

# New Alaskan Records of *Eurytemora* (Crustacea, Copepoda)

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THE COPEPOD GENUS *Eurytemora* is known from all the coastal areas of North America, though the records are not extensive. The species occur in salt, brackish, and fresh water. As the genus is widely spread throughout the northern regions of the world, it is to be expected that the coastal areas of Alaska would have an abundance of all the habitat forms. Unfortunately, in the Alaskan collections made during the Canadian Arctic Expeditions no mature specimens were found (Marsh, 1920: 4j). The present report is therefore of interest in recording two species from western Alaska. These include a fresh-water form new to science and an Asiatic brackish-water species not before known in North America.

I am indebted for these collections to Dr. Clifford O. Berg of the Arctic Health Research Center and to Mr. Frank P. Pauls of the Alaska Department of Health. Specimens of each species have been deposited in the United States National Museum.

## *Eurytemora yukonensis* n. sp.

Figs. 1-5

SPECIMENS EXAMINED. Four lots, fresh water, lower Yukon River area, western Alaska. C. O. Berg, collector.

*Type lot*: 25 ♀ (many ovigerous); 13 ♂; many copepodids. Wilson Creek, about a mile southeast of Fortuna Ledge (formerly and popularly known as Marshall), July 27, 1951.

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Holotype ♀, U.S.N.M. 93268; allotype ♂, U.S.N.M. 93269.

*Lot 2*: 4 ♀, 5 ♂, many copepodids. Near outlet of stream into Yukon River, about ¼ mile north of Fortuna Ledge, July 28, 1951.

*Lot 3*: 4 ♀, copepodid stage V. Small lake southwest of Holy Cross, June 15, 1951.

*Lot 4*: 7 ♀, 8 ♂, 4 copepodids. Widened portion of stream emptying into Andreafsky River, about 1 mile east of Andreafsky, August 16, 1951.

*Female*: Total length, dorsal mid-line, 1.645 mm. (metasome 1.01 mm., urosome 0.635 mm.). Head rounded, body tapering, the greatest width in segment 2 (0.415 mm.); width of segment 5, 0.34 mm. First segment showing in lateral view (Fig. 1) a pronounced cephalic depression and a prominent medial distal protuberance. "Wings" of last segment very wide, slanting outward, without pronounced inner lobes, entire expanse greater than width of second segment (0.48 mm.).

Urosome equaling 38 per cent of total length. Relative lengths of segments and caudal rami, exclusive of caudal setae:

1	2	3	CR
50	33	45	61

Genital segment constricted in middle, a little asymmetrical, both proximal and distal lobes prominent, proximal wider than distal, both armed with a few lateral sensory hairs. Genital operculum small, nearly hemispherical, distal edge quite rounded. Segments 2 and 3 without ornamentation.

Caudal rami shorter than segments 2 and 3 combined, their length about 5.5 × their width; unarmed except for inner marginal



hairs. Longest of caudal setae equaling length of rami.

Antennules 24-segmented, reaching to near end of metasome segment 5. Division between segments 8 and 9 distinct on inner side, but not always on outer. Aesthetes with stalk-like bases (Fig. 2). Setae not long, none reaching farther than to near end of succeeding two segments. Numerical setation as follows (s—seta, sp—spine, a—aesthete):

Segment	1—3s, a	13—2s
	2—3s, a	14—2s, a
	3—2s, a	15—2s
	4—ls	16—2s, a
	5—2s, a	17—2s
	6—ls	18—2s
	7—2s, a	19—2s, a
	8—sp	20—ls
	9—2s, a	21—ls
	10—sp	22—ls+ls
	11—2s, a	23—ls+ls, a
	12—ls, a, sp	24—6s, a

Mandible blade (Fig. 5) with anterior side rounded, produced to moderately sized denticle with small transparent cap; symmetrical, moderately deep gap present between it and following denticle.

Leg 5 (Fig. 2) having basipod and exopod subequal in length. Lateral spines of exopod 1 short, not as long as width of segment, tips sinuous. Inner process nearly straight, forming right angle with segment, its width greater than length of segment (22:15, measured from notch at inner lower base); margins serrate. Terminal inner spine of exopod 2 as long as total exopod, proportion to outer lateral spine 25:7; segment produced to minute point between the two spines; inner margin of segment with two extremely fine hairs.

