basal part of the front, *d* - disk of the frons, *eg* - epicranial groove, *es* - epicranial suture, *hy* - hypodon, *na* - nasale, *ot* - ocellar hilbercula; *pc* - paraclypeus, *po* - postocellare groove, *sf* - sinus of frontal suture, 3 - ventral aspect: *ar* - antennal ring or segment, *eg* - epicranial groove, *m* - mentum, *po* - postocellare groove, *sm* - submentum, *t* - tentorial dimple); 4 - left antenna, dorsal aspect: *se* - sensorial appendages; 5 - right mandible, dorsal aspect: *p* - penicillum, *r* - retinaculum; 6 - left maxilla, dorsal aspect *c* - cardo, *g* - galea, *l* - lacinia, *pm* - maxillary palpi, *st* - stipes; 7 - transverse membranous zone (*tmz*) on left stipes, ventral aspect; 8 - tergite: *dt* - pretergum, *pt* - posttergum, *te* - tergum; 9 - median leg, anterolateral aspect: *co* - coxa, *fe* - femur, *ta* - tarsus, *ti* - tibia, *tr* - trochantinum, *un* - claws; 10 - additional teeth on claws.

*Cerci* (urogomphi), can differ in structure. Firstly, they can be separated from the tergite by pale membranous band (whose border passes closer to the base than the attachment of musculus tergoepygidialis, so the cerci become movable). Secondly, they can be differently broken up. In some species this occurs when the parts with low sclerotised cuticle divide setiferous nodules, in others there are distinct joints with clear margins (Fig.11). Some larvae have very long cerci, consisting of numerous, usually incomplete, rings (Fig. 12).

*Tenth segment* is characterized by wholly fused ventrites and pleurites, the presence of anus on the top, and the existence of paired, eversible, appendages. Development of these appendages is variable, their length can exceed half of the segment. In some cases, small microscope thorns on their surface can grow and form a more or less clear (regular) crown (Fig. 13).

### Chaetotaxy

Here we do not touch all the details of the chaeta and its' variation (see Bousquet and Goulet, 1984), and discuss only the topological characteristic that are most important for identification using setae.

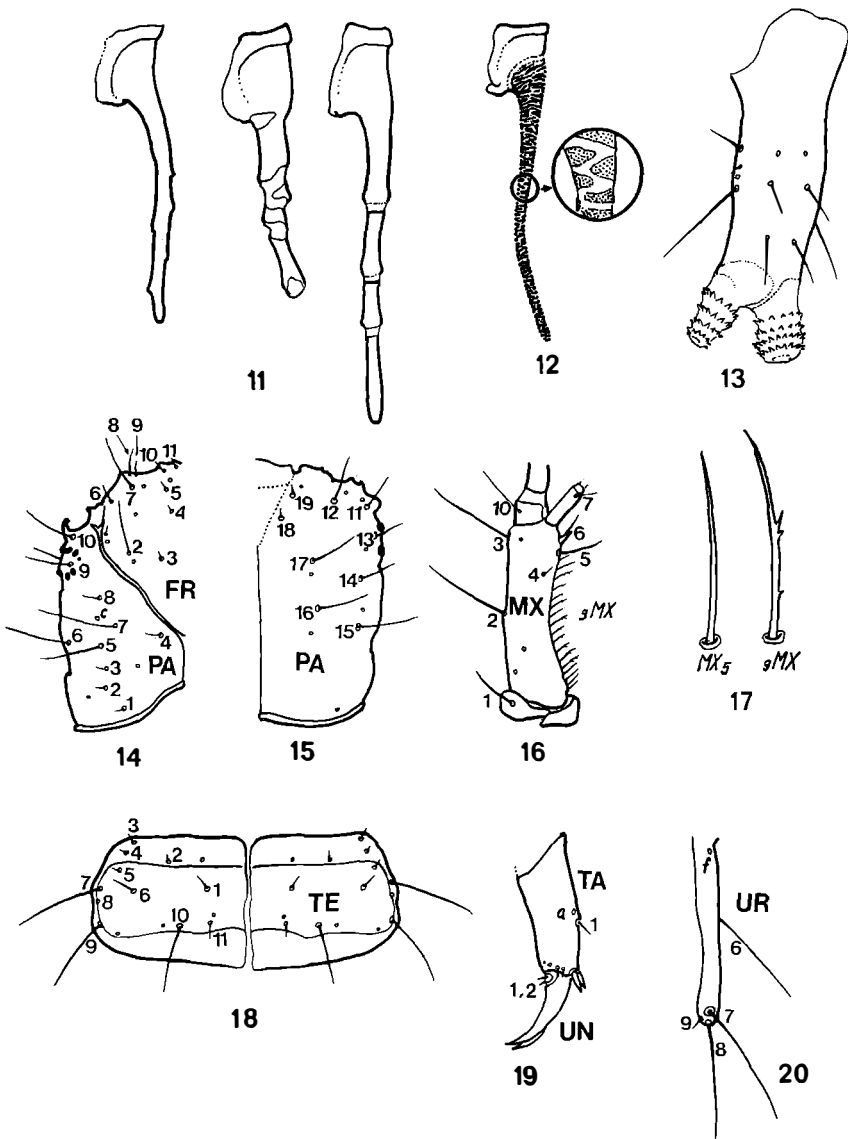
On the frontal sclerite in the lateral angles of the paraclypeus a pair of setae are placed (FR<sub>8,9</sub>), that can be reduced, or, alternatively, multiple, and on the front margin of nasale FR<sub>10,11</sub> are found (Fig. 14). The latter are often smoothed or inconspicuous on heavily sclerotised nasale. Parietal sclerite carries 19 pairs of primary setae, the groups PA<sub>1,2,3</sub>, forming a row in occipital part, and PA<sub>6,7,8</sub>, grouped near sensillum PA<sub>c</sub>, are the most interesting (Fig. 14). Setae PA<sub>14</sub> is placed lower, behind ocellar tubercula, and in gular area in front of tentorial dimples – PA<sub>18</sub> (Fig. 15).

As for chaetae of head appendages, we'll mention only paired setae LA<sub>6</sub> on the top of ligula, seta MX<sub>6</sub> on lacinia or instead of lacinia and the group of setae gMX, more or less evenly covering the inner part of stipes (Fig. 16). Setae of this group are distinguished from neighbouring MX<sub>5,6</sub> by complicated form (Fig. 17), but this is often visible only in microscopic preparations.

Tergites usually have heavily modified chaetae. Seta TE<sub>1</sub> is placed on the disclose to the medial suture, and TE<sub>6</sub> is usually in the lateral part (excl. – larvae with tergites well-developed laterally). Position of lateral setae TE<sub>7,9,10,11</sub> is shown on Fig. 18.

Among numerous leg setae we should mention CO<sub>7</sub> on the front surface of coxa that often forms the group of thorn-like setae, and TA<sub>1</sub> – normally this is the only seta on dorsal side of the tarsus (in doubtful cases it's possible to find this seta by looking for sensillae TA<sub>a</sub>) and the pair of pretarsus setae - UN<sub>1,2</sub> (Fig. 19).

Chaetae on cerci consists of 9 primary setae, for the diagnosis only the apical group UR<sub>7,8,9</sub> is used in this key.



Figs. 11-20 - Larval morphology (generalized larva, schematic): 11 - types of cerci, lateral aspect; 12 - multiple joints on cerci, lateral aspect; 13 - X abdominal segment (*pygidium*), dorsolateral aspect; 14, 15 - chaetotaxy of cephalic capsule (14 - dorsal aspect, 15 - ventral aspect), 16 - chaetotaxy of maxilla, ventral aspect; 17 - differens from setae MX5 and gMX, 18 - chaetotaxy of abdominal tergite, 19 - chaetotaxy of tarsus, lateral aspect; 20 - setae on apex of cerci. Setae designed after Bousquet & Goulet (1984).

