

## Studies on the Fine Structure of Gregarines

Observation on *Ferraria cornucephala iwamusi*

By

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### Introduction

The surface structure of the cephaline gregarine, *Ferraria cornucephala iwamusi* H. Hoshide 1956, was studied with the light and the electron microscope. The investigation of the fine structure of gregarines which belong to various genus is significant to find the systematic relation among them. The author wishes to add the knowledge on the fine structure of them hereafter. This observation on *F. cornucephala iwamusi* is his first report for this purpose.

There are some papers about the fine structure of other gregarines (1, 2, 3, 5, 6) but there are comparatively few observations on the gregarines parasitized with marine animals. This paper contains the comparison between the structure observed with the light microscope and that with the electron microscope.

### Materials and Methods

*F. cornucephala iwamusi* was reported by H. Hoshide from *Marphysa sanguinea* (Montagu) of Japan. The host belongs to Polychaeta and distributes commonly around the coast of Setouchi area. The material used in this study was collected at the sandy beach of Aio in Yamaguchi Prefecture. Most of the hosts were parasitized with numerous *F. cornucephala iwamusi* in the digestive tract. The digestive tract was removed from the host and cut open with fine needles in a petridish filled with sea water. Many of the sporadins were released into the water and they were gathered with a fine pipette. For prefixation they were fixed in cold 5% glutar aldehyde (pH. 7.4, 0.1M cacodylate buffer) for 1.5 hours. The specimens were rinsed in buffer, transferred to cold 1% osmium tetroxide solution buffered with cacodylate for 1 hour, dehydrated in an alcohol series and propylene oxide and embedded in Epon 812. The thin section was made with a Porter-Blum MT-1 microtome and examined with JEM 5HS electron microscope. The thickness of the specimens was 0.5–1 $\mu$  for the light microscope and 150–100m $\mu$  for the electron microscope.

### Observation

The living specimen of immature *F. cornucephala iwamusi* has one or two pseudoseptums and seems to be divided into two or three parts. By the thin section with the light microscope the author can not recognize either a septum like structure or any basic difference all through the cytoplasm. There are many various sized vacuoles dispersed partially in the cytoplasm.

All the surface of the body is covered with folds similar to those of other gregarines. These folds run longitudinally, undulate regularly and are narrowly discernible even with the light microscope. The folds measure 0.6—0.9 $\mu$  in length and 0.3—0.5 $\mu$  in width. The interval of the waves is 0.5—1 $\mu$ .

The pellicle of this gregarine comprises the 3-layered outer pellicular membrane and the 5-layered inner cytoplasmic membrane.

In the cytoplasm there are a lot of Golgi body like structures but there is no typical mitochondria with cristae mitochondriales.

### Discussion

1. The Number of vacuoles is comparatively smaller than that of other gregarines such as *Pyxinooides balani* or *Selenidium fallax* (5, 6) but in this species the vacuoles gather partially in the cytoplasm.
2. The folds of this species run longitudinally and the grooves between the folds are uniform like *P. balani* and *G. rigida* (1, 6) but are different from *S. fallax* or *Ditrypanocystis cirratuli* (5), which has two types of grooves, the deeper primary and the shallower secondary ones. In this point this species has closer relation to *G. rigida* and *P. balani* than to *S. fallax* and *D. cirratuli*.
3. The pellicle consisting of the 3-layered outer and the 5-layered inner membrane is the same as that of all the other gregarines observed by now.
4. In this species Golgi like structures are observed as in some other gregarines (2, 3, 5).
5. From *P. balani* and *Callythrochlamys phronimae* typical mitochondria with cristae has been reported (2, 6) but in this species such a body can not be observed as not in *S. fallax* and *D. cirratuli* (5). In this point this species resembles the latter groups.

