No. 8, pp. 127-136

25 June 1976

# PROCEEDINGS OF THE LOLOGICAL SOCIETY OF WASHINGTON

## EURYTEMORA RICHINGSI, A NEW SPECIES OF DEEP-WATER CALANOID COPEPOD FROM THE ARCTIC OCEAN<sup>1</sup>

## BY GAYLE A. HERON AND DAVID M. DAMKAER Pacific Marine Environmental Laboratory/NOAA University of Washington WB-10, Seattle, Washington 98195

There are 32 described species of *Eurytemora* of which 12 are considered to be synonyms (Table 1) (Giesbrecht and Schmeil, 1898; Sars, 1902; Gurney, 1931, 1933; Smirnov, 1931). Of the 20 valid *Eurytemora* species (Table 2), 7 are restricted to fresh water, 7 are found in both fresh and brackish water, and 4 occur only in brackish water. *Eurytemora affinis*, *E. herdmani*, and *E. pacifica* are the only species known to live also in marine waters, but usually they have been found close to shorelines and always above a continental shelf. This paper describes a new species, *E. richingsi*, from deep samples collected in the Canada Basin of the Arctic Ocean. *Eurytemora richingsi* is the first *Eurytemora* species to be reported only from a marine environment.

Gurney (1931) suggested the possibility that *Eurytemora* may have evolved from the marine genus *Temora* in the "arctic sea of glacial times." The genus has a definite northern distribution and it is therefore not surprising to find an Arctic marine representative.

*Eurytemora richingsi* was collected from Fletcher's Ice Island (T-3) using 1-m closing nets with mesh aperture of 0.110 mm (Damkaer, 1975). Figures were drawn with the aid of a Wild M20 drawing tube. The letter after each figure legend refers to the 0.10-mm scale to which the figure was

QH 1 B4X

NH

3

<sup>&</sup>lt;sup>1</sup>Contribution No. 876 from the Department of Oceanography, University of Washington WB-10, Seattle, Washington 98195.

<sup>8—</sup>Proc. Biol. Soc. Wash., Vol. 89, 1976 (127)

E. affinis (Poppe, 1880)	E. lacustris (Poppe, 1887)
E. inermis (Boeck, 1865)	E. intermedia Nordquist, 1887
E. hirundo Giesbrecht, 1881	E. pacifica Sato, 1913
E. hirundoides (Nordquist, 1888)	E. johanseni Willey, 1920
E. americana Williams, 1906	E. velox (Lilljeborg, 1853)
E. thompsoni Willey, 1923	E. lacinulata (Fischer, 1853)
E. transversalis Campbell, 1930	E. clausii (Hoek, 1878)
E. kieferi Smirnov, 1931	E. adleri Schiklejew, 1931
E. canadensis Marsh, 1920 E. tolli Rylov, 1922	THE GARLA MERON A

Table 1. Eurytemora synonymy.

drawn. Body length measurements were taken from specimens in glycerine, from the anterior border of prosome to posterior edge of uropods.

The authors are indebted to Dr. T. Saunders English for the opportunity to study the samples collected from Fletcher's Ice Island and for other kindnesses. The specimens were found coincidental to an investigation directed by Dr. English and supported through Office of Naval Research (Contract N00014-67-A-0103-0005 Project NR083 012).

## Eurytemora richingsi, new species

Figures 1-17

Material studied: Holotype female, 1.68 mm (USNM 154756) 1000-500 m, 83°14'N, 153°48'W, 12 June 1968; allotype male, 1.52 mm (USNM 154757) 400-350 m, paratypes, 1 female and 1 male (USNM 154758) 500-400 m, 83°14'N, 154°2'W, 10 June 1968.

*Female*: Body with moderately stocky prosome (Fig. 1). Length about 1.74 mm (4 specimens, 1.68–1.80 mm). Last prosomal segment (Fig. 2) with rounded corners, hyaline margins slightly produced ventrolaterally. Cephalic segment with depression in lateral view. Genital segment (Fig. 2) lateral margins asymmetrical, with circumscribed hyaline areas where some *Eurytemora* species have protrusions; most surfaces rugose; rows of minute spinules on distal third of dorsal surface. Genital operculum protruding ventrally, about twice as wide as long (Fig. 3). Uropod length approximately equal to that of anal segment; inner marginal hairs. All specimens with damaged uropodal setae except dorsal and innermost terminal setae.

