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Notes on the Gregarines in Japan 10.

Three New and Seventeen Already-known Species of Gregarines from Japanese Tenebionidae.

By

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Twenty species of eugregarines from thirteen species of Japanese Tenebrionidae are described in this paper. Three of them are new species. The other seventeen are already known species and the description of them is rewrited with the system that the author proposed in the previous paper. Coleoptera is the biggest Order which includes about 40% of species in the Class Insect. A lot of gregarines have been reported from Coleoptera until now but the gregarines from Japanese Tenebrionidae are reported this time. The twenty gregarines belong to 6 genus : 12 species belong to *Gregarina*, 4 species belong to *Steinina* and other 4 belong to *Hirmocystis*, *Stylocephalus*, *Stylocephaloides* and *Asterophora*. Hosts, *Tenebrio molitor* L, and *Tribolium castaneum* Herbst are both cosmopolitan species and parasitized with three species of gregarines. *Tribolium castaneum* Herbst, *Lyprops sinensis* Marseul, *Hemicera zigzaga* Marseul and *Uloma latimanus* Kolbe are parasitized with 2 species of gregarines. On the other hand *Gregarina cuneata* Stein is reported from 3 species of host : *Tenebrio molitor* L., *Tenebrio obscurus* Fabricius and *Tribolium castaneum* Herbst.

The List of Gregarines from Japanese Tenebrionidae

Parasites	Hosts
Gregarina lypropsi H. Hoshide	*Lyprops sinensis* Marseul (adult)
Gregarina cuneata Stein	*Tenebrio molitor* L. (larva) *Tenebrio obscurus* Fabricius (larva, adult) *Tribolium castaneum* Herbst (larva, adult)
Gregarina polymorpha (Hammerschmidt) Stein	*Tenebrio molitor* L.
Gregarina platycephala H. Hoshide	*Neatus picipes* Herbst
Gregarina ulomae H. Hoshide	*Uloma latimanus* Kolbe
Gregarina tokonoi Obata	*Uloma latimanus* Kolbe
Gregarina plesiophthalmi H. Hoshide	*Plesiophthalmus nigrocyaneus*

	Motschulsky
Gregarina gonocephali Obata	*Gonocephalus pubens* Marseul
Gregarina minuta Ishii	*Tribolium castaneum* Herbst
Gregarina pumila H. Hoshide	Tenebrionidae sp.
Gregarina inclinata n. sp.	*Hemicera zigzaga* Marseul
Gregarina drispiae n. sp.	*Derispia maculipennis* Marseul
Hirmocystis mirabilis H. Hoshide	*Lyprops sinensis* Marseul
Stylocephalus japonicus H. Hoshide	*Gonocephalus pubens* Marseul
	Gonocephalus japanum Motschulsky
Stylocephaloides sedenis (H. Hoshide) K. Hoshide	*Setenis valgipes* Marseul
Asterophora hemicerae n. sp.	*Hemicera zigzaga* Marseul
Steinina ovalis (Stein) Leger et Duboscq	*Tenebrio molitor* L.
Steinina obconica Ishii	*Tribolium castaneum* Herbst
	Lyprops sinensis Marseul
Steinina sphaerospora H. Hoshide	*Neatus picipes* Herbst
Steinina minor Obata	Tenebrionidae sp.

Gregarina lypropsi H. Hoshide 1951
(Fig. 1 F.)

1951 *Gregagina lypropsy* H. Hoshide 1951 : 8 (162)
1957 *Gregagina lypropsy* H. Hoshide 1957 : 71

Host : *Lyprops sinensis* Marseul Coleoptera, Tenebroidae
Habitat : Intestine
Locality : Obatake, Hikari, Ogori (Yamaguchi Pref.)

I. Sporadin

1 . Association	Biassociative, elongate cylindrical.
2 . Measurements	
2—1 . Size	
Maximum	Maximum length of association 2000μ, width 90μ.
Average	TL 875 LP 31 LD 844 WP 48 WD 62
	tl 576 lp 38 ld 543 wp 34 wd 56
2—2 . Ratio	LP : TL = 1 : 31.5 WP : WD= 1 : 1.3
	lp : tl = 1 : 15.0 wp : wd = 1 : 1.6
3 . Shape	Elongate cylindrical, slightly flattened like a tape.

(Primite)

4 . Protomerite	
4—1 . Shape	Hemispherical, slightly wider than long, widest in middle, broadly rounded or truncated at top.

5. Deutomerite

5—1. Shape — Elongate cylindrical, widens a little below septum widest generally at shoulder.
In some specimens swell at posterior region in old age.

6. Septum — Conspicuous deep constriction.

7. Nucleus

7—1. Shape — Ellipsoidal, large, 50×25μ, visible in vivo.

7—2. Position — Generally in posterior region of deutomerite.
In almost cases axis of nucleus parallel to that of body.

7—3. Nucleolus — Large one.

(Satellite)

4′. Protomerite

4′—1. Shape — Flattened, pressed at top and bottom, widest through middle.

5′. Deutomerite

5′—1. Shape — Cylindrical, generally widest about middle or slightly below there.
In some specimens widest near septum, posterior extremity well rounded.

8. Endoplasm

8—1. Color — Brownish.

8—2. Granules — Comparatively not dense.

9. Ectoplasm — Many longitudinal fine striations visible on body surface.

II. Cyst

1. Structure — Spherical, 170 to 250μ in diameter.

2. Dehiscence — By 8 to 12 spore ducts, each duct swells at base, 40—50μ in length, extrudes spores in chain.

III. Spore

1. Shape — Barrel shaped.

2. Size — 6×4μ

IV. Movement — Sliding and bending movement, active.

V. Cephalin

1. Shape — In young stage ovoidal, lengthen with age.

2. Structure — Protomerite subglobular, slight constriction at septum, deutomerite ovoidal in young but becomes cylindrical as it grows older.

3. Epimerite — Small, simple sessile papilla.

Gregarina cuneata Stein 1848

(Fig. 1. R.U.)

1911 *Gregarina cuneata* Ishii 1911 : 279

1914	*Gregarina cuneata*	Ishii 1914 : 435
1951	*Gregarina cuneata*	H. Hoshide 1951 : 11
1953	*Gregarina cuneata*	Obata 1953 : 7
1957	*Gregarina cuneata*	H. Hoshide 1957 : 72

Host : *Tenebrio molitor* L., *T. obscurus* Fabricius, *Tribolium castaneum* Herbst
Coleoptera, Tenebrionidae

Habitat : Intestine

Locality : Hikari, Tabuse, Obatake (Yamaguchi Pref.)
Hiroshima (Hiroshima Pref.)
Izushi (Hyogo Pref.)