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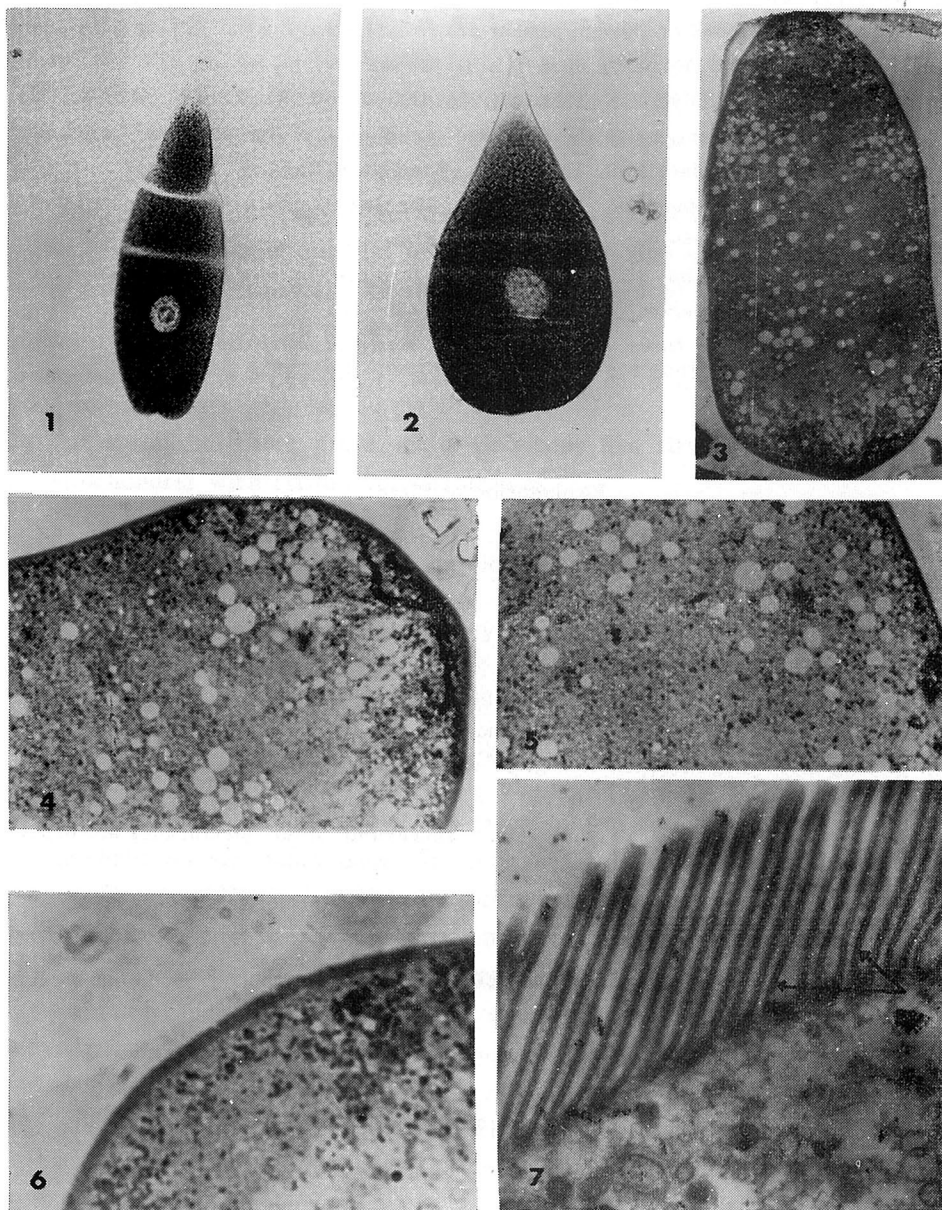
Explanation of Plate

PLATE I.

- Fig. 1. Immature cephaline ×200  
Fig. 2. Mature cephaline ×200  
Fig. 3. Light micrograph of thin section ×320  
Fig. 4. Light micrograph enlarged on the part of Fig. 3. ×640  
Fig. 5. Different part of the same body shown in Fig. 3. ×640  
Fig. 6. Still more magnification of Fig. 3. with oil immersion.  
The folds are narrowly observed. ×1500  
Fig. 7. Electron micrograph of the folds. Inner and outer membranes are observed (arrow) ×19000

PLATE II.

- Figs. 1—4. Electron micrograph of the folds and a part of cytoplasm. Golgi like structure (arrow) ×17000  
Fig. 3. Longitudinal section at the center of the fold is observed like a wall with the same height) ×21000  
Fig. 4. Section of the folds : some of them are partially continuous. ×17000



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