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A new genus and species of Tricorythidae (Ephemeroptera : Pannota) from Madagascar

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Keywords : Tricorythidae, Madagascar, *Provonshaka*, new genus, *Manohyphella*.

Newly discovered mayflies from Madagascar have proven to represent a new genus and species of Tricorythidae. *Provonshaka* n. gen. is described in the larval stage, and compared with the Madagascar genus *Manohyphella,* which is also shown to be a member of the Tricorythidae. *Provonshaka* is a member of a phylogenetic lineage that also contains *Manohyphella* and the southeast Asia genus *Teloganella*. There are presently three tricorythid genera present in Madagascar, including the distantly related *Tricorythus*. *Provonshaka thomasorum* n.sp. is described from three rivers in Madagascar and is sometimes found cohabiting with *Manohyphella keiseri*. A diagnostic table giving the differences between *Provonshaka* and *Manohyphella* is provided.

Un genre nouveau et une espèce nouvelle de Tricorythidae (Ephemeroptera : Pannota) de Madagascar

Mots clés : Tricorythidae, Madagascar, *Provonshaka*, genre nouveau, *Manohyphella*.

Des éphémères malgaches récemment découverts appartiennent à un genre nouveau et à une espèce nouvelle de Tricorythidae. *Provonshaka* n.gen. est décrit à l'état larvaire, et est comparé au genre malgache *Manohyphella*, dont l'appartenance aux Tricorythidae est aussi prouvée. *Provonshaka* fait partie d'une lignée phylogénétique comprenant aussi *Manohyphella* et le genre *Teloganella* d'Asie du Sud-Est. Trois genres de Tricorythidae sont actuellement connus de Madagascar, y compris le genre plus éloigné *Tricorythus*. *Provonshaka thomasorum* n.sp. est décrite de trois rivières malgaches et peut cohabiter avec *Manohyphella keiseri*. Une table de diagnose résumant les caractères différentiels entre *Provonshaka* et *Manohyphella* est présentée.

1. Introduction

To date, the only Tricorythidae of record from Madagascar has been *Tricorythus* Eaton, which was treated as *Neurocaenis* by Demoulin (1968). We recently received a gift of Madagascar specimens from Dr. George Edmunds that contained material of a new genus and species of Tricorythidae that we describe herein. In addition, we received paratypes of *Manohyphella keiseri* Allen, a genus and species described from Madagascar and placed in the family Ephemerellidae by Allen (1973). Our study showed *Manohyphella* is closely related to the new genus and to the genus *Teloganella* Ulmer from southeast Asia. The larva and adult of *Teloganella* were recently described by Wang et al. (1995). Together, the new genus, *Manohyphella*, and *Teloganella* appear to represent a distinct lineage within what traditionally has been known as the family Tricorythidae. We do not yet know of any representative of this particular lineage in southern Africa.

2. *Provonshaka* n.gen. : description

Mature larva

Body (Fig. 1) densely covered with robust microtrichiae. Frontal and lateral margins of head ; lateral margins of thorax, legs, and abdomen ; and outer lateral margins of operculate gills fringed with long hairlike setae.

