

**A NOMENCLATRURAL PROBLEM IN EPHEMEROPTERA:  
*PROSOPISTOMA* OR *BINOCULUS*?**

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*Prosopistoma*, or "*Binoculus*", is a genus of mayflies known from Europe, southern Asia, central and southern Africa, and Madagascar. The genus, as presently constituted, contains 11 named species, although there are an even greater number of species known to be undescribed. For the century following the first description of this insect by GEOFFROY (1762), the adult was unknown and the armored aquatic nymph was believed to be a type of crustacean. It was not until 1871 that it was recognized as a nymph of *Ephemeroptera* by N. and E. JOLY.

Originally described from Europe in the genus *Binoculus*, the species of GEOFFROY has gone through an immense series of nomenclatural changes, both generic and specific. It has been referred to by 5 specific names and 4 different generic names. Today, this species is still called by three different specific epithets and the genus is alternately referred to as *Binoculus* or *Prosopistoma*.

In this paper I will attempt to unravel this nomenclatural tangle and show that the valid name the genus is *Prosopistoma*, the type species is *P. variegatum*, and the valid family name is *Prosopistomatidae*.

**Nomenclatural History of the Genus**

GEOFFROY (1762) established the genus *Binoculus* which he thought belonged to the *Crustacea* and placed in it three species; viz. "Le Binocle à queue en filets", "Le Binocle à queue en plumet" (which he considered to be the same species described by LINNAEUS as *Monoculus foliaceus*), and "Le Binocle du gasteroste".

The "Binocle à queue en plumet" was the European species now known as *Prosopistoma pennigerus* as discussed in this paper. The other two species are still considered to be in the *Crustacea*.

MÜLLER (1776) redescribed many of GEOFFROY's genera and species, bringing them into a binomial system of nomenclature. The "Binocle à queue en filets" became *Binoculus palustris* (and was synonymized with *Monoculus apus* LINNAEUS) and the "Binocle du gasteroste" became *Binoculus piscinus*. In this work MÜLLER made no reference to the "Binocle à queue en plumet". MÜLLER did not designate a type species for *Binoculus*.

FOURCROY (1785) listed the genus *Binoculus* and included and briefly described all three of GEOFFROY's species utilizing the binomial system of nomenclature. The "Binocle à queue en plumet" became *Binoculus foliaceus* because GEOFFROY had listed *Monoculus foliaceus* LINNAEUS, 1758 as the same species. Again no type species was given.

In that same year, however, MÜLLER (1785) pointed out that the "Binocle à queue en plumet" was not the same species as *Monoculus foliaceus* of LINNAEUS and placed it in a new genus, *Limulus*, as *Limulus pennigerus* MÜLLER with *Limulus palustris* (the "Binocle à queue en filets").

LATREILLE (1802), also recognizing that the "Binocle à queue en plumet" was not synonymous with *Monoculus foliaceus* LINNAEUS, removed it from *Limulus*, called it *Binoculus pennigerus*, and designated it as the type species of *Binoculus*. DUMÉRIL (1816), for no apparent reason, in his *Dictionnaire des Sciences Naturelles*, called this species *Binoculus piscinus*. LATREILLE (1833) later decided that the "Binocle à queue en plumet" was not congeneric with the other two species of GEOFFROY and placed it in a new genus, *Prosopistoma* (renaming it *Prosopistoma punctifrons*), along with a new species from Madagascar, *Prosopistoma variegatum*. Why LATREILLE placed *pennigerus* in a new genus when he himself had already designated it as the type species of *Binoculus* is not known. The renaming of the species as *punctifrons* is not unexpected, because it was a common practice at that time to rename species whenever names were not thought to be suitable and often upon generic transfer.

In a series of papers beginning in 1871, N. & E. JOLY (e.g., E. JOLY, 1871, E. JOLY, 1876, E. & N. JOLY, 1872, N. & E. JOLY, 1872a, 1872b) reported the discovery in 1868 near Toulouse of the "Binocle à queue en plumet". They recognized for the first time that this was, in fact, a true insect and correctly assigned it to the *Ephemeroptera* although the adult was still underscribed.

Coincident with the recognition that *Prosopistoma* was not a Crustacean, E. & N. JOLY (1872) proposed the new name *Chelysentomon* for the genus, but immediately began using the name *Prosopistoma* once more.

*Prosopistoma* still had no designated type species, and EATON (1884) therefore designated *Prosopistoma variegatum* LATREILLE as the type of the genus. In 1917 LESTAGE established a new family, *Prosopistomatidae*, for *Prosopistoma*.

The name *Prosopistoma* was used almost exclusively for this genus until DEMOULIN (1954) pointed out that, under the rules of zoological nomenclature in effect at that time, the valid name for the genus was *Binoculus* and proposed the new name *Binoculidae* as the name of the monotypic family. Both *Prosopistoma* and *Binoculus* have been used as the name for the genus since that time. Further, the "Binocle à queue en plumet" of Europe has in recent years been known by the names *foliaceus*, *pennigerus*, and *punctifrons* by various authors.

