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Diaptomus meridionalis Kiefer 1933 junior synonym of *Notodiaptomus gibber* (Poppe 1889)? : a contribution to the problem

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RESUMEN

Es Diaptomus meridionalis *Kiefer 1933 sinónimo de* Notodiaptomus gibber *(Poppe 1989)? una contribución al problema.*

Diaptomus meridionalis *Kiefer 1933 fue descripta en base a ejemplares hembras de Montevideo, Uruguay y su presencia nunca fue registrada nuevamente, al menos con ese nombre. El análisis de la información publicada y observaciones realizadas sobre material del río Uruguay, apoyan la idea de que* Diaptomus meridionalis *Kiefer 1933, es un sinónimo de* Notodiaptomus gibber *(Poppe 1889).*

ABSTRACT

Diaptomus meridionalis Kiefer 1933 was described on the basis of female specimens from Montevideo Uruguay, and never recorded again, at least with this name. Study of the literature and observations on material from Uruguay River, support the hypothesis that Diaptomus meridionalis Kiefer 1933, is a junior synonym of Notodiaptomus gibber (Poppe 1889).

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INTRODUCTION

As part of his long series of papers "Beirtäge zur Copepodenkunde" Kiefer (1933) described a new species, *Diaptomus meridionalis*, from Montevideo, Uruguay, on the basis of material collected by the noted German ostracodologist Prof. W. Klie.

The diagnosis of this species was based only on the features of female remaining the male undescribed. The most characteristic features of this species were the presence of a conspicuous dorsal protuberance on the fourth prosomal somite and the genital segment assymetrically expanded at its distal end (Figs 3 & 5).

Though *D. meridionalis* was mentioned and included in taxonomic lists by a number of authors (Wright 1938, Brandorff 1976, Dussart & Defaye 1983, 2002) there was not other record apart of the original given by Kiefer (1933) which is the unique valid record of this species, from a taxonomic point of view, because it was documented with descriptions and illustrations.

On the other hand, several decades before, Poppe (1889) had described *Diaptomus gibber* on the basis of specimens collected by Dr. G. Müller in Santa Catarina, southern Brazil. The original description of this species, by Prof. S. A. Poppe, was included in the first revision of the freshwater Calanoida of the world carried out by De Gerne and Richard (1889), in page 95 with figures in plates II, III and IV. The new species was easily distinguishable from the other South American species known at that time because the rare features exhibited by the male fifth legs and the female prosome and urosome.

Later, this species was mentioned and recorded almost simultaneously by Wright (1938) and Brehm (1938), from small pools located in Barras Santa Lucía and Barras Agas, Montevideo, on the Uruguayan side of La Plata River. These materials, collected by the Uruguayan zoologist Ricardo Thomsen, were identified as *D. gibber* without publishing any illustration or description.

About thirty years later, Pallares (1963), published the finding of a population of *D. gibber* in a small dam connected to the southern side of La Plata River, in Balneario Norte, Buenos Aires City, Argentina. In this paper Pallares wisely transferred this species to the genus *Notodiaptomus* Kiefer and gave a detailed description of the material, confirming the most important features of this remarkable species.

The specimens illustrated by Pallares (*op. cit.*) displayed the features which are characteristic of the Poppe's species, such as the very short lateral spine and the hook-shaped process on inner border of the first exopodial segment in the male right fifth leg, and the distal right angle of the genital segment conspicuously expanded into a pair of protuberances, in females (Fig. 4). Female specimens described by Pallares (*op. cit.*) also have a remarkable outgrowth on the dorsal side of the fourth prosomal somite (Fig. 6), already described by Poppe (1889) but not so detailedly as in Pallare's work.

