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The distribution of four morphotypes of *Hydropsyche contubernalis* MCL. (Trichoptera, Hydropsychidae), a possible object for genetical studies on subspecific differentiation
(An updated version of my 1981 paper)

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Abstract. The distribution of four morphotypes of *Hydropsyche contubernalis* is recorded. This species may be a good object for the genetical analysis of subspecific differentiation.

30 years ago, I had the opportunity to study the rich material of *Hydropsyche contubernalis* in the collections of the Zoological Institute of the Academy of Sciences of the USSR (now Russian Academy of Sciences) in Leningrad (now St Petersburg). The results were published in the leading entomological journal of the USSR to draw the attention of Russian entomologists to the problem which may be best studied in the field on the territory of their country. It appears that there was no response, but the problem was discussed since in other European countries where the workers had no knowledge of my paper. So I give here an updated version of this old paper, and hope to give useful information.

Hydropsyche contubernalis is a species with an unusually large area which includes northern and Central Europe, Asia Minor, Iran, and large parts of Central Asia and Siberia eastward to Yakutia and Mongolia. We know other Trichoptera species with even larger areas, but most of these inhabit standing waters, but *H. contubernalis* lives, like all other Hydropsychidae, in running water. In this respect it is euryoecous as it may live in small streams as well as in large rivers.

The large material in the above mentioned Institute, but also in my own collection, has revealed a high rate of variability in the characters of the species. This was already noticed by MARTYNOV (1926) in which publication he called the species *H. ornatula*. It was only KIMMINS (1949, 1957) who fixed the lectotypes so that the definitive name of the species is now *contubernalis*. These and other very similar species may be identified using the papers by MALICKY (1977, 2004).

Among the structures of the male genitalia, the variability is best seen in the form of the phallus which is strongly sclerotized and therefore not influenced by shrinking or other deformation as it may happen in the terminal segments themselves. In this paper, only the variation of the phallus will be discussed. The females were not studied.

According to the form of the phallus, four morphotypes may be separated which are figured in Fig. 1. In many populations, one of these morphotypes is represented by 100% of individuals which means that they may be considered subspecies in their classical sense. In other populations however, several morphotypes including transitional specimens may occur.

In the nominotypical morphotypus (*contubernalis* s.str.), with the lectotype from England, the lateral edges of the phallus are parallel in ventral view; in lateral view the distal part is slightly swollen dorsally and ventrally, and immediately before the distal part is a tiny constriction. This morphotype is the only one found in Central and western Europe, but also in Karelia, in Asia Minor and even in the region between Wolga and Ural River, and in the catchment area of the rivers Irtysh and Ob.

In the lowlands of eastern Germany, Poland and in large areas of European Russia, in particular in the region of Moscow, the morphotype *masovica* MALICKY 1977 is found. The distal part of the phallus is slightly undulated similar to *H. ornatula* in ventral view. In lateral view, the ventral subterminal constriction is lacking. A morphotype very similar to this or even identical, lives in large areas of Siberia, approx. between Irtysh, Lake Baikal, and Lena River, and in Mongolia. It is possible that this morphotype will turn out to be a different one, to be described separately when enough material is available.

The morphotype *borealis* MARTYNOV had been described in the paper by MARTYNOV (1926) as "natio". It can be recognised by the strong subterminal inflation of the phallus in ventral view. Between this inflation and the less inflated end is a distinct constriction. In lateral view, the subterminal ventral inflation is much more expressed than in *masovica*, which means that the phallus as a whole resembles to *H. angustipennis*. Specimens with these characters dominate in the surroundings of St Petersburg and Helsinki, but also in other regions of European Russia, in Lietuva and even near the River Ob. It was said by several authors that this morphotype also lives (or lived) in Denmark and even in the Netherlands, but I have not seen specimens from there, and cannot exclude the possibility that they meant *masovica*. However, the specimens from Olonets (far north of St. Petersburg) are *not borealis* as stated by MARTYNOV (1926) but normal *contubernalis* s.str.

The fourth morphotype easy to distinguish is *iranica* MALICKY. The phallus has in its ventral view a strong inflation like *borealis*, but no constriction between it and the distal end, so that the end of the phallus shows a more or less straight-sided conical reduction. The lateral view is as in *borealis*. This morphotype dominates in Iran and in the Caucasus, but specimens with this character are also found in Afghanistan, Asia Minor, in southern Russia and the Crimea and in Central Asia as far as Irtysh River.

Figure 2 shows the localities from which I have seen material (except most localities in Central and Western Europe). The large circles indicate places from where I have seen long series of males, but the small circles mean single specimens. From the figure it is evident that in many regions only one morphotype occurs, which would mean to represent a subspecies in the classical sense, but in other regions there are mixed populations including transitional specimens.

