Species Boundary Problems in Opiliones

by Jochen Martens

Regional fauna lists show differences over time, but some of these alterations reflect changes in prevailing species concepts rather than in the faunas themselves. Araneologists are fortunate in being able to rely on good, stable and objective characters such as complex genitalia and distinctive behavioural patterns to define species limits. At first sight the situation seems similar in the opilionids: complex genitalia are present but, although penis structure is reliably diagnostic to species level, ovipositors can only be used to distinguish higher level taxa such as families. Furthermore, attempts to find other reliable morphological features to correlate with variation in diagnostic characters of male genitalia are in their early stages. To illustrate some aspects of species problems in the Opiliones, we need only to consider the limited fauna of the British Isles and, specifically, some recent additions to the British list.

Our first case-history, though remarkable, is relatively straightforward. *Sabacon viscoyanum ramblianum* Martens, 1983 was first discovered by Abbott (1981) on the Gower peninsula, S. Wales; he very kindly provided me with reference specimens. This is a relict population which has survived in a moist lowland habitat. The structure of the male genitalia and also the secondary male character, a distinctive bump on the first member of the male chelicera, are identical to those of the Pyrenean population of this subspecies. So, there has been no differentiation of the two populations, indicating that separation must have taken place relatively recently, probably postglacially.

No less startling was the description of a new *Mitopus* species, *Mitopus ericaeus* Jennings, 1982, from upland areas in England (Jennings, 1982). Before discussing details of the genitalial characters of this new species, we must first consider the rather difficult taxonomic situation within this holarctic genus. Until recently, three valid species were known: *Mitopus morio* (Fabricius, 1799): *M. glacialis* (Heer, 1845); and *M. mongolicus* Roewer, 1912. Populations of *M. morio* show considerable variability: characters such as the dorsal body pattern and leg lengths, which normally show limited individual variation, are markedly different in geographically or altitudinally widely-separated populations. Are there, perhaps, several species involved, even within Central and Western Europe, not to mention Asia and North America, where populations of this species are said to differ ecologically from those of the Old World? This has not been checked in detail, but the huge range of this species, when compared with others, seems suspicious. What makes this case even more delicate is that the genital morphology of *M. morio* has not been examined in major parts of its European range, to provide a reliable scale for *morio* variability, or perhaps to discover cryptic species by such a procedure.

Within this context, *M. ericaeus* poses problems: detailed drawings of an important male structure, the glans penis, were not provided in the original description.

It was therefore helpful to receive a male paratype from the British Museum (Natural History), courtesy of Mr Paul Hillyard, and a series of specimens collected by Mr John Sankey from the type locality, Muggleswick Common, and from Malham Tarn. Two types seem to be present: i. with a relatively long and slender glans (when seen in lateral view) gradually tapering to a point at the stylus; the truncus is long (Figs 1 a-c, i); ii. with a stouter glans which narrows markedly to the stylus; there is a small plateau just above the glans-truncus joint (Figs 1 d, g, k).

Type i seems to match *M. ericaeus* in the characters described by Jennings and in others; type ii seems to resemble *M. morio* more closely. But the distinction between these two local types is nowhere near as great as that between *ericaeus* and continental *morio* (Figs 1 f, h).

Thus *morio* and *ericaeus* from the type locality seem to form a 'common block' of variability, at least in the character of the glans, in contrast to that of continental populations.

Another observation may serve to make us even more cautious. In 1967, during a tour of the French Pyrenees, below the Port d'Aula Pass, Ariège, I noticed that leg length in *M. morio* showed a pattern exactly the opposite of that known from the Alps: short-legged specimens at lower altitudes (a series from 1,690m) and long-legged at higher altitudes (a series from 2,200m). Confronted with the *ericaeus* problem, I re-checked the series in question and was astonished to find the upper (long-legged) specimens identical in glans proportions to 'typical' *ericaeus* i.e. glans slender etc. (Fig. 1e). The lower specimens had stouter glans but, again unexpectedly, differed from the 'normal' *morio* from outside the Pyrenees: the glans shows a slight dumb-bell-shaped depression on the upper and underside (glans silhouette, lateral view, Fig. 1f). However, in large parts of Central Europe, from the Austrian Alps to Southern Sweden and, in the east, to Moscow, glans morphology seems to be quite uniform in *morio* (see Martens, 1978).

