

## Notes on the Gregarines in Japan 5.

A New Eugregarine *Leidyana suzumushi* n. sp from  
*Homoeogryllus japonicus* de Haan

By

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The author investigated 8 species of Orthoptera from August to November in 1972 and found five of them infected with gregarines. Among these he wishes to report in this paper on a new member of the genus *Leidyana*, which is the only genus belonging to the family Leidyaniidae.

At this writing, 10 eugregarines have been reported in the Japanese Orthoptera and these are shown in the following list,

Parasite	Host
<b>Gregarinidae</b>	
<i>Gregarina blatterum</i> Siebold	<i>Blatella germanica</i>
<i>G. concava</i> H. Hoshide	<i>Gampsocleis burgeri</i>
<i>G. korogi</i> H. Hoshide	<i>Gryllus yemma</i>
<i>G. diestrammenae</i> H. Hoshide	<i>Diestrammena japonica</i>
<i>G. monoducta</i> H. Hoshide	.....
<i>G. inago</i> H. Hoshide	<i>Oxa velox</i> , <i>O. japonica</i>
<i>G. scapsidae</i> H. Hoshide	<i>Scapsides asperus</i>
<i>G. acantholobae</i> H. Hoshide	<i>Acantholobus japonicus</i>
<b>Acanthosporidae</b>	
<i>Coronoepimeritus japonicus</i>	<i>Locusta migratoria</i> , <i>Oedaleus</i>
H. Hoshide	<i>infernalis</i> , <i>Atractomorpha bedli</i> ,
	<i>Acrida lata</i>
<i>C. monospinus</i> H. Hoshide	<i>Euconocephalus thumbergi</i>

As above mentioned, the gregarines reported in the Japanese Orthoptera belong to two different families, the Gregarinidae and the Acanthosporidae. Though many members of the *Leidyana* found in Orthoptera have been reported in Europe (4, 7, 11, 13) and America (2, 3, 10, 12, 13), there is no record of the *Leidyana* in the Japanese Orthoptera. In Japan, only three species of *Leidyana*—*L. latiformis*, *L. lancea* and *L. aglossae*—were all reported by H. Hoshide (6) from Lepidoptera larvae. From the author's observations at this time, most of the Orthoptera were

infected with *Leidyana*, and in some instances the gregarines belonged to the two different genera, *Gregarina* and *Leidyana*, and were observed at the same time in the same host's intestines.

From the comparison of *Gregarina* with *Leidyana*, these two genera can be seen to have almost the same characteristics. The only different point between the two is the associated stage in one and the solitary stage in the other at the time of sporadin.

A comparison table of the characteristics  
in *Gregarina* and *Leidyana*

	<i>Gregarina</i>	<i>Leidyana</i>
Association	Biassociative	Solitary
Epimerite	Small globular or cylindrical	Simple globular sessile knob
Cyst dehiscence	By sporeducts	By sporeducts
Spores	Dolioform to cylindrical	Dolioform

Most gregarines which have been reported by now were classed in *Leidyana* simply because their sporadins were solitary and had a simple globular sessile epimerite. *Leidyana suzumushi* n. sp. which is reported in this paper was observed in almost all the stages of its life cycle—sporadin, cyst and spore.

#### Materials and methods

The host *Homoeogryllus japonicus* de Haan, is noted because of its chirping as a "bell ring" insect and is grown generally in a pot from its early stage in some Japanese homes. The materials used in this experiment were taken around Tabuse area by Mr. T. Shiramatsu and sent to the author at the beginning of the summer of 1972. The author then raised them in the boxes in his laboratory from that time till their death, toward the end of October.

The methods of preparation were almost the same as those which were described in the author's previous papers. The gregarines were observed with a microscope and then were photographed or sketched with a camera lucida. When the cysts were found among the host's faeces, they were picked up with a fine glass pipette and placed in a moist chamber. If the cysts were kept in moist chambers, they dehisced and extruded spores with sporeducts. The period of maturation of the cysts is influenced by its environmental conditions but it needs generally two or three weeks in autumn. The spores were observed under oil immersion.

Host : *Homoeogryllus japonicus* de Haan

Habitat : Gastric caeca, intestine

Locality : Tabuse (Yamaguchi Pref.)