I. Sporadin

1 . Association	Biassociative, sometimes two or three satellites attach together to posterior end of a primite.
2 . Measurements	Maximum length of association 1200μ.
2—1 . Size	
Average	TL 290 LP 79 LD 211 WP 37 WD 43
	tl 226 lp 62 ld 173 wp 35 wd 43
3 . Shape	Elongate ovoidal to cylindrical. Primite always longer than satellite.
(Primite)	
4 . Protomerite	
4—1 . Shape	Cylindrical, elongate, dilated at anterior end, apex broadly rounded or almost flattened.
5 . Deutomerite	
5—1 . Shape	Elongate cylindrical, widens gradually from septum to posterior portion, widest near posterior end, terminating in a very broadly rounded extremity.
6 . Septum	Slight constriction, projects conically upwards into protomerite.
7 . Nucleus	
7—1 . Shape	Spherical, comparatively small, 15—20μ in diameter,
7—2 . Position	Unfixed,
7—3 . Nucleolus	One, spherical.
(Satellite)	
4′. Protomerite	
4′—1 . Shape	Cylindrical, widest below middle, about 1.5 times as high as wide.
5′. Deutomerite	
5′—1 . Shape	Almost equal to primite
6′. Septum	Conical projection upwards into protomerite, sometimes

visible.

7′. Nucleus

7′—3. Nucleolus — Generally in middle of deutomerite.

8. Endoplasm

8—1. Color — Yellowish brown.

8—2. Granules — Rather dense in deutomerite than protomerite.

II. Cyst

1. Structure — Spherical, 170μ in average diameter.

2. Dehiscence — By 15—20 sporeducts, each duct about 40μ in length, spores discharged in chains.

III. Spore

1. Shape — Barrel-shaped.

2. Size — $6 \times 4\,\mu$

IV. Movement — Fairly active.

V. Cephalin

1. Shape — Ovoidal to cylindrical.

3. Epimerite — Simple spherical papilla.

Gregarina polymorpha (Hammerschmidt) Stein
(Fig. 1. D.)

1911 *Gregarina polymorpha* — Ishii 1911 : 279

1957 *Gregarina polymorpha* — H. Hoshide 1957 : 72

Host : *Tenebrio molitor* L. — Coleoptera, Tenebrionidae

Habitat : Intestine

Locality : Tabuse (Yamaguchi Pref.)

I. Sporadin

1. Association — Biassociative

2. Measurements

2—1. Size

Average — TL 273 LP 42 LD 231 WP 46 WD 78
tl 254 lp 35 ld 219 wp 41 wd 65

2—2. Ratio — LP : TL= 1 : 6.5 WP : WD= 1 : 1.7
lp : tl= 1 : 7.3 wp : wd= 1 : 1.6

3. Shape — Elongate cylindrical

(Primite)

4. Protomerite

4—1. Shape — Dome-shaped, as wide as high, widest just above base, well rounded at apex.
In living specimens often the anterior half of protomerite invaginated into the posterior half.

5. Deutomerite
5—1. Shape — Elongate cylindrical, widening gradually from septum, attaining the greatest width some distance below shoulder, thence tapering to a well rounded posterior extremity.
6. Septum — Constriction here slight.
7. Nucleus
7—1. Shape — Spherical, 15—17μ in diameter.
7—3. Nucleolus — One, spherical.
(Satellite)
4'. Protomerite
4'—1. Shape — Depressed and somewhat flattened top and bottom.
5'. Deutomerite
5'—1. Shape — Elongate cylindrical, almost like the deutomerite of primite.
6'. Septum — Constriction here slight.
8. Endoplasm
8—1. Color — Light brown.
8—2. Granules — Dense, protomerite somewhat less denser than deutomerite containing rather coarse and large granules.
II, III. Cyst, Spore — Not known.
V. Cephalin
1. Shape — Ovoidal.

Gregarina platycephala H. Hoshide 1951
(Fig. 1. T.)

1951 *Gregarina platycephala* H. Hoshide 1951 : 20
1957 *Gregarina platycephala* H. Hoshide 1957 : 71

Host : *Neatus picipes* Herbst Coleoptera, Tenebrionide
Habitat : Intestine
Locality : Hikari (Yamaguchi Pref.)

I. Sporadin
1. Association — Biassociative.
2. Measurements — Maximum length of association 1050μ.
2—1. Size
Maximum — TL 600 WD 130
Average — TL 394 LP 58 LD 336 WP 103 WD 123
tl 295 lp 61 ld 234 wp 85 wd 133
2—2. Ratio — LP : TL= 1 : 6.8 WP : WD= 1 : 1.2
lp : tl= 1 : 4.8 wp : wd= 1 : 1.6

3. Shape	Cylindrical.
(Primite)	
4. Protomerite	
4—1. Shape	In adult flattened or broadly rounded at apex, widest through middle, about twice as wide as high. In young stage a little higher than wide, slightly dilated at apex.
5. Deutomerite	
5—1. Shape	Cylindrical, widening gradually from septum, widest at near posterior end which is broadly rounded.
6. Septum	Constriction here conspicuous.
7. Nucleus	
7—1. Shape	Spherical, 25μ in diameter.
7—3. Nucleolus	One.
(Satellite)	
4′. Protomerite	
4′—1. Shape	Depressed top and bottom, wider than high, widens through middle.
5′. Deutomerite	
5′—1. Shape	Quite alike to primite, well rounded at posterior end, generally small conical projection observed at the end.
6′. Septum	Constriction here.
8. Endoplasm	
8—1. Color	Pale brown, protomerite somewhat reddish.
8—2. Granules	In primite fine but deutomerite contains endoplasm less dense than protomerite and becomes transparent. Deutomerite of satellite most dense in the body.
II. Cyst	
1. Structure	Spherical, 250—320μ in diameter.
2. Dehiscence	By 6—7 sporeducts, spores extruded in chains.
III. Spore	
1. Shape	Ellipsoidal.
2. Size	5 × 3 μ
V. Cephalin	
1. Shape	Ovoidal, deutomerite always wider than protomerite.
2. Structure	A small conical projection at posterior end usually observed and fine longitudinal striation on body surface clearly discernible.
3. Epimerite	Small spherical to mamillated.

Gregarina ulomae H. Hoshide 1951
(Fig. 1. E.)

1951 *Gregarina ulomae* H. Hoshide 1951 : 99

Host : *Uloma latimanus* Kolbe Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Obatake, Yanai (Yamaguchi Pref.)

I. Sporadin

1. Association	Biassociative.
2. Measurements	Maximum length of association 230μ.
2—1. Size	
Average	TL 85 LP 20 LD 65 WP 32 WD 37
	tl 79 lp 15 ld 64 wp 31 wd 35
2—2. Ratio	LP : TL= 1 : 4.8 WP : WD= 1 : 1.2
	lp : tl= 1 : 5.3 wp : wd= 1 : 1.1
3. Shape	Cylindrical to ovoidal.

(Primite)

4. Protomerite	
4—1. Shape	Hemispherical, widest at base, rounded at apex, truncated or a little concaved at base, one and one third to one and one twice as wide as high.
5. Deutomerite	
5—1. Shape	Cylindrical, widening gradually from septum, widest in middle and thence tapering gradually to truncated or broadly rounded posterior extremity.
6. Septum	Slight constiriction.
7. Nucleus	
7—1. Shape	Spherical, diameter about two-thirds of deutomerite.
7—3. Nucleolus	One, large.

