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## 12 | Revision of the Genus *Messor* (Harvesting Ants) on a Biometrical Basis

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**Abstract:** To clarify the systematics of the genus *Messor* worldwide (83 species), we compared, in 68 *major* workers, the ratios: scape length/head length, and body length/length of posterior leg. Longer antennae and legs are observed around the Himalayas region from which the genus originates. Shorter antennae and legs are found mainly in highly evolved sections from North Africa.

*Messor* is one of the most difficult genera of ants to classify: for example, hundreds of "races" and "varieties" have been named by the classical authors (such as Forel, Emery, Finzi and Santschi). To provide a maximum of clarity we used biometry, restricting it to *major* workers, the only caste present for all species in the collections. Queens are known for about 1 species in 5, and males for 1 species in 15 (in these granivorous ants, swarms are generally in September or October, months during which entomologists are seldom in the field!)

The most useful relationships of those tried (Fig. 1) proved to be the following. S: scape length/head length, which varies from 0.68 to 1.21; the primitive forms, from the Himalayas and Syria, show the longest scapes. P: body length/length of posterior leg, which varies from 0.64 to 2.0;

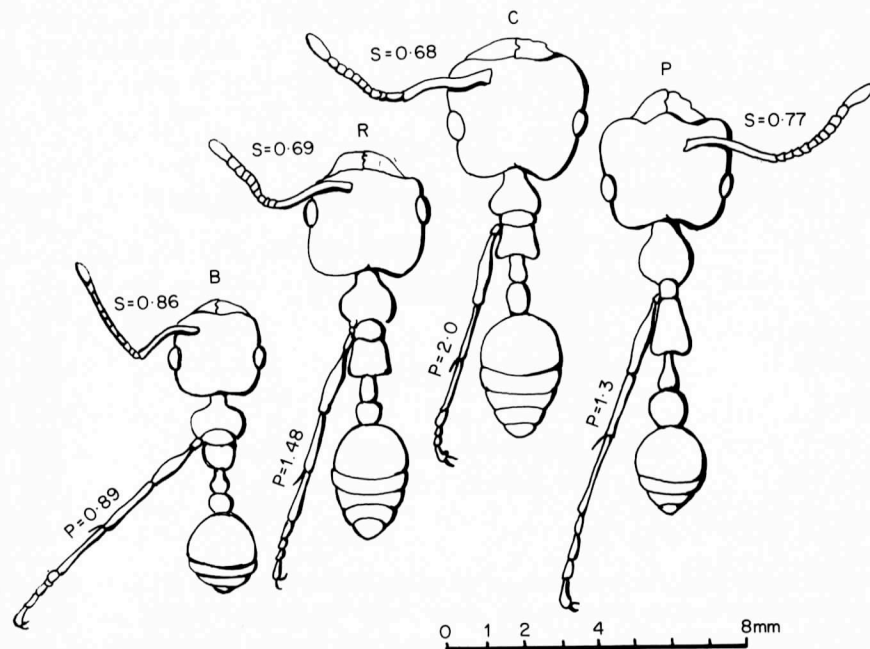


Fig. 1. Comparison of 4 *Messor* species chosen as extreme types. S: length of scape/length of head. P: body length/length of posterior leg. The species (B, R, C, P) are defined in the text.

legs are particularly short in several north African species, such as *M. carthagenensis* (Fig. 1c).

First the material studied is defined; four extreme examples of *Messor* are then described (Fig. 1); finally, biometric comparisons are shown graphically.

#### ELEMENTS OF BIOGEOGRAPHY: MATERIAL STUDIED

Of the 83 known species, all from the Old World, 65 have been measured. Of the 83, 31 were from central Asia, i.e. steppes and deserts of the U.S.S.R., the Himalayas, Iran and western China. In 1966 and 1968, I was able to examine these in Arnoldi's fine collection in Moscow. Twelve were from the Middle East (Syria, Caucasus, Balkans); of these, only *M. semirufus* (André), common in Greece, reaches Calabria and Corsica, where it is the commonest *Messor* species.

Thirty one species from northern Africa (author's collection) inhabit steppes and the Atlas: Three are strictly Saharan, *M. foreli* (Sant.) being by far the most common. In France, four out of five come from Maghreb. Only *M. rufitarsis* (Latr.) is of European origin, probably from the calcareous Alps. It is the only species common in forest (predominantly in *Quercus pubescens* woods). Here, it often nests in moist clays, although it is not clear why the collected seeds do not germinate in such soils. Five *Messor* species live in South Africa and are rather primitive, probably coming from Asia. In contrast to the *Messor* of Maghreb, they collect, not Cereals or Leguminosae, but mainly seeds of small wild Gramineae, such as *Aristida* (Arnold, pers. comm.). The most complete collections from the West are those of Santschi (Basel Museum) and Emery (Genoa Museum).

