Studies on Gregarines from Japan: II. Cephaloidophora anisogammari n. sp. and Cephaloidophora elongata n. sp. from Amphipoda (With 2 Text-figures, 2 Tables and 1 Plate)

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Studies on Gregarines from Japan

II. Cephaloidophora anisogammari n. sp. and Cephaloidophora elongata n. sp. from Amphipoda

By

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(With 2 Text-figures, 2 Tables and 1 Plate)

Much investigation has done in the field of gregarines. Various workers have reported using their own patterns since there isn’t yet any standardized pattern for describing the diagnosis of the animal. It is, I believe, necessary to unify and simplify the description. As the first step, in this paper, I shall make some simplifications and standardizations by introducing a numbering system placing a numeral before each character. Of course a more sophisticated system should be established in the near future.

In this paper I wish to report two new species belonging to the family Cephaloidophoridae which are parasitic in the intestine of the marine amphipodes. These observations were made in 1968 and 1970.

I am deeply grateful to Prof. M. Yamada under whose direction this work has been carried out and also to Dr. Sh. F. Sakagami for his valuable suggestions and criticisms. I also thanks Prof. D. McCoy, Sophia University Science English Center, for his needful suggestion.

Materials and Methods

The host amphipodes used in this study were collected from the seaside districts of Hokkaido. Almost all the amphipodes examined in my investigation were infected with gregarines.

One host, Anisogammarus pugetensis, was caught at Ishikari beach in December 1970. It is a common sea flea whose habitat is under sea weeds or rubbish washed upon the shore.

The other host, Hyale schmidtii, is a dark brown sandhopper with white spots on the body surface. It was found among calcareous algae on a reef at Aikappu Point in Akkeshi.

These parasites were studied as fresh specimens and also in fixed preparations, as has been done in a previous paper (K. Hoshide, 1968). The smear preparations were fixed in Bouin’s fluid and stained by Delafield’s haematoxylin. Lugol’s solution was often used for the detection of iodonophilous granules in the cytoplasm and nucleus.

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Cephaloidophora elongata n. sp.
(Fig. 1, Pl. 1–4)

Host: *Hyale schmidtii* (Heller)
Habitat: Intestine
Locality: Akkeshi, Aikappu Point
Time: June 1968
Ratio of infection: 60%

### Diagnosis

1. **Association**........Biassociation, Longest specimen 378μ
2. **Measurements**
   - Size (unit μ)
     - Maximum: TL 202, WD 25
     - Average: TL 155, LP 10, LD 145, WP 14, WD 19
     - Nucleus: 14×10
3. **Epimerite**............Rudimental
4. **Protomerite**
   - Shape..............Hemispherical, well rounded at top
   - Structure...........Lens-shaped transparent structure at anterior half of protomerite
5. **Deutomerite**
   - Shape..............Elongate cylindrical, almost the same width from anterior to posterior part, widest portion unfixed
6. **Septum**..............Distinct, transparent Constriction shallow but clear
7. **Nucleus**
   - Shape...............Ellipsoidal, sometimes spherical
   - Position............At anterior half of deutomerite, visible in living
8. **Endoplasm**
   - Color...............Brown
   - Granules............Fairly dense, fine homogeneous granules
(Satellite)
9. **Protomerite**
   - Shape...............Somewhat suppressed, disc-shape
   - Structure...........Anterior part projects into concave posterior end of primite
10. **Deutomerite**........Same as that of primite
Fig. 1. *Cephaloidophora elongata* n. sp. A. Large adult association. B. Trophozoite. C. Small trophozoite. D. Large trophozoite.

Table 1.

<table>
<thead>
<tr>
<th>Diagnosis number</th>
<th>Species</th>
<th><em>Cephaloidophora elongata</em> n. sp.</th>
<th><em>C. carpilodei</em></th>
<th><em>C. guinotae</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>I. 1. Association (Primate)</td>
<td>Max. length</td>
<td>Max. length</td>
<td>378µ</td>
<td>300µ</td>
</tr>
<tr>
<td>I. 2-1. Measurements Size</td>
<td>Max. TL</td>
<td>Max. TL</td>
<td>202µ</td>
<td>135µ</td>
</tr>
<tr>
<td></td>
<td>TL&lt;tl</td>
<td>TL&gt;tl</td>
<td>TL&gt;tl</td>
<td></td>
</tr>
<tr>
<td>I. 2-2. Measurements Ratio</td>
<td>PL: TL</td>
<td>1: 16.3</td>
<td>1: 5.5</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>PW: DW</td>
<td>1: 1.4</td>
<td>1: 1.0</td>
<td></td>
</tr>
</tbody>
</table>
Studies on Gregarines from Japan II

6'. Septum ...............Distinct
Constriction shallow

II. Cyst .................Not observed

III. Spore .................Not observed

IV. Movement ...............Gliding movement

Remarks:
This species has some similarity to *Cephaloidophora carpilodei* Ball 1963 and *C. guinotae* Théodoridès 1967 generally in body shape, but *C. elongata* n. sp. is different from the latter two in the points shown in Table 1.

