



To Michael  
after Ephemeridia centobis  
J. Jarc  
Michel

## A revision of the Malagasy genus *Madecocercus* Malzacher, 1995 (Ephemeroptera, Caenidae)

par

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**Abstract.**—ELOUARD J.-M. and SARTORI, M., 2001. A revision of the Malagasy genus *Madecocercus* Malzacher, 1995 (Ephemeroptera, Caenidae). *Bull. Soc. vaud. Sc. nat.* 87.3: 229-235.

Based on the examination of several hundreds of specimens from 50 localities, including reared material, the authors present a critical review of the genus *Madecocercus* Malzacher, 1995. It is established that the genus *Provonshaka* McCafferty & Wang, 1995 is a junior synonym of *Madecocercus* and the species *P. thomasorum* is synonymized with *M. tauroides*. (syn. nov.). The female subimago and the eggs of *M. tauroides* are described for the first time. Affinities of *Madecocercus* with other allied genera are given.

**Keywords:** taxonomy, Caenidae, Tricorythidae, Madagascar, new synonym.

**Résumé.**—ELOUARD J.-M. et SARTORI, M., 2001. Révision du genre malgache *Madecocercus* Malzacher, 1995 (Ephemeroptera, Caenidae). *Bull. Soc. vaud. Sc. nat.* 87.3: 229-235.

Sur la base de l'étude de plusieurs centaines d'individus provenant de 50 stations, dont du matériel élevé, les auteurs présentent une analyse critique du genre *Madecocercus* Malzacher, 1995. Il s'avère que le genre *Provonshaka* McCafferty & Wang, 1995 est un synonyme plus récent de *Madecocercus*, comme l'espèce *P. thomasorum* l'est de *M. tauroides* (syn. nov.) La subimago femelle et les œufs de *M. tauroides* sont décrits pour la première fois. Les affinités de *Madecocercus* avec d'autres genres apparentés sont discutées.

**Mots-clés:** taxonomie, Caenidae, Tricorythidae, Madagascar, nouveau synonyme.

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## INTRODUCTION

Until recently the Caenidae of Madagascar were practically unknown. In August 1995, MALZACHER described five new species of *Caenis*, as well as the new genus and species, *Madecocercus tauroides*. The establishment of this monotypic genus was based on the description of the adult males only. In September of the same year, MCCAFFERTY and WANG (1995) described a new genus and species of «Tricorythidae», *Provonshaka thomasorum*, on the basis of several nymphs, the adults remaining unknown.

Within the framework of the project «Biotypology and biodiversity of Malagasy continental freshwaters» carried out jointly by CNRE and IRD, we have collected and reared numerous mayflies from more than 600 localities. Among them, we obtained a *Madecocercus* female subimago from a *Provonshaka* nymph. It is therefore clear that the two genera are identical, representing two stages of the same taxon.

We propose to remove the genus *Provonshaka* from the Tricorythidae to be placed in the Caenidae, and to consider it a junior synonym of *Madecocercus*.

***Madecocercus* MALZACHER, 1995**

= *Provonshaka* MCCAFFERTY and WANG, 1995 **syn. nov.** (misplaced in the Tricorythidae). Type species: *Provonshaka thomasorum* MCCAFFERTY and WANG, 1995 by original designation.

Type species: *Madecocercus tauroides* MALZACHER, 1995 by original designation.

***Madecocercus tauroides* MALZACHER, 1995**

= *Provonshaka thomasorum* MCCAFFERTY and WANG, 1995 **syn. nov.** (misplaced in the Tricorythidae).

*Nymphal characters*

See original description by MCCAFFERTY and WANG, 1995 sub. nom. *Provonshaka thomasorum*.

Habitus of the nymph is given in figure 1.

*Male imago*

See original description by MALZACHER, 1995.

*Female subimago (reared material)*

Body length: 7,6 mm. Cerci length: 3,4 mm. Wing length: 6,1 mm.