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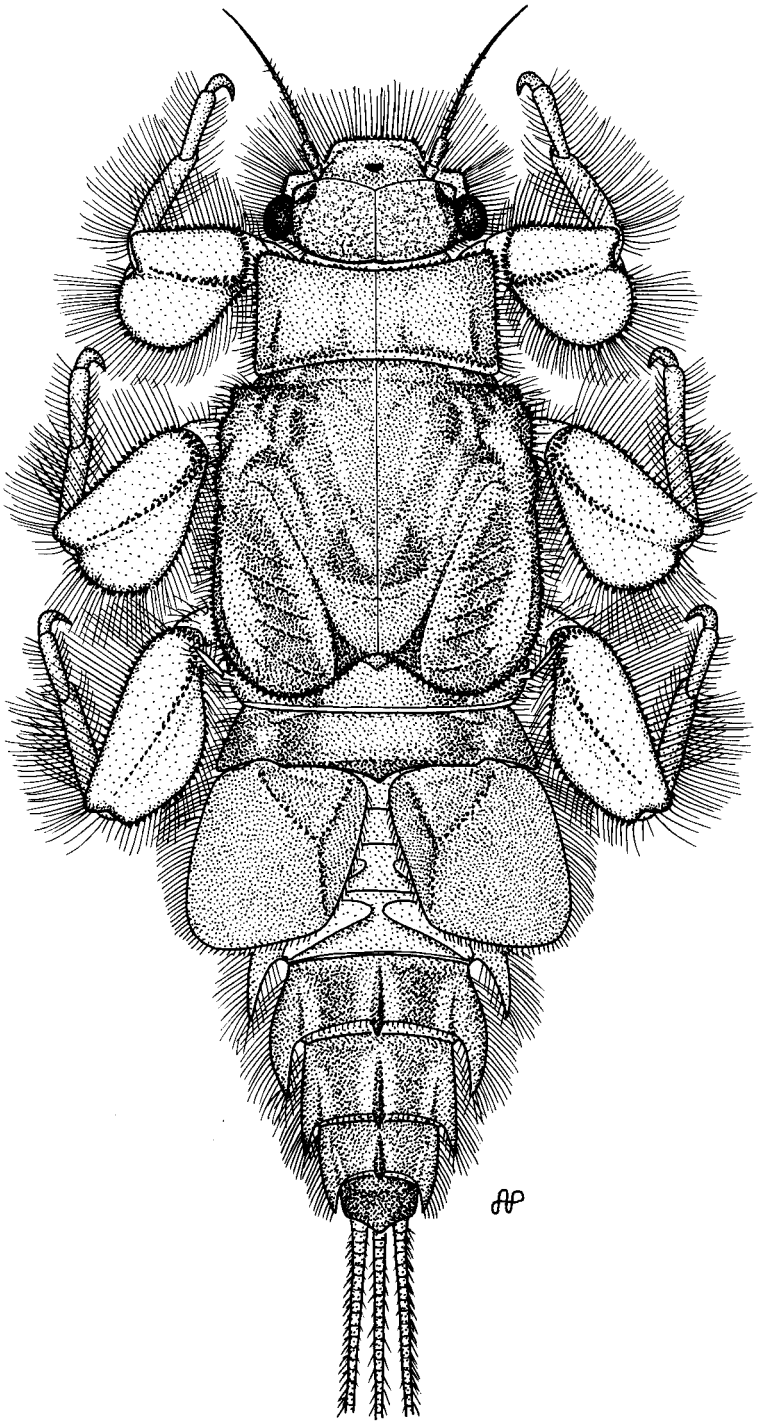

Fig. 1. Dorsal view of *Provonshaka thomasorum* n.gen., n.sp. : larva holotype.
Fig. 1. *Provonshaka thomasorum* n.gen., n.sp. : larve holotype en vue dorsale.

Maxillae (Fig. 2) narrow-elongate and lacking palps.

Labium (Fig. 3) with three-segmented palps. All palp segments subequal in length ; palp segment 1 broader than segments 2 and 3.

Femora (Fig. 1) well developed, with broad convex margin posteriorly (most produced in forelegs) ; lateral margins with long hairlike setae and small spines ; dorsal surface with median row of spinelike setae, continuing anterobasally.

Tarsal claws lacking denticles.

Gills (Figs. 1, 4-8) present on abdominal segments 1-6. Gills 1 (Fig. 4) consisting of single filament with hairlike setae. Gills 2 (Fig. 5) operculate, more-or-less quadrate, with Y-shape dorsal ridge in medial area of gills. Gills 3-6 (Figs. 1, 6-8) generally hidden from dorsal view by operculate gills, lacking marginal filaments, and oriented medially (Fig. 1).

Abdominal segments (Figs. 1, 9, 10) with posterolateral projections well developed on segments 2, 6, and 7 ; variously less developed on segments 5, 8, and 9 (Figs. 9, 10).

Egg : Polar caps absent.

Alate stages : Unknown.

3. Type species

Provonshaka thomasorum McCafferty and Wang n.sp.

4. Generic etymology

The generic nomen is an arbitrary combination of letters (with a Latin feminine ending) that incorporates the surname of our colleague and renowned scientific illustrator Arwin Provonsha.

5. Diagnosis

Provonshaka is somewhat similar to the Madagascar genus *Manohyphella*. Even though we have found the two genera cohabiting in the Tsaratango River, they can easily be told from each other in the larval stage by the characters given in Table 1. The Adults of *Provonshaka* remain unknown at this time. It is possible that the hindwings of *Provonshaka* are either entirely absent or smaller than the very small hindwings of *Manohyphella*. However, we were unable to distinguish any moveable flap on the larval metathorax of *Provonshaka* larvae, whereas a minute flap can be located on the metathorax of *Manohyphella* (and also *Teloganella*), both of which have relatively small hindwings as adults.

