

*togenys ergatogyna* differ from *L. khammouanensis* by the presence in both species of the metanotal suture, the absence of a pair of enlarged, straight and hard setae on the clypeal lobe border, less mandibular teeth (no mandibular teeth in *L. assamensis* and only two apical teeth in *L. ergatogyna*) and by other characters (color, eyes size) discussed in the paragraph below concerning troglobiomorphic characters in *Leptogenys*.

## DISCUSSION

The combination of reduced eyes, very pale color and elongate appendages isolates *Leptogenys khammouanensis* in its genus. Short of a revision of Oriental *Leptogenys*, it is impossible to assess its affinities, especially because these conspicuous morphological traits are adaptive to hypogean life. For this reason, however, they are of great interest, as they point to an unusual mode of life for an ant. The possibility of troglobitic life for ants has long puzzled specialists (see Wilson, 1962), and is still a matter of debate (Tinaut and López, 2001). Compared to other ant candidates to troglobitic life, *L. khammouanensis* is one step ahead in terms of morphological characters linked to cave life. This question of troglobitic and troglobiomorphic ants will be discussed below, taking into account recent literature and the rich material of cave ants we have gathered in Southeast Asia.

Assessing the troglobitic status of a taxon is not easy. However, troglomorphy (Christiansen, 1962), or better troglobiomorphy (Boutin, in press), i.e. the set of morphological traits characteristics of cave organisms, is always a strong indication of troglobitism (while the opposite is not always true). Troglobiomorphy in arthropods is defined by four morphological traits: loss of wings in winged arthropod groups, reduction of eyes, reduction of tegumentary pigment and elongation of appendages (Vandel, 1964; Christiansen, 1965; Culver, 1982; Marques and Gnaspini, 2001). All known specimens of *L. khammouanensis* are workers, which are always apterous in ants. We do not know therefore the state of the first character in the new species, but the last three traits are present.

### Troglobiomorphic characters in *Leptogenys*

The small eyes and light color of *L. khammouanensis* recall those of the group of *L. processionalis* sensu Taylor (1969) (= *fallax*-group of Andersen, 2000), which comprises three Australian species, *L. fallax* (Mayr, 1876), *L. tricosa* Taylor, 1969 and *L. fortior* Forel 1900, and the Oriental species *L. myops* (Emery, 1887), *L. crassicornis* Emery, 1895 and *L. processionalis* (Jerdon, 1851). Species of this group possess also light color and reduced eyes varying from a single (*L. tricosa*) to about fifteen facets, but antennae are short, and size is small. Such a morphology appears as a classical adaptation to endogeous, not to cave life. At least several African species in the *guineensis*- and the *nitida*-group also possess small eyes, and are yellow brown to

dark brown. However their head and appendages are so not elongated.

In its slender habitus (very elongate head, mesosoma, petiole, antennae and legs), *Leptogenys khammouanensis* is similar to *Leptogenys ergatogyna* Arnold 1954 from Africa (redescribed in Bolton, 1975) and to *L. assamensis* Forel, 1900 from Assam (redescribed by Bingham, 1903). But both species differ from *L. khammouanensis* by their black color and larger eyes, and cannot be considered as troglobiomorphic.

No species of *Leptogenys* therefore approaches *L. khammouanensis* in its combination of troglobiomorphic characters.

### Troglobiomorphic ants

Only one species of Formicidae, *Aphaenogaster cardenai* Espadaler, 1981, could be associated to subterranean habitats (Decu *et al.*, 1998, Tinaut and López, 2001). This rare Spanish species has always been collected in cryptic habitats: under big rocks, galleries of rodents and caves. However in this latter habitat no nests have ever been found, which led these authors to postulate that *A. cardenai* is more probably an inhabitant of the MSS ("Milieu Souterrain Superficiel" of Juberthie *et al.*, 1980, "superficial underground compartment" in Humphreys, 2000), than a strictly cave dwelling species.

*A. cardenai* is related to *A. splendida* (Roger, 1859), *A. ovaticeps* (Emery, 1898) and *A. muelleriana* Wolf, 1915. All have reduced eyes, slender body, elongate appendages and often pale color, compared to other species of the genus. Bernard (1968: 136) stressed the peculiar morphology of the species then known and noted that they have "un faciès aphaenopsien de cavernicole" ("an *Aphaenops*-like morphology of cave species"). He supposed they inhabit hypogean habitats, probably deep cracks that they rarely leave, hence their rarity in collection. However a few captures from surface habitats (Forel, 1911; Wheeler and Mann, 1916) could indicate nocturnal activity more than hypogean life.

*Leptogenys khammouanensis* is therefore the second example in Formicidae with the *Aphaenogaster* of the *splendida*-group, and the first Ponerinae, which combines hypogean life with microphthalmmy, light color, and elongated appendages, i.e. the typical adaptive characters of cave inhabiting arthropods. None of the *splendida*-group species of *Aphaenogaster* is cave-restricted. Conversely, *L. khammouanensis* was observed only in deep parts of caves and in rather significant numbers, bringing an exciting question to the fore: is *L. khammouanensis* the first truly troglobitic ant?

### Cave ants

Though frequently cited from caves, ants have not provided so far any unambiguously troglobitic species. Most records (Wilson, 1962; Tinaut and López, 2001) concern in fact accidental occurrences, generally not far from cave