*Cephaloidophora anisogammari* n. sp.  
(Fig. 2, Pl. 5–9)

Host: *Anisogammarus pugettensis* (Dana)
Habitat of parasite: Intestine
Locality: Ishikari beach
Ratio of infection: 100%

Diagnosis

I. Sporadin
1. Association...............Biassociation, Longest specimen 102μ
(Primite)
2. Measurements
   2-1. Size (unit μ)
       Maximum TL 54, WD 24; tl 48, wd 24,
       Average TL 36, LP 10, LD 26, WP 13, WD 14; tl 31,
       lp 7, ld 24, wp 12, wd 13
       Nucleus 5
   2-2. Ratio LP:TL=1:3.7, WP:WD=1:1.1;
       lp:tl=1:4.6, wp:wd=1:1.2
3. Epimerite ........Rudimental
4. Protomerite
   4-1. Shape ......Dome shaped, middle part of protomerite widest
   4-2. Structure...Lens-shaped structure at top of protomerite which
       part projects forward, nearly transparent without granules.
       Size of lens-shaped region 5μ in width, 3μ in thickness
5. Deutomerite
   5-1. Shape............Cylindrical, anterior 1/5 portion of deutomerite
       widest
6. Septum.........Distinct, transparent
       Constriction fairly deep at septum
7. Nucleus
   7-1. Shape..........Ellipsoidal, sometimes spherical
   7-2. Position........Unfixed
8. Endoplasm
   8-1. Color ............ Light yellow
   8-2. Granules .......... Relatively coarse
       Granules of protomerite more coarse than that of deutomerite

(Satellite)
4'. Protomerite
   4'-1. Shape ........ Disc-shaped, middle portion of protomerite widest
   4'-2. Structures .... Lens-shaped structure, comparable to that of
         primite, protrudes into posterior end of primite
         Size of lens-shaped part smaller than that of primite,
         3μ in width, 1.5 μ in thickness

5'. Deutomerite ...... Same as that of primite
6'. Deptum ............ Distinct, transparent
       Constriction shallower than that of primite

Fig. 2. *Cephaloidophora anisogammaria* n. sp. A. Adult association. B. Another adult
A, B, F. A bar indicates 20μ. C, D, E. A bar indicates 10μ.

II. Cyst
1. Shape and size ...... Spherical, diameter 35μ
2. Color .............. Light yellow
3. Structure .......... Covered with thin transparent wall
       Two gametocytes contact side by side in cyst, one of
       them swells and the other caves in

III. Spore ............ Not observed
IV. Movement .......... Smooth gliding movement
Remarks:
This species is similar in the body shape and ratio to *Cephaloidophora setoutiensis* H. Hoshide 1958 and *C. setoutiensis minor* K. Hoshide 1969, but it differs from them in the points shown in Table 2.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th><em>Cephaloidophora antiospamnari</em> n. sp.</th>
<th><em>C. setoutiensis</em></th>
<th><em>C. setoutiensis minor</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Primite) I 4–2.</td>
<td>Lens-shaped area measure 5×3μ</td>
<td>Lens-shaped area measures 12×7–8μ</td>
<td>Lens-shaped area measures 8×3μ</td>
</tr>
<tr>
<td>Protomerite Structure</td>
<td>Cylindrical to ellipsoidal</td>
<td>Ovoid to cylindrical middle</td>
<td>Ovoid to cylindrical</td>
</tr>
<tr>
<td>I. 5. Deutomerite</td>
<td>Cylindrical anterior 1/5 portion widest</td>
<td>Ovoid widest portion not definite</td>
<td>Ellipsoidal to cylindrical middle portion widest</td>
</tr>
<tr>
<td>I. 6. Septum</td>
<td>Constriction fairly deep</td>
<td>Constriction slight</td>
<td>Constriction slight</td>
</tr>
<tr>
<td>I. 8–1. Endoplasm Color</td>
<td>Light yellow</td>
<td>Brown</td>
<td>Brown</td>
</tr>
<tr>
<td>(Satellite) I. 5’</td>
<td>Cylindrical</td>
<td>Ovoid</td>
<td>Ellipsoidal to cylindrical</td>
</tr>
</tbody>
</table>

References


———. 1969. Studies on gregarines from Japan I. *Cephaloidophora warekara* n. sp. and two other gregarines from crustaceans. Ibid. 17: 6–16.

Explanation of Plate VIII

Fig. 1–4: *Cephaloidophora elongata* n. sp.
1. Associated sporadins. \( \times 140 \). 2. Another associated sporadins and trophozoite. \( \times 170 \). 3. Large trophozoite. \( \times 265 \). 4. Another trophozoite. \( \times 265 \).

Fig. 5–9: *Cephaloidophora anisogammaris* n. sp.
5. Associated sporadins. \( \times 385 \). 6. Another associated sporadins. \( \times 385 \). 7. Trophozoite. \( \times 640 \). 8. Another trophozoite. \( \times 720 \). 9. Cyst. \( \times 720 \).