UNIVERSITY OF WASHINGTON
DEPARTMENT OF OCEANOGRAPHY

Technical Reports
Nos. 142, 143, 144, 145, 146,
147, 148, and 149

A COMPILATION OF ARTICLES REPORTING RESEARCH
Sponsored Jointly by
THE U.S. ATOMIC ENERGY COMMISSION
and
THE OFFICE OF NAVAL RESEARCH

U.S. Atomic Energy Commission
Contract AT(45-1)-1725
and
Office of Naval Research
Contracts Nonr-477(10)
and Nonr-477(37)
Project NR 083 012

Reference M66-2
January 1966

SEATTLE, WASHINGTON 98105
A Compilation of Articles Reporting Research

Sponsored Jointly by

The U.S. Atomic Energy Commission

and

The Office of Naval Research

U.S. Atomic Energy Commission
Contract AT(45-1)-1725

and

Office of Naval Research
Contracts Nonr-477(10)
and Nonr-477(37)

Project NR 083 012

Reference M66-2

January 1966

Reproduction in whole or in part is permitted
for any purpose of the United States Government
ARTICLES REPORTING RESEARCH SPONSORED JOINTLY BY THE
U.S. ATOMIC ENERGY COMMISSION AND THE OFFICE OF NAVAL RESEARCH

Technical Report No. 142


Technical Report No. 143


Technical Report No. 144


Technical Report No. 145


Technical Report No. 146


Technical Report No. 147


Technical Report No. 148


Technical Report No. 149

THE TINTINNID PARAFAVELLA GIGANTEA (BRANDT), KOFOID & CAMPBELL, 1929, IN THE NORTH PACIFIC OCEAN

BY

HSIN-YI LING

Reprinted from JOURNAL OF PALEONTOLOGY Vol. 39, No. 4, July, 1965
THE TINTINNID PARAFAVELLA GIGANTEA (BRANDT), KOFOID & CAMPBELL, 1929, IN THE NORTH PACIFIC OCEAN

HSIN-YI LING
University of Washington, Seattle

INTRODUCTION

During the preparation of planktonic radiolarians from the northeast part of the Pacific Ocean, an interesting tintinnid specimen was recovered. The presence of an uncommonly elongate aboral horn, which makes up a high proportion of the total length of the lorica, led the writer to study the detailed morphology of the specimen and to make comparisons with related forms previously recorded from the North Pacific Ocean.

The sample from which the tintinnid was recovered was obtained aboard the University of Washington's Department of Oceanography research vessel, the M. V. Brown Bear, on Cruise 144, August 23, 1956. The sample was collected with a Clarke-Bumpus sampler (Clarke & Bumpus, 1950) using a nylon net of 0.239-mm. aperture size, from depths between 200 meters and the surface at station 34 (lat. 44°00' N., long. 128°29' W.) (Text-fig. 1). The slide on which the specimen is mounted is deposited in the collection of the Department of Oceanography, University of Washington, Seattle.

DESCRIPTION OF SPECIMEN

Pl. 90, figs. 1-4

Lorica large, elongate, chalice-shaped, seven oral diameters in total length; oral margin denticulate, bearing 48 slender, slightly outward-flaring (15°) conical teeth 4 microns in length; long cylindrical portion of the bowl about three oral diameters in length, smoothly and barely tapering aborally; aboral region of the bowl is slightly convex conical (40°), about one oral diameter in length, and has an acute tip; aboral horn slender, elongate, nearly three oral diameters in length, which is 0.4 of the total length of the lorica; wall of the lorica has well-developed hexagonal meshwork of nearly uniform size except in the aboral horn, from which the meshwork is completely absent.

Length of the lorica, 521 microns; oral diameter, 77 microns.

Comparison.—The specimen is morphologically similar to Parafavella gigantea (Brandt) of Kofoid & Campbell, 1929. In 1929, Kofoid & Campbell established the genus Parafavella, listed a complete synonymy of Parafavella gigantea, and figured but did not describe the species. Since then, two forms from the North Pacific Ocean have been referred to this species. Hada's (1932, p. 52, fig. 16) figure of a specimen distinctly shows a constriction at the middle of the bowl of the lorica, whereas Campbell's forms (1942, p. 77, figs. 52, 53) of this species lack this constriction. In discussing his forms, Campbell stated:

"The Carnegie loricae lack contraction in the bowl, being either directly cylindrical or tapering, and are much more like that figured by Kofoid and Campbell than figured by Hada."

Table 1 summarizes the minor variations in the described forms of Parafavella gigantea.