(Satellite)

4′. Protomerite.	
4′—1. Shape	Flattened top and bottom or slightly convexed anteriorly, width about twice the height.
5′. Deutomerite	
5′—1. Shape	widest a little below septum, thence tapering gradually to a bluntly pointed posterior end.
8. Endoplasm	
8—1. Color	Light brown.
8—2. Granules	Rather coarse, not so dense.
9. Ectoplasm	Fairly thick.

II. III. Cyst, Spore — Not known
IV. Movement — Not so active, gliding and bending observable.
V. Cephalin
1. Shape — Ovoidal.
3. Epimerite — Small, spherical papilla.

Gregarina tokonoi Obata 1953
(Fig. 1. Q)

1953 *Gregarina tokonoi* Obata 1953 : 11

Host : *Uloma latimanus* Kolbe Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Hiroshima (Hiroshima Pref.)
Izushi (Hyogo Pref.)

I. Sporadin
1. Association — Biassociative
2. Measurements — Maximum length of association 410μ, its width 42μ.
2—1. Size
Average — TL 95 LP15 LD 80 WP 28 WD 34
tl 107 lp 23 ld 84 wp 21 wd 29
2—2. Ratio — LP : TL= 1 : 6.3 WP : WD= 1 : 1.2
lp : tl= 1 : 4.7 wp : wd= 1 : 1.4
3. Shape — Elongate, cylindrical, bending to one side as a bow in mature sporadins but straight in young stage.

(Primite)
4. Protomerite
4—1. Shape — Flattened and crooked, two or two and a half times as wide as high.
5. Deutomerite
5—1. Shape — Curved, widest at shoulder, tapering thence to a obliquely truncated posterior end.
6. Septum — Slight constriction
7. Nucleus
7—1. Shape — Spherical or ellipsoidal, 10—13μ in diameter.
7—3. Nucleolus — One or a few.

(Satellite)
4'. Protomerite
4'—1. Shape — Nearly or quite as wide as high.
Satellite interlocks with primite obliquely.
5'. Deutomerite
5'—1. Shape — Cylindrical, elongate, terminating in a well rounded

posterior extremity.

8. Endoplasm

8—2. Granules — Thin in both protomerite and deutomerite.

II, III. Cyst, Spore — Not known.

Gregarina plesiophthalmi H. Hoshide 1951

(Fig. 1. S.)

1951 *Gregarina plesiophthalmi* H. Hoshide 1951 : 22

1957 *Gregarina plesiophthalmi* H. Hoshide 1957 : 70

Host : *Plesiophthalmus nigrocyaneus* Motschulsky

Coleoptera, Tenebrionidae

Habitat : Intestine

Locality : Tabuse (Yamaguchi Pref.)

I. Sporadin

1. Association — Biassociative

2. Measurements — Maximum length of association 530μ and its width 120μ.

2—1. Size

Average — TL 222 LP 52 LD 170 WP 68WD 101

tl 231 lp 38 ld 193 wp 60 wd 91

2—2. Ratio — LP : TL= 1 : 4.2 WP : WD= 1 : 1.5

lp : tl= 1 : 6.1 wp : wd= 1 : 1.5

3. Shape — Ovoidal.

(Primite)

4. Protomerite

4—1. Shape — Subspherical, well rounded at apex, widest at three fifths distance posterior to apex, 1.4 to 1.5 times as wide as high.

5. Deutomerite

5—1. Shape — Ovoidal, widens gradually from septum, widest at near posterior end, broadly rounded here.

6. Septum — Conspicuous, constriction deep.

7. Nucleus

7—1. Shape — Spherical, 25μ in average diameter.

7—3. Nucleolus — Several.

(Satellite)

4'. Protomerite

4'—1. Shape — Short, broad, widest at base, a thin discoidal plate connected with primite well develops.

5'. Deutomerite

5'—1. — Shape Ovoidal, widest at about one-third posterior from

septum, becoming suddenly thin near posterior end, terminating in a blunt extremity.

6′. Septum — Conspicuous but no constriction here.

8. Endoplasm

8—1. Color — Brown.

8—2. Granules — Dense, homogeneous, fine, nearly transparent at anterior region of protomerite.

II. Cyst

1. Structure — Spherical, 250μ in averaged diameter, outer gelatinous cyst membrane thick 50—60μ in thickness.

2. Dehiscence — By 7—10 spore-ducts, each 70μ in length, spores extruded in chains.

III. Spore

1. Shape — Barrel-shaped, with small discoidal plate at both ends.

2. Size — 5×3.2μ

IV. Movement — Active.

V. Cephalin

1. Shape — Elongate ovoidal.

2. Structure — A deep depression at apex, into which epimerite gotten.

3. Epimerite — A small cone.

Gregarina minuta Ishii 1914

(Fig. 1. I, J.)

1914 *Gregarina minuta* — Ishii 1914 : 436

1957 *Gregarina minuta* — H. Hoshide 1957 : 52

Host : *Tribolium castaneum* Herbst

Coleoptera, Tenebrionidae

Habitat : Intestine

Locality : Obatake, Hikari (Yamaguchi Pref.)

Izu-Province

I. Sporadin

1. Association — Biassociative

2. Measurements

2—1. Size — Maximum length of association 270μ.

Maximum — TL 155 WD 34

Average — TL 125 LP 17 LD 108 WP 18 WD 29

tl 95 lp 11 ld 84 wp 18 wd 27

2—2. Ratio — LP : TL= 1 : 7.3 WP : WD= 1 : 1.6

lp : tl= 1 : 8.6 wp : wd= 1 : 1.5

3. Shape — Elongate cylindrical, primite is almost similar to satellite

in shape.

(Primite)

4. Protomerite

4—1. Shape — Hemispherical, well rounded at apex, widest at base, slightly wider than long or width equals to height.

5. Deutomerite

5—1. Shape — Elongate cylindrical, widest at a short distance from septum.

6. Septum — Conspicuous, constriction deep.

7. Nucleus

7—1. Shape — Spherical, 10—15μ in diameter.

7—2. Position — Variable, most often near the middle of deutomerite.

7—3. Nucleolus — One.

(Satellite)

4′. Protomerite

4′—1. Shape — Slightly flattened, usually wider than long.

5′. Deutomerite

5′—1. Shape — Elongate cylindrieal, slightly widens in middle, tapers gradually to broadly rounded posterior extremity.

6′. Septum — Constriction shallow.

8. Endoplasm

8—1. Color — Light brown, protomerite lighter than deutomerite.

8—2. Granules — Dense, homogeneous, in protomerite, less dense than in deutomerite.
Anterior region of protomerite nearly transparent.