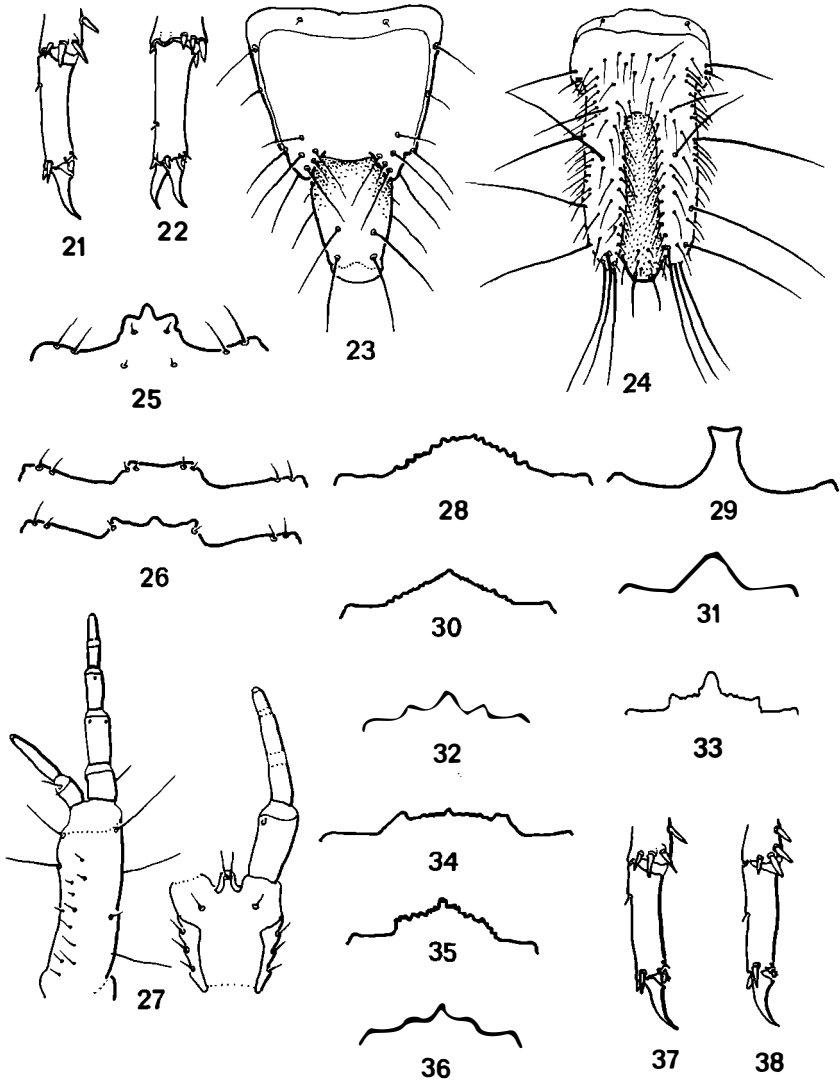
## KEY TO TRIBES AND GENERA

- 1 – Mouth parts and appendages normally developed; free-living larvae ..... 2  
 – Mouth parts and appendages significantly reduced (Fig. 123); thick larvae with poor integument pigmentation (Fig. 125,126), parasitic or commensal ..... 131
- 2 – Tarsus with one claw (Fig. 21), lacinia always rudimentary ..... 3  
 – Tarsus with two claws (Fig. 22), lacinia more often developed ..... 32
- 3 – Third antenna joint massive (Fig. 104), with very big sensorial appendage (tribus *Brachinini*, larvae 1st stage) ..... 4  
 – Third antenna joint and sensorial appendage normal ..... 5
- 4 – Second galea joint with only 3 setae ..... *Aptinus* Bon.  
 – Second galea joint with at least 5 setae ..... *Brachinus* Web.
- 5 – Cerci very short, nasale (Fig. 23) more or less three-toothed, its lateral parts toothed (tribus *Clivinini*, part) ..... *Dyschirius* Bon.  
 – Cerci not shorter than 1/2 length of segment X ..... 6
- 6 – Cerci wide, flattened (Fig. 24), with numerous setae; epicranial groove and ocelli absent, apex of stipes with a sclerotic projection, not homologous to lacinia! (tribus *Clivinini*, part) ..... *Clivina* Latr.  
 – Cerci cylindrical, ocelli present (if absent, then epicranial groove developed) ..... 7
- 7 – Setae UN<sub>1</sub> and UN<sub>2</sub> thick, hornlike (tribus *Broscini*) ..... 8  
 – Setae UN<sub>1</sub> and UN<sub>2</sub> fine, often inconspicuous ..... 10
- 8 – Nasale with three teeth (Fig. 25), head rounded, occipital groove absent ..... *Miscodera* Eschsch.  
 – Nasale a broad protrusion (Fig. 26) with more or less straight margin ..... 9
- 9 – Tarsus with 1-2 dorsal setae ..... *Broscus* Panz.  
 – Tarsus with 8-10 dorsal setae ..... *Craspedonotus* Schaum
- 10 – First antenna joint not shorter, often longer, than the second one ..... 11  
 – First antenna joint shorter than the second one (tribus *Pogonini*) ..... *Pogonus* Curt.
- 11 – Upper surface of tibia, pygidium and tergites with numerous additional setae. The claw flat, broad; eyes absent (tribus *Aepini*) ..... *Aepus* Sam., *Aepopsis* Jeann.  
 – Upper surface of tibia without additional setae, pygidium and tergites only with few secondary setae. If eyes are absent, then other features different ..... 12
- 12 – Last joint of labial and maxillary palpi divided into a secondary joints (Fig. 27) (tribus *Trechini*) ..... 13  
 – Last joint of labial and maxillary palpi normal ..... 27
- 13 – Nasale widely rounded, slightly protruded (Fig. 28) with toothed front margin ..... 14  
 – Nasale different ..... 16
- 14 – Ocelli present ..... *Iberotrechus* Jeann.  
 – Ocelli absent ..... 15
- 15 – Stipes almost twice as long as palpus, the second antennal joint longer than the first one ..... *Typhotrechus* J. Mull.  
 – Stipes at most 1,5 times longer than palpus, the second antennal joint not longer than the first one ..... *Orotrechus* J. Mull. (part.)
- 16 – Nasale narrow, strongly protruding, its front margin not toothed (Fig. 29) ..... *Allegretia* Jeann.  
 – Nasale not narrower than frontal disk, its front margin more or less toothed (Fig. 30-36) 17
- 17 – Nasale strongly protruding, trapezium-like or triangular (Fig. 30, 31) ..... 18  
 – Nasale different ..... 20



- 18 – Nasale 3 times as broad as long, with 1-2 large teeth basally (Fig. 30) ..... *Geotrechus* Jeann. (part.)  
 – Nasale at most 2 times as broad as long, all marginal teeth approximately equal (Fig. 31) 19
- 19 – Cerci not longer than pygidium ..... *Paraphaenops* Jeann.  
 – Cerci significantly longer than pygidium ..... *Trichaphaenops* Jeann.
- 20 – Nasale clearly three-lobed (Fig. 32, 33) ..... 21  
 – Nasale different ..... 22
- 21 – Medial part of nasale separated from lateral ones by deep incisions (Fig. 32) .....  
 ..... *Trechus lairv.*, *Duvalius* Del., *Kurasawatrecus* Ueno  
 – Medial part of nasale not separated from lateral ones by incisions (Fig. 33) .....  
 ..... *Trechoblemus* Ganglb.
- 22 – Nasale with more or less straight front margin, limited on the sides by large teeth (Fig. 35, 36) ..... 23  
 – Nasale on the sides without clear lobes, without large teeth (Fig. 34) ..... 25
- 23 – Front margin of nasale almost straight (Fig. 35); with only two ocelli .....  
 ..... *Geotrechus* Jeann. (part.)  
 – Front margin of nasale protruding (Fig. 36); with at last four ocelli ..... 24
- 24 – Head with slightly developed epicranial groove; setae PA1-3 form an angle of about 150° .....  
 ..... *Neotrechus* J. Mull.  
 – Head without epicranial groove; setae PA1-3 form an angle of about 120° .....  
 ..... *Speotrechus* Jeann.
- 25 – Cerci not longer than pygidium ..... *Anophthalmus* Sturm  
 – Cerci distinctly longer than pygidium ..... 26
- 26 – Head length more than width ..... *Doderotrechus* Vigna-Tagl.  
 – Head length no more than width ..... *Orotrechus* J. Mull. (part.)
- 27 – Seta TA<sub>1</sub> placed in the basal third of tarsus (Fig. 37). Epicranial suture not shorter than the first antennal joint (tribus *Bembidini*) ..... 28  
 – Seta TA<sub>1</sub> placed approximately in the middle of tarsus (Fig. 38). Epicranial suture often shortened, sometimes absent (tribus *Tachiini*) ..... 30
- 28 – Ocelli absent, claw very long (Fig. 39) ..... *Cillenius* Sam.  
 – Ocelli distinct, if partly reduced, then claw is short ..... 29
- 29 – Setae simple, cuticle surface without cone-like microsculpture .....  
 ..... *Bembidion* Latr., *Asaphidion* Gz.  
 – Setae thickened, with splinted tops, cuticle surface with cone-like microsculpture (Fig. 40, 41) ..... *Asaphidion* Gz. (part.)
- 30 – Retinaculum near base of mandible (Fig. 42) ..... 31  
 – Retinaculum placed in the middle of inner mandible margin ..... *Tachys* Steph. (part.)
- 31 – Cutting margin of distal part of mandible toothed ..... *Tachys* Steph. (part.)  
 – Cutting margin of distal part of mandible smooth ..... *Tachya* Kirby
- 32 – Lacinia well developed, seta MX<sub>6</sub> placed on its top or on lateral surface (Fig. 43, 44) 33  
 – Lacinia rudimentary or absent ..... 97
- 33 – Tergal setae more or less reduced (TE<sub>8</sub> absent, TE<sub>1,6,11</sub> as a rule, small, TE<sub>7</sub> not large, often thorn-like). Integuments, as a rule, often strongly sclerotised, cerci massive, not flexible, with one or two teeth (sometimes without teeth – *Cychnus*). Sensorial appendage on the third antenna segment small, placed on the ventral side ..... 34  
 – Tergal setae normal, or often hyper-developed (neotrichia), cerci and sensorial appendage of another form ..... 37

