

NOTES ON CRITICAL CHARACTER STATES IN  
*TELMATOTREPHEs* (HETEROPTERA: NEPIDAE)S. L. KEFFER<sup>1</sup>, J. T. POLHEMUS<sup>2</sup>, AND J. E. MCPHERSON<sup>1</sup><sup>1</sup>Department of Zoology, Southern Illinois University, Carbondale, Illinois, 62901<sup>2</sup>University of Colorado Museum, 3115 S. York St., Englewood, Colorado 80110

## ABSTRACT

In his 1972 revision of *Telmatotrephe*s Stål, Lansbury discussed four character states he considered important in understanding the systematic position of the genus in the family. We examine the distribution of those characters across the Nepidae and find two of Lansbury's conclusions to be invalid. Short respiratory siphons are found in seven nepid genera, including *Telmatotrephe*s, and not two as supposed by Lansbury. Paired sulci on the prothoracic venter are not unique to *Telmatotrephe*s but are also found in *Nepa* Linnaeus. Vestigial, coriaceous metathoracic wings and clubbed egg respiratory horns without a plastron meshwork remain as valid diagnostic character states for *Telmatotrephe*s as hypothesized by Lansbury.

## RESUMEN

En la revisión de *Telmatotrephe*s Stal en 1972, Lansbury expuso cuatro caracteres que él consideraba importantes para entender la posición sistemática del género en la familia. Nosotros examinamos la distribución de esos caracteres en los Népidos y encontramos que dos de las conclusiones de Lansbury son inválidas. Siete géneros de nepid tienen sifones respiratorios cortos, incluyendo a *Telmatotrephe*s, y no los dos supuestos por Lansbury. Parejas de sulci en el venter protorácico no son exclusivos de *Telmatotrephe*s, pues también se encuentran en *Nepa* Linnaeus. Vestigios de alas coriáceas metatorácicas y cuernos de huevos respiratorios en maza sin malla de plastrón, se mantiene como un carácter diagnóstico válido para *Telmatotrephe*s como Lansbury hipotizó.

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During our studies of nepid genera of the world, anticipating a cladistic analysis, we reviewed Lansbury's (1972) revision of *Telmatotrephe*s Stål wherein he compared this genus to other genera within the family. Because our data and conclusions differ somewhat from his, and because some of the nepid genera we studied are rare in collections, hence known only to a few workers, we present some notes that should be of interest to those involved with the taxonomy and phylogeny of Nepomorpha.

Lansbury concluded his revision of the genus *Telmatotrephe*s with a discussion of four character states he believed to be important in understanding the systematic position of *Telmatotrephe*s in the Nepidae (p. 285):

1. Short caudal respiratory siphons.
2. Prominent spiracular apertures on the venter of the prothorax.
3. Coriaceous, vestigial metathoracic wings.
4. Incomplete plastron meshwork on respiratory horns of eggs.

According to Lansbury, short respiratory siphons were found in only one nepid species outside of *Telmatotrephe*s, i.e., *Borborophyes erutus* Montandon (subsequently placed in its own genus, *Montonepa*, by Lansbury in 1973). The other three character states Lansbury regarded as unique to *Telmatotrephe*s.

During a recent visit to the National Museum of Natural History (NMNH), one of us (SLK) observed that four monotypic Ethiopian genera represented in the Raymond Poisson Collection: *Borborophilus* Stål, *Paranepa* Montandon, *Nepita* Poisson, and *Nepella* Poisson, also had short siphons. Poisson's 1965 catalogue of Ethiopian Nepidae confirmed those observations and listed precise siphon measurements (Poisson 1965, pp. 230-231) which are summarized in Table 1. In addition to the Ethiopian genera and the Oriental *M. erutus*, we also observed that the Palearctic *N. hoffmanni* Esaki possesses a short siphon (also noted by Esaki 1925, p. 314). Thus, short respiratory siphons are shared by seven known nepid genera and not two as supposed by Lansbury.