9. Ectoplasm — Thin, of the same thickness throughout, longitudinal fine striation well discernible.

II. Cyst

1. Structure — Spherical, 50—85μ in total diameter.
Cyst membrane rather thick, 15μ in average thickness.

2. Dehiscence — By one or two spore ducts, about 30μ in length, from which spores are discharged in chains.

III. Spore

1. Shape — Barrel-shaped.

2. Size — $6 \times 4\,\mu$

V. Cephalin

1. Shape — Elongate ellipsoidal to cylindrical.

2. Structure — Cephalins, 30μ in length, differentiate body in three segments ; epimerite, protomerite and deutomerite.

3. Epimerite — Simple spherical or ovoidal, hyaline, without stalk.

Gregarina gonocephali Obata 1953
(Fig. 1. G.)

1953 *Gregarina gonocephali* Obata 1953 : 9

Host : *Gonocephalus pubens* Marseul Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Yagi (Hiroshima Pref.)
Izushi (Hyogo Pref.)

I. Sporadin

1. Association	Biassociative, in young stage of sporadin sometimes three associate in line.
2. Measurements	Maximum length of association 175μ, its width 26μ.
2—1. Size	
Average	TL 85 LP 16 LD 69 WP 24 WD 37
	tl 83 lp 12 ld 71 wp 25 wd 36
2—2. Ratio	LP : TL= 1 : 5.3 WP : WD= 1 : 1.5
	lp : tl= 1 : 6.9 wp : wd= 1 : 1.4
3. Shape	Small, ellipsoidal in primite, ovoidal in satellite. Young sporadin cylindrical.

(Primite)

4. Protomerite	
4—1. Shape	Ellipsoidal to dome-shaped, one and a half as wide as high.
5. Deutomerite	
5—1. Shape	Cylindrical, dilated through middle, narrowed at both anterior and posterior ends.
6. Septum	deep constriction.
7. Nucleus	
7—1. Shape	Spherical, small, 15μ in diameter.
7—3. Nucleolus	Large one.

(Satellite)

4'. Protomerite	
4'—1. Shape	Resemble with that of primite, twice as wide as high, widest at base.
5'. Deutomerite	
5'—1. Shape	Elongate ovoidal, widest at shoulder, tapering to a posterior rounded extremity.
6'. Septum	deep constriction.
8. Endoplasm	
8—1. Color	Yellowish brown.
8—2. Granules	Very fine.

9. Ectoplasm — Very thin.
II, III. Cyst, Spore — Not known.

Gregarina pumila H. Hoshide 1957
(Fig. 1. H.)

1957 *Gregarina pumila* H. Hoshide 1957 : 60

Host : Tenebrionidae sp. Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Obatake (Yamaguchi Pref.)

I. Sporadin

1. Association — Biassociative
2. Measurements — Largest association 160μ in length.
2—1. Size
Maximum — TL 95 WD 35
Average — TL 77 LP 14 LD 63 WP 16 WD 27
tl 61 lp 10 ld 51 wp 15 wd 24
2—2. Ratio — LP : TL= 1 : 5.5 WP : WD= 1 : 1.7
lp : tl= 1 : 6.1 wp : wd= 1 : 1.6
3. Shape — Ovoidal, small in primite, rather ellipsoidal in satellite.

(Primite)

4. Protomerite
4—1. Shape — Hemispherical or subglobular, widest just above septum, always a little wider than long.
5. Deutomerite
5—1. Shape — Ovoidal, widest in posterior one-third.
In some specimens widest at about central portion, shallow constriction at posterior third.
6. Septum — Constriction slight.
7. Nucleus
7—1. Shape — Spherical, 7—8 μ in diameter.
7—2. Position — Not fixed but generally posterior half of deutomerite.
7—3. Nucleolus — One spherical.

(Satellite)

4′. Protomerite
4′—1. Shape — Slightly compressed up and down, nearly flattened.
5′. Deutomerite
5′—1. Shape — Ovoidal to ellipsoidal, generally widest in middle but in some at shoulder or near rounded posterior end.
6′. Septum — Constriction slight.
7′. Nucleus

7′—1. Shape — Spherical.
7′—2. Position — Not fixed, often in anterior half of deutomerite.
8. Endoplasm
8—1. Color — Light brown.
8—2. Granules — In lower half of protomerite and deutomerite dense, but in upper half of protomerite nearly devoid of endoplasm.
Slightly larger and coarser in protomerite than in deutomerite.

II. Cyst
1. Structure — Spherical, 25—52μ in diameter, outer cyst membrane thin, 3—5 μ in thickness.
2. Dehiscence — Spores extruded from a pore in chains.

III. Spore
1. Shape — Somewhat cylindrical, widen in central and truncate at both ends.
2. Size — 5.5 × 2.5μ

IV. Movement — Slow gliding and bending body observed, just below septum flexible.

V. Cephalin
1. Shape — Ovoidal in young stage, grown in rather cylindrical.
2. Epimerite — Spherical, simple, transparent without stalk.

Gregarina inclinata n. sp.
(Fig. 2. A—F. Fig. 6. A—I.)

Host : *Hemicera zigzaga* Marseul
Habitat : Intestine
Locality : Obatake

I. Sporadin
1. Association — Biassociative
2. Measurements — Maximum length of association observed 470μ.
2—1. Size
Maximum — TL 203 WD 65
Average — TL 169 LP 39 LD 130 WP 62 WD 65
tl 199 lp 27 ld 172 wp 54 wd 67
2—2. Ratio — LP : TL= 1 : 4.3 WP : WD= 1 : 1.0
lp : tl= 1 : 7.4 wp : wd= 1 : 1.1
3. Shape — Elongate cylindrical, incline the body to one side, especially so the primite.
As one example the primite measured 180μ in length ;

one side 220μ but another side only 130μ in length.

(Primite)

4. Protomerite

4—1. Shape — Low and broad, somewhat flattened irregulary infront, usually wider than height, widest through middle.

5. Deutomerite

5—1. Shape — Asymmetrically cylindrical, curved to one side, widening out rapidly from septum to shoulder which is widest, thence slightly tapers to broadly rounded or flattened square cornered extremity.

6. Septum — Conspicuous, but costriction there not very deep.

7. Nucleus

7—1. Shape — Spherical, average 20μ in diameter.

7—2. Position — Unfixed but in many cases at the anterior region of deutomerite

7—3. Nucleolus — Spherical, comparatively large

(Satellite)

The satellite is longer than the primite in all associations observed. The interlocking device between primite and satellite is well developed. Satellite is almost straight but in some slightly curve in one side.

4'. Protomerite — Slightly narrower than that of primite.

4'—1. Shap — Flattend discoidal shape, pressed top and bottom, twice as wide as high

5'. Deutomerite

5'—1. Shape — Almost regularly cylindrical, widest just behind the septum, thence tapers very gradually to broadly rounded posterior extremity.

6'. Septum — Constriction at septum very shallow.

7'. Nucleus

7'—1. Shape — Spherical, as large as that of primite.

