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EMPLOYMENT OF THE LARVAE MICROMORPHOLOGICAL FEATURES IN THE
SYSTEMATICS OF THE GENUS CARABUS(L.) THOMS

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The genus *Carabus* numbering about 600 species in the recent fauna is characterized by very complicated intrageneric structure. The significant individual and geographical variability of its members of the one hand causes the awarding of the specific

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status to the different forms and aberrances, and on the other hand limits the quantity of the taxonomic features. The use of a little number of the characteristics leads to the creation of clearly artificial systems of the intrageneric categories (for instance Ishikawa, 1973, 1978, 1979).

The study of the larvae morphology as once more embodiment of the genotype gives a new material for the taxonomy of the genus.

G.Lapouge (1929) was the first, who employed the larval features in the Carabus systematics. He distinguished three phylogenetical groups of the larvae, using mainly the general morphological signs. K.Harka (1971) considered these groups as the morphological types.

The method of the investigation of the sensory structures (Bousquet, Goulet, 1984) inaugurated a new stage in the study of the carabid larvae. But some circumstances make difficult the "fine" chaetotaxy of the Carabus larvae. These are the strong sclerotization and pigmentation of the integuments, the development of a large number of the additional sensillae, the reduction some setae on the head and tergites and the increase their quantity on the legs and ventrites. We have done the necessary modification of this method and gomologized the most of the sensillae of the Carabus larvae.

Parallel investigation of the morphological adaptation and functional role of some structures gave an opportunity to distinguish the features for the characteristics of the larvae ecological radiation of the Carabus larvae more precisely (Makarov, 1987), which characterizes a layer of the habitat, a method of the movement and a peculiarity of the feeding. Such nonadaptive characteristics as some peculiarities of the chaetotaxy of the head, tergites and antenna etc. are the most perspective for the valuation of the relationships of the species and for the creation of the phylogenetical system of the genus. The offered scheme of the phylogenetical connections of the subgenera groups of Carabus (fig. 1) is based on the analysis of 97 morphological features (mainly chaetotaxy), which the morphological and ecological specialisations were valued. There are three groups on the scheme, which generally correspond to ones distinguished earlier (Bengtsson, 1927; Lapouge, 1929 et al.). The character of the used features and the presence of the parallel adaptations in these distinguished groups of the larvae allow the interpretation them as the phylogenetical branches.

Among offered earlier systems of the genus, based of imaginal features, S. Breuning's one (1931-1936) is the most similar to the our one. His groups *Carabu brevinmandibulare* (with the line *C. carabogenici* (= *Archicarabus* s. Bengtsson) and *C. multistriati* (= *Metacarabus* s. Bengtsson)) - and *Carabi Longimandibulare* (= *Neocarabus* s. Bengtsson) correspond to ones, shown on the scheme. The significant part of the R. Ishikawa's taxons seems to be artificial. These are the entering *C. clathratus* in *Apotomopterus*, the connection *Carabus* s. str. and *Ohomopterus*, the inclusion in the *Lipaster* of the members of all branches, the combined character of the phylogenetical branch *Carabi multistriati* sensu Ishikawa. The Ishikawa's inferences are based mainly on the investigation of the male genital organs. In our opinion, the genital can have only the limited application in the creation of the natural system of the taxon. Firstly, the simpatrial species may have more different genital, than the allopartical ones in spite of the same degree of the relationship. Secondly, we can not define, is the similarity of the male genital organs primary or second (in case of the parallelism), because of the difficulty of the gomologization of their sclerotized structures. But the value of some genital features for the differential diagnostic of the species is doubtless.

The analysis of the external morphology on condition of the functional valuation of the features in our opinion is the more useful for the creation of the natural system. The larval characteristics are the most valuable on account of the relatively monotonous morphological adaptations and the opportunity of the gomologization of the micromorphological structures. Doubtless the natural system must be founded on the features of all development stages. That is why the given scheme does not claim to be irreproachable.

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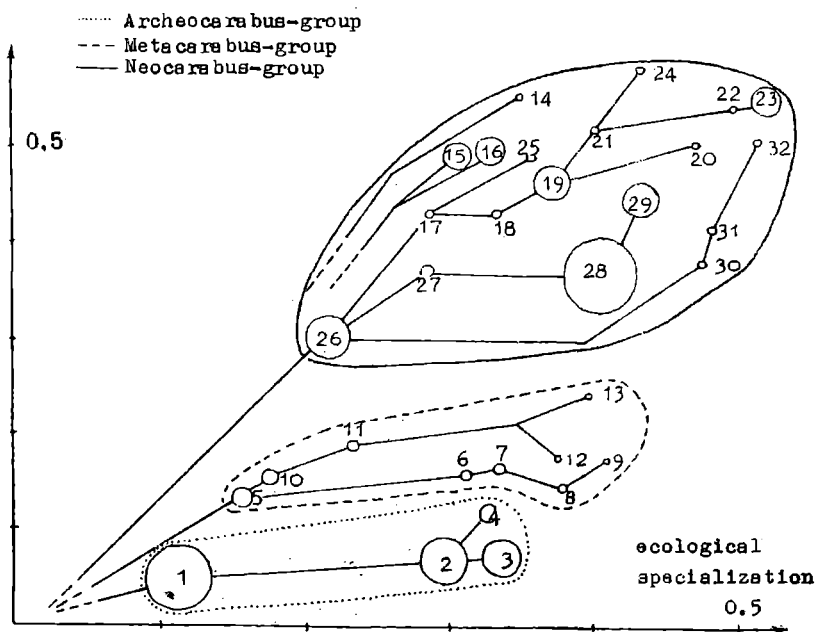


Fig.1. The scheme of the phylogenetical relations in the genus *Carabus*. The co-ordinates give the parts of apomorphic features from the general number of the characteristics (97). The disks diameter corresponds to the quantity of the species in the group. 1-Acrocarabus, Eucarabus, *Carabus* s.str.; 2-Trachycarabus, Morphocarabus; 3-Cryptocarabus; 4-Arohicarabus, Mimocarabus; 5-Aulonocarabus, Leptocarabus; 6-Hadrocarabus, Orinocarabus; 7-Diocarabus. 8-Pachycarabus; 9-Hemicarabus; 10-Oreocarabus, Ulocarabus; 11-Tomocarabus; 12-Pachystus; 13-Semnocarabus; 14-Hygrocarabus; 15-Sphodristocarabus; 16-Chrysocarabus; 17 -Chaetocarabus, Platycarabus; 18-Deroplectes, Plesius; 19-Cratocephalus, Alipaster, Cratophyrtus, Pseudotribax; 20-Gonlocarabus; 21-Axinocarabus; 22-Eupachys; 23-Acoptolabus, Copitolabus; 24-Procerus, 25-Cyclocarabus, Pant. ophyrtus; 26-Megodontus, Pachycranion; 27-Procrustes; 28-Archiplectes, Lamproctus; 29-Microplectes, Tribax; 30-Cechenochilus, 31-Cratocarabus; 32-Cratocechenus, Eotribax.

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