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The ant genus *Triglyphothrix* Forel a synonym of *Tetramorium* Mayr. (Hymenoptera: Formicidae)

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The myrmicine ant genus *Triglyphothrix* Forel is newly synonymized with *Tetramorium* Mayr. Six replacement names are proposed for the secondary homonyms resulting from this synonymy.

Introduction

The genus-level name *Triglyphothrix* was erected by Forel (1890) to hold only the type-species *Tr. walshi*, characterized by and differentiated from other tetramoriine ants by its possession of a dense pelt of trifid (three-branched) hairs. Soon afterwards other species with the same or apparently similar pilosity were discovered and, on description, they also were added to *Triglyphthrix* solely on the strength of this one character. A few species previously described in *Tetramorium* were later noted to have branched hairs (e.g. *coonoorensis* (Forel), *indosinensis* (Wheeler), *lanuginosa* (Mayr), *obesa* (André)) and they too were shifted into *Triglyphothrix*.

It was stated by Arnold (1917) that this means of distinguishing the genus *Triglyphothrix* from its obvious near relative *Tetramorium* was not satisfactory, and he treated the former as a subgenus of the latter rather than as a separate genus, as was otherwise universally accepted by myrmecologists of that time and later, saying, 'I have thought it necessary to reduce *Triglyphothrix* Forel to the rank of a subgenus of *Tetramorium*, since there is not one character or even a set of characters which can be used consistently as a basis of differentiation.'

With the discovery and description of more and more tetramoriine species during the first third of this century it became apparent that tetramoriines with regularly branched hairs were numerous, and that the species in question could have bifid, trifid or quadrifid hairs, or a mixture of these hairs, or a mixture of branched hairs with simple pilosity. This did not result in the synomymy of *Triglyphothrix*, as would seem reasonable, but instead the limits of the genus were tacitly gradually expanded to include any and all tetramoriine ants which possessed at least a few regularly branched hairs, either alone or in combination with other forms of pilosity.

During his investigation of the genera constituting the tribe Tetramoriini, Bolton (1976), following this previous usage, uncritically accepted that the presence of regularly branched hairs of any description, whether alone or in combination with

other pilosity, was sufficient to place that species in the genus *Triglyphothrix*. This acceptance was reflected in the keys then presented to the tetramoriine genera, where the form of the pilosity was used to isolate all castes of *Triglyphothrix* from the other genera. The presence of regularly branched bifid, trifid or quadrifid hairs was confirmed as the only means of differentiating *Triglyphothrix* from *Tetramorium*.

In the terminology of phylogenetic systematics the presence of regularly branched hairs was uncritically assumed to be an autapomorphy of the genus-level taxon *Triglyphothrix*, which was assumed to be holophyletic. That is, the presence of regularly branched pilosity was accepted as synapomorphic throughout all the species placed in *Triglyphothrix*, rather than the result of homoplasy; an assumption which now appears to be unjustified.

Serious doubts as to the veracity of this assumption first surfaced during Bolton's (1980) revision of the Afrotropical species of the genus *Tetramorium*, when a number of species from different species-groups were described which had a wide range of bizarre pilosities, including clavate, squamiform, pectinate, pinnate, plumose and flabellate. The suspicion arose that perhaps the constituents of *Triglyphothrix* had arisen from more than one species-group within *Tetramorium*, and that branched hairs had developed in members of different groups at different times.

A re-examination of the species constituting *Triglyphothrix and Tetramorium* has revealed a number of anomalies and irregularities which destroy the validity of *Triglyphothrix* as a genus; these considerations are discussed below.

Anomalies in *Triglyphothrix*

Triglyphothrix rothschildi Forel

Originally described in *Triglyphothrix* because of its trifid pilosity, *rothschildi* was referred by Bolton (1976) to its own species-group, where it was termed 'certainly the most aberrant member of the genus yet known from the Ethiopian [=Afrotropical] region.'

Bolton's (1980) revision of the *Tetramorium solidum*-group made it immediately and abundantly clear that *rothschildi*, rather than being an aberrant *Triglyphothrix*, was in fact quite plainly a *Tetramorium* species belonging to the *solidum*-group, isolated by its bizarre pilosity but otherwise having all the species-group characteristics. Bizarre pilosity is present in some other members of the group (*clunum* Forel, *galoasanum* Santschi, *setuliferum* Emery) but the closest living relative of *rothschildi* appears to be *peringueyi* Arnold, with which it shared characters of dense pilosity, very deep and extensive anterior clypeal emargination and the shape of both the petiole and postpetiole. Mr. J. C. Powles (personal communication) has informed me that *rothschildi* in Kenya is granivorous, a habit shared with other members of the *solidum*-group.