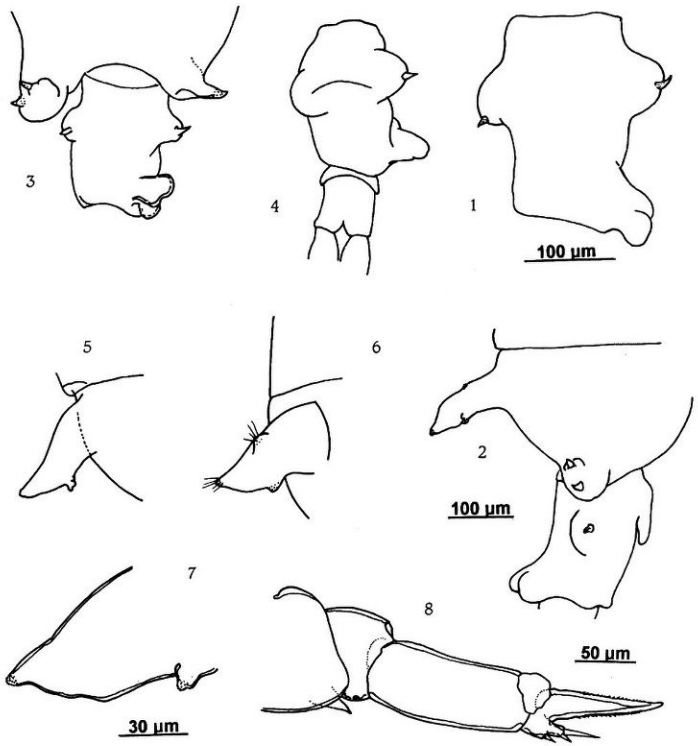
MATERIAL AND METHODS

Material studied was found in two opportunities on the Argentine side of the main stream of the Uruguay River. Site 1: near its confluence with Paraná Bravo River, a branch of Paraná River, October 1972; Site 2: a few kilometers downstream of Gualeguaychú City (33° 11' 25" S, 58° 25' 53" W), December 2005.

Zooplankton samplings were conducted at the Site 1 using a centrifugal pump and filtering the water through a 56 μm mesh to catch the animals, and at the Site 2 by hauling up a net of 60 μm aperture and 25 cm diameter. All material was fixed and stained *in situ* formaldehyde 4% and erithrosine, respectively.

The studied specimen was sorted and dissected under stereoscopic microscope Olympus using sharpened entomological needles. Descriptions were based on observation of the dissected specimen mounted in pure glycerol and drawn with the aid of a camera lucida attached to a light microscope Nikon Optiphot. Additional observations were carried out by mean a phase contrast microscope Carl Zeiss. In order to avoid the distortion of the natural shape of the appendages due to an excessive compression, slide and cover slip of the mountings were separated by four mall balls of a brand modelling clay.

Most of descriptions and illustrations are based upon the material obtained from the Site 1 were we found one incomplete female specimen of copepod belonging to the genus *Notodiaptomus*. In fact, it was only the empty exoskeleton of the caudal half of the body, the last somites of the cephalosoma and part of the urosoma. The material from the Site 2 consisted of an also incomplete and poorly preserved specimen of female about which we think, due to the level of wrinkling, it suffered a drying lapse. Our efforts to improve the condition of this material, using the methodology suggested by Dussart & Defaye (2002) which consists in boiling the specimens in a solution of trisodium phosphate (0.25 g/l), resulted unsuccessful.



Figs. 1 a 8

Notodiaptomus gibber (Poppe 1889), female; 1, 3 & 4: genital segment, dorsal view; 2: distal part of prosome and genital segment, lateral view; 5-7 : dorsal protuberance; 8: fifth leg. (3 & 5: redrawn from Kiefer 1933; 4 & 6: redrawn from Pallares 1963; 1 - 2 , 7- 8: original, Uruguay River, Site 1)

RESULTS AND DISCUSSION

In spite of the bad conditions of preservation of the material we do not hesitate to equate the specimen from Uruguay River with Poppe's species, because they show, at least, the two above mentioned features which are characteristic of the *N. gibber* female, the complex dorsal outgrowth on fourth prosomal somite and the genital segment markedly expanded at the distal right angle (Figs 1-2).

A comparison of the Kiefer's and Pallares' illustrations and the present observations on the dorsal outgrowth reveals few minor differences probably more attributable to the natural variability of this feature than to preservation artifacts.