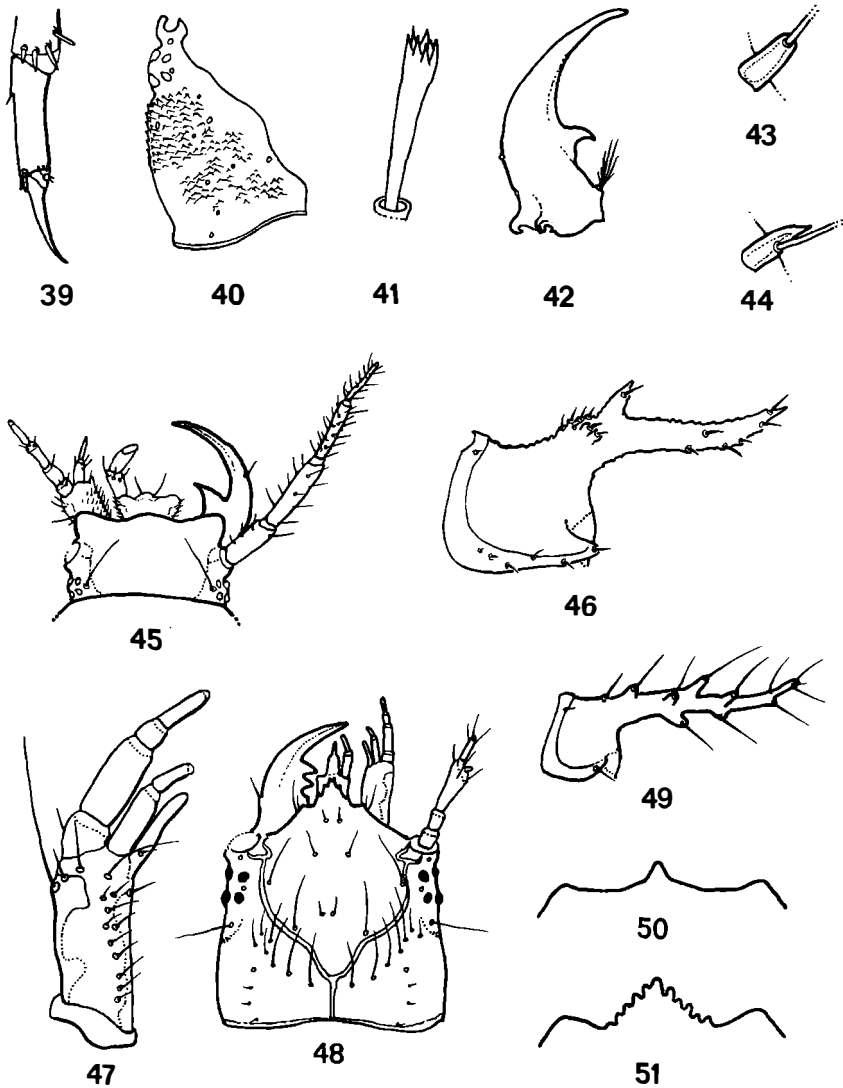
- 34 – Antennae almost twice as long as mandibles, their third and fourth segments are covered with numerous secondary setae (Fig. 45). Cerci very short, without teeth (tribus *Cychrini*) ..... *Cychrus* L.  
 – Antennae not longer than mandibles, their third and fourth segments with normal numbers of setae, cerci longer, with one or two teeth (tribus *Carabini*) ..... 35
- 35 – Setae PA<sub>6</sub>, PR<sub>8,14</sub> large, well developed, cerci with one (dorsal) tooth of characteristic shape (Fig. 46), often with additional thorn-like setae ..... 36  
 – Setae PA<sub>6</sub> absent, PR<sub>8,14</sub> more or less reduced, cerci with one or two teeth, without additional thorns ..... *Carabus* (L.) Thoms.
- 36 – Epipleura of abdominal tergites with 1-4 additional setae, tubercula supraocellar smoothed, retinaculum usually with additional tooth ..... *Callisthenes* Fisch.  
 – Epipleura of abdominal tergites without setae, if with 1-2 setae, than retinaculum with additional tooth. Larvae of older ages with supraocellar tubercula developed ..... *Calosoma* Web.
- 37 – Ligula well developed, 1,5-2 times longer than the 1st segment of labial palpus, lacinia long, sticklike (Fig. 47), nasale and mandibles – Fig. 48 (tribus *Omophonini*) ..... *Omophon* Latr.  
 – Ligula always shorter than 1/2 length of the 1st segment of labial palpus, lacinia, nasale and mandibles of another shape ..... 38
- 38 – Cerci with developed setiferous processes (Fig. 49), nasale (Fig. 50, 51) of characteristic shape (tribus *Elaphrini*, part) ..... 39  
 – Cerci at most with small setiferous thickenings, nasale of another shape ..... 40
- 39 – Seta MX<sub>6</sub> on the top of lacinia, nasale as in Fig. 50, setiferous processes on cerci not numerous ..... *Diacheila* Motsch.  
 – Seta MX<sub>6</sub> at base of lacinia, nasale – as in Fig. 51, cerci with dense, numerous setiferous processes ..... *Blethisa* Bon.
- 40 – Maxillae in distal part with expressed group of thick, straight setae (Fig. 52); stipes dissected by transverse membranous zone. Nasale with 4-6 approximately equal teeth (Fig. 53, 54) or only two very long teeth (Fig. 55). Head massive, with slightly developed epicranial grooves ..... 41  
 – Maxillae with more or less homogeneous group of setae gMX, stipes dissected by transverse membranous zone or monolithic, nasale and head of another shape ..... 44
- 41 – Nasale with only two very long and widely separated teeth (Fig. 55); seta MX<sub>6</sub> apical ..... *Zabrus* Clairv.  
 – Nasale with 4-6 subequal, small teeth; seta on lacinia lateral ..... 42
- 42 – First and second segments of antenna with 5-10 thick setae, forming a longitudinal row, similar rows are formed by setae FR<sub>4,5</sub> etc. .... *Harpalodema* Rtt.  
 – First and second antennal segments without setae or with some setae, that do not form a longitudinal row ..... 43
- 43 – Epicranial suture at least as long as fourth antennal joint, tergites with pigmented sigillae ..... *Curtonotus* Steph.  
 – Epicranial suture shorter than the fourth antennal joint, tergites slightly pigmented, sigillae usually do not differ in colour ..... *Amara* Bon.
- 44 – Claws equal or subequal ..... 45  
 – Claws unequal, the inner one is very small (Fig. 56) ..... 73
- 45 – Cerci mobile and flexible, long, with numerous pseudo-segments (Fig. 12), tergites usually black, with numerous additional setae (tribus *Callistini*, part) ..... 46  
 – Cerci usually unmovable, if mobile, then not segmented (Fig. 59) ..... 47



Figs. 21-38 - Larval morphology and diagnostic characters of carabid larvae: 21, 22, 37, 38 - tarsus, lateral aspect; 23, 24 - IX and X abdominal segments, dorsal aspect; 25, 26, 28-36 - nasale, dorsal aspect; 27 - right maxilla and labium, dorsal aspect. 21-22 - generalized larva, schematic, 23 - *Dyschirius salinus* Schaum, 24 - *Clivina collaris* Herbst, 25 - *Miscodera arctica* (Pk.), 26 - *Brosicus* (up - *B. cephalotes* L., down - *B. asiaticus* Ball.), 27 - *Trechus* sp., 28 - *Typhlotrechus bilimeki* Ganglb., 29 - *Allegrettia boldorii* Jeann., 30 - *Geotrechus* sp., 31 - *Trichaphaenops* sp., 32 - *Trechus quadristriatus* Schrank, 33 - *Trechoblemus micros* Herbst, 34 - *Anophthalmus fabbrii* Muell., 35 - *Speotrechus carminatii* Dod., 36 - *Duvalius boldorii* Jeann., 37 - *Bembidion semipunctatum* Ol., 38 - *Tachyta nana* Kirby (24 - after Vanek, 1984; 25 - after Luff, 1978; 28, 29, 34-36 - after Boldori, 1932; 30, 31 - after Hurka, 1978, 32 - after Luff, 1985).

