

whole body long (e.g., FCHL: 296 ± 26 , 237 - 339). Maximum distance between tips of spines wider than postpetiole (SPWI / PPW: 1.05 ± 0.03 , 0.97 - 1.10). Petiolar node in lateral view smoothly curved to peduncle (Fig. 6). Striae on base of first gaster tergite few, weak and short.

Habitats of *Tetramorium pacificum* and *T. manobo*

Collections in the Philippines by HZ yielded some information about differences in habitats of the two species. *Tetramorium pacificum* has never been collected in natural places but only in disturbed habitats, e.g., foraging on a small tree in a coconut groove along a road; feeding on food remnants on the posts of a shed and on the ground in a picnic area at a water fall. A nest of *T. pacificum* was found in a cut bamboo internode along a trail in an area which was recently converted from a degraded forest to a coconut plantation. In contrast, *T. manobo* has without exception been collected in near-natural or natural habitats: At Lake Danao Natural Park, Leyte, specimens were collected from lower vegetation along a path in an open area next to a degraded forest. In the Mt. Pangasugan area, Leyte, specimens were found foraging on lower vegetation near a stream and on the steep, wet banks of another small stream in forested areas. These observations allow the cautious conclusion that *T. manobo* is a native forest species, which is also important concerning its status as a true Philippine endemic and hence of taxonomic relevance as argued above. *T. pacificum* might either be a species of open habitats native to the Philippines, existing originally along seashores, river edges, landslides etc., or may have been introduced to the Philippines by humans.

Distribution of the species of the *T. bicarinatum* group in the Philippines

The Philippine Islands are divided into sixteen terrestrial biogeographical regions (ONG & al. 2000), but most of the land area belongs to only five regions, i.e., Greater Luzon, Greater Mindanao, Greater Negros-Panay, Greater Palawan, and Greater Mindoro, which are roughly based on the large Pleistocene islands during the time when the sea water level had dropped by about 120 metres (see, e.g., HEANEY 1991). The distribution of most land and freshwater organisms is related to those island complexes (ONG & al. 2000). Within the *Tetramorium bicarinatum* group, six described species are recorded from the Philippines (BOLTON 1977, and this paper): *Tetramorium bicarinatum*, *T. insolens*, and *T. pacificum* have an extraordinarily wide distribution and have been introduced to many countries by humans, so that the original distributions of these species remain unclear (e.g., BOLTON 1977, MCGLYNN 1999, RADCHENKO & al. 1999, STEINER & al. 2003). *Tetramorium obtusidens* (in the present wide sense, see BOLTON 1977) is widely distributed from south-east Asia to New Guinea; this paper presents the first records from the Philippines. On the other extreme, *T. cynicum* BOLTON, 1977 is only known from the island of Negros and is probably endemic to Greater Negros-Panay. It seems to be restricted to (semi-)natural places, as is *T. manobo*. *Tetramorium manobo* is probably restricted to Greater Mindanao and is presently known from the islands of Leyte, Bohol, Dinagat, Hikdop, and Mindanao.

Acknowledgements

For funding, to the Austrian Science Fund; for support of entomological research in The Philippines, to the Univer-

sity of the Philippines in Los Baños, the University of San Carlos in Cebu City, the Leyte State University (formerly Visayan College of Agriculture) in Baybay, and the Camarines Sur State Agricultural College in Pili; for assistance with the field work, to Clister Pangantihon; for sample donations, to John Fellowes, Paul Krushelnicky, Lloyd Morrison, Martin Pfeiffer, and Seiki Yamane; for assistance in the molecular laboratory, to Heino Konrad and Andrea Stradner; for type loans, to Bernhard Merz (MHNG) and Sandor Csósz (HNHM); for valuable information, to Barry Bolton and Bernhard Merz; for indispensable support in the statistical analyses, to Karl Moder; for working as Guest Editor for this article, to Alfred Buschinger; for a linguistic revision of the manuscript, to Michael Stachowitsch; for constructive criticism, to the referees, Donat Agosti, Bernhard Seifert, and Phil Ward. Some of the raised criticism was contradictory, prompting us to compromise in certain cases; any remaining shortcomings despite the referees' efforts explicitly remain in the authors' responsibility.

We dedicate this work to the late Stefan Schödl.

Zusammenfassung

Mit Hilfe morphologischer und molekularer Analysen untersuchen wir den taxonomischen Status ausgewählter Arten der *Tetramorium bicarinatum* (NYLANDER, 1846) Artengruppe. Wir bestätigen *Apomyrmex manobo* CALILUNG, 2000 als eine Art des Genus *Tetramorium* und bewerten, ob *T. manobo* und *T. scabrum* MAYR, 1879, welches derzeit als jüngeres Synonym von *T. pacificum* MAYR, 1870 gilt, von *T. pacificum* artverschieden sind. Morphometrie zeigt klare Unterschiede zwischen Arbeiterinnen der drei Arten. Sequenzvergleich von 700 bp des mitochondrialen *COI*-Gens bestätigt, dass sie unterschiedliche Arten in der *T. bicarinatum* Artengruppe sind. Daher bestätigen wir *T. manobo* als valide Art und heben *T. scabrum* sp.rev. aus seiner Synonymie. Auffällige morphologische Variabilität zwischen *T. scabrum* Populationen weist jedoch auf die mögliche Existenz von mehreren Arten hin. Wir diskutieren unsere Ergebnisse hinsichtlich Plesiomorphie und/oder konvergenter Entwicklung der Arbeiterinnen-Morphologie. *Tetramorium manobo* dürfte ein philippinischer Endemit sein, der auf die Subregion "Greater Mindanao" beschränkt ist, wo er Waldhabitate bewohnt. Im Gegensatz dazu findet man auf den Philippinen *T. pacificum* nur in gestörten Lebensräumen. Zusätzlich behandeln wir jene Arten der *T. bicarinatum* Gruppe, welche derzeit von den Philippinen bekannt sind, und weisen *T. obtusidens* VIEHMEYER, 1916 erstmals nach.

References

- BOLTON, B. 1977: The ant tribe Tetramoriini (Hymenoptera: Formicidae). The genus *Tetramorium* MAYR in the Oriental and Indo-Australian regions, and in Australia. – Bulletin of the British Museum (Natural History), Entomology series 36: 67-151.
- BOLTON, B. 2003: Synopsis and classification of Formicidae. – Memoirs of the American Entomological Institute 71: 1-369.
- CALILUNG, M.V.J. 2000: A new genus, two new species and a new subspecies of Philippine ants. – Philippine Entomologist 14: 65-73.
- CHIOTIS, M., JERMIIN, L.S. & CROZIER, R.H. 2000: A molecular framework for the phylogeny of the ant subfamily Dolichoderinae. – Molecular Phylogenetics and Evolution 17: 108-116.