Thus the *T. solidum*-group includes species belonging to two supposedly separate genera. As no other species presently placed in *Triglyphothrix* is referrable to this group it is apparent that the presence of branched pilosity has arisen on at least two separate occasions, and that the generic name *Triglyphothrix* must fall into the synonymy of *Tetramorium*, there being no other characters to keep the two separate.

Triglyphothrix microps Mayr and *Tr. arnoldi* Forel

In the original description of *arnoldi* Forel (1913) stated that he could not find any branched hairs, but pointed out that the species was closely related to *auropunctatus* Forel (now a junior synonym of *microps*) which most obviously does have branched

pilosity. Probably because of this very clear relationship between the two species he placed *arnoldi* in *Triglyphothrix*, despite the fact that it lacks branched hairs and regardless of the fact that the possession of such hairs is the only character which separates the genus from *Tetramorium*.

Arnold (1917) stated that *arnoldi* was anomalous in this respect and later (Arnold 1926) said, 'Dr. Santschi has expressed the opinion (in litt.) that this [*Triglyphothrix*] should be treated as a distinct genus, to include only those species which have the hairs branched. If this view be adopted, *T. arnoldi* Forel, would have to be placed in the genus *Tetramorium*.'

Despite Arnold's objections both *arnoldi* and *microps* continued to be treated as members of *Triglyphothrix*, although the former lacks branched hairs and the latter has them present. The opinion tacitly accepted all along, and repeated in Bolton (1976), was that *arnoldi* is a species close to *microps* which has lost its branched hairs secondarily, rather than the reverse, that *microps* has independently gained them. The latter hypothesis may be closer to the truth as both species show some affinity with the core-species of the *Tetramorium capense*-group. Whichever may be true the situation still remains that here are two very closely related species which span the generic limits of *Tetramorium* and *Triglyphothrix* (and which equally obviously are not derived from the same group as *rothschildi*, above), showing that the name *Triglyphothrix* has no significance at genus-level.

***Triglyphothrix antrema*-complex**

Members of this small complex within the *Tr. paupera*-group are demonstrably holophyletic, sharing the apomorphic characters of reduced size, 11-segmented antennae, reduced palp formula, presence of long sensory setae on the upper scrobe margins and leading edges of the scapes, angled clypeus and short stout petiolar peduncle. They also illustrate vividly the variation in development of simple and branched pilosity which can occur within a single easily defined small group, demonstrating that pilosity varies greatly whilst underlying characters remain stable. It also indicates that branched pilosity has most likely arisen separately in several groups, or has been lost several times in different groups, the direction of change being irrelevant.

On the first gastral tergite *Tr. distincta* Bolton has all hairs simple or at most has one or two bifid hairs basally. *Tr. antrema* Bolton shows a mixture of simple and bifid hairs whose proportions differ in different populations. *Tr. cryptica* Bolton has simple, bifid and a few trifid hairs present. *Tr.* sp. (undescribed, Nigerian species in BMNH) has almost entirely trifid hairs but with some 2–4 bifid. *Tr.* sp. (undescribed, Ivory Coast species in BMNH and MHN, Geneva) shows all hairs trifid.

Elsewhere in the *paupera*-group, among the species with 12-segmented antennae, there is similar variation, with *Tr. minima* Bolton having mostly simple but a few bifid hairs present; *Tr. paupera* Santschi having mostly bifid but a few simple hairs; *Tr. menkaura* Bolton with a mixture of simple and bifid hairs; and *Tr. muscorum* (Arnold) showing variation in pilosity over its wide range but having some populations with trifid hairs present.

In the Oriental and Indo-Australian *Tr. obesa*-group the gastral pilosity is also mixed and variable. This group contains *Tr. chepocha* Bolton, the species with the feeblest development of branched hairs yet placed in the genus, in which bifid hairs are very short and extremely sparse, almost lost among the numerous long simple hairs. A

few species in this group have the gastral pilosity entirely simple (*chepocha, coonoorensis, vombis* Bolton).

The members of these groups show that the development of branched hairs is a variable process even among very closely related species, and thus cannot constitute a sound character for maintaining *Triglyphothrix* as a separate genus.

Anomalies in *Tetramorium*

Since completing the study of Afrotropical *Tetramorium* (Bolton 1980) it has become apparent that many forms of bizarre pilosity occur within the genus. It now appears that regularly branched hairs constitute three ways (bifid, trifid, quadrifid) of many in which a hair may be subdivided. I cannot understand what selective advantage the development of such pilosity may confer but it is obvious that regularly branched hairs are more frequently developed than the forms described below. These other forms however strikingly demonstrate that species in different groups of *Tetramorium*, other than those formerly assigned to *Triglyphothrix*, have found some advantage in branched pilosity. They also confirm that the single character 'branched pilosity present' is insufficient to delimit *Triglyphothrix* as a separate genus, as the three species discussed below originate in radically different groups of *Tetramorium* and their closest relatives within their respective groups do not show similar modification.

