

POSTEMBRYONIC DEVELOPMENT OF CARABUS

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Abstract. Postembryonic development of beetles of the genus *Carabus* has not yet been fully studied, which is due to their biological characteristics. In Central Asia, only the stages of development of *C. granulatus* and *C. clathratus* species were observed. Their larvae are campodeal and have a morphologically distinctive structure. The larvae go through a three-year period, and morphological differences are observed at each age. *Carabus* larvae differ from the genus *Calosoma* in the structure of their jaws, lip tentacles, and sclerites. The 9th segment does not have a respiratory opening, but contains urogomphs, which is a diagnostic feature. Pupae have not been sufficiently studied and resemble adult beetles in body structure.

Keywords: *Carabus*, segment, dorsal, campodeal, urogomphs, epipleuritis, hypopleuritis, scleritis, sternitis, poststernitis, pigment, roller, pupa.

The early stages of postembryonic development of *Carabus* are still insufficiently studied due to their biological characteristics. Of the species found in Central Asia, only the species *C. granulatus* L. and *C. clathratus* L., distributed in all temperate parts of the Palearctic, have developed.

The eggs of all *Carabus* are quite large, slightly curved, cylindrical with rounded ends; their length is 2-3 times greater than their width.

The larvae of *Carabus*, like those of all buzzing beetles, are campodeal, mainly nocturnal. They have 6-segmented legs, 4-segmented antennae, an upper lip completely fused with the fontanelle, 8 pairs of abdominal breathing holes, and 6 eyes on each side. The body is elongated, roller-shaped, slightly flattened.



Carabus larva

The most important parts of systemic importance are the nalichnik, lower lip, labial palps, central abdominal sclerites, and the structure of the dorsal processes (urogomphs) in the 9th segment of the abdomen.

The middle part of the napkin can be of various shapes. In the logimandibular Corabi, it is simple, semi-circular or two-toothed; Corabi brevimandibules are either 5-toothed with slightly close lateral edges (suborder *Carabus* s. str), or 4-toothed with parallel or distant lateral edges (suborders *Oreocarabus*, *Pachystus*, *Hemicarabus*, *Eurycarabus*, etc.).

The lower lip consists of a rather large trapezoidal chin, at the apex of which are located a small, rather strongly chitinized tongue and two-segmented lip tentacles. The terminal segment of these tentacles is cylindrical or significantly widened towards the tip, and in some cases (for example, in *C. jedtschenkoi* Sols.) can be bipartite.

The lower jaws are sickle-shaped, with a strong, sharp, toothless inner edge near the middle; sometimes an additional small tooth on the inner edge of this tooth.

will be. The tuft of hairs at the base of the inner edge, which is found in the larvae of most other buzzing beetles, is absent in Carabus.



Carabus larva left mandible

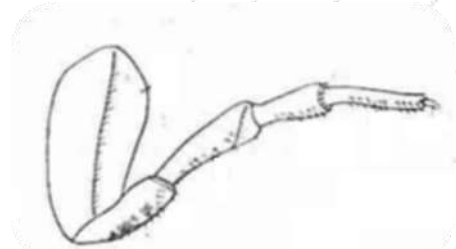


Diagram of the structure of the left middle leg of the Carabus larva

The legs, as mentioned above, consist of 6 joints: pelvic, gluteal, femoral, tibial, metacarpophalangeal, and nail joint. The Carabus larva, like other Carabinae, is characterized by two nails of equal length and a paw equipped with two rows of spines on the central surface.

Abdominal tergites are wide, strongly sclerotized, sometimes much wider than the edges of the trunk, their posterior corners are often elongated into acute lobes, and 1 strong hair is located in front of them. On the lateral surface of the abdominal segments, there is 1 strong hair.

Also on the lateral surface of the abdominal segments are located 2 sclerites: upper - epipleuritis and lower - hypopleuritis, each of which (fully or partially) is divided into two parts - anterior, greater, and posterior, very small. In front, between the tergite and epipleurite, there is a round respiratory opening. On the central surface of the abdominal segments, there are 5 sclerites: large unpaired broad sternitis and 2 pairs of post-sternitis - internal and external. The shape of scleritis and the location of hairs on it can serve as an important diagnostic sign.

The 9 th segment does not have a respiratory opening, has only one central sclerite, and carries a pair of urogomphs on its dorsal surface. Like other Carabinae, urogomphs are non-articular, horn-shaped, covered with bumps and spines (of which 1 or 2 are usually larger than the others) and have several hairs.

The overcoat of the larvae is usually strongly sclerotized and strongly pigmented, especially on the upper side; the color is black, less often brown or brownish-red; the surface of the tergites is usually covered with small grains.

Larvae have three age periods. Larvae of the first instar differ from larvae of other instars in the "egg teeth," the ratio of antennae and leg joints, and sometimes in the structure of the tube.

Larvae in the second and third instars are very similar, differing only in size and the shape of the sclerites. The ratio of the length of the adult beetle's body to the width of the larval head for different species is as follows: in the first instar - 12-16, in the second instar - 9-12, in the third instar - 7-9.5.

Carabus larvae can differ from larvae that are close to the genus Calosoma in the following ways:

1. The two main joints of the maxillary palps are not longer than their width.

Epithelial segments of the abdomen are completely separated into large anterior and small posterior scleritis. The joint of the last labial palps is spindle-shaped or cylindrical;

Not expanded towards the apex. The middle notch between the teeth of the calyx is deep. Calosoma.

2. Jag' paypaslagichlarining ikkita asosiy bo'g'imi har doim o'z enidan uzunroq bo'ladi.

Epipleuritlar to'liq 2 ta skleritga bo'linmagan, ammo ko'pincha chuqur kesimlar mavjud.

Lab paypaslagichlarining oxirgi bo'g'imi odatda uchiga tomon ozmi-ko'pmi kengaygan bo'ladi.

Nalichnik tishlari orasidagi o'rta o'yiqli odatda sayoz yoki umuman bo'lmaydi.....*Carabus*.

Pupae have been described for fewer species than larvae, not known from Central Asia.

They are free, naked, resembling adult beetles, with a mobile abdomen and a delicate white coating. They are characterized, in particular, by paired bundles of long hairs on the dorsal surface of the first 5 segments of the abdominal cavity, as well as on the sides of the anterior posterior and 2-6th abdominal segments.

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