The present specimen seems to be intermediate between Hada's and Campbell's forms, although the aboral horn is much longer and the ratio of the length of the aboral horn to that of the entire lorica is much higher than in any of the forms previously described. It is the writer's

EXPLANATION OF PLATE 90

Figs. 1-4—Parafavella gigantea from station 34 of Brown Bear Cruise 144, North Pacific Ocean (Text-fig. 1). 1, Lorica, X207; 2-4, same specimen, X662, showing oral margin and its dentition, cylindrical portion of bowl and hexagonal meshwork of the wall, and aboral portion of the bowl.
Text-fig. 1—Map of the North Pacific Ocean showing the occurrences of *Parafavella gigantea* (Brandt), Kofoid & Campbell, 1929. Surface circulation, dashed lines, and Subarctic Pacific boundary, dotted line, from Dodimead and others (1962); boundary of Cold North Pacific Region, heavy dashed line, from Graham & Bronikovsky (1944); Hada's (1932) stations, solid triangles; Campbell's (1942) Carnegie stations, solid circles; and station 34 of Brown Bear cruise 144, solid square.


**Table 1. Characters of North Pacific forms of *Parafovela gigantea***

<table>
<thead>
<tr>
<th>Character</th>
<th>Hada (1962)</th>
<th>Campbell (1942)</th>
<th>This paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral diameter</td>
<td>63 to 71</td>
<td>61 to 72*</td>
<td>77</td>
</tr>
<tr>
<td>Microns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total length</td>
<td>340 to 576</td>
<td>337 to 576</td>
<td>521</td>
</tr>
<tr>
<td>Microns</td>
<td>5.3 to 8.1</td>
<td>5.9 to 6.9</td>
<td>7.0</td>
</tr>
<tr>
<td>Oral diameters</td>
<td>1.56*</td>
<td>1.17</td>
<td>3.0</td>
</tr>
<tr>
<td>Length of aboral horn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral diameters</td>
<td>1.56*</td>
<td>1.17</td>
<td>3.0</td>
</tr>
<tr>
<td>Aboral horn length/total length</td>
<td>0.25 to 0.33</td>
<td>0.17 to 0.2*</td>
<td>0.4</td>
</tr>
<tr>
<td>Teeth</td>
<td>slightly outflared</td>
<td>distinctly outflared</td>
<td>slightly outflared</td>
</tr>
<tr>
<td>Convexity of aboral region</td>
<td>present</td>
<td>absent</td>
<td>absent</td>
</tr>
<tr>
<td>Constriction in bowl</td>
<td>45° to 60°</td>
<td></td>
<td>40° to 45°</td>
</tr>
<tr>
<td>Convexity</td>
<td></td>
<td></td>
<td>40°</td>
</tr>
</tbody>
</table>

* Data taken from illustrations.

An opinion that it may be assigned to *Parafovela gigantea* s.l. until more specimens are obtained.

**Parafovela gigantea in the North Pacific Ocean**

Hada (1932) first reported the occurrence of the species in the North Pacific Ocean. His specimens came from six stations, two of which were located south of the Kamchatka Peninsula and others in the Sea of Okhotsk. Through the *Carnegie* cruise, Campbell (1942) found the species at six stations in the Pacific Ocean, two (116, 117) in the middle northern latitudes, three (119, 122, 123) in the east Asian marginal sea, and one (130) in the California region.

All these occurrences of *Parafovela gigantea*, with the exception of *Carnegie* station 130, are within the Cold North Pacific Region, which was delineated by Graham & Bronikovsky (1944) on the basis of distribution of *Ceratium*, a dinoflagellate, observed during the *Carnegie* cruise. Using a more recent oceanographic interpretation, almost all the reported occurrences of the species are within the area defined as the Subarctic Pacific Region by Dodimead and others (1962).

This preliminary information on occurrence indicates that surface circulation plays an important role in the distribution of these plankton. In addition, the absence of the species from the subtropical or tropical regions of the Pacific suggests that *Parafovela gigantea* might be useful as a cold water or cold current indicator.

**Acknowledgments**

Thanks are due Betty J. Enbysk, University of Washington, Dorothy Jung Echols, Washington University, St. Louis, and Arthur S. Campbell, St. Mary's College, Contra Costa, California, for their advice and reading of the manuscript. This work was supported in part by Atomic Energy Commission Contract No. AT(45-1)-1725 and Office of Naval Research Contract No. 477(10), Project No. NR 083 012, and Contract No. 477(37), Project No. RR 044-03-01. This paper constitutes Contribution No. 329 of the Department of Oceanography, University of Washington.

**References**


