

A DISTRIBUTION RECORD FOR *MESOCYCLOPS LEUCKARTI* (CLAUS) (COPEPODA: CYCLOPIDAE) IN SOUTH AMERICA

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ABSTRACT

Unequivocal distribution records for Mesocyclops leuckarti (Claus) do not exist for South America. Our survey of Lake Valencia, Venezuela, has yielded the first such record to expand significantly the known range for this species.

Mesocyclops leuckarti (Claus) is regarded as a cosmopolitan species occurring in Europe, Asia, Africa, North America and Australia (Dussart 1969, Gurney 1933). However, there have been no unequivocal records for this species in South America. Our intensive survey of Lake Valencia, Venezuela (10°10'N, 67°45'W) has yielded the first such record.

M. leuckarti was originally described within the genus *Cyclops* O.F.M., but later was moved to *Mesocyclops* Sars by Kiefer (1927). Early distribution records, of course, do not reflect this change, but will be introduced here as they originally appeared.

Two previous reports have listed *M. leuckarti* from South America and one from Central America, but the validity of each is uncertain. Daday (1905) listed *Cyclops leuckarti* Claus from Paraguay but included no description. Van Douwe (1912) described *C. leuckarti* from Itapura, Brazil, although he admitted that it differed somewhat from the typical European specimens. Marsh (1913), reporting on collections from Panama, also believed that he had encountered *C. leuckarti*. All of these early reports appeared before the freshwater cyclopoid fauna of South America had received critical systematic attention. We now know that South America embraces more species of *Mesocyclops* s. str. than any other continent. Three of the South American species — *M. brasiliensis* Kiefer, *M. meridianus* (Kiefer), and *M. ellipticus* Kiefer — were unknown to science before 1925. For these and other reasons, the records of Daday, van Douwe, and Marsh have been questioned by subsequent workers (e.g., Gurney 1933, Pesta 1927).

M. leuckarti occurs elsewhere in the Western Hemisphere, but some distance to the north. Reliable records nearest to South America include a Puerto Rican reservoir (Saunders, unpubl.) and several sites in central and southern Mexico (Comita 1951). *M. leuckarti* is widely distributed in the United States (Yeatman 1959).

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RESULTS AND DISCUSSION

The specimens from Lake Valencia were immediately recognizable as *Mesocyclops leuckarti* because it is the only species in the genus known to lack a seta on the inner rounded margin of the basipodite of leg 1 (Fig. 1) (Lowndes 1930). The length: width ratio of the terminal endopodite of leg 4 averages 2.7:1 (N = 3 females) (Fig. 2) and therefore would fall into the range for *M. leuckarti aequatorialis* Kiefer. In addition, the inner margins of the caudal rami bear fine hairs characteristic of Kiefer's form *pilosa* (Fig. 3) (Kiefer 1930). However, in view of the small sample size (4 specimens), it would be premature to make subspecific designations.

Little is known about the ecology of *M. leuckarti* in this locality. Lake Valencia is a large, tropical lake with high levels of primary production. Specific conductance is relatively high, 2100 $\mu\text{mhos cm}^{-1}$, but within the range of values (76-5740 $\mu\text{mhos cm}^{-1}$) for which *M. l. aequatorialis* Kiefer has been reported in tropical Africa (LaBarbara & Kilham 1974). Additional limnological characteristics of Lake Valencia are given by Lewis & Weibezahn (1976).

Daday's (1905) report of *M. leuckarti* from Paraguay, unfortunately, was without description or figures, making it impossible to discuss further. The other reports have been reviewed previously, but in the light of our current knowledge of the systematics of *Mesocyclops*, it would be useful to reconsider the evidence.