Rostral filaments extend to half the width of first antenna basal segment. First antenna reaching to distal adge of prosome, 25-segmented; 8-9 and 24-25 with incomplete sutures. Numerical armature (Table 3)

	Length	l, mm		Anal		Fusironna	
	Female	Male	Metasomal	segment/			
		DIDINI	SALLA	+Dodoru	F'resh	Brackish	Marine
E. affinis (Poppe, 1880)	0.80-1.90	0.75-1.65	o.+	2117	-	T	-
E. americana Williams, 1906	1.14-1.85	0.75-1.60	<u>}</u> +	4/7	F	+ +	ł
E. anadyrensis Borutsky, 1960	1.30-1.60	1.20-1.40	- +	2./3	4	F	
E. arctica Wilson & Tash, 1966	1.85-2.02	1.56-1.65	- +	6/11	1		
E. asymmetrica Smirnov, 1935	1.74-1.95	1.60-1.79	+	3/4	F	-	
E. bilobata Akatova, 1949	1.58		+	1/9	4	ŀ	
E. canadensis Marsh, 1920	1.30-2.30	1.20-2.10	- 0	1/9.		+	
E. composita Keiser, 1929	1.21-1.46	1.07-1.20	• +	6/2			
E. foveola Johnson, 1961	1.12-1.25	1.00-1.20	• +	1/2	+	4	
E. gracilicauda Akatova, 1949	1.54-1.65	1.16-1.33	• +	1/2			
E. gracilis (Sars, 1898)	1.20-1.40	1.25-1.30	- +	9/13	-		
E. grimmi (Sars, 1897)	1.50-1.70	1.30-1.40	- 0	11/17		+ -4	
E. herdmani Thompson & Scott, 1897	1.05-1.60	1.16-1.50	+	6/11			4
E. kurenkovi Borutsky, 1960	1.23-1.40	1.02-1.12	- +	2/5	+	F	F
E. lacustris (Poppe, 1887)	1.10-1.40	1.10-1.30	- 0	2/3			
E. pacifica Sato, 1913	0.99-1.46	0.99-1.16	+.0	8/9	_	-1	Ŧ
E. raboti Richard, 1897	1.20-2.20	1.10-2.10	:+	1/2	+		F
E. richingsi new species	1.68-1.80	1.40-1.56	- 0	1/1	_	F	1
E. velox (Lilljeborg, 1853)	1.30-2.20	1.20-1.80	+	10/11	+	+	F
E. wolterecki Mann, 1940	1.09-1.16	0.97-1.04	• +	12/13		-	
E. yukonensis Wilson, 1953	1.64	1.38	• +	6/2	- +		
* Relative lengths of anal segment and uropods	(terminology after Bow	man, 1971).					

Table 2. Characteristics of Eurytemora species, compiled from literature.

New Arctic Ocean copepod

1

129



typical for the genus, except segment 10, with a seta in addition to the usual spine.

Mandible (Fig. 4) with wide gap on blade separating outer denticle. Hyaline setules between and at bases of some denticles and anterior edge. Second antenna, first maxilla, second maxilla, and maxilliped with setation and segmentation typical for the genus.

Leg 1 (Fig. 5) atypical for the genus: endopod with 8 instead of 6 setae, and incipient segmentation on anterior surface. Anterodistal cluster of setules on first basipod. Legs 2–4 (Figs. 6–8) with segmentation and setation typical for the genus; exopods with hyaline pointed cusps at anterior base of each spine. Legs 1–4 with outer exopod spines trowel-shaped, posterior view; each edge with hyaline serrated flange, usually apparent in anterior view. Sars' (1902) figure of *Eurytemora velox* leg 1, third exopod, is missing a spine, but his illustration of the species as *Temorella lacinulata* (Fischer) in 1897 correctly shows 1 long and 2 short spines.