EDMUNDS ALLEN, and PETERS (1963) pointed out that because *Prosopistoma* was in almost universal use for the time between the establishment of the genus and the appearance of the paper by DEMOULIN (1954) asserting that *Binoculus* was the valid name, the "50-year rule" (Article 23, International Code of Zoological Nomenclature) might apply and *Prosopistoma* would be the valid name.

The history of the nomenclature of this genus is further complicated by the fact that carcinologists have used the name *Binoculus* for species of *Crustacea* and ignored its use by entomologists, who in turn paid no regard to its continued use in the *Crustacea*. FOWLER (1912) proposed the name *Binoculidae* for a family in the *Crustacea* containing GEOFFROY's *Binoculus* (sensu carcinological), apparently unnoticed by entomologists. The use of *Binoculus* in the *Crustacea* was so unnoticed by entomologists, in fact, that a ruling on *Binoculus* by the International Commission on Zoological Nomenclature requested by carcinologists apparently received no comment whatsoever from ephemeropterists.

Further accounts of the nomenclatural history of this genus may be found in papers by VAYSSIÈRE (1890), DEMOULIN (1954), and GILLIES (1954). These accounts discuss certain points in more detail than the present paper.

#### Discussion

Ordinarily, there would be little problem in discerning the proper nomenclature involved in this genus, if it were not for a few problems which have occurred. The rulings of the International Commission on Zoological Nomenclature, however, when taken into consideration with the nomenclatural history, show quite clearly the correct nomenclature.

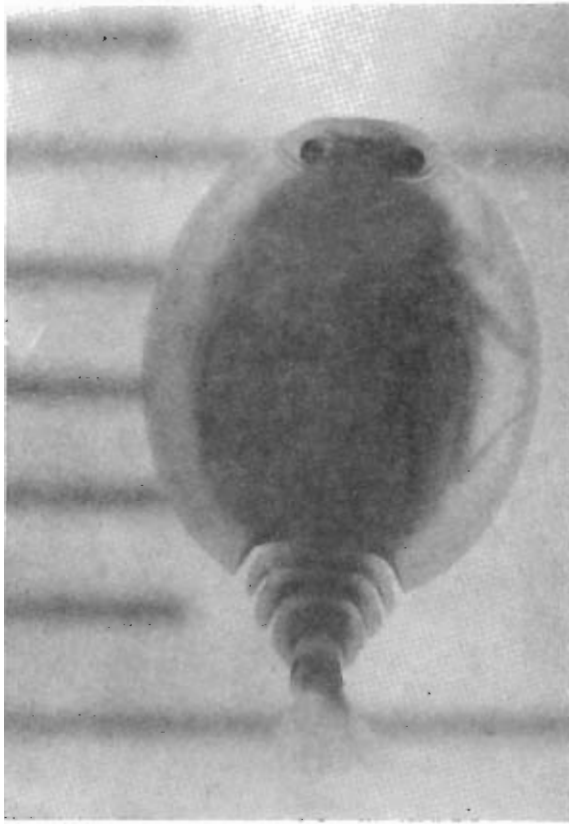


Fig. 1. Dorsal view of nymph of *Prosopistoma* sp. from Sri Lanka (1 div. = 1 mm)

*Binoculus* is the oldest name for the genus, first being used by GEOFFROY in 1762. The International Commission on Zoological Nomenclature in Opinion 228 (1954) has declared this work by GEOFFROY to be invalid for nomenclatural purposes, because GEOFFROY did not use the binomial system of nomenclature. The next use of *Binoculus* was by MÜLLER (1776). However, *Binoculus* MÜLLER was suppressed by the International Commission on Zoological Nomenclature in Opinion 502 (1958) for the purposes of the law of priority but not for the law of homonymy and is therefore also unavailable. *Binoculus* FOURCROY (1785) is thus either a second use of *Binoculus* MÜLLER or a junior homonym of it and in either case it is not available for use. The next available synonym is then *Prosopistoma* LATREILLE (1833) which becomes the valid name of the genus with *Chelysentomon* JOLY & JOLY (1872) falling as a junior objective synonym. This means that there is no need to apply to the International Commission on Zoological Nomenclature for a ruling on the application of the "50-year rule" as suggested by EDMUNDS, ALLEN, and PETERS (1963). The type species of *Prosopistoma* is *P. variegatum* LATREILLE, 1833, from Madagascar, as subsequently designated by EATON (1884). As I pointed out previously, the type species of *Binoculus* is *Limulus pennigerus* MÜLLER, 1785.

The European species, the "Binocle à queue en plume" of GEOFFROY, was given a binomial name by both MÜLLER and FOURCROY in 1785, being called *Limulus pennigerus* and *Binoculus foliaceus*, respectively. However, as pointed out by both MÜLLER (1785) and LATREILLE (1833), GEOFFROY (and so FOURCROY in following him) was in error in thinking this species to be *Monoculus foliaceus* LINNAEUS which is indeed a crustacean. Article 49 of the International Code of Zoological Nomenclature states that a specific name used in an erroneous specific identification cannot be retained for the species to which the name was wrongly applied. The epithet *foliaceus* therefore becomes invalid and the next available name is *pennigerus* MÜLLER, 1785, which becomes the valid name for this species (c.f. DEMOULIN, 1954).

