Studies on Gregarines from Japan
II. *Cephaloidophora anisogammari* n. sp. and *Cephaloidophora elongata* n. sp. from Amphipoda[1)]

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 seaflea whose habitat is under sea weeds or rubbish washed upon the shore.

The other host, *Hyale schmidti*, 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 iodinophilous granules in the cytoplasm and nucleus.

1) Contribution No. 917 from the Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, Japan.

***Cephaloidophora elongata* n. sp.**

(Fig. 1, Pl. 1–4)

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

Diagnosis

I. Sporadin
1. Association.....Biassociation, Longest specimen 378μ
2. Measurements
2–1. Size (unit μ)

Maximum	TL 202, WD 25
Average	TL 155, LP 10, LD 145, WP 14 WD 19; tl 164, lp 6, ld 158, wp 14, wd 19
Nucleus	14×10
2–2. Ratio	LP:TL=1:16.3, WP:WD=1:1.4; lp :tl =1:27.9, wp : wd=1:1.4

3. Epimerite.....Rudimental
4. Protomerite
4–1. Shape .....Hemispherical, well rounded at top
4–2. Structure.....Lens-shaped transparent structure at anterior half of protomerite
5. Deutomerite
5–1. 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
7–1. Shape.....Ellipsoidal, sometimes spherical
7–2. Position.....At anterior half of deutomerite, visible in living
8. Endoplasm
8–1. Color.....Brown
8–2. Granules .....Fairly dense, fine homogeneous granules

(Satellite)
4′. Protomerite
4′–1. Shape .....Somewhat suppressed, disc-shape
4′–2. Structure.....Anterior part projects into concave posterior end of primite
5′. Deutomerite.....Same as that of primite

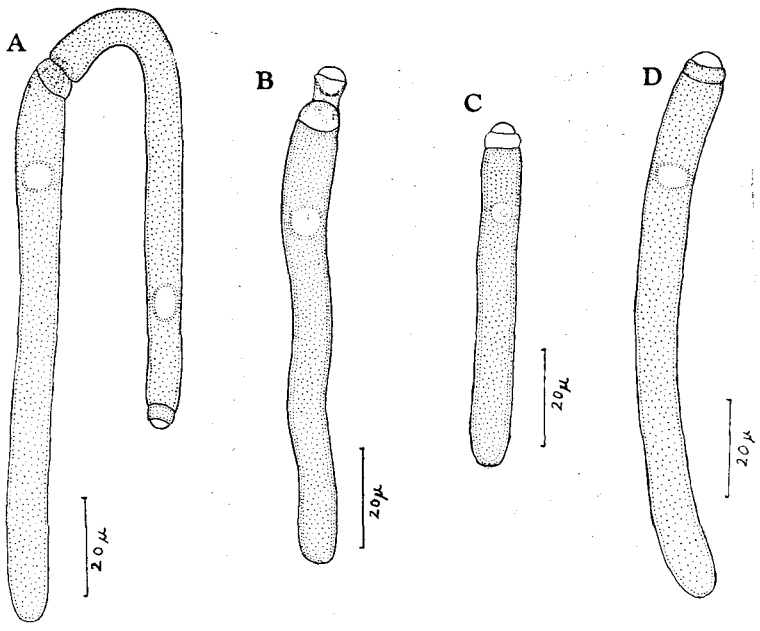


Fig. 1. *Cephaloidophora elongata* n. sp. A. Large adult association. B. Trophozoite. C. Small trophozoite. D. Large trophozoite.

Table 1.