*Male*: Total length dorsal mid-line 1.38 mm. (metasome 0.81, urosome 0.57 mm.). First segment with cephalic depression and prominent medial dorsal protuberance as in female.

Urosome 41 per cent of total length of body. All segments lacking ornamentation. Caudal rami a little shorter than segments 3–5

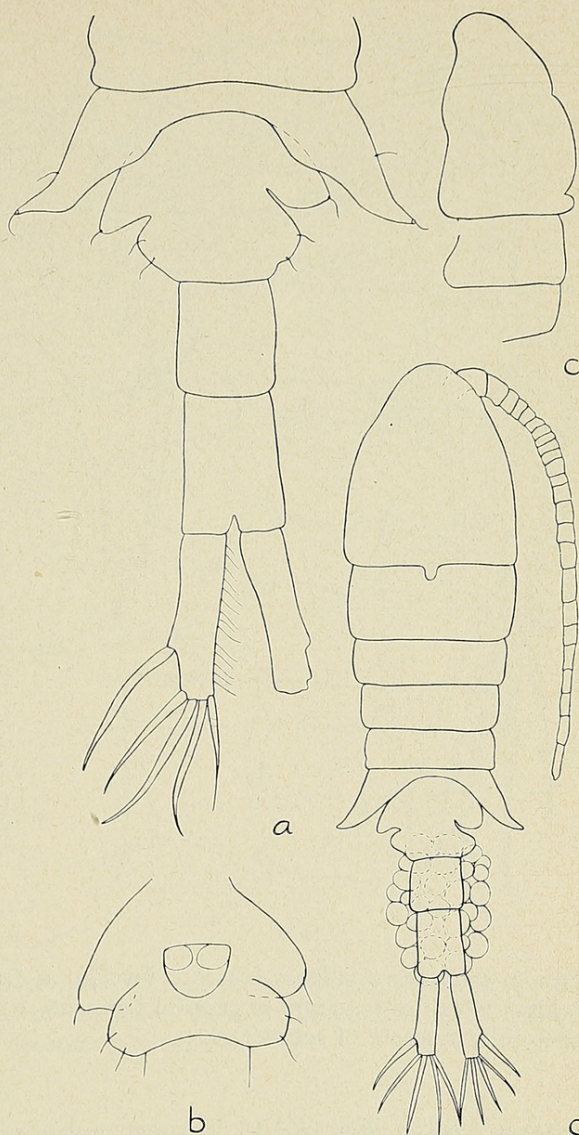


FIG. 1. *Eurytemora yukonensis* n. sp. Female. a, Metasomal segment 6 and urosome, dorsal view; b, genital segment with operculum, ventral view; c, habitus, lateral view of cephalic segment; d, habitus, dorsal view.

combined, about 35 per cent of total length of urosome; their length about  $7 \times$  their width. Rami unornamented, except for long hairs on inner margins. Longest caudal setae longer than rami.

Antennules reaching a little beyond metasome. The left differing from that of female in having only 1 seta on segment 11, and in having aesthetes on all of segments 1–19, except on 4. Aesthetes longer than in female, those of segments 12 and 14 particularly long, reaching to about end of following two segments. Right antennule with spines on segments 8–12, length of all less than width of



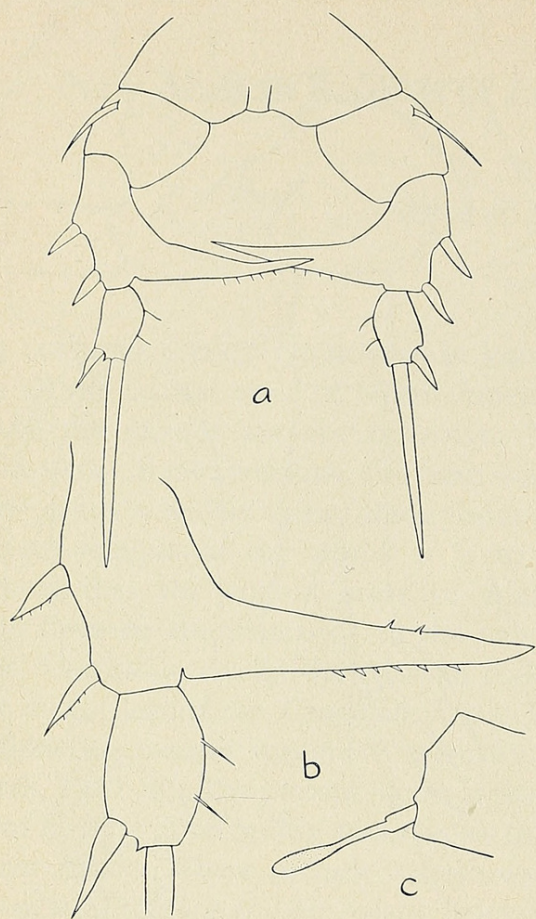


FIG. 2. *Eurytemora yukonensis* n. sp. Female. *a*, Leg 5; *b*, leg 5, detail of armature of exopod segments 1-2; *c*, antennule, aesthete of segment 11.