What preliminary conclusions may we draw? At present that the status of *M. ericaeus* is uncertain: more of the arguments discussed in the original description need checking. But it seems to me that at the northwestern and western fringes of *morio* 's range there is greater variability in genitalial characters, as can be shown by comparing...
Figure 1. Male genitalia of Mitopus morio (Fabricius) and M. 'ericaeus' Jennings. a-c, e. Glans penis, lateral view, cf. 'ericaeus'. d, f-h. Glans penis, lateral view, of morio. i, k. Penes, lateral and dorsal views (i as c, k as d). Localities: a, b. Malham Tarn, Yorkshire; c, d. Muggleswick Common, Durham (c from the type series); e, f. Port d'Aula, Dép. Ariège, French Pyrenees, 2260 and 1690m respectively; g. Oskyll, Sutherland; h. Pasvik Valley, Sweden.
morio from England or the Pyrenees with those from other parts of Europe. Glacial influences may be responsible: possibly small populations of morio survived glacial periods isolated in ice-free pockets in Northwestern Europe. Such areas are known from the Pyrenees, famous for its very rich soil fauna, and certainly from the parts of southern Britain which were not glaciated (note the geographic parallel with Sabacon!). After the postglacial return of the 'old' Siberian morio proper to Europe, sexual isolating-mechanisms were incomplete and interbreeding between local residents and the 'newcomers' occurred. But this did not eradicate or absorb certain ecological and morphological constraints which developed during separation and which therefore continue to survive locally. So, at present, I am not inclined to consider that two distinct and independent genetic entities, biospecies, exist either in Britain or in the Pyrenees.

The third and final case still needs further elucidation, but may eventually result in a further addition to the British list. When I asked Mr John Sankey, my most reliable source for British reference specimens, for some Trogulus from Britain, which I had never seen before, he kindly sent two females which, to my surprise seemed to belong to two different species. The specimen from Box Hill, Surrey, matches T. tricarinatus (Linnaeus, 1767), presently the only British species, quite well when compared with specimens from Southern Germany and Yugoslavia. The other specimen, from Godmersham Park, Kent, is considerably larger, with relatively shorter legs and a slightly different distal hood formation.

The taxonomic position of Trogulus in Central Europe seems straightforward, but is actually extremely complex. Martens (1978) recognised four species: T. nepaeformis (Scopoli, 1763); T. tricarinatus (Linnaeus, 1767); T. coriciformis C. L. Koch, 1839; T. tingiformis C. L. Koch, 1848. The only species with a wide distribution are the first two. The difficulties we face in Trogulus are that the external morphology in all species is extremely uniform, that secondary male sexual characters do not exist, and that genital morphology again seems to be uniform, at least in groups of closely-related species.

In Trogulus, we are just beginning to understand how and where to draw species' limits. To recognise biospecies in morphologically rather uniform genera, we need 'gaps' in character series, preferably in populations living in sympoty. Chemini has a good 'feel' for this sort of approach and has used it to establish a new species in an 'ideal' population in the Italian Alps, T. martensi Chemini, 1983, and to revalidate a Carpathian species, T. closanicus Avram, 1971, which I had synonymised in 1978 (see Chemini, 1984). There will be more such cases and currently we are learning to recognise which minor differences, in genitalia for example, are significant and sufficient to define new species in this genus in sympoty situations. In allotopic or allopatric situations, to assess the significance of such slight differences is a great problem: do they reflect the presence of different species or merely represent geographic variation? This will be the problem we face with the possible new British species, when males can be examined.

Some years ago, a student of mine, Ulrike Neuffer (1980), surveyed all available material of T. nepaeformis, paying particular attention to genitalia. She found great differences across the range — from the Carpathians to the Cantabrians — too profound to be encompassed within a single species. But she did not dare, with very little biological information, to split this assemblage into several species, which it almost certainly requires. So Trogulus is the most difficult genus of the European opilionids to deal with taxonomically: it will be a Herculean labour to unravel the situation.

Mayr (1963) characterises biospecies as always distinct (biologically separate) but not always distinguishable (readily morphologically separable) from other closely-related species. Thus we may encounter situations where we have two (or more) distinct biospecies which are not easy to distinguish morphologically. Alternatively, we may find an amount of variation within a species that deludes us into thinking that we are dealing with more than one species. Consideration of even the limited British opilionid fauna can highlight these problems.

References


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