Tetramorium plumosum Bolton

A member of the *grassii*-group (5 species) which is characterized by the combination of 12-segmented antennae, spatulate sting appendage, high narrow petiole node and impressed clypeal margin. *T. plumosum* has apically plumose hairs which are predominantly 2–4 branched at the tip. Pilosity is simple in the remainder of the group.

Tetramorium ~~***flabellum***~~ *pinnipilum* Bolton (printer's error)

A member of the *weitzeckeri*-group (13 species) which is characterized by the combination of 11-segmented antennae, spatulate sting appendage, anteroposteriorly compressed petiole node and impressed clypeal margin. *T. pinnipilum* has long erect hairs which are mostly pinnate, pectinate or plumose in the apical halves. Pilosity elsewhere in the group is mostly simple, but bizarre pilosity is present in *rogatum* Bolton (claviform) and *zonacaciae* (Weber) (decumbent and somewhat spatulate).

Tetramorium flabellum Bolton

A member of the *flabellum*-group (12 species) which is characterized by the combination of 12-segmented antennae, triangular sting appendage, nodiform petiole and entire clypeal margin. *T. flabellum* has hairs with a short basal shaft, the apex of which radiates into 9–12 branches in a flat plane, like the ribs of an open fan. Pilosity is uniformly simple in the four closest relatives of *flabellum*, see Bolton (1980).

Conclusion

It is demonstrated that *Triglyphothrix* is an artificial genus, derived from several separate groups within *Tetramorium* and paralleled by developments in yet other species-groups retained within that genus. The following formal synonymy is proposed:

Tetramorium Mayr

Tetramorium Mayr, 1855: 423. Type-species: *Formica caespitum* L., 1758: 581; by subsequent designation of Girard 1879: 1016.

Triglyphothrix Forel, 1890: cvi. Type-species: *Triglyphothrix walshi* Forel, 1890: cvii; by monotypy. **Syn. nov.**
[For full statement of current synonymy of *Tetramorium* see Bolton, 1976, 1980.]

All species referred to *Triglyphothrix* in the previous world revision of Bolton (1976) are thus new combinations in *Tetramorium*, except for those species originally described in *Tetramorium* but later placed in *Triglyphothrix*, which now revert to their original combination, namely *T. constanciae* Arnold, *T. coonoorense* Forel, *T. indosinense* Wheeler, *T. lanuginosum* Mayr, *T. muscorum* Arnold, *T. obesum* André, *T. sericeum* Arnold, *T. tenebrosum* Arnold.

The following replacement names, produced by secondary homonymy resulting from the synonymy of *Tetramorium* and *Triglyphothrix*, are necessary.

Tetramorium manni nom. nov.

Triglyphothrix pacifica Mann, 1921: 460 (see also Bolton 1976: 355).[Junior secondary homonym of *Tetramorium pacificum* Mayr, 1870: 972, 976; see also Bolton 1977: 102.]

Tetramorium mutatum nom. nov.

Triglyphothrix pulchella Mann, 1919: 352, fig. 31 (see also Bolton 1976: 356). [Junior secondary homonym of *Tetramorium pulchellum* Emery, 1897: 586, pl. 15, fig. 28; see also Bolton 1977: 118.]

Tetramorium surrogatum nom. nov.

Triglyphothrix silvestrii Emery, 1915: 17, fig. 8 (see also Bolton 1976: 336). [Junior secondary homonym of *Tetramorium silvestrii* Santschi, 1909: 6 (= *Leptothorax silvestrii* (Santschi)); see Bolton 1979: 158.]

Tetramorium incruentatum Arnold

Rhoptromyrmex arnoldi Santschi, 1916: 503 (= *Tetramorium arnoldi* (Santschi)). [Junior secondary homonym of *Triglyphothrix arnoldi* Forel, 1913: 220.]

Tetramorium incruentatum Arnold, 1926: 271. [Previously unnecessarily proposed replacement name for *arnoldi* (Santschi), now first available name; see also Bolton 1976: 318; 1980: 306.]

Tetramorium ericae Arnold

Triglyphthrix pauper Santschi, 1917: 286 (see also Bolton 1976: 333). [Junior secondary homonym of *Tetramorium pauper* Forel, 1907: 14; see also Bolton 1980: 317.]

Tetramorium ericae Arnold, 1917: 332. [Junior synonym of *pauper* Santschi and hence first available replacement name.]

Tetramorium taylori nom. nov.

Tetramorium australe Bolton, 1977: 146, fig. 68. [Junior secondary homonym of *Triglyphothrix striatidens* var. *australis* Forel, 1902: 449 (= *T. lanuginosum* Mayr).]

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