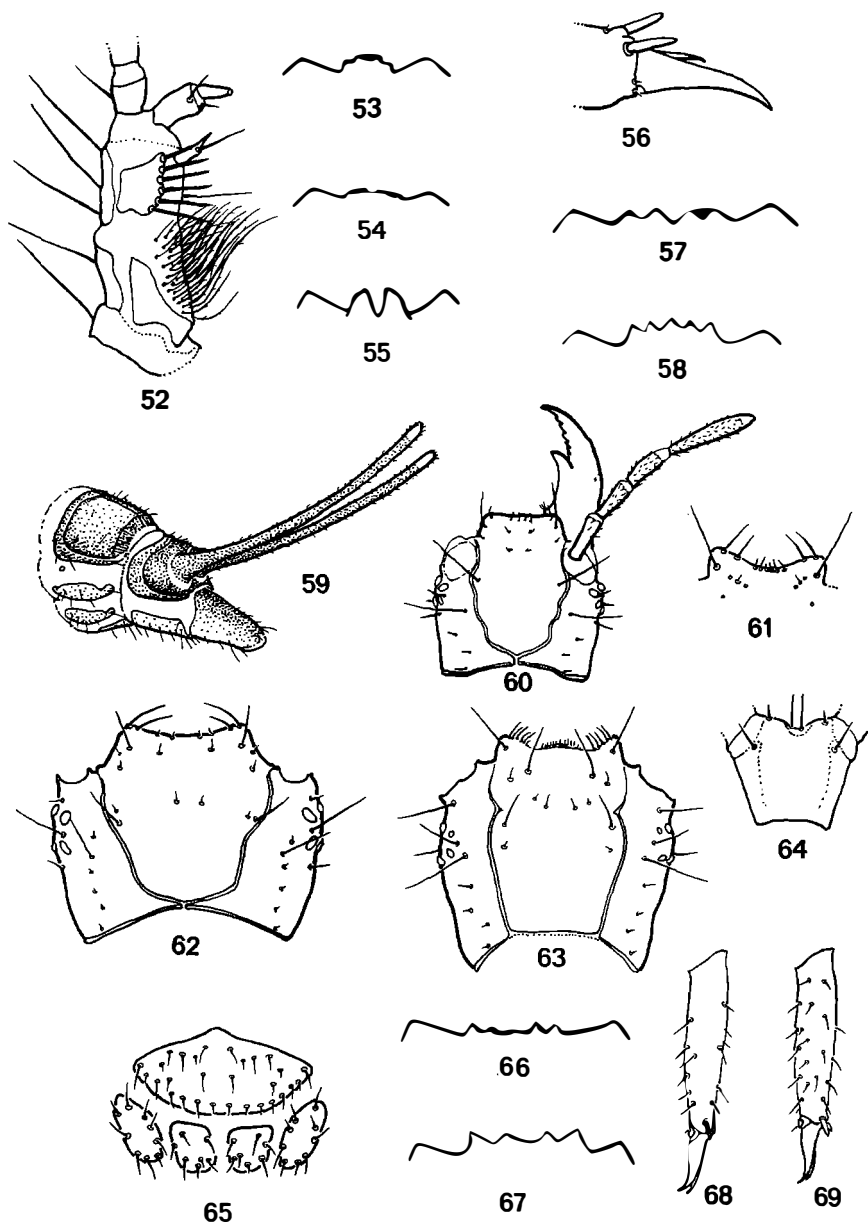
- 46 – Cerci rather short, only 2-3 times longer than X segment, on tergites only the sigillae are darkened; nasale with 4 teeth (Fig. 57) ..... *Epomis* Dej.  
 – Cerci 5-8 times longer than pygidium, the major part of tergites wholly pigmented; nasale with more or less distinctive 5 teeth (Fig. 58) .....  
 ..... *Chlaenius* Bon. (sg. *Chlaenius* s.str, *Chlaenites*, *Stenochlaenius*)
- 47 – Cerci movable, very long, unjointed (Fig. 59), as a rule with pale yellow apex ..... 48  
 – Cerci fixed, maximum 1,5-2 times longer than the X segment, unicoloured ..... 49
- 48 – Antennae very long, at least twice as long as mandibles, 3 and 4 antennal segments as large as first and second joints (Fig. 60), tergites unicoloured, black, ventrites normal (tribus *Panagaeini*) ..... *Panagaeus* Latr.  
 – Antennae of typical structure, lateral part of 1 and 2 abdominal tergites yellow, ventrites of V-VIII segments fused (tribus *Callistini*, part) ..... *Callistus* Bon. (\*)
- 49 – Nasale never projecting, with smooth front margin and FR<sub>10</sub>-FR<sub>11</sub> setae group (Fig. 61), frontal sinuses not expressed (tribus *Licinini*) ..... 50  
 – Nasale protruded, more or less toothed, frontal sinuses well expressed (Fig. 70-81) 53
- 50 – Basal part of frontal sclerite triangular, epicranial suture present (Fig. 62), cutting edge of mandible and retinaculum, as a rule, smooth ..... *Diplocheila* Latr.  
 – The rectangular frontal piece reaching the back of the head, cutting edge of mandibles always serrate ..... 51
- 51 – Ligula absent, setae LA<sub>6</sub> placed on apical margin of praementum (Fig. 64), seta MX<sub>6</sub> on top of lacinia; epipleurites protruded sideways (Fig. 127) ..... 52  
 – Ligula present, seta LA<sub>6</sub> placed on its apex, seta MX<sub>6</sub> – on lateral surface of lacinia, epipleurites not protruded ..... *Badister* Clairv.
- 52 – Cerci 2.3-2.6 times longer than X segment, setae gST<sub>2</sub> not longer than sternum, gPS<sub>1</sub> with 3-4 setae ..... *Licinus* Latr.  
 – Cerci 3-3.4 times longer than X segment, at least some setae in gST<sub>2</sub> are longer than sternum, gPS<sub>1</sub> with 5-7 setae ..... *Tricholicinus* Popp.
- 53 – Tergites black, complete at sides, ventrites with well developed secondary setae (Fig. 65) ..... 54  
 – Tergites, as a rule, pale, only sigillae often more or less pigmented, ventrites with a normal amount of setae or with a small number of secondary ones (Pterostichitae, part.) . 58
- 54 – Dorsal surface of tarsus and tibia, and in CO<sub>7</sub> group on coxae numerous secondary setae present; nasale (Fig. 66, 67) with 4-5 more or less distinct teeth, slightly protruded (tribus *Callistini*, part) ..... 55  
 – Dorsal surface of tarsus and tibia, and CO<sub>7</sub> group usually without additional setae; nasale (Fig. 70, 71) with five teeth, the three medial ones strongly projecting (tribus *Oodini*) . 57
- 55 – Nasale with four teeth (Fig. 67), gPA<sub>18</sub> consisting of 3-5 setae is present .....  
 ..... *Agostenus* Motsch.  
 – Nasale with 5 more or less distinctive teeth (Fig. 66), seta PA<sub>18</sub> simple ..... 56
- 56 – Body thickly pubescent, on tarsus 3-4 rows of setae are developed (Fig. 68) *Dinodes* Bon.  
 – Body less pubescent, on tarsus only two rows of setae are present (Fig. 69) .....  
 ..... *Chlaenius* Bon. (sg. *Chlaeniellus*, *Pelasmus*)
- 57 – Medial teeth of nasale subequal (Fig. 70), epicranial groove less developed *Oodes* Bon.  
 – Medial teeth of nasale unequal (Fig. 71), epicranial groove deep .... *Lachnocrepis* Lec.

(\*) The larva of the *Callistus* Bon. described by E. Arndt (1991) belongs evidently to *Agostenus* Mor. (See couplet 55).



Figs. 39-51 - Diagnostic characters of carabid larvae: 39 - tarsus, lateral aspect; 40 - left parietalia, dorsal aspect; 41 - seta TE6; 42 - left mandible, dorsal aspect; 43, 44 - lacinia, dorsal aspect; 45, 48 - head, dorsal aspect; 46, 49 - cerci, lateral aspect; 47 - left maxilla, dorsal aspect; 50, 51 - nasale, dorsal aspect. 39 - *Cillenius* sp., 40, 41 - *Asaphidion flavipes* L., 42 - *Tachys* sp., 45 - *Cychnus caraboides* L., 46 - *Calosoma auropunctatum* Herbst, 47, 48 - *Omophron limbatum* F., 49 - *Elaphrus* sp., 50 - *Diacheila arctica* Gyll., 51 - *Blethisa multipunctata* (L.) (45, 48 - after Sharowa, 1958; 50, 51 - after Lindroth, 1954).