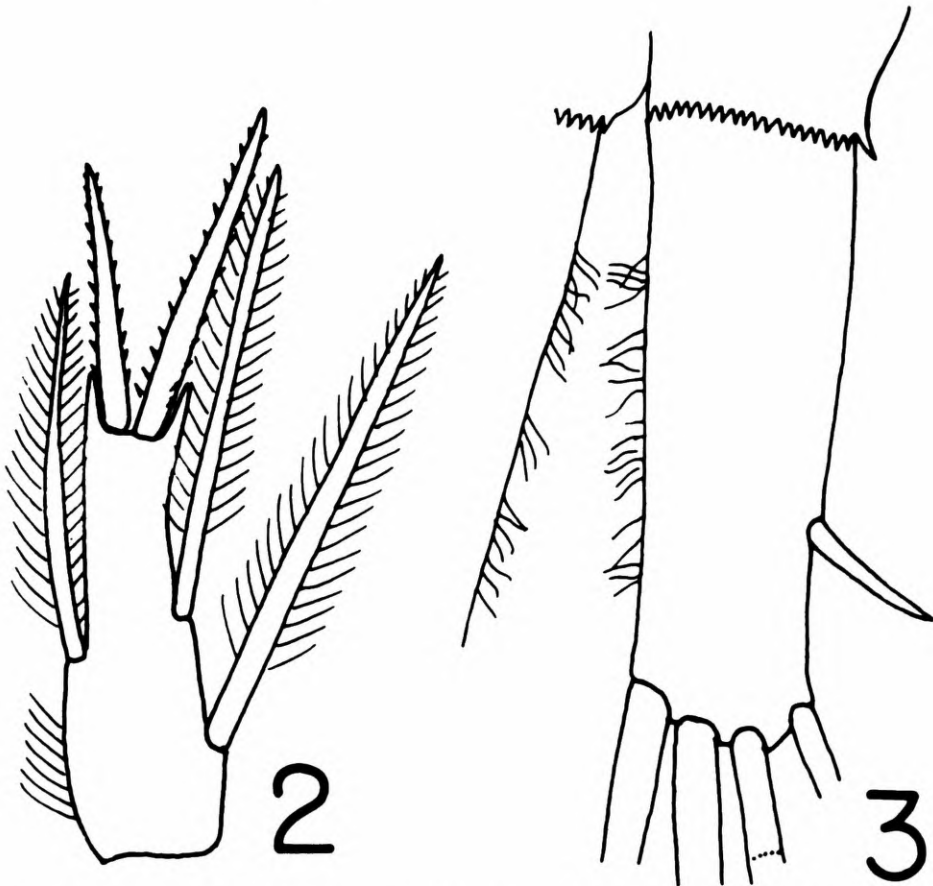
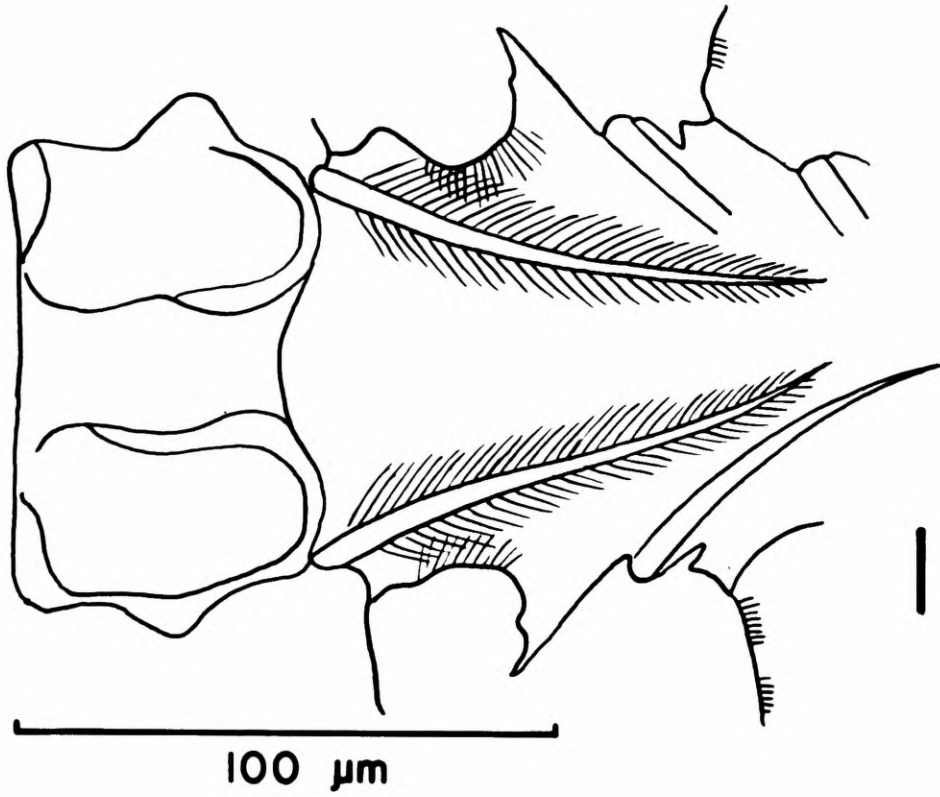
Pesta (1927) examined critically van Douwe's description of *M. leuckarti* from Brazil and cited three features as evidence that the identification was erroneous: 1) the relatively shorter first antenna (reaching only to the middle of the second leg-bearing segment), (2) multiple notches in the hyaline membrane on the terminal segments of the antennule, and (3) equal length terminal spines on the endopodite of leg 4. Characteristics 2 and 3 do not exclude the possibility of *M. leuckarti*, but when combined with characteristic 1, they support Pesta's contention. Pesta concluded that van Douwe had really found *M. meridianus* (Kiefer) (described in 1926) and was convinced of his conclusion to the extent that he listed van Douwe's locality as a record for *M. meridianus*.