Species Diagnosis number	*Cephaloidophora elongata* n. sp.	*C. carpilodei*	*C. guinotae*
I. 1. Association (Primite)	Max. length 378μ	Max. length 300μ	—
I. 2–1. Measurements Size	Max. TL 202μ TL<tl	Max. TL 135μ TL>tl	Max. TL 200μ TL>tl
I. 2–2. Measurements Ratio PL: TL PW: DW	 1: 16.3 1: 1.4	 1: 5.5 1: 1.0	 —

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

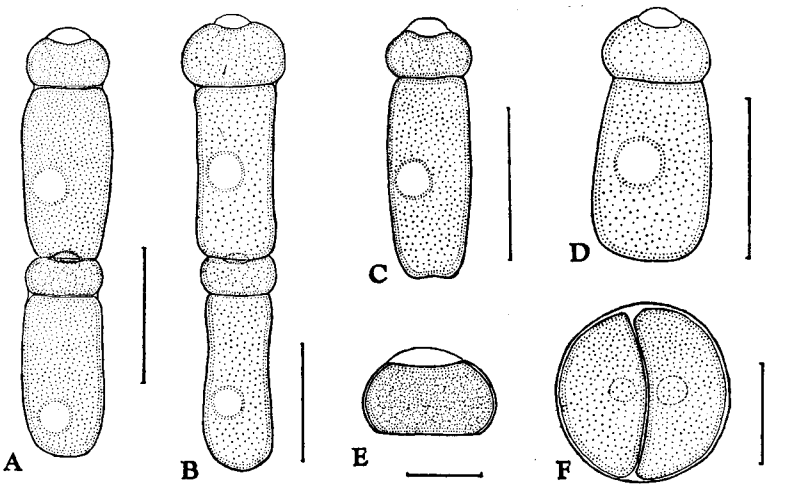


Fig. 2. *Cephaloidophora anisogammari* n. sp. A. Adult association. B. Another adult association. C. Trophozoite. D. Another trophozoite. E. Protomerite of primite. F. Cyst. A, B, F. A bar indicates 20μ. C, D, E. A bar indicates 10μ.

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 them in the points shown in Table 2.

Table 2.

Species / Diagnosis	*Cephaloidophora anisogammari* n. sp.	*C. setoutiensis*	*C. setoutiensis minor*
(Primite) I. 4–2. Protomerite Structure	Lens-shaped area measure $5\times3\mu$	Lens-shaped area measures 12×7–5μ	Lens-shaped area measures $8\times3\mu$
I. 5. Deutomerite	Cylindrical anterior 1/5 portion widest	Ovoid widest portion not definite	Ellipsoidal to cylindrical middle portion widest
I. 6. Septum	Constriction Fairly deep	Constriction slight	Constriction slight
I. 8–1. Endoplasm Color	Light yellow	Brown	Brown
(Satellite) I. 5′. Deutomerite	Cylindrical	Ovoid	Ellipsoidal to cylindrical

References

Ball, G. H. 1963. *Cephaloidophora carpilodei* n.sp. Gregarines of a xanthid crab in Hawaii. J. Protozool. **10**: 321–329.

Hoshide, H. 1958. Studies on the cephaline gregarines of Japan. II. 1) Description of those belonging to the families Lecudinidae, Polyrabdinidae, Cephaloidophoridae and Stenophoridae. Bull. Fac. Educ. Yamaguchi Univ. **1**: 136–142.