Kiefer (*op. cit.*) and Pallares (*op. cit.*) pointed out the existence of small protuberances on the dorsal outgrowth, and in the case of the specimens studied by Pallares (*op. cit.*) they have also a tuft of short hairs at tip . In Uruguay River specimen found in Site 1, though it has the mentioned protuberances, the tuft of hairs are not present. However, at tip of these protuberances the presence of a small punctuated area which seems to be the base of insertion of the lost hairs is clearly visible. In fact, after a careful observation, using a phase contrast microscope, two short unequally broken hairs, still remaining attached to the punctuated area, were found. In the specimens of the Site 2, though punctuated areas were present, we were not able to find any hair.

The dorsal process on somite 4 or 4-5 appears to be quite common in *Notodiaptomus* since it presence has been reported in at least twelve species. This process is also present in species belonging to the genera *Arctodiaptomus* and *Mastigodiaptomus*, which occur in Caribbean Islands, Central America and southern North America (Wilson, 1959; Bowman, 1984). However, in none of the mentioned cases the process is so large and complex as those described for *D. meridionalis* and *N. gibber.* Anyway, females of *Notodiaptomus isabelae* (Wright 1936), as described by Paggi (1976), have a conspicuous outgrowth on the fourth prosomal somite faintly granulose on the upper surface, but it is rounded somewhat inflated and it lacks the characteristic conical protuberances described for the afore-discussed species. Anyway, from a phylogenetical point of view, it is interesting the fact that the right fifth leg of the male of *N. isabelae* and *N. gibber* share the feature of having a quite similar aspect about the shape of the second segment of the endopodite, particularly the short lateral spine.

Fifth legs of the studied material from Uruguay River were not completely preserved because, at least in the specimen from Site 1, which was in better general conditions of conservation, they had lost its endopodites but the rest of these appendages were apparently undamaged. The rest of the appendage, most of the morphological features, closely fit the characteristics described by Poppe (*op. cit.*), Kiefer (*op. cit.*) and Pallares (*op. cit.*). In our material the second segment of the expodite bears a short spine and at the tip of the third segment there are two spines, one of them more than twice longer than the segment (Figs 7-8). In the specimens from Uruguay River and in those described by Pallares (*op. cit.*) the claw of the second expodite seems to be somewhat longer than those described by Poppe (*op. cit.*) and Kiefer (*op. cit.*), showing a level of variability often in the species of *Notodiaptomus*. In the specimen from the Site 2 we were able to see, in one of the fifth legs, the existence of a not well defined segmentation at the middle of the endopodite.

In two unpublished works the present author proposed the synonymy of these two species, in a master thesis (Paggi, 1995) and as a communication "Calanoid Copepods from continental waters of Argentina and Uruguay" at the Workshop on Copepod Diversity in Neotropics, São Sebastião, Brasil, 1999. Moreover in the synonymy list of *N. gibber*, Dussart & Defaye (2002) included the name *D. meridionalis* followed by a question mark which suggest, with doubts, the possible synonyny of *N. gibber.* Also, Dussart and Defaye (2002) included to *"Diaptomus" ohlei* Brandorff 1978 as a possible synonym of *D. gibber,* however in this case it is not so easy to agree such opinion whether we compare the features of the male in both species or we take in account the afore-discussed characteristics of the dorsal protuberance of female.

Though the male of *N. meridionalis* was not described it is evident that the similarities between the females of this species and *N. gibber* have been largely neglected, particularly the conspicuous and peculiar dorsal outgrowth. This morphological feature perhaps was overlooked by many of the authors dealing with South American diaptomids because Wright (1927) in his important and popular revision omitted to include the figure, given by Poppe (1889), where the dorsal outgrowth is clearly visible.

The fact that our findings consisted only of remains of specimens, mainly exhuviae, suggests that this species lives in river marginal environments from which they are moved to the main stream during flood process. Wright (1938) and Brehm (1938) reported *N. gibber* from small pools nearby La Plata

River and Pallares (*op. cit.*) from a small lentic environment connected to this river. There is no information about of the envoronmental features of the type locality.

CONCLUSION

In our opinion, the weight of the new evidences emerging from the material here described favours the conclusion that *D. meridionalis* and *N. gibber* should be considered synonyms. According to the law of priority *N. gibber* should be the valid name for the species.

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