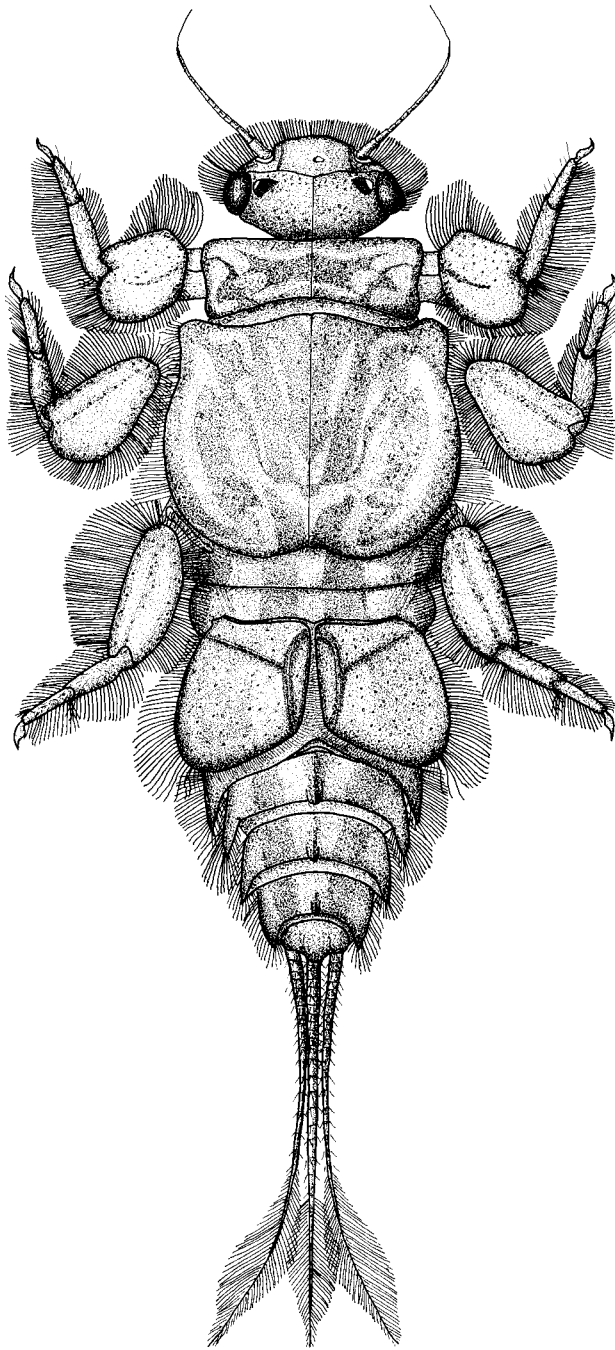


Figure 1.—*Madecocercus tauroides*: general habitus of the nymph.

Head uniformly greyish-brown; eyes black, ocelli non tuberculate and greyish-white. Antennae with scape wider than long; pedicel ca 2,5 longer than wide; flagellum not dilated proximally.

Thorax mid-brown: legs greyish-brown; mesonotal sutural ommation (sensu WANG *et al.*, 1997) well developed. Wing caenid-like with few crossveins in radial and median fields; no crossvein between CuA and ICuA.

Abdominal tergites I - II greyish-brown, the others mid-brown. Lateral filaments present on segments V to VIII, the longest on segments VI and VII.

Cerci only haired on the distal half.

#### *Eggs*

Shape ovoid; length between 110 and 130  $\mu\text{m}$ . No polar cap visible. Chorionic surface apparently smooth, without structures. A dense net of barbed wire-like filaments covering the whole chorionic surface (figs. 2-4, next page).

#### *Examined material*

One female subimago, with its nymphal exuvia: Madagascar, Namorona River at Ambiabe (P0227), 22/4/94, J.-M. Elouard & M. Sartori leg.

Several hundreds of specimens from 50 localities all over Madagascar (see fig. 5).