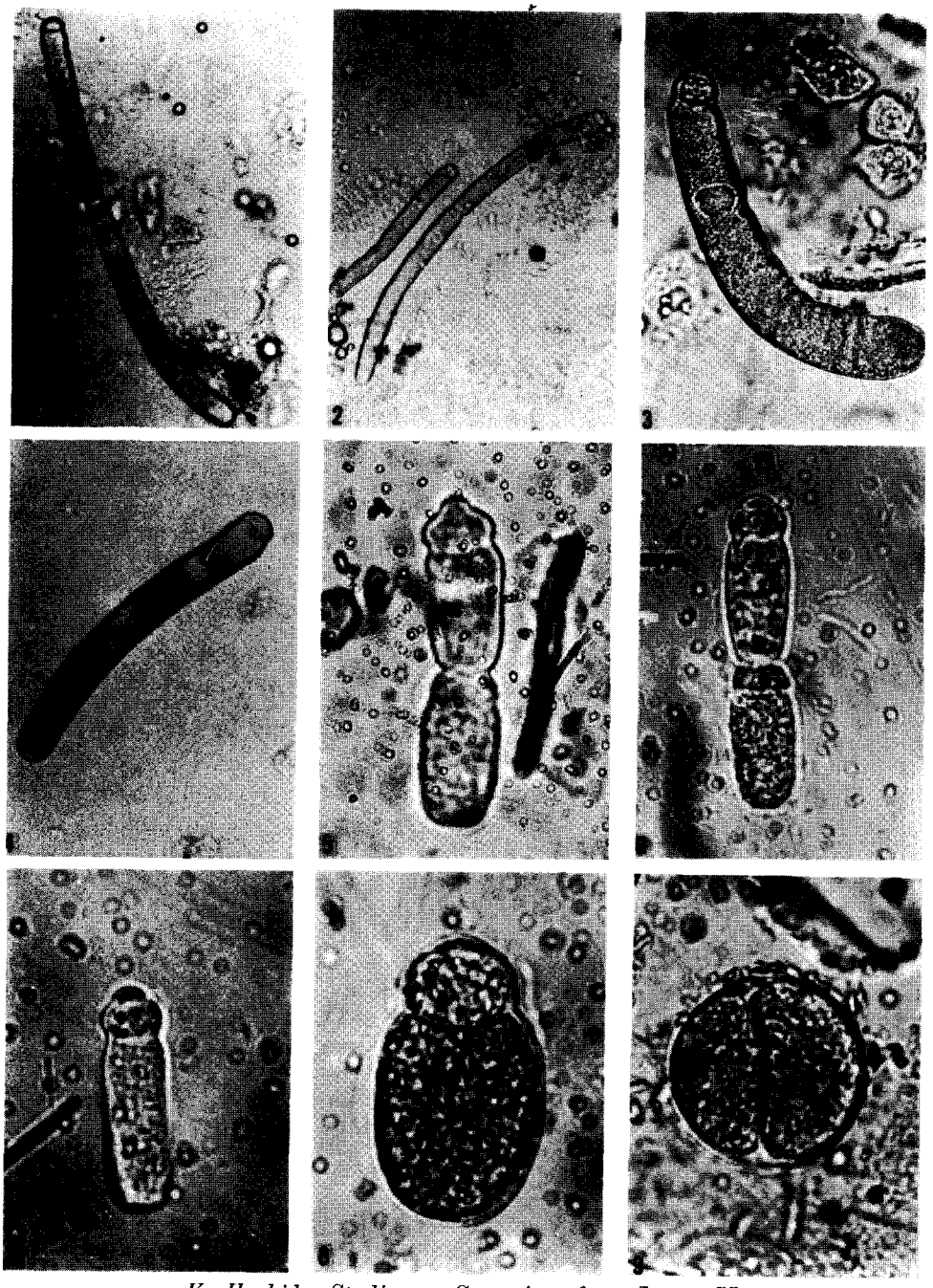
Hoshide, K. 1968. Studies on the cephaline gregarines from some barnacles in Japan. Jour. Fac. Sci. Hokkaido Univ. Ser. VI, Zool. **16**: 1968.

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

Théodoridès, J. 1967. Grégarines d'Invertébrés marins de la région de Banyuls IV. Quelques Eugrégarines du genre *Cephaloidophora* parasites de Crustacés Amphipodes et Décapodes. Vie et Milieu. **18**: 265–279.

Explanation of Plate VIII

Fig. 1–4: *Cephaloidophora elongata* n. sp.
1. Associated sporadins. ×140. 2. Another associated sporadins and trophozoite. ×170. 3. Large trophozoite. ×265. 4. Another trophozoite. ×265.
Fig. 5–9: *Cephaloidophora anisogammari* n. sp.
5. Associated sporadins. ×385. 6. Another associated sporadins. ×385. 7. Trophozoite. ×640. 8. Another trophozoite. ×720. 9. Cyst. ×720.



K. Hoshide: Studies on Gregarines from Japan II