Leuckartiara acuta (Hydrozoa, Anthoathecatae, Pandeidae),
a New Species from the Pacific

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Abstract  Leuckartiara acuta sp. nov., family Pandeidae (Anthoathecatae, Hydrozoa) has been
collected during surveys of epipelagic salmon habitat in the northern Subtropical Region and the
Transitional Domain of the Subarctic Region of the North Pacific. It is characterized by a tall,
pointed, narrow, apical projection, four perradial tentacles and two or three tentaculae in each
quadrant. Reexamination of specimens recorded from the Subtropical Region of the central
North Pacific by Kramp (1965) as L. gardineri shows that these specimens also belong to the new
species.

Key words: Leuckartiara, Anthoathecatae, Hydrozoa, Cnidaria, taxonomy, distribution

Introduction

During surveys of the epipelagic salmon habitat of the North Pacific specimens of a species of the
family Pandeidae were collected in the northern Subtropical Region and the Transitional Domain of
the Subarctic Region between the date line and Japan. The species belongs in the genus Leuckartiara
Hartlaub, 1914, but differs from any previously described species. The present paper constitutes a
description of the new species, Leuckartiara acuta sp. nov. Previous papers such as Kramp (1965) and
specimens were obtained and reexamined, and were found to also belong to the new species.

Material and Methods

Samples were collected by Japan-U.S. Cooperative High-Seas Salmon Research Cruises in June
of 1995 and 1996 along a South to North transect line at 179°30’W longitude from 38°30’N to
58°30’N latitude in the central North Pacific Ocean and Bering Sea, at transit stations en route to the
fishing area along a line at 40°00’N latitude, and returning to Hokkaido, Japan from the Bering Sea
(Davis et al, 1996; Nagasawa and Ishida, 1997a)(see Fig. 1). In July of each year a North to South line
at 165°00’E was also sampled (Nagasawa and Ishida, 1997b). Similar collecting trips were conducted
in 1997 and 1998 (Nagasawa and Ishida, 1998, 1999), together with one in February 1998 which
sampled shorter portions of both lines (Nagasawa, 2000). In April of 1995 a single specimen was
obtained at 40°00’N, 136°00’E in the Japan Sea (Ishida, 1996).

Samples were collected using a remodeled Norpac net (0.45 m diameter opening, 1.95 m length,
and 0.335 mm mesh size). The net was towed vertically from 150 m depth to the surface at night. The
samples were fixed in 10% formalin in sea water. Preliminary sorting was carried out at the National
Research Institute of Far Seas Fisheries, Shimizu-Orido, Shizuoka. Coelenterates were sorted by M. N. Arai, and over 80 pandeid specimens collected in the North Pacific in 1995 and 1996 and the specimen from the Japan Sea were provided to A. Brinckmann-Voss for taxonomic work (see Fig. 1 for locations). Subsequent sorting of collections from summers of 1997 and 1998 yielded further specimens from the same locations as the first two summers. A single specimen was collected on February 22, 1998 from 43°30’N, 180°00’ (Fig. 1).

Specimens reported by Kramp (1965) as *Leuckartiara gardineri* were lent to us by the Zoological Museum, Copenhagen, Denmark. The lot was collected at the “Selandia” station 4788 (32°50’N, 173°10’W) on 17 May 1933 (Fig. 1). Specimens of *Leuckartiara gardineri* and *L. simplex* were lent to us by the Institut Royal des Sciences Naturelles de Belgique. J. Bouillon collected the *L. gardineri* in 1979 and 1980 off Laing Island, Hansa Bay, Madang Province, Papua New Guinea, and the *L. simplex* in 1981 from the same location.

Figure 1 was drawn by M. Arai with the assistance of M. Theiss; Figures 2-6 were photographed or drawn by A. Brinckmann-Voss.

**Description**

*Leuckartiara acuta* sp. nov.


Diagnosis: *Leuckartiara* with long, narrow apical projection, four perradial tentacles and two or three tentaculæ in each quadrant.

Type Material: Holotype: One specimen (Figs. 2a, 3, 6b) collected at 40°00’N, 160°00’E, June 11, 1996, vertical tow from 150 m depth to surface, deposited in Showa Memorial Institute, Tsukuba Research Center, National Science Museum, 4-1-1 Amakubo, Tsukuba-city, Ibaraki 305-0005, Japan, registration number NSMT-Co S11.

Paratypes: 14 specimens from the same location and collection as the holotype, deposited in Showa Memorial Institute, registration numbers NMST-Co S12-25; 5 specimens from single collection, 40°00’N, 165°00’E, June 12, 1996, vertical tow from 150 m depth to surface deposited in
Fig. 2. *Leuckartiara acuta* sp. nov.: a. holotype, sex unknown. Scale 1 mm; b. a female paratype. Scale 1 mm. c. female gonad on one quadrant of manubrium. Scale 0.25 mm. d. cnidocyst clusters on exumbrellar cnidocyst track. Scale 100 μm. b-d are from different specimens of paratypes but from the same collection as the holotype.
Table 1. Dimensions of several fixed specimens of *Leuckartiara acuta* collected from two locations June 11, 1996. As apical projections are often folded, exumbrellar measurements do not include the apical projection, which in most specimens is approximately half the height of the remaining exumbrella. The tallest specimen included is the holotype.

