

NOTES ON THE GREGARINES IN JAPAN 2.

Neoschneideria douxi (Hesse) is found from *Dixa* sp. in Japan.

By

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A cephaline gregarine which has segmentation in deutomerite is found from *dixa* sp. in Yamaguchi, Japan. The mosquito larvae are occasionally captured in paddy fields or in small streams from winter till spring. They are easily found because of their blackish body color and of characteristic habit of sitting on something at the water edge and of bending the abdomen in the shape U. Almost of the larvae are parasitized by this gregarine.

Habitat and Parasitic ratio.

About 90% of the larvae collected near around Miyano, Yamaguchi City last winter, 1967, were lodged by this species. The number of parasites obtained from one host was not so large and 3 or 4 was common, however, more than 30 parasites rarely live in the host's intestine at a time.

If one puts the whole digestive tract between two plates of slide glass and examines it under microscope, one can easily recognise the position and state of the parasite. The parasite generally sticks to the wall of middle or posterior region of the intestine (Fig.m).

Cephalins.

In young stage of cephalins they stick their epimerite into the wall of the host's gut. The smallest cephalin observed was 20 μ in length. The body was already divided into three parts,— protomerite, deutomerite and epimerite. In this stage no separation is noticeable in the deutomerite.

When the cephalins grow up to be measured more than 30 μ in the body length the deutomerite is separated into four loges with three clear septa (Fig. b).

Measurements of one of them are shown in microns : Total length excepting epimerite 32, protomerite length 8. protomerite width 5, deutomerite length 24 and deutomerite width 7. The body is elongate ovoidal in shape. The protomerite is elongate conical with an epimerite at the anterior end. The deutomerite being elongate ovoidal has four loges. The second loge is the largest part of the body and a spherical nucleus situates in it. The last and fourth loge is small, terminating in a well rounded extremity.

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The epimerite is a corolla-shape organella attached on the top of protomerite with a short stalk. The corolla is furnished with 16 hooks around it. The epimerite measures 5μ in height and 6μ in width.

As the cephalins grow older, they measure $150\text{--}200\mu$ in length and become an elongate cylindrical form (Fig. c, j and k).

Measurements of some cephalins of this stage with all dimensions expressed respectively in microns as follows.

Table 1.

Total length (TL)	114	148	150	178
Protomerite length (LP)	12	16	16	17
Deutomerite length (LD)	103	134	134	164
Protomerite width (WP)	15	16	16	18
Deutomerite width (WD)	16	18	19	19
Ratio of LP : TL	1 : 9.5	1 : 9.3	1 : 9.4	1 : 10.5
WP : WD	1 : 1.0	1 : 1.1	1 : 1.2	1 : 1.0
Nucleus size	10×12	11×14	11×15	13×16

About the cephalin which is 148μ in length, the separated parts of body measure each in microns as follows : protomerite length 16, Deutomerite Ist loge 22, IIInd 42, IIIrd 45 and IVth 23. The anterior three are cylindrical and almost the same in width but [the last one is subglobular. At the septa excepting the one between the protomerite and deutomerite, any distinct constriction is not visible.

The epimerite is alike a corolla of flower as that of the younger one described above but is much developed. The hooks around the corolla are counted from 18 to 20. There is a shallow depression at the top of the corolla and in the center of which a small style is often discernible. The corolla measures $10\text{--}12\mu$ in diameter (Fig. d).

Sporadins.

The epimerite persists long after the animals have completed their development. The matured sporadins are set free in the gut lumen losing their epimerite (Fig. a and 1).

The sporadins are solitary and elongate cylindrical. The largest one measured 250μ in length, 25μ in width. They are generally about 200μ in length and $20\text{--}23\mu$ in width. The average ratio of protomerite length : total length = 1 : 12 and protomerite width : deutomerite width = 1 : 1.2.

The protomerite is almost globular and is broadly rounded at apex. The septum between the protomerite and deutomerite is flat, but there is a distinct constriction here.

The deutomerite is elongate cylindrical. It is widest through the middle and tapers gradually from here to the posterior end. Near the end it often widens slightly again and terminates in a broadly rounded extremity. The deutomerite is separated into four or

rarely five loges with septum.

The ectoplasm is fairly thick at the protomerite, it measures about 3μ in thickness, while at the deutomerite it is thin. Fine longitudinal striations are well discernible in the epicyte. The endoplasm is dense and is light yellowish brown in color. There are very fine granules near the septum between protomerite and deutomerite and near around the nucleus. Other regions contain much larger granules which are well dyed with Lugol's solution.