LESTAGE (1917) created the family *Prosopistomatidae* for *Prosopistoma*. Thus, *Prosopistomatidae* has priority over *Binoculidae* DEMOULIN, 1954, and is the valid name of the family (c.f. EDMUNDS, 1955).

The formal synonymy is as follows:

*Prosopistoma* LATREILLE, 1833

*Binoculus* GEOFFROY [partim], 1762, Hist. Abregée ..... 2:658 (not available).

*Binoculus* MÜLLER [partim], 1776, Zoologiae danicae ..... p:200 (not available).

*Binoculus* FOURCROY [partim], 1785, Entomol. Paris. 2:539 (not available).

*Limulus* MÜLLER [partim], 1785, Entomostraca seu Testacea ..... p. 127.

*Prosopistoma* LATREILLE, 1833, Ann. Mus. Hist. Nat., Paris, 3<sup>e</sup> Sér., 2:33.

*Chelysentomon* JOLY & JOLY, 1872, Mém. Acad. Sci. Inscr. B.-Lett. Toulouse, 7<sup>e</sup> Sér., 4:438.

Type species of *Prosopistoma*: *Prosopistoma variegatum* LATREILLE, 1833; subsequent designation, EATON, 1884, Trans. Linn. Soc. Lond., 2nd Ser. Zool., 3:150.

#### Catalog of the Genus *Prosopistoma*

*Prosopistoma africanum* GILLIES

*Prosopistoma africanum* GILLIES, 1954, Trans. R. Entomol. Soc. Lond. 105:359.

*Prosopistoma boreus* PETERS

*Prosopistoma boreus* PETERS, 1967, Tijdschr. Entomol. 110:214.

*Prosopistoma crassi* GILLIES

*Prosopistoma crassi* GILLIES, 1954, Trans. R. Entomol. Soc. Lond. 105:362.

*Prosopistoma deguernei* VAYSSIÈRE

*Prosopistoma deguernei* VAYSSIÈRE, 1893, Ann. Sci. Nat. Zool. 15:337.

*Binoculus guernei* DEMOULIN, 1970, S. Afr. Anim. Life 14:145 (unjustified emendation).

*Prosopistoma indicum* PETERS

- Prosopistoma indicum* PETERS, 1967, Tijdschr. Entomol. 110:219.  
*Prosopistoma lieftincki* PETERS  
*Prosopistoma lieftincki* PETERS, 1967, Tijdschr. Entomol. 110:217.  
*Prosopistoma palawana* PETERS  
*Prosopistoma palawana* PETERS, 1967, Tijdschr. Entomol. 110:213.  
*Prosopistoma pennigerum* (MÜLLER)  
 "Binocle à queue en plumet" GEOFFROY, 1762, Hist. Abregée ... 2:660.  
*Binoculus foliaceus* FOURCROY, 1785, Entomol. Paris. 2:539.  
*Limulus pennigerus* MÜLLER, 1785, Entomotraca seu Testaca ... p. 127.  
*Binoculus piscinus* MÜLLER (?); DUMÉRIL, 1816, Dict. Sci. Nat. 4:406 (misidentification?).  
*Prosopistoma punctifrons* LATREILLE, 1833, Ann. Mus. Hist. Nat., Paris, 3<sup>e</sup> Sér., 2:34.  
*Chelysentomon [punctifrons]* (LATREILLE); JOLY & JOLY, 1872, Mém. Acad. Sci. Inscr. B.-Lett. Toulouse, 7<sup>e</sup> Sér., 4:438.  
*Prosopistoma sedlaceki* PETERS  
*Prosopistoma sedlaceki* PETERS, 1967, Tijdschr. Entomol. 110:215.  
*Prosopistoma variegatum* LATREILLE  
*Prosopistoma variegatum* LATREILLE, 1833, Ann. Mus. Hist. Nat., Paris, 3<sup>e</sup> Sér., 2:34.  
*Prosopistoma wouterae* LIEFTINCK  
*Prosopistoma wouterae* LIEFTINCK, 1932, Tijdschr. Entomol. 75:46.

## SUMMARY

*A nomenclatural problem in Ephemeroptera: Prosopistoma or Binoculus?*

For the century after the description of the first species of the mayfly *Prosopistoma* by GEOFFROY in 1762 (as "Binocle à queue en plumet"), it was thought to be a crustacean. GEOFFROY did not use a binomial system of nomenclature, and MÜLLER (1776, 1785) and FOURCROY (1785) redescribed many of his species using a binomial system. The "Binocle" of GEOFFROY became the nominal genus *Binoculus*. In 1833, LATREILLE removed "Binocle à queue en plumet" from *Binoculus* and placed it in his new genus *Prosopistoma* along with a new species. The generic name *Prosopistoma* has generally been accepted as correct since its proposal by LATREILLE. Recently, however, some authors have again begun to use *Binoculus* as the name for this genus. I show that the valid name is *Prosopistoma*, the type species is *P. variegatum*, and the valid family name is *Prosopistomatidae*.

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