segments, those of 9 and 12 longest, subequal to each other (Fig. 3). Segments 14-16 very swollen. Segments 17 and 18 with marginal, hyaline, depressed processes ornamented with double row of spinous serrations. Penultimate segment with proximal curving group of long, slender spinules, with striated lamina following; distal portion without ornamentation. Terminal segment somewhat longer than preceding segment (50:40).

Leg 5 (Fig. 3) having both rami 4-segmented. Basal portion narrow, first segment of left leg longer than that of right. Right leg characterized by an extremely long terminal segment. Relative lengths of basipod 2 and exopod segments 1 and 2: 40:50:73. Inner distal portion of second basipod segment swollen a little. Terminal segment not only extremely long but very slender, without

any inner basal swelling, and with distal inner margin very irregular.

Second basipod segment of left leg short, swollen inside. Terminal segment a little longer than exopod 1 (45:40), apex broadened but hardly produced on either side; inner portion and most of anterior side set with short hairs.

**COPEPODID STAGES** (Fig. 4). Copepodid stages 3, 4, and 5 were present in the collections. All had a prominent dorsal protuberance of the cephalic segment as in the adult. Stage V is briefly described.

*Female, stage V*: Total length 1.29 mm. (metasome 0.8, urosome 0.49 mm.). Urosome 3-segmented, genital segment without lateral protrusions. Proportion of caudal rami to rest of urosome 12:20. Antennule 23-segmented. Leg 5 having inner process of exopod short, lateral spines all short as in adult, terminal spine also about as long as exopod, spinous process between terminal spines more pronounced than in adult.

*Male, stage V*: Total length 1.175 mm. (metasome 0.725, urosome 0.45 mm.). Urosome 4-segmented. Leg 5 with 4-segmented rami, left a little shorter than right, apical segments very similar, others showing a slight asymmetry, most pronounced difference being rounded protrusion of inner margin of right basipod 2.

**DIAGNOSTIC CHARACTERS.** The diagnostic characters of this species may be summarized as follows:

Pronounced dorsal protuberance of cephalic segment in both sexes in adult and copepodid stages 3-5.

Genital segment of female strongly constricted, proximal lateral lobes wider than distal; genital operculum hemispherical.

Urosome and caudal rami in both sexes lacking dorsal ornamentation.

Caudal rami of female shorter than segments 2 and 3 combined; those of male shorter than segments 3-5, their length about 7 X their width.