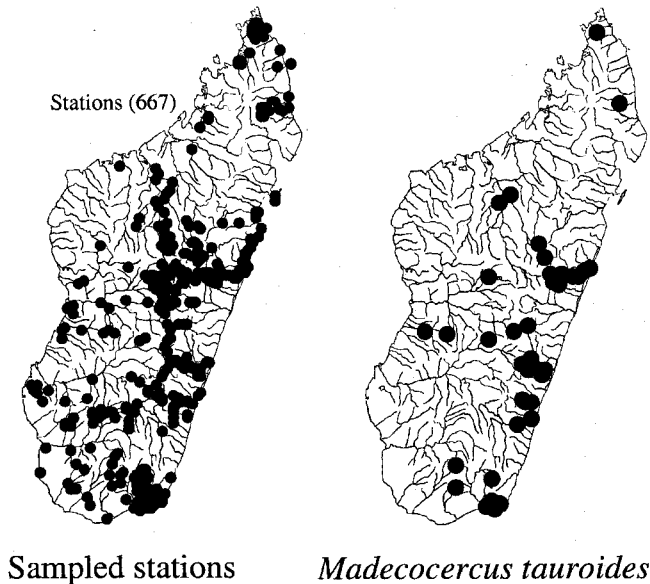
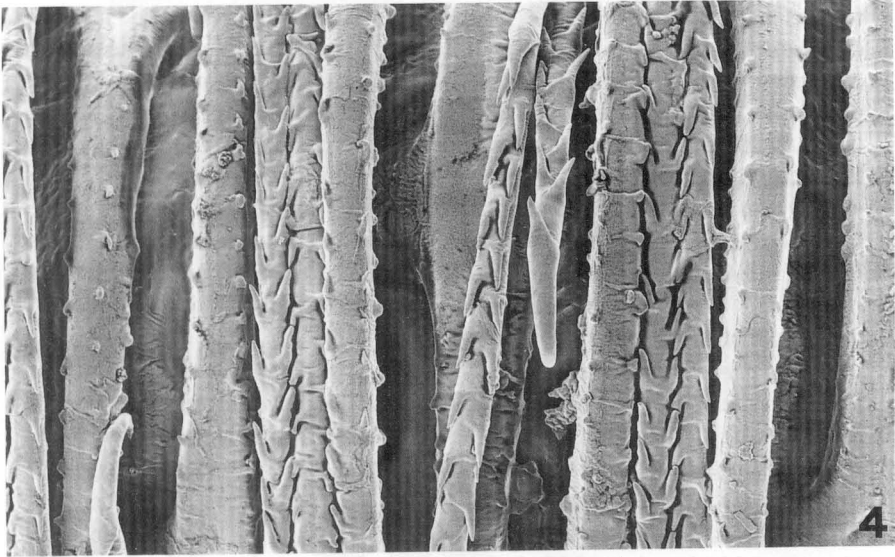
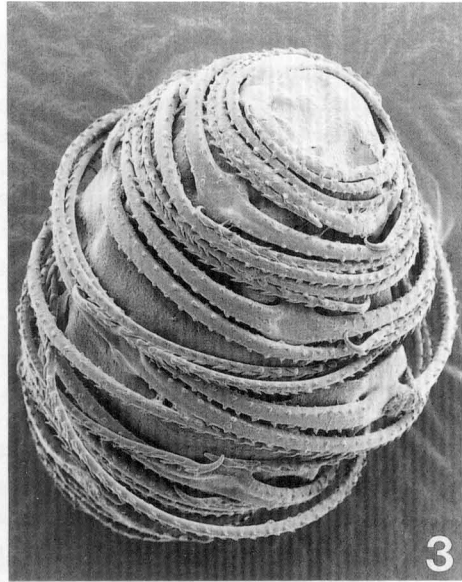
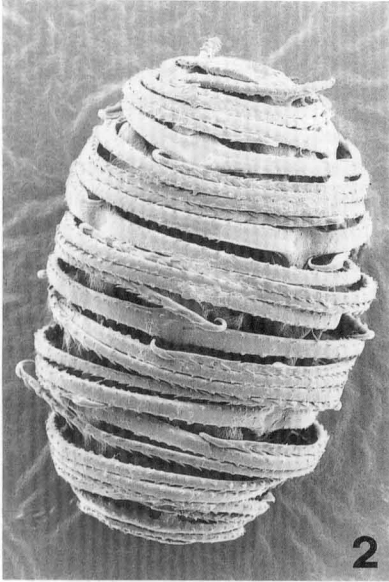


Figure 5.—Distribution of *M. tauroides* in Madagascar compared to the investigated localities.