<table>
<thead>
<tr>
<th>Location</th>
<th>Height exumbrella</th>
<th>Width exumbrella</th>
<th>Width radial canal</th>
<th>Width ring canal</th>
</tr>
</thead>
<tbody>
<tr>
<td>40° N, 160°E</td>
<td>3.0 mm</td>
<td>3.1 mm</td>
<td>0.16 mm</td>
<td>0.12 mm</td>
</tr>
<tr>
<td>40° N, 160°E</td>
<td>3.2 mm</td>
<td>2.6 mm</td>
<td>0.14 mm</td>
<td>0.12 mm</td>
</tr>
<tr>
<td>40° N, 160°E</td>
<td>3.2 mm</td>
<td>2.6 mm</td>
<td>0.16 mm</td>
<td>0.10 mm</td>
</tr>
<tr>
<td>40° N, 155°E</td>
<td>3.2 mm</td>
<td>4.0 mm</td>
<td>0.28 mm</td>
<td>0.12 mm</td>
</tr>
<tr>
<td>40° N, 160°E</td>
<td>3.4 mm</td>
<td>3.0 mm</td>
<td>0.16 mm</td>
<td>0.12 mm</td>
</tr>
<tr>
<td>40° N, 160°E</td>
<td>4.0 mm</td>
<td>3.0 mm</td>
<td>0.16 mm</td>
<td>0.12 mm</td>
</tr>
<tr>
<td>40° N, 160°E</td>
<td>4.0 mm</td>
<td>3.0 mm</td>
<td>0.16 mm</td>
<td>0.12 mm</td>
</tr>
<tr>
<td>40° N, 160°E</td>
<td>4.8 mm</td>
<td>4.1 mm</td>
<td>0.16 mm</td>
<td>0.12 mm</td>
</tr>
</tbody>
</table>
attaching the manubrium to the subumbrella, and entering the stomach at its mid-height, thus forming triangular subumbrellar pockets in each quadrant. Manubrium wide, occupying about half of the subumbrellar cavity; mouth wide with no conspicuous neck-like narrowing of the manubrium towards its opening. Lips with few irregularly shaped frills. Gonads interradial, forming irregular folds or knobs resembling a horseshoe or part of it; sex unknown.

Other specimens (Figs. 2b, 2c, 2d, 4). Height of exumbrella other than apical projection greater or less than the width in preserved specimens (see Table 1). Apical projection often damaged and folded in preserved specimens, but always narrow and distinctively pointed; in most specimens approximately half the height of the remaining exumbrella. Four perradial marginal tentacles, with short abaxial spurs usually not more than 1/10 the height of the exumbrella, with club-like tentacle bulbs, ocelli not discernible in preserved specimens; between each pair of tentacles two or three small triangular bulbs with short tentaculae, the interradial bulb being slightly larger than the adradial ones. The ring and radial canals resemble those of the holotype, with the radial canals flatter and wider than the ring canal (Table 1). The perradial “mesenteries” delimit four triangular subumbrellar pockets as is typical of members of this genus (see Russell, 1953 p. 6). The manubrium filling only half, rarely more, of the subumbrellar cavity with a broad mouth. Some of the specimens could be identified as female showing eggs or planulae in their gonads; other specimens without visible eggs are probably male or immature. The shape of the gonads may vary substantially among specimens (Figs. 2b, 2c, 4): some show a complete horseshoe shape with gonads folded inwards (Fig. 4), others have an extra row of gonad folds within the horseshoe (Fig. 2c), and yet others are just an assemblage of ridges and knobs arranged more or less like a horseshoe (Fig. 2b). Velum present, but often damaged in preserved specimens.

Cnidae measured from tentacles: microbasic euryteles, length/width 7.3/5 μm (n: 10). Cnidae examined from tentacles, lips and exumbrella showed no significant differences of shape or size.

Etymology
This species has been named with reference to its conspicuous but narrowly pointed apical projection.

Distribution
In the present study specimens were obtained from 136°00'E to 179°30'W at latitude 40°00'N, as well as from 38°30'N to 44°30'N at longitude 179°30'W, and from 40°00'N to 43°00'N at longitude 165°00'E. i.e. from the Subtropical Region and the Transitional Domain of the Subarctic Region of the
North Pacific and the Japan Sea (Fig. 1). The “Selandia” specimens were obtained from 32°50′N, 173°10′W (Fig. 1).