The "spiracular apertures" (Lansbury's terminology) of *Telmatotrephes* are paired sulci lateral to the median prosternal ridge and posteromedial to the coxal cavities (Lansbury 1972, Figs. 2, 16, 34, 41, 56). They are deep, glabrous, and distinct from the surrounding propleura and sternum. Two aperture shapes are evident in *Telmatotrephes* (Lansbury 1972, p. 271): elongate in the Neotropical species and triangular in the Oriental species. A survey of the synoptic collections of Nepidae in the NMNH and the Polhemus Collection revealed that paired sulci on the venter of the prothorax are also found in *Nepa* Linnaeus but absent in all other nepid genera. The sulci of *N. cinerea* Linnaeus (Fig. 1), *N. sardiniensis* Hungerford (similar to *N. cinerea*), and *N. apiculata* Uhler (Fig. 3) are narrowly triangular and thus somewhat intermediate in shape between the Oriental and Neotropical *Telmatotrephes*. *N. hoffmanni* has broadly triangular sulci (Fig. 2) which closely resemble those of the Oriental *Telmatotrephes*. In short, ventral paired prothoracic sulci are not unique to *Telmatotrephes* but are instead found in both *Telmatotrephes* and *Nepa*.

It should be noted that these sulci have nothing to do with spiracular openings as assumed by Lansbury (1972). Dissection of specimens of *N. apiculata* reveals that internally each sulcus ends anteriorly in an apodeme and not in a spiracular opening (Fig. 4). As noted by Hamilton (1931, p. 1091 and Plate I) in his description of adult *N. cinerea*, and McPherson & Packauskas (1987, p. 683) in their description of nymphal *N. apiculata*, the most anterior pair of spiracles is found ventrally in the membrane between the pro- and mesothorax and not in the area of the sulci. The tracheal system of

TABLE 1. RELATIVE LENGTHS OF SHORT RESPIRATORY SIPHONS IN NEPIDAE.

Taxon	Body length	Siphon length	Body/Siphon
<i>Nepa hoffmanni</i> (Esaki) <sup>1,5</sup>	21.5-23 mm	3 mm	>7
<i>Borborophilus afzelii</i> (Stål) <sup>2,5</sup>	15-17	3-4.5	>3.77
<i>Paranepa primitiva</i> (Montandon) <sup>2,5</sup>	15-17.5	3.5-4	>4
<i>Nepita djaloni</i> Poisson <sup>2,5</sup>	13-14	2.75-3	>4
<i>Nepella pauliani</i> Poisson <sup>2,5</sup>	18.5	2	9.25
<i>Montonepa erutus</i> (Montandon) <sup>3,5</sup>	14.25	0.9	15.83
<i>Telmatotrephes sculpticollis</i> Stål <sup>4</sup>	31-32	6	>5
<i>T. ecuadorensis</i> Lansbury <sup>4</sup>	22.8	unknown	?
<i>T. grandicollis</i> Kuitert <sup>4,5</sup>	25-27	4.5-5.5	>4.9
<i>T. chinensis</i> Lansbury <sup>4</sup>	25.5	4.5	5.67
<i>T. breddini</i> Montandon <sup>4,5</sup>	30	8	3.75
<i>T. carvalhoi</i> De Carlo <sup>4</sup>	25	2	12.5