6. *Provonshaka thomasorum* n.sp. : description

Mature larva

Body (Fig. 1) 5.0-6.0 mm. Caudal filaments 2.5-3.0 mm. General color ranging from light brown to dark brown.

Head capsule (Fig. 1) lacking tubercles and projections. Antennae approximately one and one half times length of median head capsule length ; flagella with minute hairlike intersegmental setae. Compound eyes relatively small and widely separated (both sexes).

Galealaciniae (Fig. 2) acute apically, with row of pectinate bristlelike setae apicomedially and tuft of hairlike setae apicolaterally.

Labium (Fig. 3) with densely setose glossae and paraglossae and apical palp segment only sparsely setose.

Pronotum (Fig. 1) three times as wide as long, and lacking tubercles.

Table 1. Differential characteristics of the larvae of the Madagascar genera *Provonshaka* and *Manohyphella*.
Tableau 1. Caractères différentiels des larves des genres de Madagascar *Provonshaka* et *Manohyphella*.

Character	*Provonshaka*	*Manohyphella*
Labial palps	subequal	3rd segment shorter
Femoral armature	hairs and spines	hairs only
Claw denticles	absent	present
Head marginal setae	very long	very short
Operculate gills	wider than long	longer than wide
Gills 6	present	absent
Abdominal median tubercles	on terga 2, 6-9	on terga 3-8
Abdominal posterolateral projections	on terga 2, 5-9	on terga 2-9