Remarks

The medusa described in this paper has most of the characters attributed to the genus *Leuckartiara* Hartlaub, 1914, family Pandiidae, by previous authors. As described above the species has a long apical projection, a large manubrium connected to radial canals by “mesenteries”, four broad ribbon-like radial canals, and four well developed marginal tentacles when adult. It lacks

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Fig. 5. *Leuckartiara gardineri* Browne, 1916. Hansa Bay, Madang Province, Papua New Guinea. a. entire animal. Scale 1 mm. b. apex of umbrella showing wide angle of the short apical projection and upper ends of cord-like exumbrellar spurs. c. umbrella margin with four perradial tentacle bulbs and small interradial and adradial bulbs. Scale figures b and c 1 mm (included with figure b).
diverticulae of the radial canals, marginal cirri, or manubrial lobes. Although the gonads are often very irregular in this species, “horseshoe” gonads, still attributed by several authors to the genus Leuckartiara (see for example Schuchert, 1996), are not a necessary character for the genus. Gonad structure is variable between and within species and distinct interradial connections between the adradial portions of the gonad to form a “horseshoe” are lacking in Leuckartiara foersteri Arai and Brinckmann-Voss, 1980 and L. brownei Larson and Harbison, 1990.


L. simplex differs from L. acuta in possessing laterally compressed marginal bulbs, one interradial bulb and no adradial bulbs per interradius and a large flask-shaped manubrium extending nearly to the velar opening (see Bouillon, 1980). We confirmed these characters by examination of specimens of L. simplex from off Papua New Guinea.

L. gardineri (Fig. 5) resembles L. acuta in possessing small interradial and adradial tentaculae between the 4 perradial tentacles (Browne, 1916; Kramp, 1953; 1961b; Bouillon, 1980) (compare Fig. 3 with Fig. 5c). However the two species are distinguished by several other morphological characters: The apical projection is just the inconspicuous tip of a rather triangular bell in L. gardineri (Figs. 5b,
6c) but a pointed, slender, structure in *L. acuta* (Figs. 6a, 6b). The manubrium extends to near the velar level with a clear constriction near its mouth in *L. gardineri*, but fills only approximately half, rarely up to two thirds, of the subumbrellar cavity with no narrowing towards the mouth in *L. acuta*. Cordlike exumbrellar spurs extend from the tentacle bulbs to near the apex of the bell of *L. gardineri* (Figs. 5a, 5b), whereas in *L. acuta* spurs are short (less than \( \frac{1}{10} \) the height of the exumbrella) and thin and in addition there are long, thin vertical lines - interspersed with nematocyst clusters (Fig. 2d, 3) - leading from the marginal bulbs up and onto the apical projection.

Kramp (1965) reported several specimens of *L. gardineri* collected from the Central North Pacific at the “Selandia” Station 4788 (32°50′N, 173°10′W) on May 17, 1933, but noted that their occurrence in that region was “very peculiar”. We reexamined those specimens from Kramp’s collections, and identified them as clearly belonging to the new species *L. acuta*. In Figure 6 an outline of an exumbrella of a “Selandia” specimen is compared with those of *L. gardineri* and *L. acuta*.

In a masters thesis Hirohashi (1988) reported *L. gardineri* in samples collected between 150 m depth and the surface along a transect at 180° longitude in June to August 1986. The *Leuckartiara* specimens were common in subtropical samples, i.e. from samples collected between 37° and 41°N. It was not possible to obtain these samples to recheck the species identification as would have been desirable in light of our present work.

All of the North Pacific specimens of *Leuckartiara acuta* examined in this study were obtained from the Subtropical Region and the most southern Transitional Domain of the Subarctic Region (Fig. 1). Definitions of the boundaries between regions and domains of the North Pacific are included in Favorite et al (1971). The subarctic boundary with the Subtropical Region is defined by the somewhat variable location of the 34‰ isohaline in the surface layer and lies farther north at the date line than near Japan. Lying immediately north of this boundary the Transitional Domain of the Subarctic Region widens as it runs from Japan toward the date line. Tows made even further north through the Western Subarctic Domain and into the Bering Sea in 1995-1998 did not yield specimens, so it is very unlikely that the range of *Leuckartiara acuta* extends farther north than the Transitional Domain. It is, however, unclear how far south the range might extend since that area was not collected in 1995-1998.

The “Selandia” collection extends the range southward only to 32°50′N (Fig. 1).

The specimens collected in the present investigation were obtained from the upper 150 m of the water column because the investigators were concentrating on salmon habitat. The “Selandia” specimens were collected with 220 m of wire out. However, it is not known whether the species is only epipelagic, since this area of the North Pacific has not been intensively collected below these depths. Most of the specimens examined were obtained by tows made in June and July. The season begins much earlier as shown by the single specimen collected on February 22 and the “Selandia” specimens collected on May 17. They have not as yet been found in late summer or autumn but few collections have been made in those periods.

The locations where species were collected were on the high seas away from the continental shelves. In the pandeid life cycles many instances are known of hydroids which are associated with other animals. This character of the hydroids found in pandeids may make it possible for their medusa stage to inhabit the high seas.

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