- 58 – Antennae with a small auxiliary pseudosegment at base, look like 5-jointed ..... 59  
 – Antennae 4-jointed ..... 63
- 59 – Nasale protruded, sometimes with small excision on apex (Fig. 72), cerci with 4-5 more or less distinct segments, in older larvae the 2-3 apical joints covered with microsetae 60  
 – Nasale with a deep, rounded-triangular excision (Fig. 73-75), cerci short, unjointed (Fig. 76) .....61
- 60 – Ocelli present, retinaculum very long ..... *Abax* Bon.  
 – Ocelli absent, retinaculum normal ..... *Tapinopterus* Schaum
- 61 – Lateral parts of nasale hardly protruded (Fig. 73) ..... *Myas* Dej.  
 – Lateral parts of nasale more or less protruded (Fig. 74,75) ..... 62
- 62 – Nasale exceeding the top level of paraclypeus (Fig. 74) ..... *Molops* Bon.  
 – Nasale does not exceed the top of paraclypeus (Fig. 75) ..... *Typhlochoromus* Jedl.
- 63 – Lacinia long, seta  $MX_6$  placed on its lateral surface ..... 64  
 – Lacinia conical, seta  $MX_6$  placed on its top ..... 68
- 64 – Bottom eye on second row reduced ..... *Abacetus* Dej.  
 – Ocelli normal, well developed, sometimes in second row ocelli slightly smaller than in the first ..... 65
- 65 – Cerci noticeably jointed ..... *Percus* Bon.  
 – Cerci unjointed or the joints are slightly separated by pale belts ..... 66
- 66 – Setae  $TE_{11}$ , at least on first three abdominal segments, shorter than  $1/10$  seta  $TE_{10}$ ; parietal region between setae  $PA_6$  and  $PA_7$  with longitudinal keel, thickened basally ..... *Poecilus* Bon.  
 – Setae  $TE_{11}$  not shorter than  $1/3$   $TE_{10}$ , keel between setae  $PA_6$  and  $PA_7$  absent ..... 67
- 67 – Seta  $UR_9$  very small, almost imperceptible, so cerci with 5 (in the 1st stage larvae) or 9 setae visible ..... *Pterostichus* Bon.  
 – Seta  $UR_9$  not shorter than  $1/2$   $UR_8$ , so that cerci with 6 (1st stage larvae) or 10 setae visible ..... *Stereocerus* Motsch.
- 68 – Nasale widely rounded, slightly protruding, with wavy front margin, lacinia very small 69  
 – Nasale of another form, its front margin noticeably serrated, lacinia large ..... 72
- 69 – Head approximately 1,5 times narrower than tergites of medial abdominal segments 70  
 – Head wide, usually not narrower or slightly narrower than tergites of medial abdominal segments ..... 71
- 70 – Cerci with 9 macrosetae ..... *Calathus* Bon. (part)  
 – Cerci with 6 macrosetae ..... *Lindrothius* Kurn.
- 71 – Paraclypeus with group  $FR_{8,9}$  of 4 to 7 setae ..... *Thermoscelis* Putz.  
 – Setae  $FR_{8,9}$  singular ..... *Laemostenus* Bon. (part)
- 72 – Nasale widely triangular (Fig. 77) ..... *Olisthopus* Dej.  
 – Nasale of different form (Fig. 78-80) ..... *Agonum* Bon.
- 73 – Second and third antennal segments entirely fused, so the antennae appears 3-segmented, maxillary palpi massive (Fig. 82), cerci semi-movable, conical (Fig. 83), body covered with long setae (tribus *Anthiini*) ..... *Anthia* Web.  
 – Antennae normal, 4-jointed, other features different ..... 74
- 74 – Mandibles slender, with long distal parts, inner arm of cardo not protruded into a knob 75  
 – Mandibles massive, inner arm of cardo usually forming a conspicuous granulose or spinose (Fig. 88) knob (*Harpaliae*) ..... 78
- 75 – Cerci movable (with the exception of 1st stage *Pelophila*) unjointed, nasale (Fig. 86-87) with 4 teeth (tribus *Nebriini*, part) ..... 76



Figs. 52-69 - Diagnostic characters of carabid larvae: 52 - left maxilla, dorsal aspect; 53-55, 57, 58, 61, 66, 67 - nasale, dorsal aspect; 56 - apex of tarsus, dorsolateral aspect; 59 - VIII-X abdominal segments, lateral aspect; 60, 62, 63 - head, dorsal aspect; 64 - praementum, dorsal aspect; 65 - ventrites of 5th abdominal segment, ventral aspect 68, 69 - tarsus, lateral aspect. 52 - *Zabrus (Pelor) trinii* Fisch., 53, 54 - *Amara* (up - *A. (Percosia) eguestris* (Duft.) and *A. (Celia) bifrons* Gyll.), 55 - *Zabris (s. str.) tenebrioides* (Gz.), 56 - *Harpalus latus* (L.), 57 - *Epomis dejeani* Dej., 58 - *Chlaenius* (*C. (s. str.) festivus* Panz.), 59, 60 - *Panagaeus crux-major* (L.), 61 - *Badister bipustulatus* (F.), 62 - *Diplocheila striatopunctata* Lec., 63, 64 - *Licinus depressus* (F.), 65, 66, 68 - *Chlaenius* (*C. (Chlaeniellus) vestitus* Pk.), 67 - *Agostenus* sp., 69 - *Dinodes decipiens* (Dufour) (52 - after Makarow et al., 1991; 61 - after Luff, 1980; 62 - after Bousquet and Goulet, 1984).

- Cerci unmovable, sometimes the joints are slightly separated by pale belts, nasale with small teeth on frontal margin (Fig. 81) ..... *Atronus* Lec.
- 76 – Head without distinct neck (Fig. 84), mandibles with penicillus ..... *Pelophila* Payk.
- A very distinct and rather narrow neck present (Fig. 85), mandibles without penicillus 77
- 77 – Head wide, nasale slightly protruding (Fig. 87) ..... *Eurynebria* Ganglb.
- Head narrow, nasale very protruding (Fig. 86) ..... *Nebria* Latr.
- 78 – Front margin of clypeus semicircularly excised and serrated, not defined with large teeth on the margins. Epicranial groove not apparent (tribus *Amblystomini*) *Amblystomus* Er.
- Nasale of different form, epicranial groove well developed ..... 79
- 79 – Ocelli and cerci reduced (subtribus *Ditomina*) ..... 95
- Ocelli and cerci developed ..... 80
- 80 – Ligula at base narrower in diameter than the first joint of labial palpi (tribus *Stenolophini*) ..... 81
- Ligula at base equal in diameter to the first joint of labial palpi ..... 86
- 81 – All abdominal tergites with a complete transverse keel, defining praeternum from tergum, usually with two macrosetae (TE<sub>9,10</sub>) in posterior row ..... 82
- Abdominal tergites (at least 5-8th) without transverse keel, usually with numerous macroseta on posterior row ..... 83
- 82 – Nasale rounded, with 8 long teeth (Fig. 89), lacinia with seta MX<sub>6</sub> on its lateral surface, cutting edges of mandible often serrated ..... *Dicheirotichus* Jacq. (\*)
- Upper row of nasale teeth dissected by protruding lower row, seta MX<sub>6</sub> on top of lacinia, cutting edges of mandible and retinaculum smooth; nasale - Fig. 90 *Trichocellus* Ganglb.
- 83 – Nasale with 4 wide serrated lobes (Fig. 94) ..... *Bradycellus* Er.
- Nasale of different form (Fig. 91) often with large teeth on both sides of the denticulate part ..... 84
- 84 – Tergites of the 1-4th abdominal segments with short thorn-like setae in medial part (nasale - Fig. 91) ..... *Daptus* Fisch.
- Abdominal tergites with normal setae ..... 85
- 85 – Apical segment of maxillary palpi more or less longer than preapical segment; nasale is more or less excised in the medial part ..... *Acupalpus* Latr.

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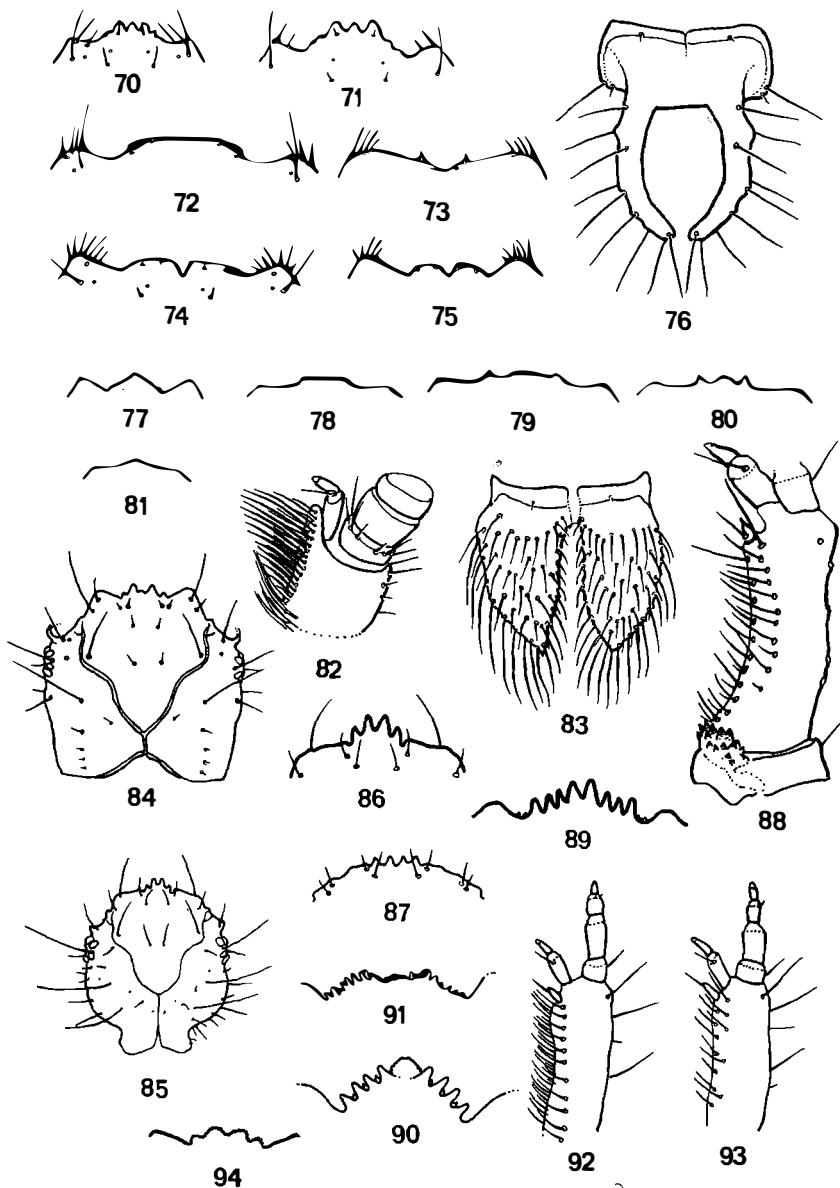
(\*) The characteristic features of this genus, pointed out by E. Arndt (1991), are based mainly on the larval morphology of *D. rufithorax* (Sahlb.). We suppose the latter species to be much closer to the genus *Trichocellus* Ganglb. Thus, the characteristics of the genus, presented in our paper was made using the features of larvae of typical *D. gustavi* Crotch and *D. ustulatus* Dej.