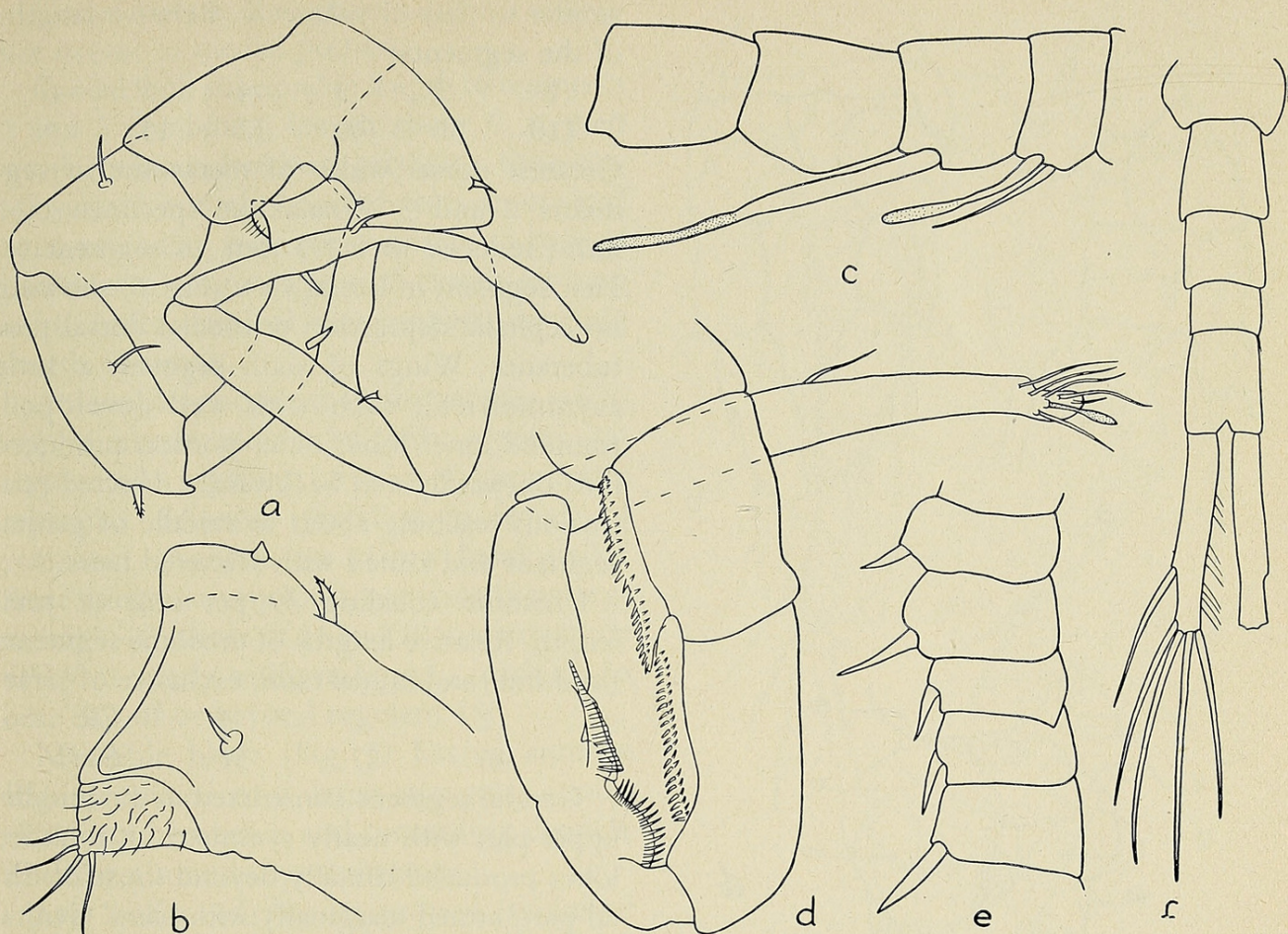


FIG. 3. *Eurytemora yukonensis* n. sp. Male. *a*, Leg 5, posterior view; *b*, leg 5, detail of apex of left exopod, posterior view; *c*, left antennule, segments 11-13, with detail of aesthetes; *d*, right antennule, apical segments; *e*, right antennule, segments 8-12, with detail of spines; *f*, urosome, dorsal view.

Mandible blade with symmetrical gap between anterior edge and succeeding denticle.

Spines on segments 8-12 of right antennule of male shorter than width of segments, those of 9 and 12 longest.

Leg 5 of female with 2 spines on exopod 1; inner process straight, wider than length of segment; lateral spines short. Inner terminal spine of exopod 2 as long as whole exopod; this segment with inner hairs.

Leg 5 of male with both rami 4-segmented, claw of right side very much longer than preceding segment (73:50). Terminal portion of left leg expanded but without digitiform protrusion.

#### COMPARISON WITH OTHER SPECIES

The fifth leg of the female most closely resembles that of *Eurytemora lacustris* Poppe (as

described by Sars, 1903). It further agrees with this species in lacking dorsal ornamentation on the urosome and caudal rami. It differs in having the last metasomal segment produced into conspicuous wings and the genital segment swollen and constricted laterally. The left fifth leg of the male of *yukonensis* differs from *lacustris* in not having the terminal portion produced into a prominent digit.

#### *Eurytemora composita* Keiser

Figs. 5-7

*Eurytemora composita* Keiser, 1929: 301, figs. 1-6.

*Eurytemora composita* Smirnov, 1929: 318, figs. 1-2.

*Eurytemora composita* Rylov, 1930: 234, fig. 77 (after Keiser).