Leg 5 (Fig. 9) with outer sclerotized margins, conspicuous at posterior articulation of exopod (Fig. 10). First exopod with 2 finely barbed outer spines; robust inner spinous process with anterior and posterior row of short spinules. Second exopod small, oval, with 2 outer and 1 terminal finely barbed, sinuate spines; 2 delicate setules on inner margin.

Male: Body with moderately stocky prosome (Fig. 11). Length about 1.49 mm (4 specimens, 1.40–1.56 mm). Last prosomal segment rounded, not produced. Uropod length about equal to combined length of preceding 2 segments (Fig. 12). Uropodal setae longer than uropod.

First antenna (Table 3) differs from other males in the genus with the additions of an esthete on segments 4 and 5, a seta on left segment 10, and a spine on right segment 10 (Fig. 13). Right and left segment 5 with 1 elongate and 1 short esthete; delicate setules on segments 4, 5, and 7. Esthetes on right and left segments 11, 13, and 15 elongate, with dilated bases. Left segment 17 with elongate esthete. Right segments 6–11 ridged and curved with dorsal coalescence; segments 13–16 expanded; segment 16 (Fig. 14) with 2 spinous protuberances partially covering 2 pores, a setule between them; segments 17–19 each with complex sclerotized pointed processes bearing scale-like modified setules, geniculation between 18, 19. Second antenna, mandible, first maxilla, second maxilla, and maxillipeds like those of female.

Legs 1-4 similar to those of female. Leg 5 (Figs. 15-16) with first basal segments fused left to right. Left ramus 3-segmented: second basal segment and first exopod robust; second exopod mitten-shaped

4

FIGS. 1-5. Eurytemora richingsi new species, female: 1, Lateral (a); 2, Posterior of prosome and urosome, dorsal (a); 3, Genital segment, ventral (b); 4, Right mandible (c); 5, Leg 1, anterior (b).



#### New Arctic Ocean copepod

March Mark			MIN	Male											Male				
	Female		-	Le	ft		Rig	ght		]	Female		-	Le	ft	1	Right	-	
Segment	s	е	Sp	S	e	Sp	S	e	Sp	Segment	5	e	Sp	s	e	Sp	s	e Sp	,
1	3	1		3	1		3	1		13	2			2	1		2	1	
2	3	1		3	1		3	1		14	2	1		2	1		2	1	
3	2	1		2	1		2	1		15	2			2	1		2	1	
4	1			1	1		1	1		16	2	1		2	1		2	1	
5	2	1		2	2		2	2		17	2			2	1		1	1	
6	1			1	1		1	1		18	2			2	1		1	1	
-7	2	1		2	1		2	1		19	2	1		2	1		1	1)	
8)			1		1	1		1	1	20	1			1			1	)	
9)	2	1		2	1		1	1	1	21	1			1			ab	sent	
10	1		1	1	1	1		1	2	22	2			2			2	)	
11	2	1		2	1		1	1	1	23	2	1		2	*		2	1)	
12	1	1	1	1	1	1	1	1	1	24)	6	1		6	1		6	1)	
a a se										25)									

Table 3. Eurytemora richingsi first antenna armature: s = seta; e = esthete; Sp = spine; ) = adjacent segments fused.

\* Only 1 male had a complete left antenna; lack of the typical esthete on segment 23 should be verified.

(Fig. 17), with 2 outer spines and 2 spines on the articulated thumb; dense clusters of setules on distal surfaces, margins heavily sclerotized. Right ramus 4-segmented: second basal segment robust, with prominent posterior boss; inner margin dilated, with 3 sclerotized petaloid flaps and 1 blunt hyaline spine. First exopod with distal sclerotized constriction. Second exopod with 1 setule and 1 spine on rugose inner margin. Third exopod a curved claw with a spine and 2 spinules on inner margin.

*Etymology*: This species is named for the late Michael Kent Richings, Department of Oceanography, University of Washington, in memory of his dedication to the Arctic field program, in which he participated for many years.

Remarks: Eurytemora richingsi was found in only 3 samples from a collection of 54 samples taken from May-September 1968. Most of these samples were taken in 500 m intervals between 3000-500 m; others

FIGS. 6-10. Eurytemora richingsi new species, female: 6, Leg 2, anterior (b); 7, Leg 3, anterior (b); 8, Leg 4, anterior (b); 9, Leg 5, anterior (b); 10, Left leg 5, posterior (c).