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Figs. 70-94 - Diagnostic characters of carabid larvae: 70-75, 77-81, 86, 87, 89-91, 94 - nasale, dorsal aspect; 76, 83 - IX abdominal segment, dorsal aspect; 82, 88, 92, 93 - left maxillae, dorsal aspect; 84, 85 - head, dorsal aspect. 70 - *Oodes helopioides* F., 71 - *Lachnocrepis proluxa* Bat., 72 - *Abax parallelopipedus* (Pill. et Mitt.), 73, 76 - *Myas cyanescens* Dej., 74 - *Molops piceus* (F.), 75 - *Typhlochoromus stolzi* (Mocz.), 77 - *Olistopus* sp., 78-80 - *Agonum* s.l. (78 - *A. (Europhylus) gracilis* Gyll., 79 - *A. (s.str.) sexpunctatum* (L.), 80 - *A. (Idiochroma) dorsale* Pontop.), 81 - *Atronus pubescens* Dej., 82, 83 - *Anthia mannerheimi* Chaud., 84 - *Pelophila borealis* (Pk.), 85, 86 - *Nebria gyllenhalli*

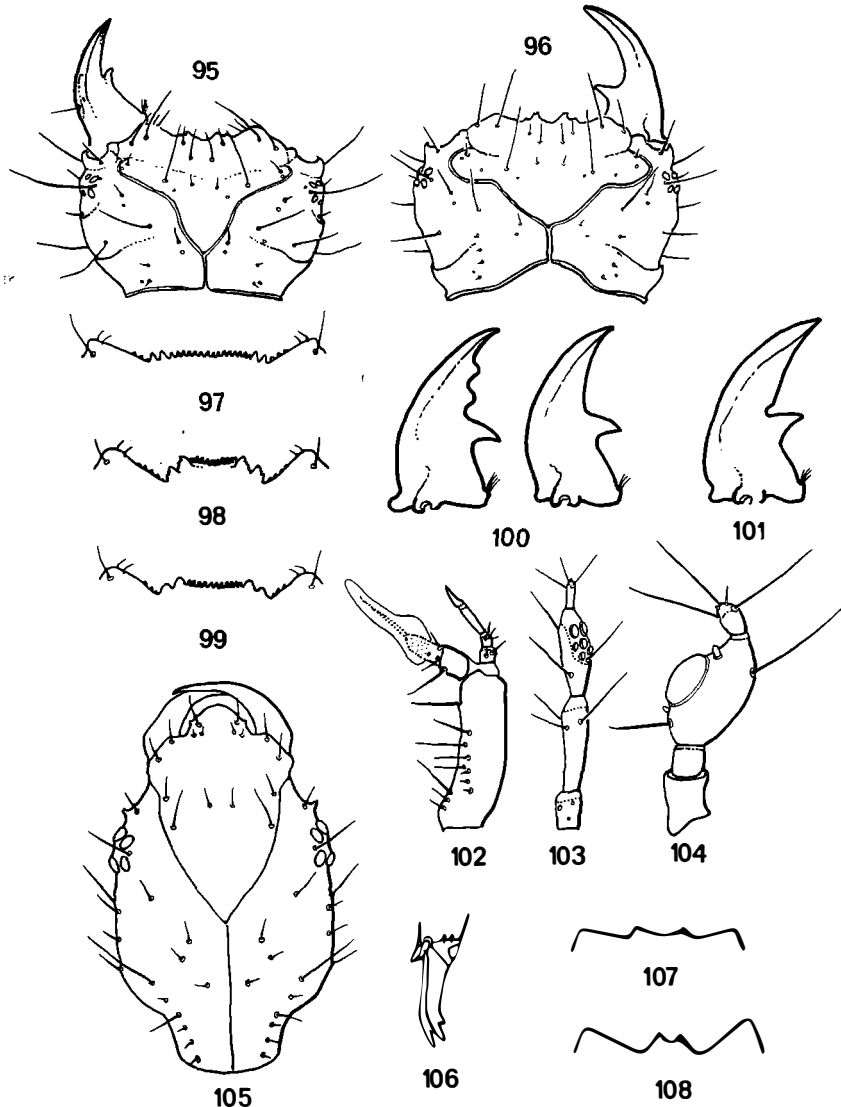
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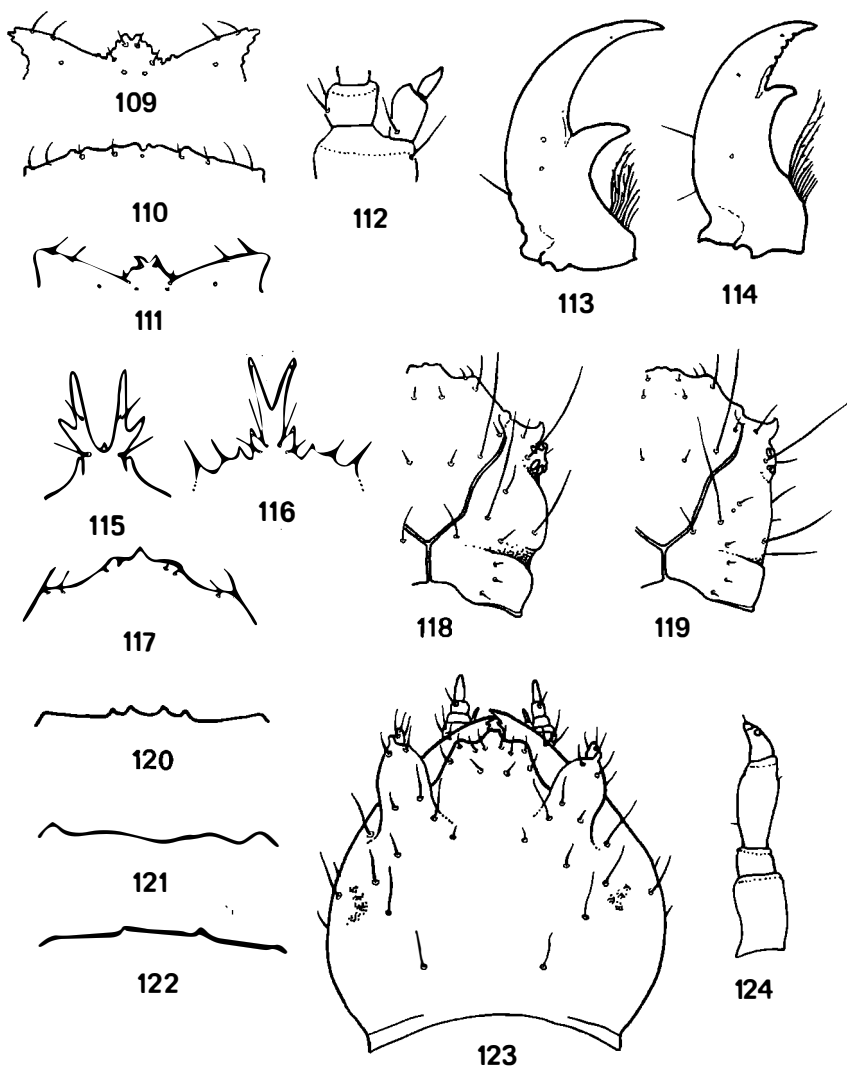
Schoenh., 87 - *Eunebria complanata* L., 88, 91 - *Daptus vittatus* Fisch., 89 - *Dicheirotichus* sp., 90 - *Trichocellus* sp., 94 - *Bradycellus* sp. (71 - after Habu and Sadanago, 1971; 72 - after Arndt, 1989; 73, 76 - after Bousquet, 1985; 75 - after Leonardi, 1969; 78-80 - after Hurka, 1981; 81 - after Bousquet, 1985; 84-86 - after Andersen, 1970; 87 - after Luff, 1972; 90, 94 - after Sharowa, 1958).