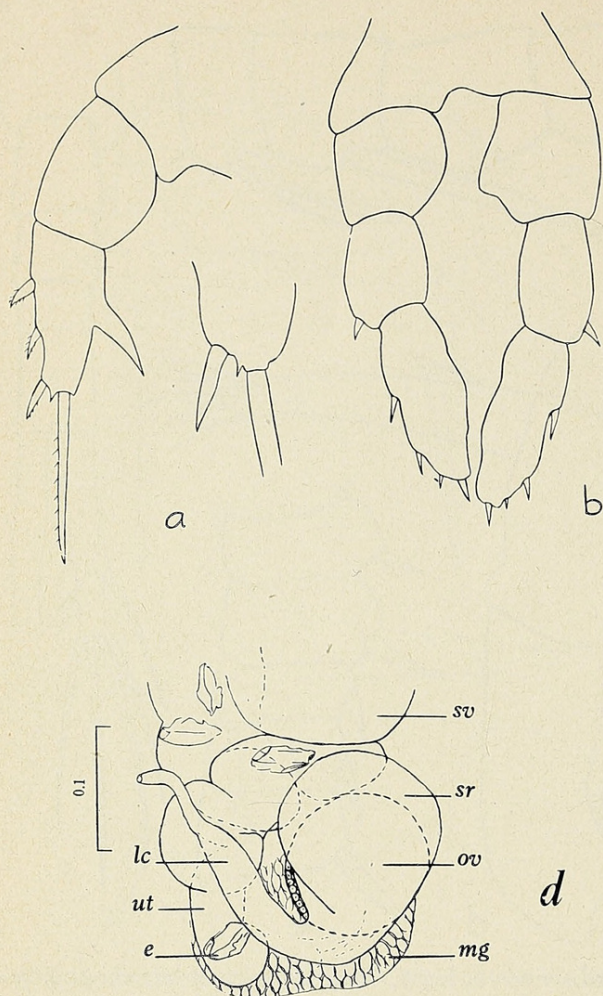


FIG. 4. *Eurytemora yukonensis* n. sp. Copepodid stage V. a, Female, leg 5 with detail of apex of exopod; b, male, leg 5, posterior view.

?*Eurytemora* spec. Kiefer, 1938: 78, figs. 1-3 (♂).

SPECIMENS EXAMINED. One ♀. Tundra pond (brackish?) near Unalakleet, on Norton Sound, western Alaska, August 7, 1951, C. O. Berg.

Five ♀ (4 ovigerous), 8 ♂, 21 copepodids. Pond (fresh water which might become brackish at times), Boxer Bay, southwest cape of St. Lawrence Island, Bering Sea, Alaska, July 6, 1952, F. P. Pauls.

#### DESCRIPTION OF ALASKAN SPECIMENS.

*Female*: Total length dorsal mid-line: St. Lawrence Island specimens 1.21-1.46 mm.; Unalakleet specimen 1.41 mm. (metasome 0.68, urosome 0.55 mm.). Body form in dorsal view

similar to that of *yukonensis*. Relative lengths of the segments:

1	2	3	4	5	6
110	50	40	32	15	9

Greatest dorsal width of metasome in segments 2 and 3 (Unalakleet specimen 0.37 mm.; reduced to 0.295 mm. in segment 5). First segment in lateral view (Fig. 6) showing no cephalic depression or medial dorsal protuberance. Wings of sixth segment a little asymmetrical, each with well-developed, rounded inner lobe; outer portion produced into outwardly and backwardly directed protrusions reaching about to middle of genital segment and armed with scattered hairs.

Urosome equaling 39 per cent of total length. Relative lengths of urosome segments (mid-line) and caudal rami, exclusive of setae:

1	2	3	CR
46	27	31	60

Genital segment constricted in the middle, upper part with nearly symmetrical, rounded lobes produced laterally beyond those of distal part, armed marginally with hairs. Genital operculum conspicuous in lateral profile (Fig. 6d), occupying a comparatively large part of ventral area which is without cuticular folds or tumid protrusions. A heavy, sclerotized, semicircular line encloses area of receptacula, portion of operculum distad to this consists of a large, rounded flap.