Gurney (1933) was familiar with the records of van Douwe and Marsh, but considered both to be highly questionable. Gurney believed that an allied species (*Cyclops (Mesocyclops) annulatus* Wierzejski or *C. (M.) longisetus* Thiebaud) was the most likely crustacean of these records. Gurney gave Honduras as the locality for Marsh's record, but did not cite a reference. We could not locate a record by Marsh for Honduras, but Gurney's comments are equally appropriate for Panama.

Marsh (1913) included three figures (Pl. III, figs. 6, 9, 14) with his brief description of *M. leuckarti* from the Panama Canal Zone. These were: the connecting plate and basal segments of leg 4, the terminal segments of the antennule, and the plate of the labrum. Unfortunately, using only these characters, it is not possible to distinguish *M. leuckarti* from *M. longisetus*. We have examined *M. longisetus* from Venezuela, and the basal portion of leg 4 does not differ from Marsh's figure. The ornamentation of the hyaline membrane in *M. longisetus* typically consists of two semi-lunar notches, but Lowndes (1934) observed that this character was "very variable". That Marsh's figure shows a single deep notch is not conclusive evidence for one species or the other, particularly since Marsh did not discuss the variation in this or any other character.

The collection from Puerto Rico contains specimens readily identifiable as *M. leuckarti*. There is no seta on the inner rounded margin of the basipodite of leg 1, the length: width ratio of the endopodite of leg 4 is 2.86:1 (N = 4 ♀♀) and there are no hairs on the inner margin of the caudal rami. There are, however, multiple notches in the hyaline membrane on the antennule.

To identify *M. leuckarti*, early workers relied on characters such as the shape of the hyaline membrane on the antennule, the relative length of the antennule, the ornamentation of the connecting plate of the fourth pair of legs, and the absence of hairs on the inner margin of the caudal ramus. The validity of these characters has diminished as the



Figures 1-3. *Mesocyclos leuckarti* from Lake València, Venezuela. 1, Basipodite of leg. 1.2, Terminal endopodite of leg 4.3, Caudal ramus.

more recently described species of *Mesocyclops* have been studied. The hyaline membrane in *M. leuckarti* may vary considerably in shape (Gurney, 1933) and this appears to be true for other species as well (Lowndes, 1934). Variation in the length of the antennule relative to the body has not been studied sufficiently in *Mesocyclops*, but in the related genus *Thermocyclops*, great intraspecific variation is known to occur (Sewell 1957). The ornamentation on the connecting plate of the fourth pair of legs is essentially the same in *M. leuckarti*, *M. annulatus*, *M. longisetus* and *M. ellipticus*. The relative lengths of the terminal spines on the endopodite of the fourth pair of legs vary to such an extent in *M. leuckarti* (Gurney 1933) that they overlap the values for all other South American species of the genus. The absence of hairs on the inner margin of the caudal ramus was once considered a very important character for *M. leuckarti* (Coker, 1943), but Kiefer (1930) has described *M. leuckarti* forma *pilosa* with those hairs. The hairs on the Lake Valencia specimens are very fine and easily overlooked. With the possible exception of *M. meridianus*, all other South American species of *Mesocyclops* have these hairs (Coker 1943). The South American species of *Mesocyclops* have enough morphological similarities that they can be difficult to distinguish. The only character that can always be used to identify *M. leuckarti* is the absence of a seta on the inner rounded margin of the basipodite of leg 1. The uniqueness of the character was first discovered by Lowndes (1930), but its significance is not generally appreciated. Although it may be possible to identify *M. leuckarti* using a combination of other characters, the lack of this seta provides a simple and accurate means for separating *M. leuckarti* from the other South American species of the genus.

With our record, *Mesocyclops* s. str., is now represented by six species in South America. Because these species have many morphological similarities, it is imperative that workers in this geographical region exercise caution in making identifications.

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