The nucleus situates in the second loge of the deutomerite. It is ellipsoidal or rarely is spherical. It measures $16-18\mu \times 11-13\mu$. The longitudinal axis of the nucleus is parallel to that of the body. One nucleolus is visible.

A table of dimensions of a few sporadins is given here, all dimensions being expressed in microns.

Table 2.

Total length (TL)	190	206	209	240
Protomerite length (LP)	17	17	17	18
Deutomerite length (LD)	174	190	192	222
Protomerite width (WP)	18	19	18	18
Deutomerite width (WD)	19	22	20	23
Ratio of LP : TL	1 : 11.2	1 : 12.7	1 : 12.3	1 : 13.3
WP : WD	1 : 1.0	1 : 1.2	1 : 1.1	1 : 1.3
Nucleus size	13×16	11×18	13×16	13×17

Cysts and Spores

When the sporadins have fully matured, the two individuals contact each other, head to head. They are cylindrical and have almost the same width throughout their bodies. The anterior end of the one of them inserts deeply into that of the other. The interlocking device between two sporadins is well developed and they joint tightly each other. At the connecting spot a transparent lense-form body is discernible. Thus the measurements of a typical association are : Total length of one 99μ , width 20μ and total length of another 107μ , width 21μ .

The two individuals gradually come in contact with their bodies and then get closer and closer together. At last they form a sphere covered with a common envelope (Fig.e).

The cyst are generally ellipsoidal but their size is variable. For example, some of them being measured in microns are as follows.

45×41 , 47×45 , 54×50 , 63×40 , 65×50 , 68×48 .

The cyst-membrane is differentiated into two layers, outer and inner ones. On the surface of the outer membrane fine striations are visible.

The cysts are dehised by a simple rupture and the spores are extruded in chain (Fig.

g and o). The spores are navicular measuring $10\mu \times 5\mu$, which are covered with two membranes : the outer one is transparent, thick (Epispore), the inner one is thin (true spore membrane). The whole size of a spore with the epispore is $16-15\mu \times 7-6\mu$ (Fig. h).

REMARKS

Till now several gregarines with segmented deutomerite have been known. They are as follows : *Gregarina segmentata* Vincent 1924, *Triseptata fungicola* Hoshide 1957, *Taeniocystis mira* Leger 1905, *Taeniocystis truncata* Watson, *Taeniocystis parva* Foerster 1938, *Metamera schubergi* Duke 1910, *Asterophora douxi* Hesse 1925.

The gregarine found by the authors this time has undoubtedly an intimate relation with the last two species recorded by Hesse. About these two species recently R, Ormières, J. F. Manier and F. Mathiez (1965) had examined in detail. They found a gregarine from *Dixa autumnalis* in the pool of Magdelaria and St-Gly and considered their species is to be the same one with *Asterophora douxi* because the both are very like each other in their characteristics.

As to the systematic position of *Asterophora douxi* they had a different opinion with Hesse and then they created a new genus *Neoschneideria* that they pointed out is almost the same to that of the present species. So the authors assigned this to *Neoschneideria douxi* (Hesse) Ormières, Maniers and Mathiez and report here as its new locality Yamaguchi, Japan.

SUMMARY

1. A cephaline gregarine which has segmentation in deutomerite is found from *Dixa* sp. in Yamaguchi, Japan.
2. The species is assigned to *Neoschneideria douxi* (Hesse) Ormières, Maniere ans Mathiez because it has the diagnosis as follows.
3. Sporadins elongate cylindrical, 200μ more or less in length, $20-23\mu$ in width. Deutomerite separated into 4 or rarely 5 loges. Nucleus ellipsoidal to spherical with one nucleolus, situates in the second loge of deutomerite.
4. Young cephalins 20μ in length have no separation in deutomerite, however, older ones have loges as sporadins.
5. Epimerite corolla-shape with 18—20 hooks around itself, a small style sometimes is visible at the center of shallow disc at apex.
6. Two sporadins coming into contact, head to head, each other just before the cyst is formed. Cysts ellipsoidal $40-70\mu$ in diameter. Dehiscence by simple rupture extruding spores in chain.
7. Spores navicular $10\mu \times 5\mu$ in size, though measuring $16-15\mu \times 7-6\mu$ with epispoe.

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EXPLANATION OF PLATE I.

- a : A full grown sporadin.
- b : A small cephalin.
- c : A fairly large cephalin.
- d : Anterior portion of a cephalin.
- e : Pair of sporadins attached to each other, head to head.
- f : Two sporadins just previous to cyst formation.
- g : A cyst, in the process of extruding spores in chains.
- h : Several navicular spores with episore.