#### EXAMPLES OF EXTREME FORMS (Fig. 1)

B: *M. berbericus* Bernard. Common in the calcareous Atlas; primitive by virtue of long legs and scapes; head almost square-shaped. It occurs up to 2440 m in Algeria.

R: *M. rufitarsis* (Fab.). Scape short but legs rather long. It is the *Messor* species occurring at the highest altitude in Europe (up to 1550 m in the Alps).

C: *M. carthagenensis* Bernard (1979), Tunis. It has the shortest legs, but they are almost as short in the common and related *M. barbara* (L.).

P: *M. postpetiolatus* Sant. Rare: coastal Morocco (Mogador), Mauritania, Tunisia. A very special group, containing also *M. latinoda* (Sant.) from Lagos (Nigeria), it is the most highly evolved of all known *Messor* species.

These four species are examples of the extreme types; four-fifths of the *Messor* species are less extreme. The most primitive by far is *M. aphaenogasteroides* Pisarski, collected at Paghmen, Afghanistan, at a altitude of 2600 m. The workers appear to be *Aphaenogaster*, but the queen, with a dilated thorax, is clearly a *Messor*.

The *Aphaenogaster* species (20 species in the Mediterranean zone), mostly insectivorous or omnivorous, are surely the ancestors of *Messor*. Ethologically, we have discovered in Morocco and Algeria that *A. gemella* (Roger) harvests only flowers (chiefly *Lavandula* and Compositaceae): such behaviour probably leads to a transition to granivorous ants.

## BIOMETRIC COMPARISONS

Figure 2 compares "sections" (not subgenera, but useful groups). First, it is necessary to recall their chief characters.

Three primitive sections are from central Asia. The first section is *M. aphaenogasteroides*, followed by *himalayanus*, extending to Japan, and *excursionis*, chiefly from Turkestan and Iran. The three species of the group *himalayanus* are very striated and have the habits of *Myrmica*.

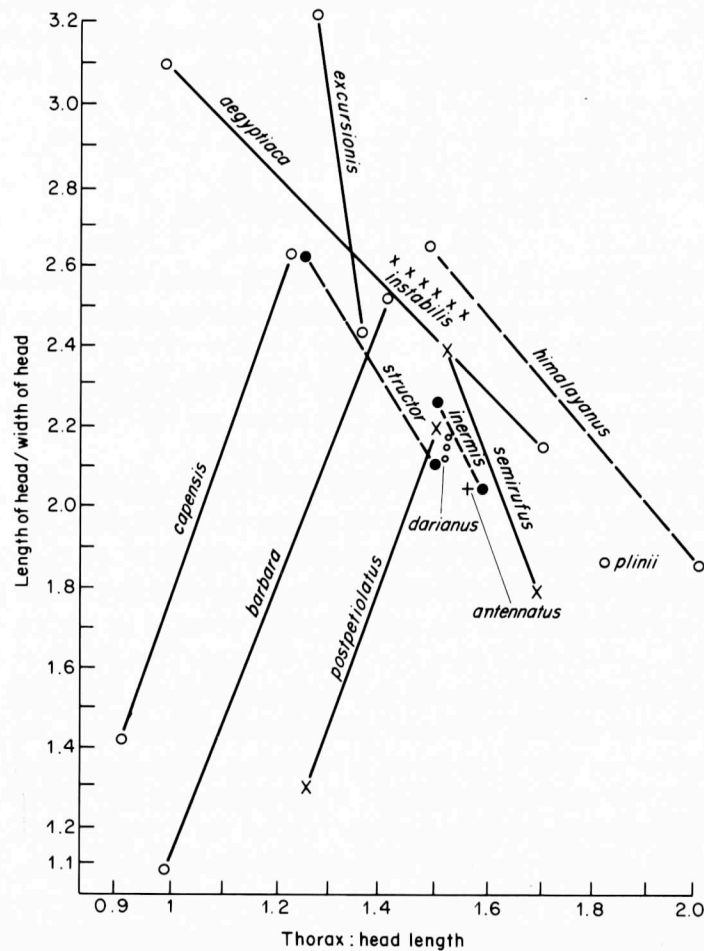


Fig. 2. Comparison between sections recognized in the genus *Messor*. Abscissa: thorax length/head length. Ordinate: Length / width of the head.

The section *structor* (see *M. berbericus*: Fig. 1b), from the Atlas and southern Europe is more primitive, and the sections *capensis*, *instabilis*, *antennatus* and *barbara* are moderately evolved. More specialized forms occur in the groups *aegyptiaca* (African deserts), *semirufus* and *incorruptus* (Middle East). Section *plinii* is very peculiar: these are large orange-yellow ants with round heads, living in dry parts of eastern Africa (e.g. in the Kenya Rift).

Further biometric comparisons show the proximity of the Myrmicini (*Manica* and *Cratomyrmex*) with the most highly evolved *Messor*. High polymorphism exists in rather primitive sections, like *structor* and *capensis*, and also in highly evolved groups such as *instabilis* and *postpetiolatus*.

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