### I. Sporadin

- |                         |  |
|-------------------------|--|
| 1. Association          | Solitary   |
| 2. Measurements         |  |
| 2—1. Size (unit $\mu$ ) |  |
| Max.                    | TL 348, LP 53, LD 295, WP 48, WD 71  |
| Ave.                    | TL 315, LP 52, LD 263, WP 53, WD 73  |
| 2—2. Ratio              | LP : TL=1 : 6.1, WP : ED=1 : 1.4   |
| 3. Shape                | Elongate ovoidal, matured sporadins lose their epimerite   |
| 4. Protomerite          |  |
| 4—1. Shape              | cone shaped  |
|                         | Width generally almost the same length with height   |
| 5. Deutomerite          |  |
| 5—1. Shape              | Elongate ovoidal to cylindrical  |
| 6. Septum               | Distinct, deep constriction at septum  |
| 7. Nucleus              |  |
| 7—1. Shape              | Spherical, $25\mu$ in diameter   |
| 7—2. Position           | Generally about middle part of deutomerite   |
| 8. Endoplasm            |  |
| 8—1. Color              | Light brown  |
| 8—2. Granules           | Fine, in deutomerite slightly dense than in protomerite  |
| 9. Ectoplasm            | Comparatively thick, anterior part of protomerite and posterior part of deutomerite thicker than the other parts |

### II. Cyst

- |               |  |
|---------------|--|
| 1. Structure  | Spherical, $200\mu$ in whole diameter, outer gelatinous covering with many fine concentric lines, $55\mu$ in thickness, transparent inner membrane thin, Substantial part, $90\mu$ in diameter |
| 2. Dehiscence | By 4—6 sporeducts, length of sporeduct 70— $75\mu$<br>Spores discharged in chain   |

### III. Spore

- |          |                      |
|----------|----------------------|
| 1. Shape | Barrel shape         |
| 2. Size  | $3\mu \times 5.5\mu$ |

### IV. Movement

Sliding movement, fairly quick

### V. Cephalin

- |              |   |
|--------------|---|
| 1. Shape     | Young one ovoidal   |
| 2. Structure | Almost the same as sporadin but with a small quantity of granules |
| 3. Epimerite | Simple globular sessile knob                                      |

Remarks :

It is difficult to determine the systematic position of the gregarines found in Orthoptera by the shape of the sporadins alone. But this species must belong to genus *Leidyana* because of the following characteristic points. (1) It has a simple globular knob like an epimerite, (2) Its cysts dehiscence spore by spore ducts and (3) Its spore is barrel-shaped and strung in chain.

This species bears some resemblance to *L. erratica* (Crawley) Watson<sup>13)</sup> and *L. gryllorum* (Cuénot) Watson<sup>1,11,13)</sup>, but both species are different from *L. suzumushi* n. sp. in some points—the maximum length of sporadins, the length of sporeduct and the size of spores. The comparison of these three species is shown below ;

	<i>L. erratica</i>	<i>L. gryllorum</i>	<i>L. suzumushi</i>
I. Sporadin			
1. Association	Solitary	Solitary	Solitary
2—2. Max. TL	500 $\mu$	420 $\mu$	348 $\mu$
2—2. LP : TL	1 : 5—7	1 : 5	1 : 6.1
WP : WD	1 : 1.3—1.7	1 : 1.1	1 : 1.4
4—1. Protom. shape	Conical	Hemispherical	Conical
II. Cyst			
1. Shape	Spherical	Spherical or ovoidal	Spherical
Size	350 $\mu$	190—240 $\mu$	200 $\mu$
2. Dehiscence	Sporeducts		
Length of sporeduct	1—12 in number 1200 $\mu$	3—8 ?	4—6 70—75 $\mu$
III. Spore			
1. Shape	Barrel shape	Barrel shape	Barrel shape
2. Size	3 $\mu$ ×6 $\mu$	7 $\mu$ in length	3 $\mu$ ×5.5 $\mu$
Host	<i>Gryllus</i> <i>abbreviatus</i> <i>Gryllus</i> <i>pensilvanicus</i>	<i>Gryllus</i> <i>domesticus</i>	<i>Homoeogryllus</i> <i>japonicus</i>
Locality	America	France	Japan

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Explanation of Plate I.

*Leidyana suzumushi* n. sp.

- Fig. 1. Fairly grown sporadin.
- Fig. 2. Well grown sporadin.
- Fig. 3. Cyst covered with two membranes, outer one is rather thin.
- Fig. 4. Ripe cyst with six sporeducts extruding spores.
- Fig. 5. Spores in chain.

Explanation of Plate II.

*Leidyana suzumsi* n. sp.

- Fig. 1. Fairly grown two sporadins.
- Fig. 2. Well grown sporadin.
- Fig. 3. Cyst.
- Fig. 4. Cyst with several sporeducts, numerous spores scattered about are shown.
- Fig. 5. Barrel shape spores extruded from sporeduct in chain.