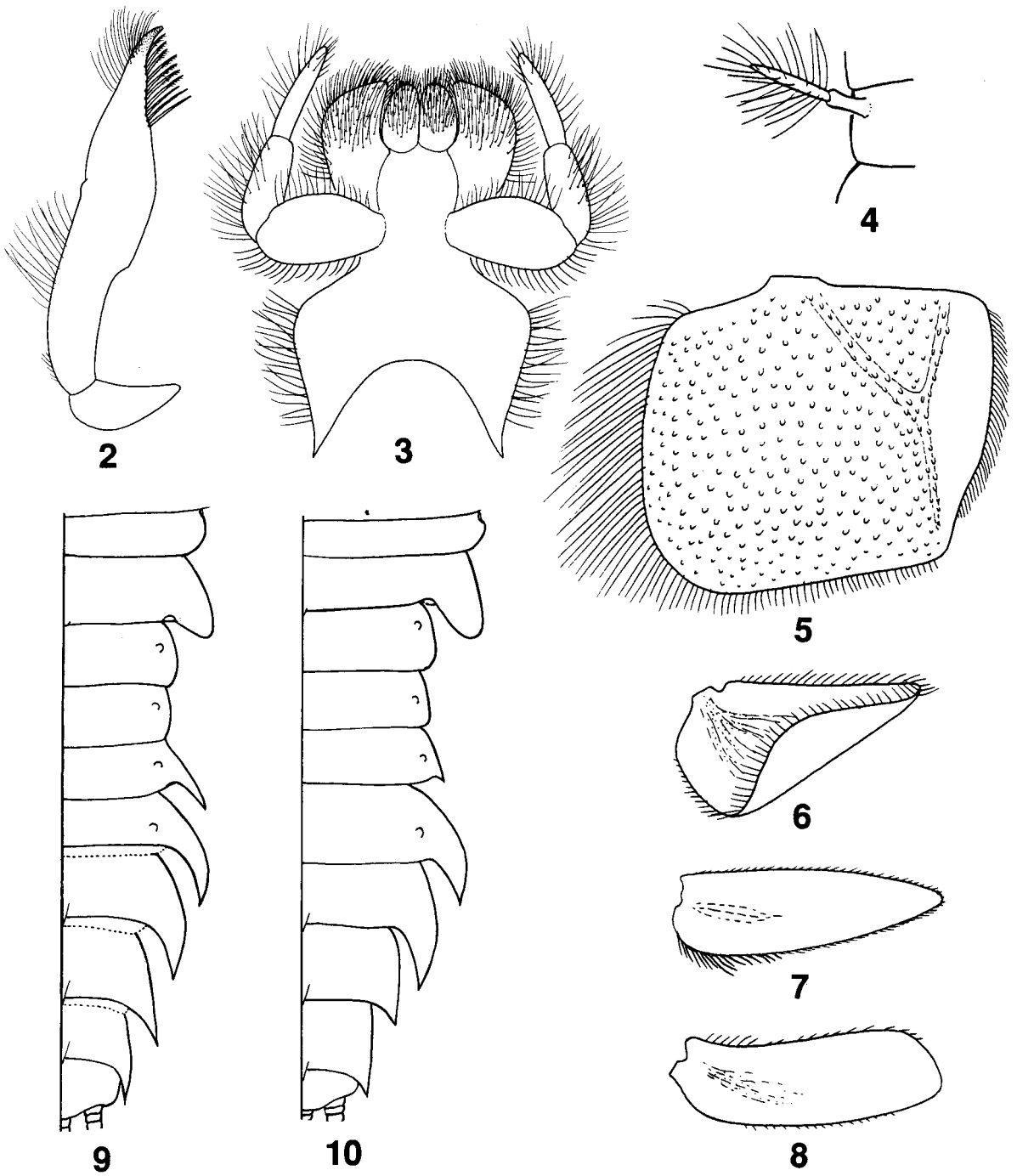

Fig. 2 to 10. Structures of *Provonshaka thomasorum* n.gen., n.sp., larvae. 2 : galealacinia. 3 : labium. 4 : gill 1. 5 : gill 2. 6 : gill 3. 7 : gill 5. 8 : gill 6. 9 : Abdominal terga (mature, right half). 10 : Abdominal terga (immature, right half).

Figs. 2 à 10. Structures larvaires de *Provonshaka thomasorum* n.gen., n.sp. 2 : galealacinia. 3 : labium. 4 : 1^{e} branchie. 5 : 2^{e} branchie. 6 : 3^{e} branchie. 7 : 5^{e} branchie. 8 : 6^{e} branchie. 9 : tergites abdominaux (larve mature : moitié droite). 10 : tergites abdominaux (larve immature, moitié droite).

Hindwingpads absent.

Tibiae (Fig. 1) with long hairlike setae.

Abdominal terga 7-10 (Fig. 1) with small spines along most of posterior margin. Terga 2 bluntly produced apicomedially. Terga 7-9 each with median elevated ridge produced into apex slightly exposed beyond posterior margin of tergum, and with dark submedian and sublateral stripes. Posterolateral projections on abdominal segments 5 and 8 strongly to slightly developed (Figs. 9, 10).

Alate stages : Unknown.

7. Material examined

Holotype : Female larva, Malagasy, Fianarantsoa Prov., Namarona Riv. (22 ° C) at Ranomafana, 5-XI-1971, G.F. and C.H. Edmunds, F. Emmanuel, deposited in the Purdue Entomological Research Collection. Additional material : one male larva and 2 female larvae, Malagasy, Fianarantsoa Prov., Tsaratango Riv. 9 km E Ranomafana, 6-XI-1971 ; 1 female larva, Malagasy, Tamatave Prov., Farimbony Riv. (22 ° C) at R.N. 2, 15-X-71. All additional material was collected by the holotype collectors and has the same deposition as the holotype.

8. Species etymology

This species is named after Alain and Nicole Thomas of Toulouse, France.

9. Species characteristics

There is some variability in the series before us, particularly regarding the development of the posterolateral projections on larval abdominal segments 5 and 8 (compare Figs. 9 and 10). The holotype, which is represented by a mature larva, possesses the much more developed projections shown in Figure 9. The other specimens were young to mid-instar larvae, and these did not show that same development (Fig. 10). This could be due to the age differential. On the other hand, the posterolateral projections on abdominal segments 6 and 7 are comparable among all of the specimens, and it is therefore possible that the differences in other segments are not related to age but are genetic differences associated with two different species. Until we have further data, we are taking the conservative approach to this problem, recognizing one variable species rather than two species.

10. Generic relationships

The arguments for placing *Teloganella* in the Tricorythidae instead of the Ephemerellidae (Teloganodinae) were outlined by Wang et al. (1995). Those same arguments apply to *Provonshaka* and *Manohyphella*. *Provonshaka, Manohyphella,* and *Teloganella* share the apomorphic posteriorly expanded larval femora. In *Manohyphella* and *Teloganella*, forewing veins CuA and ICuA are connected by a crossvein, and it appears quite possible that *Provonshaka* will also express this apomorphy. This lineage shares the reduction of segments in the male genital forceps and additional forewing venation apomorphies with the other Tricorythidae (again assumed for *Provonshaka*), and does not share any of the larval or adult apomorphies that delineate Ephemerellidae or Teloganodinae. Complete cladistic data will be forthcoming in our phylogenetic revision of the pannote mayflies.

Acknowledgements

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