7'—2. Position — Unfixed, but often it situated near the posterior end of body.

7'—3. Nucleolus — One spherical

8. Endoplasm

8—1. Color — Brownish in deutomerite and much lighter in protomerite than deutomerite of both primite and satellite.

9. Ectoplasm — Thick and even so all over the body excepting the anterior part of protomerite of primite where is especially thick. Longitudinal striations on the body surface are easily visible.

II. Cyst

1. Structure — Spherical but often ellipsoidal. Average 200μ in outer diameter and inner diameter 180μ, transparent envelope about 10μ in thickness.

2. Dehiscence — By spore ducts, from 10 to 15 or more in number. Length of each spore duct 100μ. Spores extruded in chains.

III. Spore

1. Shape — Barrel shaped.

2. Size — $6 \times 4\,\mu$.

IV. Movement — Sliding sluggishly forewards is observed.

Table 1. *Gregarina inclinata* n. sp.

Measurements and Ratio of Sporadins (unit μ)

Total length of association	463	450	375	363	355
Primite					
TL	203	190	180	182	160
LP	45	45	30	38	48
LD	158	145	150	144	112
WP	62	75	62	68	67
WD	65	85	63	68	65
Ratio					
LP : TL	1 : 4.5	1 : 4.2	1 : 6.0	1 : 4.8	1 : 3.3
WP : WD	1 : 1.0	1 : 1.1	1 : 1.0	1 : 1 0	1 : 1.0
Satellite					
tl	260	260	195	181	195
lp	30	35	27	30	25
ld	230	225	168	151	170
wp	64	65	54	53	52
wd	66	85	55	52	60
Ratio					
lp : tl	1 : 8.7	1 : 7.4	1 : 7.2	1 : 6.0	1 : 7.8
wp : wd	1 : 1.0	1 : 1.3	1 : 1.0	1 : 1.0	1 : 1.2

Remarks :

With the shape of the sporadin, the cyst, the spore, the type of association and the cyst dehiscence this species belongs to the genus *Gregarina*. Among the members of *Gregarina* this species has some resemblances to *G. platyni* Watson and *G. tokonoi* Obata. The remarkable character in common with these three species is an insecure association : inclind body to one side. This species resembles *G. platyni* in the shape and the ratio of the body but *G. platyni* differs from this species in the following points. *G. platyni* is bigger than this species. The average TL is 300μ in *G. platyni* and 199μ in this species. *G. platyni* has a characteristic

deep constriction at the middle of the protomerite but this species has no such constriction. *G. tokonoi* Obata is reported from Japanese Tenebionidae. This species differs from *G. tokonoi* in the total length of the sporadin and the ratio of the body. The total length of *G. tokonoi* is smaller than that of this species. On the body ration $\left(\frac{LP}{TL}, \frac{lp}{tl}\right)$ of *G. tokonoi*, the primite is always bigger than the satellite but that of this species the satellite is bigger than the primite. The author considers that this species is a new member of *Gregarina* and propose the name *Gregarina inclinata* for it with the morphology of the primite.

Gregarina derispiae n. sp.
(Fig. 3. A—F. Fig. 7. A—D.)

Host : *Derispia maculipennis* Marseul Tenebrionidae
Habitat : Intestine
Locality : Kawayama (Yamaguchi Pref.)

I. Sporadin

1. Association — Biassociative, rarely two satellites stuck together to a primite's end.

2. Measurements

2—1. Size

Maximum — TL 364 LP 52 LD 312 WP 135 WD 104
tl 312 lp 42 ld 270 wp 94 wd 114

Average — TL 327 LP 44 LD 283 WP 102 WD 88
tl 264 lp 41 ld 223 wp 79 wd 98

3. Shape — Cylindrical, primite always larger than satellite.

(Primite)

4. Protomerite

4—1. Shape — Iregularly flattened dish-shaped, anterior top concaved, crenately projected at its brim where is generally widest. In some specimens the top extended or swollen as a cone.

5. Deutomerite

5—1. Shape — Cylindrical to somewhat ellipsoidal, generally widest at shoulder, slightly narrowed through middle portion, widened a little at near posterior end where is broadly rounded.

6. Septum — Distinct, constriction fairly deep.

7. Nucleus

7—1. Shape — Spherical, 25—30μ in diameter.

7—2. Position — Not fixed.

7—3. Nucleolus — One, large.

(Satellite)

4′. Protomerite

4′—1. Shape — Depressed and flattened top and bottom widest a little or just above septum, ring-shaped projection observed at brim of head to come in contact with primite.

5′. Deutomerite

5′—1. Shape — Cylindrical to ellipsoidal, widest in middle but almost equal in width throughout deutomerite, broadly rounded or truncated at posterior extremity.

6′. Septum — Distinct but constriction very slight or none.

7′. Nucleus — Same as primite,

8. Endoplasm

8—1. Color — Brown.

8—2. Granules — Dense homogeneous in both primite and satellite except the protomerite of primite which contains uneven granules irregularly lumped.

9. Ectoplasm — Very thick, 10μ or more in thickness throughout the body, except at protomerite and posterior end of primite which is thin.

IV. Movement — Not active, gliding very slowly.

V. Cephalin

1. Shape — Ovoidal.

Table. 2. *Gregarina derispiae* n. sp.

Measurements and Ratio of Sporadins (unit μ)

Total length of Association	562	624	645	583	583	614
Primite						
TL	281	374	364	354	302	354
LP	31	42	42	52	42	42
LD	250	332	322	302	260	312
WP	94	94	83	73	104	104
WD	83	73	104	73	94	78
Ratio						
LP : TL	1 : 6.7	1 : 8.9	1 : 8.7	1 : 6.8	1 : 7.2	1 : 8.4
WP : WD	1 : 0.9	1 : 0.8	1 : 1.3	1 : 1.0	1 : 0.9	1 : 0.8
Satellite						
tl	281	250	281	229	281	260
lp	42	36	42	36	42	42
ld	239	214	239	203	239	218
wp	73	73	73	73	94	73
wd	94	94	104	94	114	83
Ratio						
lp : tl	1 : 6.7	1 : 6.9	1 : 6.7	1 : 6.4	1 : 6.7	1 : 6.2
wp : wd	1 : 1.3	1 : 1.3	1 : 1.4	1 : 1.3	1 : 1.2	1 : 1.1

Remarks :

Among the 31 spiecies of genus *Gregarina* which are found from Tenebrionidae, Coleoptera, *G. larvarum* Filipponi 1951, *G. wahrmani* Theodorides 1955, *G. cuneata* Stein 1848, *G. polymorpha* Hammerschmidt 1838, *G. verroni* Theodorides et Desportes 1965, *G. heterochirae* Theodorides 1958, *G. platycephala* H. Hoshide 1951, *G. plesiophtalmi* H. Hoshide 1951 are similar in size of sporadins to the present species. But this species easily separated from them in the form of protomerite, characters of ecto- or endoplasm.