4



were from shorter intervals from 500 m to the surface. Salinities at depth were: 34.607% (275 m), 34.751% (325 m), 34.857% (375 m), 34.927% (450 m), and 34.886% (1000 m). Three of the 4 females had a spermatophore attached to the ventral surface of the genital segment, each spermatophore fixed securely and similarly, with the distal part directed to the left (see Fig. 1).

Comparison with other species of Eurytemora: Only 3 other species have such short uropods in relation to the anal segment, *E. pacifica*, *E. velox*, and *E. wolterecki*. Leg 1 endopod differs from all other species of the genus with the presence in *E. richingsi* of an outer seta and an additional inner seta. *Eurytemora richingsi* is one of 4 species whose females have not been found with conspicuous wings. *Eurytemora affinis* and *E. pacifica* occur with and without wings (Gurney, 1931; Johnson, 1961; Heron, 1964) (Table 2).

*Eurytemora richingsi* female leg 5 has 3 short spines on exopod 2 in place of the typical 1 long and 1 shorter spine or seta. Male leg 5 left exopod 2 with distinctive mitten shape and articulated thumb. Several other *Eurytemora* species have bulbous projections on the left terminal exopod, but none is described as being articulate.

### LITERATURE CITED

- BOWMAN, THOMAS E. 1971. The case of the nonubiquitous telson and the fradulent furca. Crustaceana 21(2):165-175.
- DAMKAER, DAVID M. 1975. Calanoid copepods of the genera Spinocalanus and Mimocalanus from the central Arctic Ocean, with a review of the Spinocalanidae. NOAA Technical Report NMFS Circular 391:1-88.
- GIESBRECHT, W., AND O. SCHMEIL. 1898. Copepoda I. Gymnoplea. Tierreich 6:1-169.
- GURNEY, ROBERT. 1931. British fresh-water copepods, 1: 1–238. Ray Society, London.
  - ——. 1933. British fresh-water copepods, 3: 1–384. Ray Society, London.
- HERON, GAYLE A. 1964. Seven species of Eurytemora (Copepoda) from northwestern North America. Crustaceana 7(3):199-211.
- JOHNSON, MARTIN W. 1961. On zooplankton of some Arctic coastal lagoons of northwestern Alaska, with description of a new species of *Eurytemora*. Pacific Science 15(3):311-323.

FIGS. 11-17. Eurytemora richingsi new species, male: 11, Lateral (a); 12, Urosome, dorsal (a); 13, Right first antenna, segments 4-12, spines solid (d); 14, Right first antenna, segment 16 (d); 15, Leg 5, anterior (b); 16, Leg 5, posterior (b); 17, Left leg 5, second exopod, anterior (c).

<sup>~</sup> 

# 136 Proceedings of the Biological Society of Washington

- SARS, G. O. 1897. Pelagic Entomostraca of the Caspian Sea. Annuaire Musée Zoologique 2:1-73.
- SMIRNOV, SERGIUS. 1931. Zur Kenntnis der Copepodengattung Eurytemora Giesbr. Zoologischer Anzeiger 94(5/8):194–201.



Heron, G A and Damkaer, David M. 1976. "Eurytemora richingsi New species Of Deep Water Calanoid Copepod From The Arctic Ocean." *Proceedings of the Biological Society of Washington* 89, 127–136.

View This Item Online: <u>https://www.biodiversitylibrary.org/item/107510</u> Permalink: <u>https://www.biodiversitylibrary.org/partpdf/43946</u>

**Holding Institution** Smithsonian Libraries and Archives

**Sponsored by** Biodiversity Heritage Library

**Copyright & Reuse** Copyright Status: In copyright. Digitized with the permission of the rights holder. Rights Holder: Biological Society of Washington License: <u>http://creativecommons.org/licenses/by-nc-sa/3.0/</u> Rights: <u>https://biodiversitylibrary.org/permissions</u>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at https://www.biodiversitylibrary.org.