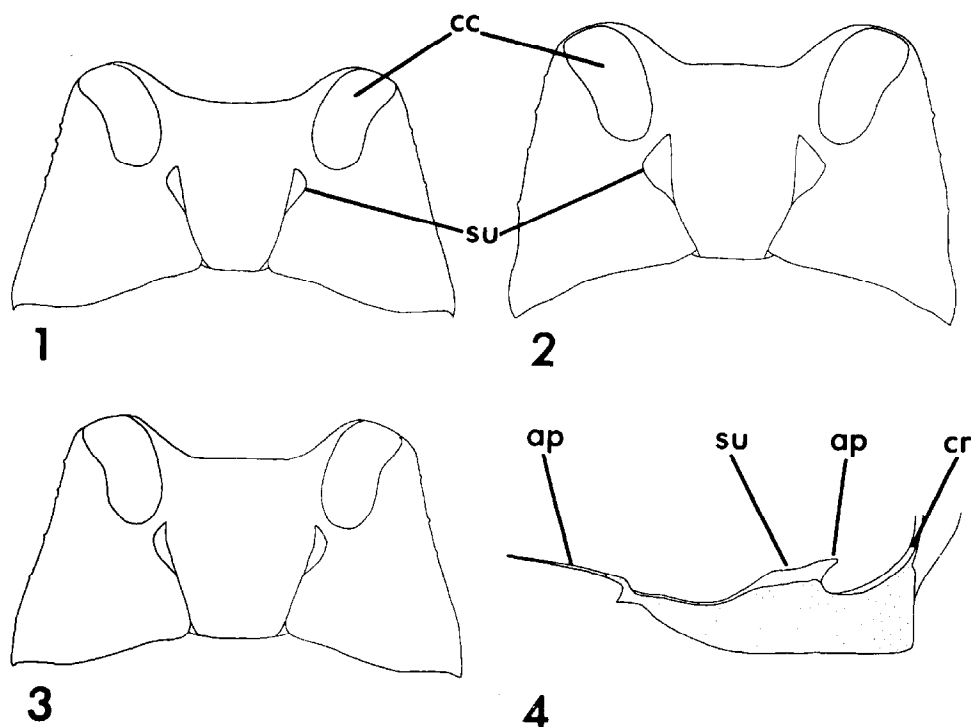
<sup>1</sup>Esaki 1925, p. 314

<sup>2</sup>Poisson 1965, pp. 230-231

<sup>3</sup>Lansbury 1973, p. 111

<sup>4</sup>Lansbury 1974, pp. 273, 277, 279, 280, 282, 283

<sup>5</sup>Personal observation



Figs. 1-3. Venter of prothorax: 1. *Nepa cinerea*. 2. *Nepa hoffmanni*. 3. *N. apiculata*.  
Fig. 4. Internal midlongitudinal view of sulcus of *N. apiculata*.  
Abbreviations: ap, apodeme; cc, coxal cavities; cr, coxal rim; su, sulcus.

*Nepa* was studied earlier and figured in detail by Brucher (1916) and Poisson (1924), who found the same arrangement of spiracles.

All specimens of *Telmatotrephes* examined by Lansbury had leathery, vestigial metathoracic wings. Reduced, membranous metathoracic wings seem to occur frequently in the Nepini, e.g., *Montonepa erutus* and *Borborophyes mayri* Stål (Lansbury 1973, pp. 111 and 113), *Nepa dollfusi* Esaki (Esaki 1928, p. 437), *N. hoffmanni*, and *Laccotrephes pseudoampliatius* Poisson (both personal observation). However, truly vestigial, leathery metathoracic wings appear to be unique to *Telmatotrephes*.

Eggs of two of the six currently recognized species of *Telmatotrephes* have been examined. Hinton (1961, pp. 240-241) studied the eggs of *T. breddini* Montandon. Eggs of *T. grandicollis* Kuitert were described by Lansbury (1972, p. 273) and found to be indistinguishable from those of *T. breddini*. In both instances the respiratory horns of the eggs were clubbed and lacked a plastron meshwork on the inner margin. Nowhere else in the Nepidae thus far studied are these two egg character states found (i.e., *Paranepa*, *Nepa*, *Laccotrephes* Stål, *Cercotmetus* Amyot and Serville, and *Ranatra* Fabricius, Hinton 1961, 1962; *Goondnomdanepa* Lansbury, 1974; *Curicta* Stål, personal observation); those of *Austronepa* Menke and Stange, *Borborophilus*, *Borborophyes* Stål, *Montonepa*, *Nepella*, and *Nepita* remain unknown. Thus, they so far appear to be truly diagnostic for the genus *Telmatotrephes*.

In conclusion, we have invalidated two of the four conclusions reached by Lansbury about character distribution in *Telmatotrephes* and other nepine genera. Short respiratory siphons are found in seven genera, including *Telmatotrephes*, and not two as supposed by Lansbury. Paired sulci on the prothoracic venter are not unique to *Telmatotrephes* but are also found in *Nepa*. Vestigial, coriaceous metathoracic wings and clubbed

egg respiratory horns without a plastron meshwork remain as valid diagnostic characters for *Telmatotrepes*.

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