The total picture is somewhat confusing. It is clear that *contubernalis* s.str. is the only morphotype in Central and western Europe, and radiates toward the Northeast and the Southeast, as well as *iranica* with its centre in Iran and the Caucasus from where it radiates toward the North and Northeast. With *borealis* it is less clear: is its centre of distribution around St Petersburg, or near Ob River, or elsewhere? Unfortunately there is no material available from the wide areas in between.

Even less clear is the situation of *masovica*. On one hand, there is almost no variation within the populations in the large area between Germany and Central Russia, but from other regions we know single specimens with *masovica* characters within populations where other characters dominate. Are the *masovica* specimens from Poland or Moscow genetically the same as those from Siberia? To answer this question one needs material from the wide areas of western Siberia.

Hydropsyche contubernalis is possibly a good object to study the process of subspecific and geographic differentiation with genetical and experimental methods. It is a very common species which is easy to catch and easy to breed (e.g. with the method described by SATTLER 1958).

There is another remarkable point in which the subspeciation process may be unusual within Trichoptera. In most caddis species, subspecific differences originate from mountain regions or islands so that the isolation is caused by geographic barriers, but *H. contubernalis* lives mainly in lowlands with probably continuous distribution and without geographic barriers between the populations.

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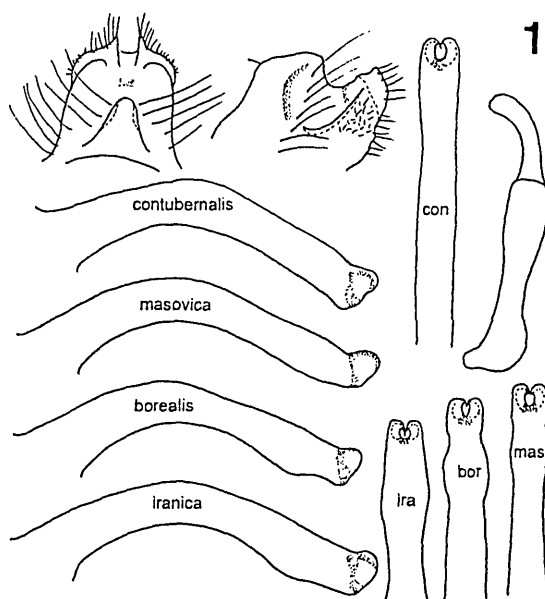
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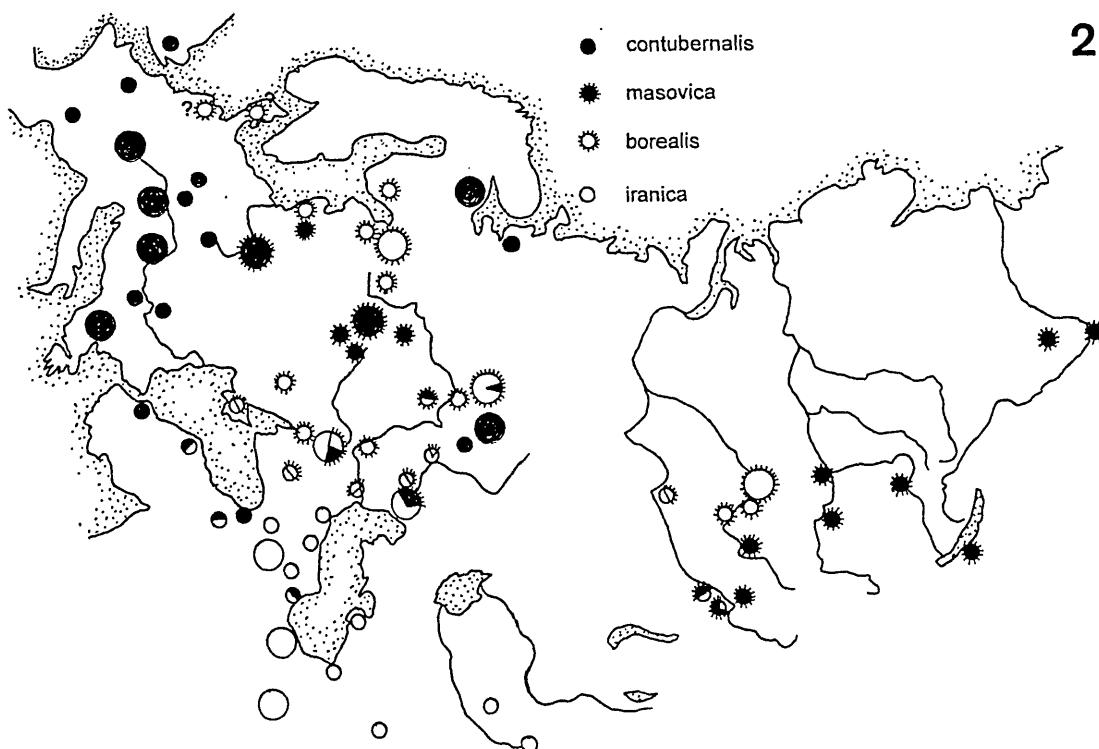
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