Hirmocystis mirabilis H. Hoshide 1950
(Fig. 1. P.)

1950 *Hirmocystis mirabilis* H. Hoshide 1950 : 9
1957 *Hirmocystis mirabilis* H. Hoshide 1957 : 84

Host : *Luprops sinensis* Marseul Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Ogori (Yamaguchi Pref.)

I. Sporadin

1. Association — Associative of 2—9 sporadins as linearly arranged or as bi-, tri- furcated arrangement. Longest association 1.6mm, its width 70μ.

2. Measurements

2—1. Size

Maximum — TL 420 WD 60

Average — TL 315 LP 24 LD 291 WP 24 WD 52
tl 333 lp 9 ld 324 wp 24 wd 55

2—2. Ratio — LP : TL= 1 : 13.1 WP : WD= 1 : 2.2
lp : tl= 1 : 37.0 wp : wd= 1 : 2.3

3. Shape — Elongate cylindrical.

(Primite)

4. Protomerite

4—1. Shape — Dome-shaped, rounded at apex, width equal to height, widest at base.

5. Deutomerite

5—1. Shape — Elongate cylindrical, widest about at middle, almost same width throughout, well rounded at posterior extremity.

6. Septum — Conspicuous, slightly constricted here.

7. Nucleus

7—1. Shape — Spherical or somewhat ellipsoidal, 26μ in average diameter.

7—3. Nucleolus (Satellite) — One, large.

4′. Protomerite

4′—1. Shape — Depressed, dish-shaped, concaved deeply at apex to be inserted the small conical projection of deutomerite.

5′. Deutomerite

5′—1. Shape — Resembles the deutomerite of primite.

6′. Septum — Conspicuous constriction.

8. Endoplasm

8—1. Color — Brown.

8—2. Granules — Dense, homogeneous in both protomerite and deutomerite, except the small region just below the apex of protomerite where it is transparent.
One chromidial body in protomerite of all sporadins.

II, III. Cyst, Spore — Not known.

V. Cephalin

1. Shape — Two types observed : spherical and ovoidal to ellipsoidal, intermediate types also found.

2. Structure — A small chromidial body in protomerite, it is observed like a vacuole in living stage.

3. Epimerite — A small spherical papilla.

Stylocephalus japonicus H. Hoshide 1951
(Fig. 1. A, B, C.)

1951 *Stylocephalus japonicus* H. Hoshide 1951 : 96
1958 *Stylocephalus japonicus* H. Hoshide 1958 : 69

Host : *Gonocephalus pubeus* Marseul, *G. japanum* Motschulsky
Coleoptera, Tenebrionidae

Habitat : Intestine

Locality : Hikari (Yamaguchi pref.)

I. Sporadin

1. Association — Solitary

2. Measurements

2—1. Size

Maximum — TL 1270 WD 110

Average — TL 1086 LP 58 LD 1028 WP 76 WD 128

2—2. Ratio — LP : TL= 1 : 18.7 WP : WD= 1 : 1.7

3. Shape — Elongate, lanceolate.

4. Protomerite

4—1. Shape — Almost hemispherical, widest at base, rounded or con-

	ically pointed at apex.
5. Deutomerite	
5—1. Shape	Elongate, lanceolate, widest at shoulder, thence tapeing gradually to an acutely or a bluntly pointed posterior extremity.
6. Septum	Fairly deep constriction.
7. Nucleus	
7—1. Shape	Ovoidal or ellipsoidal.
7—2. Position	Not fixed, sometimes anterior region near septum and other times posterior region near the end, invisible in vivo.
7—3. Nucleolus	Several (2—5).
8. Endoplasm	
8—1. Color	Milky white or light brown.
8—2. Granules	In deutomerite denser than in protomerite.
9. Ectoplasm	Fairly thick.
II. Cyst.	
1. Structure	Spherical, 450μ in average diameter, numerous small papillate projections on the surface.
2. Dehiscence	By simple rupture, spores extruded in chains.
III. Spore	
1. Shape	Hemispherical, helmet-shaped, black to dark brown.
2. Size	$14 \times 7\mu$
IV. Movement	Not so active in cephalin stage but active in adult especially when two sporadins form the cyst, contacting each other head to head and rotating around an axis.
V. Cephalin	
1. Shape	Comparatively short.
2. Structure	Body almost transparent with scant endoplasm when it is young.
3. Epimerite	A slightly dilated flame-like cone with very long, slender stalk situated at the top of protomerite; the whole length is about twice the height of protomerite.

Asterophora hemicerae n. sp.
(Fig. 4. A—H. Fig. 8. A—I.)

Host : *Hemicera zigzaga* Marseul
Habitat : Intestine
Locality : Obatake

I. Sporadine

1. Association	Solitary
2. Measurements	
2—1. Size	
Maximum	TL 420 WD 155
Average	TL 281 LP 69 LD 212 WP 72 WD 101
2—2. Ratio	LP : TL= 1 : 4.1 WP : WD= 1 : 1.4
3. Shape	Elongate ovoidal
4. Protomerite	
4—1. Shape	Dome-shaped with conoidal projection at apex, a little higher than width, widest through middle. On some specimens a shallow constriction comes out above the middle.
5. Deutomerite	
5—1. Shape	Ovoidal to elongate ovoidal, widest at shoulder, tapering thence and terminating to well rounded posterior extremity. Occasionally it becomes slender at the middle.
6. Septum	Constriction fairly deep.
7. Nucleus	
7—1. Shape	Spherical, 25μ in diameter.
7—2. Position	Unfixed but generally at the anterior region of deutomerite.
7—3. Nucleolus	One, spherical.
8. Endoplasm	
8—1. Color	Light brown. Near the apex of protomerite with conoidal projection which is nealy transparent.
8—2. Granules	Dense, homogeneous in both protomerite and deutomerite excepting above mentioned portion.
9. Ectoplasm	stout, fairly thick.
II, III. Cyst and Spore	Not known.
IV. Movement	Sliding slowly forward.
V. Cephalin	
1. Shape	Ovoidal cephalins usually stick to the epitherium of intestin but some of them enter into the enteric caeca and often the body is lengthened.
2. Structure	Almost same as adult.
3. Epimerite	Flat pumpkin-shaped disc with milled border set upon the conoidal projection of protomerite.

Table 3. *Asterophora hemicerae* n. sp.