Figures 2-4.—*M. tauroides* eggs: fig. 2: lateral view; fig. 3: antero-lateral view showing the smooth chorionic surface; fig. 4: detail of the barbed wire-like filaments (scale: 10  $\mu$ m).

## DISCUSSION

The placement of the genus *Provonshaka* among the Tricorythidae has already been put in doubt by ELOUARD and OLIARINONY (1997). The rearing of nymphal material proves that the winged stages belong undoubtedly to the Caenidae (wing shape and wing venation, presence of a mesonotal sutural ommation). Several features such as shape of the antenna, abdominal filaments on segments V to VIII, shape and venation of the wing are identical between our female subimago and the male imago described by MALZACHER (1995), and are characteristic of the genus *Madecocercus*. In their original description, MCCAFFERTY and WANG (1995) gave little justification for the placement of *Provonshaka* within the Tricorythidae. They compared the new genus with others, such as *Teloganella* and *Manohyphella* (whose larval stage remains unknown!), two genera originally described within the Ephemerellidae, but later transferred to the Tricorythidae by the same authors (WANG *et al.* 1995, MCCAFFERTY and WANG 1995). Moreover, *Madecocercus* does not possess the complete fusion of glossae and paraglossae of the labium. In our researches among pannote mayflies, we found this character to be the most reliable to distinguish tricorythid nymphs from all others.

MALZACHER (1985) gave strong evidences to place the adults of *Madecocercus* within the brachycercine lineage, such as the shape of the forceps and the prosternum, the reduction of the styliiger sclerite. The nymphs of *Madecocercus* differ from all other genera of Caenidae by the strong expansion of the femora, the lack of tubercular ocelli, the lack of maxillary palpi, the non overlapping gills II and the unusual shape of gills III-VI (SOLDAN 1986). As already outlined by MALZACHER (1995), *Madecocercus* is more closely related to *Afrocercus* Malzacher and to *Tasmanocaenis* Lestage with whom it shares the separation of lateral and baso-lateral sclerites in the male adults, as well as the lack of tubercular ocelli at the nymphal stages (SUTER 1984, MALZACHER 1987). Although these three genera are probably related, any attempt on their phylogeny mainly depends on the description of the nymph of *Afrocercus*.

*Madecocercus* nymphs have been found in streams and rivers with fast flowing waters, a quite uncommon habitat for Caenidae that generally prefer slow flowing or standing waters. The eggs exhibit peculiar barbed wire-like filaments, suggesting that the presence of these structures obviously play a role in anchoring the egg on the substratum.

The genus *Madecocercus* has been collected in 50 localities in each biogeographical region of Madagascar with the exception of the Southwest where sandy and temporary rivers are probably inadequate to support *Madecocercus* populations. Included were specimens from the Mangoro River (type locality of *M. tauroides*) and the Namorona River (type locality of *P.*

*thomasorum*). Among several hundreds of specimens examined, no clear-cut differences have been found neither on the nymphal nor on the winged stages. Some slight changes may occur for instance in the size of the adults, in the shape of the male forceps, or even in the size of the abdominal lateral filaments, but transitional forms were also found. Therefore, we consider these variations as intraspecific; consequently the species *P. thomasorum* is regarded as a junior synonym of *M. tauroides*.

As pointed out by WANG *et al.* (1995), «the ability to use the greatest number of comparative characters for deducing phylogenetic relationships ultimately depends on the association of larvae and adults». With respect to *Madecocercus*, this paper is a first step in that direction.

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