- Apical segment of maxillary palpi not longer than preapical segment; medial part of nasale protruding ..... *Stenolophus* Steph.
- 86 – Abdominal tergites with very distinct keel, separating praetergum from tergum .... 87
- Abdominal tergites without transverse keel, or it is developed only medially ..... 90
- 87 – Setae are reduced, on tergites only the TE<sub>9</sub> is normal, cerci in 2-3 aged larvae only with 5 macrosetae (tribus ?) ..... *Trichotichnus* Mor.
- Setae normal, often with presence of secondary ones (tribus *Anisodactylini*) ..... 88
- 88 – Medial part of nasale protruding (approximately as on Fig. 90), in the area of setae PA<sub>7,8</sub> longitudinal grooves are developed ..... *Anisodactylus* Dej.
- Nasale more or less excised in the medial part, head without longitudinal grooves 89
- 89 – Lacinia slender with the seta MX<sub>6</sub> ..... *Parophonus* Ganglb.
- Lacinia in a form of a massive cone, seta MX<sub>6</sub> absent ..... *Diachromus* Er.
- 90 – Nasale with two large, serrated teeth, that sometimes have 1-2 small teeth on the base, gMX as in Fig. 92 ..... 91
- Nasale with a different structure, gMX as in Fig. 93 ..... 92
- 91 – Lacinia long, not shorter than the 1st segment of galea, nasale semi-circularly excised, retinaculum small, directed forwards (Fig. 95) ..... *Liochirus* Tschit.
- Lacinia shorter, nasale usually with narrower excision (only *O. rupicola* (Sturm) has deep excision on nasale like in *Liochirus* Tschit.), retinaculum larger, directed inwards (Fig. 96) ..... *Ophonus* Dej.
- 92 – Mandibles with long apical part, their inner margins in front of retinaculum carrying 3 teeth; nasale (Fig. 97) not exceeding the level of lateral angles *Pseudophonus* Motsch.
- Apical part of mandibles shorter, without teeth or with 1-2 teeth, nasale more or less protruded (Fig. 98, 99) ..... 93
- 93 – Mandibles before retinaculum without excision, of ten with 1-2 teeth in the distal part (Fig. 100); cerci longer than X abdominal segment *Harpalus* Latr. (incl. *Semiophonus* Schaub.)
- Mandibles with small excision in front of retinaculum (Fig. 101), without teeth in distal part, cerci shorter than X abdominal segment ..... 94
- 94 – Nasale very protruding, with 20-22 small denticles on frontal margin (Fig. 98) ..... *Osimus* Motsch.
- Nasale flat, its frontal margin with 10-15 denticles (Fig. 99) ..... *Acinopus* Latr.
- 95 – Nasale with 4-5 teeth, epicranial suture developed ..... 96
- Nasale with two teeth, epicranial suture reduced ..... *Chilotomus* Chaud.
- 96 – Nasale slightly protruding, with 5 teeth, tarsus not longer than tibia .... *Ditomus* Bon.
- Nasale very protruding, with 4 teeth, tarsus 2-3 times shorter than tibia ..... *Machozetus* Chaud.
- 97 – 4th segments of antennae and maxillary palpi very long, lash-like, cerci with numerous pseudosegments as in *Chlaenius* s.str (tribus *Siagonini*) ..... *Siagona* Latr.
- Terminal segments of antennae and maxillary palpi normal, cerci, if jointed, consisting of 14-18 segments ..... 98
- 98 – Galea longer than maxillary palpus, its second joint very modified (Fig. 102), covered by glass-like substance, ligula with numerous setae (tribus *Loricenni*) ..... *Loricera* Latr.
- Galea always shorter than maxillary palpus, its second joint normal, ligula with two setae or without setae ..... 99
- 99 – Apex of third antennal segment without sensorial appendages, with 3-15 flat sensillae (Fig. 103) ..... 100
- Third antennal segment with one, normal, sensorial appendage ..... 101



Figs. 95-108 - Diagnostic characters of carabid larvae: 95, 96, 105 - head, dorsal aspect; 97-99, 107, 108 - nasale, dorsal aspect; 100, 101 - left mandibles, dorsal aspect; 102 - right maxilla, dorsal aspect, 103, 104 - antenna, dorsal aspect; 106 - claws. 95 - *Liochirus cycloderus* Sols., 96 - *Ophonus rotundicollis* Fairm., 97 - *Pseudoophonus rufipes* Deg., 98 - *Osimus amophilus* Dej., 99, 101 - *Acinopus megacephalus* Rossi, 100 - *Harpalus* (left - *H. latus* F., right - *H. caspius* Stev.), 102 - *Loricera pilicornis* F., 103 - *Scarites terricola* Bon., 104 - *Brachinus crepitans* L., 105 - *Drypta japonica* Bat., 106 - *Synthomus* sp., 107 - *Masoreus wetterhalli* Gyll., 108 - *Corsyra fusula* Fisch (96 - after Brandmayr and Zetto Brandmayr, 1981; 97, 107, 108 - after Sharowa, 1958; 98, 99, 101 - after Sharowa, 1967; 100 - after Sharowa, 1964; 104 - after Wautier, 1964; 105 - after Habu and Sadanago, 1963; 106 - after Arndt, 1989).

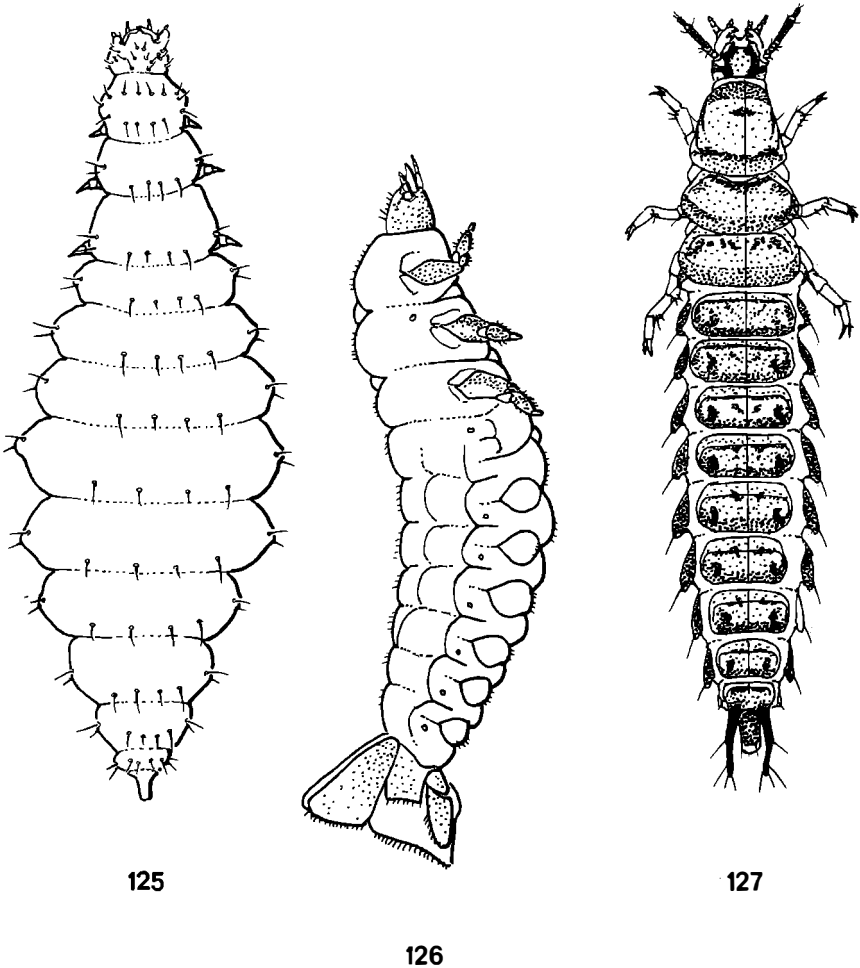
- 100 – Sclerotised part of stipes whole (tribus *Scaritini*) ..... *Scarites* Latr.  
 – Stipes on ventral side with transverse membranous zone (tribus *Morionini*) *Morion* Latr.
- 101 – Third antennae joint very large, with big lens-like (Fig. 104) sensorial appendage (tribus *Brachinini*) ..... *Pheropsophus* Sol.  
 – Sensorial appendage and third antennae joint as normal ..... 102
- 102 – Cerci with well-developed setiferous processes (Fig. 49), nasale (Fig. 50, 51) of characteristic shape (tribus *Elaphrini*, part) ..... *Elaphrus* F.  
 – Cerci at most with small setiferous nodules, nasale of another shape ..... 103
- 103 – Cerci almost as long as X abdominal segment, jointed (except *Syntomus* - long, unjointed, see couplet 108) ..... 104  
 – Cerci short, unjointed ..... 111
- 104 – Head with a neck (Fig. 105) ..... 105  
 – Head without neck ..... 106
- 105 – Cutting edge of mandibles serrate, cerci with 4-5 segments (tribus *Odacanthini*) .....  
 ..... *Odacantha* Payk.  
 – Cutting edge of mandibles simple, cerci with more than with 10 segments (tribus *Dryptini*)  
 ..... *Drypta* Latr.
- 106 – Setae LA<sub>6</sub> absent, ligula rudimentary, epicranial suture very short (tribus *Lebiini*, part)  
 ..... *Lebia* Latr.  
 – Setae LA<sub>6</sub> present, epicranial suture, as a rule, longer than the fourth antennal segment  
 ..... 107
- 107 – Retinaculum absent, sometimes with an excision instead (tribus *Calleidini*, part) .. 108  
 – Retinaculum present, normal protruded ..... 109
- 108 – Claws with a long and pointed tooth at base ..... *Plochionus* Latr. & Dej.  
 – Claws simple ..... *Parena* Motsch.
- 109 – Cerci unjointed (or joints poorly expressed), 5 times longer than the width of IX abdominal tergite; gMX consists of only 5 setae; claws with tooth (Fig. 106) *Syntomus* Hope  
 – Cerci jointed; gMX consists of more than 7 setae; claws without additional tooth 110
- 110 – Second joint of labial palpi slightly longer than first, retinaculum large, epicranial suture not shorter than 4th antennal segment ..... *Cymindis* Latr.  
 – Second joint of labial palpi noticeably longer than first, retinaculum small, epicranial suture minute ..... *Cymindoidea* Cast.
- 111 – Third antennal segment massive, not shorter, often longer than both 1st and 2nd. Nasale usually with 2-4 more or less developed teeth, its frontal margin without small denticles ..... 112  
 – Third antennae joint not longer than the 1st and 2nd together, nasale often serrate 119
- 112 – Cerci short, 2-3 times shorter than X abdominal segment ..... 113  
 – Cerci not shorter (usually longer) than X segment ..... 116
- 113 – Apex of X segment with a group of chitinised hooks. Claws with 1-2 teeth (then cerci absolutely reduced) ..... *Dromius* Bon.  
 – X segment without chitinised hooks apically (tribus *Masoreini*) ..... 114
- 114 – Nasale equal in width to paraclypeus (Fig. 107) ..... *Masoreus* Dej.  
 – Paraclypeus noticeably wider than nasale (Fig. 108) ..... 115
- 115 – Ocelli relatively small, ocellar tubercula not developed, sclerites at least partly pigmented ..... *Corsyra* Dej.  
 – Ocelli large, prominent, placed on ocellar tubercula, integument unpigmented .....  
 ..... *Discoptera* Sem.