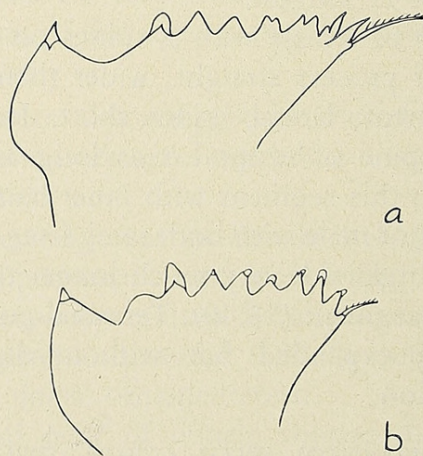


FIG. 5. Apex of mandible blade, female. a, *Eurytemora yukonensis* n. sp.; b, *Eurytemora composita* Keiser.



Dorsal surface of segments 2 and 3 spinulose except in medial portion.

Caudal rami subequal in length to segments 2 and 3 combined; length about  $6 \times$  their width (measured without pressure); their dorsal surface entirely covered with short, stiff hairs extending over outer margin to base of lateral seta; inner margin with closely set long hairs. Inner terminal seta longest, equaling length of ramus.

Antennules shorter than metasome, reaching to about middle of fifth somite; 24-segmented, segments 8 and 9 imperfectly separated. Setation typical as in female of *yukonensis*, aesthetes on narrow basal stalks. Setae comparatively long, particularly on segments 7–20; those of 15 and 20 longest, those of 15 of nearly uniform length, reaching to near end of or beyond segment 18.

Mandible blade (Fig. 5) having anterior edge produced to a large triangular tooth, usual gap between it and succeeding denticle filled by a rounded protuberance.

Leg 5 (Fig. 7d) having exopod (exclusive of spines) only a little longer than basipod, 25:20. Spines of exopod 1 longer than width of proximal part of segment. Lateral spine of exopod 2 nearly as long as terminal inner spine. Relative lengths of spines to one another:

Segment 1	Segment 2
9 : 11	13 : 18

Exopod 1 not quite twice length of exopod 2 (16:9). Inner process, measured from inner base of segment 2, a little longer than total length of its segment (19:16); tips markedly upcurved, margins with a few exceedingly fine serrations. Lateral spines appearing unarmed except under high power which shows that their margins are also minutely serrate. Terminal inner spine of exopod 2 relatively short, about twice length of segment which is not produced to a spinous point between it and lateral spine. Two very fine hair-like setae on inner margin of segment.

*Male*: Total length dorsal mid-line about 1.07 mm. (metasome 0.605, urosome 0.465

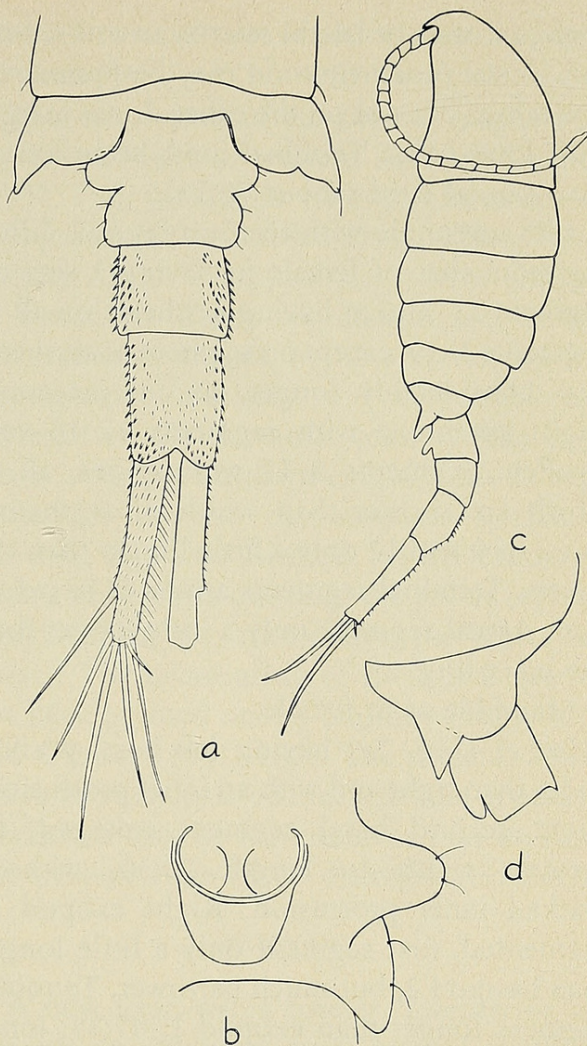


FIG. 6. *Eurytemora composita* Keiser. Female. a, Metasomal segment 6 and urosome, dorsal view; b, operculum and lateral outline of genital segment, ventral view; c, habitus, lateral view; d, outline of metasomal wings and genital operculum, lateral view.

mm.). Cephalic segment in lateral view showing no depression or distal protuberance. Last segment not produced laterally, armed with a few hairs.