Measurements and Ratio of Sporadins (unit μ)

TL	410	320	297	268	240
LP	100	78	70	60	60
LD	310	242	227	208	180
WP	120	88	69	62	55
WD	150	120	119	97	75
Ratio					
LP : TL	1 : 4.1	1 : 4.1	1 : 4.2	1 : 4.5	1 : 4.0
WP : WD	1 : 1.3	1 : 1.4	1 : 1.7	1 : 1.6	1 : 1.4

Remarks :

The cyst and the spore are unknown but the morpholgy of the sporadin and the structure of the epimerite indicate that this species belongs to the genus *Asterophora*. In *Asterophora*, *A. philica* (Leidy) Crawley is reported from Tenebrionidae in U. S.. The sporadin of *A. philica* is much bigger than that of this species. In *A. philica* maximum TL reaches 2000μ but only 420μ in this species. In Japan *A. pygmea* H. Hoshide and *A. orientalis* H. Hoshide are reported from Mycetophagidae and Melandryidae. This species resembles *A. orientalis* in the shape, the size and the ratio of the body but differs from *A. orientalis* in the shape of the nucleus ; the nucleus is spherical in this species and elongate ovoidal in *A. orientalis*. This species also resembles *A. pygmea* in the shape and the ratio of the sporadin, the shape of the nucleus and the condition of the endoplasm but differs from *A. pygmea* in the size of the body. In *A. pygmea* the maximum TL is 220μ and in this species the maximum TL is 420μ. Above mentioned the author assume that this species is a new member of *Asterophora* and propose the name *Asterophora hemicerae* n. sp..

It is very interesting ecological character of this species that a lot of young cephalines stay in the enteric caeca of the host.

Stylocephaloides sedenis (H. Hoshide) K. Hoshide
(Fig. 5. A—H. Fig. 9. A—I.)

1951 *Spherorhynchus sedenis* H. Hoshide 1951 : 6
1958 *Spherorhynchus sedenis* H. Hoshide 1958 : 69

Host : *Setenis valpiges* Marseul Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Obatake

I. Sporadin

1. Association Solitary
2. Measurements
2—1. Size
Maximum TL 2390 WD 182

Average	TL 1685 LP 122 LD 2260 WP 86 WD 131
2—2. Ratio	LP : TL= 1 : 13.8 WP : WD= 1 : 1.5
3. Shape	Very long slender cylindrical.
4. Protomerite	
4—1. Shape	Subglobular or dome-shaped, width almost equal to height or slightly higher than width. Well rounded at anterior end but in some specimens a small conical papilla visible at the top.
5. Deutomerite	Elongate cylindrical, widest a little below septum, gradually taper to very long posterior region ending rather in a sharp posterior extremity
6. Septum	Conspicuous, constriction fairly deep.
7. Nucleus	
7—1. Shape	Ellipsoidal to spherical, average 100 × 70μ in size, but not usually visible in vivo in adult because of dense endoplasm.
7—2. Position	Unfixed, in some ones at anterior region directly under septum and in others at near the posterior extremity.
7—3. Nucleolus	2 to several.
8. Endoplasm	
8—1. Color	Dark brown in deutomerite and slightly lighter in protomerite. In some specimens the body rather blackish spotted with many pale speckles.
8—2. Granules	Same quality in both deutomerite and protomerite but much denser in the former than the latter.
9. Ectoplasm	Stout, rather thick about 6μ in thickness at whole surface of body excepting the anterior end of protomerite. It is about 20μ in thickness at the conical papilla of anterior end.
II. Cyst	Two sporadins come near and contact at each anterior end, head to head or at each side of protomerite lieing down side by side before cyst formation. Then the anterior region of bodies gradually swells out and shortens drawing their posterior region. As the cysts ripen its color change from milkywhite into blakish.
1. Structure	Spherical, 390μ in average total diameter, cyst envelope thin about 10μ in thickness,
2. Dehiscence	Simple ruptue, from the split of envelope spores are extruded in chains.
III. Spore	
1. Shape	Blackish hat shaped.

2. Size — $10 \times 7\mu$.

IV. Movement — Gliding forewards slowly and often bends the near region of septum.

V. Cephalin

1. Shape — Ovoidal in early stage of cephlin but the body lengthen as it grows and becomes elongate cylindrical or elongate ellipsoidal.
Protomerite subglobular, widest through middle, generally one and a half times as wide as high.
Deutomerite elongate cylindrical or ellipsoidal widest at shoulder, thence tapering to a blunt or rather pointed posterior end.

2. Structure — Endoplasm light and dark brown in color, granules dense, homogeneous fine.

3. Epimerite — Consist of two parts, crown and stalk. Crown seems a simple hemispherical body by low magnification, measurs $30 \times 17\mu$ in average size, but on the surface small 10—12 swellings with dichotomic tips are discernible by high magnification.
Stalk cylindrical, 70—50μ in length, many longitudinal fine striations connecting to the crown are visible. The stalk usually contracts and swells out.

Table 4. *Stylocephaloides sedenis* (H. Hoshide) K. Hoshide

Measurements and Ratio of Sporadins (unit μ)

TL	1092	2392	2288	2210	1040
LP	78	130	156	156	78
LD	1014	2262	2132	2054	962
WP	91	104	130	130	78
WD	130	182	182	195	117
Ratio					
LP : TL	1 : 14.0	1 : 18.8	1 : 14.7	1 : 14.2	1 : 13.3
WP : WD	1 : 1.4	1 : 1.8	1 : 1.4	1 : 1.5	1 : 1.5

Remarks :

H. Hoshide reported *Sphaerorhynchus sedenis* from *Setenis valpiges* in 1951. The author collected some ten individuals of *Setenis valpiges* and found the gregarines in summer 1979. H. Hoshide classified this as *Sphaerorhynchus* and named it *Sphaerorhynchus sedenis*. At that time H. Hoshide observed only the cephalin and did not observe the sporadin, the cyst and the spore. On the typespecies, *Sphaerorhynchus ophioides* Labbe cyst and spore were not observed, too. H. Hoshide classified this gregarine with the structure of the epimerite. The author can observe the sporadin,

the cyst and the spore in detail this time. The epimerite of this species has 10—12 swellings on the surface. With the structure of the epimerite, the morphology of the sporadin, the cyst and the spore and the process of the cyst formation the author thinks it adequate to transfer the genus from *Sphaerorhynchus* to *Styloceph-aloides* which is established by Théodoridè, Desportes and Jolivet in 1965.

Steinina ovalis (Stein) Leger et Duboscq 1904
(Fig. 1. N,O.)

1958 *Steinina ovalis* H. Hoshide 1958 : 36

Host : *Tenebrio molitor* L. Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Tabuse (Yamaguchi Pref.)

I. Sporadin

1. Association	Solitary.
2. Measurements	
2—1. Size	
Maximum	TL 238 WD 175
Average	TL 122 LP 51 LD 71 WP 44 WD 62
2—2. Ratio	LP : TL= 1 : 2.4 WP : WD= 1 : 1.4
3. Shape	Obese, ovoidal.
4. Protomerite	
4—1. Shape	Elongate conical, terminating in a large cone, widest at base, nearly as wide as high.
5. Deutomerite	
5—1. Shape	Short ovoidal, ending in bluntly or broad rounded posterior extremity, a little longer than wide or almost as wide as long.
6. Septum	Constriction slight or none.
7. Nucleus	
7—1. Shape	Spherical, 15—20μ in diameter.
7—3. Nucleolus	Spherical, one 5—7.5μ in diameter.
8. Endoplasm	
8—1. Color	Brown.
8—2. Granules	Dense in deutomerite and posterior half of protomerite but anterior half of it nearly devoiding of endoplasm and forming a distinct hyaline conical area.
9. Ectoplasm	Stout, comparatively thick.