Figs.109-124 - Diagnostic characters of carabid larvae: 109-111, 115-117, 120-122 - nasale, dorsal aspect; 112 - apex of stipes, dorsal aspect; 113, 114 - left mandibles, dorsal aspect; 118, 119, 123 - head, dorsal aspect, 124 - left antenna, dorsal aspect. 109 - *Charoaterus paracenthesis* Motsch., 110, 113 - *Lionichus quadrillum* (Duft.), 111, 114 - *Microlestes* sp., 112 - *Tetragonoderus elegans* Andr., 115 - *Leistus* sp., 116 - *Notiophilus* sp., 117, 118 - *Patrobis atrorufus* Stroem, 119 - *Calathus micropterus* Duft., 120 - *Taphoxenus gigas* Fisch., 121 - *Dolichus halensis* Schall., 122 - *Platyderus ruficollis* Marsh., 123 - *Lebia viridis* Say, 124 - *Pheropsophus jessoensis* Mor (110, 111, 112, 113 - after Arndt, 1989; 112 - after Emden, 1941; 120, 121 - after Sharowa, 1958; 122 - after Lindroth, 1956; 123 - after Capogreca, 1980; 124 - after Habu and Sadanago, 1963).

- 116 – Basal joint of galea (Fig. 112) with a conspicuous process at apex (tribus *Tetragonoderini*) ..... *Tetragonoderus* Dej.  
 – Apex of first joint of galea normal ..... 117
- 117 – Mandibles slender, with long retinaculum (Fig. 113), each claw with 2 setae; nasale - Fig. 110. Only 5 ocelli ..... *Lionichus* Wissm.  
 – Mandibles massive, with small retinaculum (Fig. 114), claws without setae, 5 or 6 ocelli ..... 118
- 118 – Five ocelli, gMX consists of 12-16 setae, tergits with fine keel, lateral angle of paraclypeus very protruding laterally, with teeth (Fig. 109) ..... *Charopterus* Motsch.  
 – Six ocelli, gMX of 6-10 setae, tergits without keel, lateral angle of paraclypeus slightly protruded sideways, without teeth, nasale - Fig. 111 ..... *Microlestes* Schmidt-Goebel
- 119 – Cerci movable, long, unjointed, tarsus with secondary setae on dorsal surface ..... 120  
 – Cerci unmovable, sometimes the joints are slightly separated by pale belts; tarsus on dorsal surface without setae (except  $TA_1$ ) ..... 121
- 120 – 1st and 2nd antennal joints with secondary setae, 2nd joint of palpi labiale shorter than praementum, gMX consists of 1-2 rows of setae, situated along the whole length of stipes; setae  $FR_{10,11}$  large, each pair is placed on 1 of the 2 teeth (Fig. 115) (tribus *Nebriini*, part) ..... *Leistus* Froel.  
 – 1st and 2nd antennal joints without secondary setae, 2nd joint of palpi labiale noticeably longer than praementum, gMX consists of 2-3 setae, located at the base of stipes; setae  $FR_{10,11}$  small, each placed on one of 4 distinct teeth (Fig. 116) (tribus *Notiophilini*) ..... *Notiophilus* Dum.
- 121 – Nasale with distinct medial tooth (Fig. 117), penicillus small or absent, epicranial groove (Fig. 118) very deep, neck and parietalia protruding (tribus *Patrobini*) ..... 122  
 – Nasale different, penicillus well developed, epicranial groove (Fig. 119) not so deep (*Pterostichitae*, partim) ..... 124
- 122 – Nasale more or less three-toothed (Fig. 117) ..... 123  
 – Nasale consists of 5-9 irregular teeth ..... *Diploous* Motsch.
- 123 – Neck and parietalia very convex, head and tergites brown, often with black sigillae ..... *Patrobus* Steph.  
 – Neck and parietalia poorly convex, colour in general more pale .. *Deltomerus* Motsch.
- 124 – Ocelli normally developed, sometimes in second row of ocelli slightly smaller than the first ..... 125  
 – Ocelli partly or totally reduced ..... 129
- 125 – Claws very unequal; inner 3-4 times shorter than outer ..... *Eremosphodrus* Sem., *Taphoxenus* Motsch. (partim)  
 – Claws equal or subequal ..... 126
- 126 – Nasale with four distinct teeth (Fig. 120) ..... *Taphoxenus* Motsch. (partim)  
 – Nasale different, usually with four more or less fused blades (Fig. 121,122) ..... 127
- 127 – Nasale 3-4 times wider than paraclypeus (Fig. 121) ..... *Dolichus* Bon.  
 – Nasale narrower, almost equal in width to paraclypeus ..... 128
- 128 – Nasale with relatively straight, serrated front margin (Fig. 122) ..... *Platyderus* Steph.  
 – Nasale more or less wavy, with 4 lobes ..... *Laemostenus* Bon. (part)
- 129 – Ocelli absent or poorly distinct in the first row, short epicranial suture present ..... *Sphodropsis* Seidl.  
 – Only 1-2 ocelli in second row are absent ..... 130
- 130 – Epicranial suture minute ..... *Sphodrus* Clairv.  
 – Epicranial suture not shorter than the 4th antennal segment ..... *Antisphodrus* Schauf.

- 131 – Terminal abdominal segment and cerci (Fig. 126) forming a cup-like terminal disc (tribus *Paussini*) ..... *Paussus* L.  
 – Cerci absent, terminal abdominal segments not modified (*Brachinini* and some *Lebiini* larvae of 2nd and 3rd stages) ..... 132
- 132 – Antennae (Fig. 124) 4-jointed (tribus *Brachinini*) ..... *Pheropsophus* Sol.  
 – Three basal antennal segments fused (Fig. 125), so they seem 1- or 2-jointed (tribus *Lebiini*) ..... *Lebia* Latr.



Figs. 125-127 – Habitus of some carabid larvae: 125 - *Lebia viridis* Say, dorsal aspect; 126 - *Paussus kannegieteri* Wasm., lateral aspect; 127 - *Licinus punctatulus* L., dorsal aspect (125 - after Capogreca, 1980; 127 - after Boving, 1907; 127 - after Luff, 1980).

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