Urosome (Fig. 7) 43 per cent of total length of body. Segments 1–4 armed laterally with scattered hairs, segment 5 with short spinulose hairs on outer dorsal surface and lateral margins.

Caudal rami (exclusive of setae) a little longer than segments 3–5 combined; equaling about 39 per cent of total length of urosome; their length nearly  $10 \times$  their greatest width. Outer margin with closely set coarse hairs which may or may not extend onto dorsal



surface in area of lateral seta; in an individual, this dorsal ornamentation may be present on one ramus but not on the other. Inner margin with long hairs. Terminal inner setae longer than caudal rami (about 70:58).

Left antennule with setation typical, differing from that of female in having 1 seta on segment 11, and in having aesthetes on all of segments 1–19, except on segment 4; aesthetes also considerably longer, as in *yukonensis*. Right antennule with segments 12–16 very swollen. Segments 8–12 with spines, all of which are shorter than width of segments; those of 9 and 12 only a little longer than the others. Terminal segments armed as in *yukonensis*. Apical segment only a little longer than the preceding.

Mandible as in female.

Leg 5 (Fig. 7a) having left basal portion wider than right and with an inner protrusion. Right second basal segment enlarged, its greatest width to length 20:30, without marked inner protrusion. Right exopod 2-segmented, first segment only a little longer than basipod 2, but much narrower. Terminal segment longer than exopod 1, 47:35; inner basal portion without a conspicuous swollen portion; terminal part with cuticle of both margins irregular. Left leg having second basal segment shorter than that of right side, without marked inner protrusion. Exopod 2-segmented, both segments with a stout outer spine; terminal segment longer than the first, 45:30. Apical portion of segment 2 broadened, outer part extended as a swollen, rounded digit, tipped with small seta; inner portion having cuticle crenate, anterior side with pad of thickly set fine hairs which protrude beyond margin.

#### COMPARISON OF ASIATIC AND ALASKAN FORMS

*Eurytemora composita* has been known only from the type locality, Lake Issyk-Kul, a large, brackish lake in western Turkestan. Some of Keiser's specimens were examined by Smirnov, who supplemented the descrip-

tion of the type material, giving a more exact illustration of the male fifth leg. Since the two descriptions otherwise agree very well, it may be assumed that the Asiatic form is well enough known to compare it with the Alaskan form with some degree of certainty. The details of the antennules and mandible are not known for the typical form.

The Asiatic and Alaskan females exhibit the following similarities, all of which are diagnostic characters of the species:

Size—1.2–1.4 mm.

Metasomal wings produced, with inner lobes.

Genital segment with lateral hairs, constricted medially, with prominent, symmetrical, proximal lobes.

Genital operculum rounded distally, receptacula located above medial sclerotization.

Anal segment and caudal rami with dorsal ornamentation.

Caudal rami subequal to segments 2 and 3 (or a little longer), length  $6 \times$  their width.

Shape and relative proportions of segments and spines of leg 5.

Presence of inner setae on exopod 2 of leg 5.

The Alaskan female differs from the typical form in:

Presence of dorsal ornamentation on second segment of urosome.

Possible greater development of genital operculum.

Leg 5—Upcurved tip of inner process of exopod 1 and presence of two slender hair-like setae rather than a single stout seta on inner margin of exopod 2.

No illustration of the male urosome has been given for typical *composita*, but Keiser states that the length of the rami is  $7 \times$  their width, and that hairs are present only on the inner margin. The Alaskan specimens differ in having the length of the rami about  $10 \times$  their width, and in the presence of hairs on the anal segment and on both margins of the rami. The fifth leg appears to be very similar in the proportions of the segments and the structure of the apical part of the left leg.



Kiefer's brief description of two males from Paramushir Island in the Kuriles of northern Japan agrees in most points with *Eurytemora composita*. It is like the Alaskan form in having hairs on the anal segment. There are some slight differences in the fifth leg, though the proportions are similar. Without knowing the characters of the female, it would not be entirely correct to ascribe Kiefer's specimens to *composita*. However, the widely separated Turkestan and Alaskan localities suggest the

probable occurrence of the species in intermediate places.