PLATE II.

- i : A young cephalin, stained with Lugol's solution.
- j : A cephalin detached from the host's gut wall.
- k : A cephalin sticking to the host.
- l : A sporadin, four loges of the deutomerite are visible.
- m : A part of the host's intestine, in which two parasites are seen through the wall of the intestine.
- n : Two pairs of sporadins, in the process of cyst formation.
- o : Exudation of spores from the ripe cyst.

PLATE I

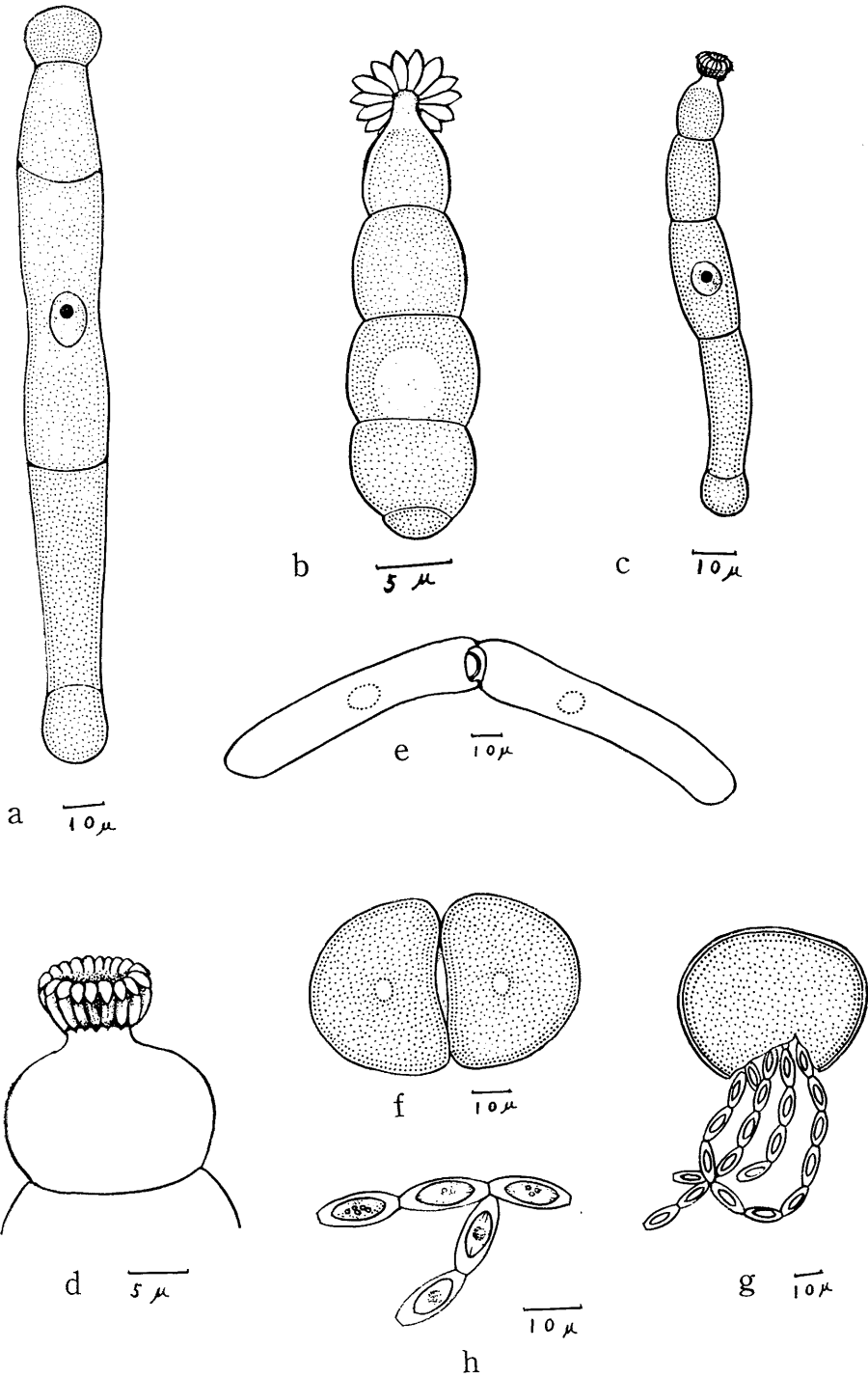


PLATE II