The occurrence of *Eurytemora composita* in an isolated lake of western Asia led Gurney (1931: 186) to suggest its origin from one of the species of the Caspian Sea (*E. affinis*, *velox*, *grimmi*). Such a supposition is now difficult to maintain. The wider distribution of the species, as evidenced by its presence on the Bering coast of Alaska and its possible occurrence on the northeast coast of Asia, suggests instead a northern origin. This is supported by the fact that *composita* is closely allied to *E. raboti* Richard, which occurs in fresh and brackish ponds in the Arctic regions (Spitzbergen, Novaya Zemlya, the White Sea coast). The relationship of these two species has been pointed out by Smirnov (1929: 320) and Gurney (1931: 186). The presence of *E. composita* in an isolated brackish lake in eastern Turkestan may be fortuitous or may indicate the western edge of its distributional range.

#### SUMMARY

A new fresh-water species, *Eurytemora yukonensis*, is described from several localities on the lower Yukon River, Alaska.

*Eurytemora composita* Keiser is recorded and described from ponds at Unalakleet, Norton Sound, and St. Lawrence Island, Bering Sea, Alaska. It has been known only from eastern Turkestan. Two unidentified males described by Kiefer from the Kuriles, Japan, are similar to the Alaskan material and may be the same species. Since *E. composita* is allied to the Arctic species, *E. raboti*, its occurrence in Alaska suggests a northern rather than a Caspian origin.

#### REFERENCES

- GURNEY, ROBERT. 1931. British fresh-water Copepoda. Vol. I. 238 pp., 344 figs. Ray Society, London.
- KEISER, N. 1929. Über eine neue Art der Gattung *Eurytemora*—*Eurytemora composita* sp. nova. Zool. Anz. 80: 301–305, 6 figs.

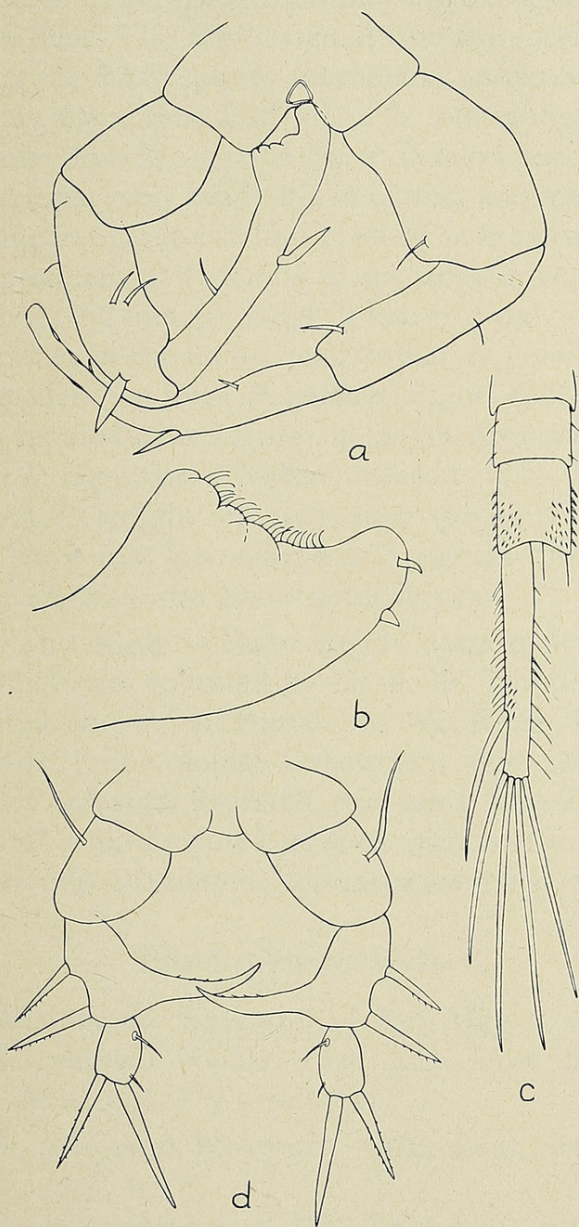


FIG. 7. *Eurytemora composita* Keiser. a, Male, leg 5, posterior view; b, male, leg 5, detail of apex of left exopod, posterior view; c, male, urosomal segments 4–5 and caudal ramus; d, female, leg 5.





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