II. Cyst

1. Structure	Spherical to ovoidal, 100μ in average diameter.
2, Dehiscence	By simple rupture.

III. Spore

1. Shape — Biconical, broad through middle.

2. Size — 9 x 7.5μ

V. Cephalin

3. Epimerite — A short retractile digitiform process in the early stage of development, becoming a flattened button in the old stage.

Steinina obconica Ishii 1914

(Fig. 1. M.)

1914 *Steinina obconica* — Ishii 1914 : 439

1951 *Steinina obconica* — H. Hoshide 1951 : 11

1958 *Steinina obconica* — H. Hoshide 1958 : 36

Host : *Tribolium castaneum* Herbst, *Lyprops sinensis* Marseul
Coleoptera, Tenebrionidae

Habitat : Intestine

Locality : Izu Province
Hikari, Obatake (Yamaguchi Pref.)

I. Sporadin

1. Association — Solitary.

2. Measurements

2—1. Size

Maximum — TL 140 WD 80

Average — TL 109 LP 26 LD 83 WP 49 WD 51

2—2. Ratio — LP : TL= 1 : 4.2 WP : WD= 1 : 1.0

3. Shape — Obese.

4. Protomerite

4—1. Shape — Dome-shaped, 2—4 times as wide as high.

5. Deutomerite

5—1. Shape — Widest just below septum, tapering to a slender, bluntly pointed posterior end.

6. Septum — Constriction slight.

7. Nucleus

7—1. Shape — Spherical, 9μ in average diameter,

7—3. Nucleolus — One.

8. Endoplasm

8—1. Color — Brown in deutomerite, blackish in protomerite.

8—2. Granules — Dense.
Much denser and larger in protomerite than in deutomerite.

II. Cyst
1. Structure — Spherical to slightly ovoidal, 120 × 108μ.
III. Spore — Not known.
V. Cephalin
3. Epimerite — A short conical, hyaline projection, 8μ in average length. The base of epimerite surrounded by the anterior region of protomerite where it is like a collar showing fine longitudinal striations.

Steinina sphaerospora H. Hoshide 1951
(Fig. 1. K)

1951 *Steinina sphaerospora* H. Hoshide 1951 : 19
1958 *Steinina sphaerospora* H. Hoshide 1958 : 36

Host : *Tenebrio picipes* Herbst Coleoptera, Tenebrionidae
Habitat : Intestine
Locality : Hikari (Yamaguchi Pref.)

I. Sporadin
1. Association — Solitary
2. Measurements
2—1. Size
Maximum — TL 240 WD 120
Average — TL 192 LP 50 LD 142 WP 78 WD 87
2—2. Ratio — LP : TL= 1 : 3.8 WP : WD= 1 : 1.1
3. Shape — Obese, ovoidal, curved to one side.
4. Protomerite
4—1. Shape — Dome-shaped, widest at base, conically projected at apex.
5. Deutomerite
5—1. Shape — Curved, horn-shaped, widest at shoulder, tapering gradually to a sharply pointed posterior extremity.
6. Septum — Constriction here slight.
7. Nucleus
7—1. Shape — Spherical, 23μ in average diameter.
7—3. Nucleolus — One or two, attached to the nuclear membrane.
8. Endoplasm
8—1. Color — Light brown to brown.
8—2. Granules — In deutomerite dense, coarse and large, in anterior half of protomerite nearly transparent, scant, in posterior half dense, fine.
9. Ectoplasm — Fine longitudinal striations clearly discernible on body surface.

II. Cyst

1. Structure — Ovoidal to spherical, 100—140μ in diameter.

2. Dehiscence — By simple rupture.

III. Spore

1. Shape — Spherical.

2. Size — 11μ in diameter.

V. Cephalin

1. Shape — Regularly symmetrical ellipsoidal.

3. Epimerite — Elongate slender projection, its top truncated, disc-shaped in adults, sometimes sharply or bluntly pointed at end in the early stage.

Steinina minor Obata 1953

(Fig. 1. L.)

1953 *Steinina minor* Obata 1953 : 14

Host : Tenebrionidae sp. Coleoptera, Tenebrionidae

Habitat : Intestine

Locality : Hiroshima (Hiroshima Pref.)

Izushi (Hyogo Pref.)

I. Sporadin

1. Association — Solitary.

2. Measurements

2—1. Size

Maximum — TL 72 WD 64

Average — TL 67 LP 14 LD 53 WP 38 WD 45

2—2. Ratio — LP : TL= 1 : 4.8 WP : WD= 1 : 1.2

3. Shape — Small, obese.

4. Protomerite

4—1. Shape — Semispherical, three times as wide as high, widest at base.

5. Deutomerite

5—1. Shape — Ovoidal, widest at one third from septum, tapering obliquely and gradually to a conical blunt end.
When fixed become almost spherical.

6. Septum — Constriction slight.

7. Nucleus

7—1. Shape — Spherical, small.

7—2. Position — Indistinct in living specimens.

7—3. Nucleolus — One, large.

8. Endoplasm

8—2. Granules	Scarce, gathered only in the posterior half of protomerite, more compact, granular in deutomerife.
II. Cyst	
1. Structure	Spherical, white and opaque, 65μ in outer diameter.
III, Spore	Not known.
IV. Movement	Slow, rotating around the posteior end to its shorter side, straight progressive not observed.
V. Cephalin	
3. Epimerite	A little variable cone.

References

1. Crawley, H. 1903, List of the polycystid Gregarines of the United States. Proc. Acad. Nat. Sci. Phila. 55 : 41—51.
2. Hoshide, H. 1951, Studies on Gregarines Parasitic in Japanese Insects. I. Zool. Mag. Tokyo Vol. 60(8) : 162—167.
3. ——, 1952, Studies on Gregarines Parasitic in Japanese Insects III. Ibid. Vol 61 (9) : 269—274.
4. ——, 1953, Studies on the Gregarines from the Coleoptera in Japan II. Bull. Fac. Educ. Yamaguchi Univ. Vo 12 (1) : 70—81.
5. ——, 1958, Studies on the cephaline gregarines of Japan. II. 2) Description of the member belonging to the Family Gregarinidae. Ibid. Vol 7 (2) : 45—109.
6. Hoshide, K. 1971, Studies on Gregarines from Japan II. *Cephaloidophora anisogammari* n. sp. and *Cephaloidophora elongata* n. sp. from Amphipoda ; Jour. Fac. Sci. Hokkaido Univ. Ser. IV. Zool. 18(1) : 186—192 Pl. 1.
7. Ishii, S. 1911, On the intracellular stages of *Gregarina polymorpha*. Annot. Zool. Jap., 7 : 279—284.
8. ——, 1914, on four polycystid gregarines from the intestine of *Tribolium ferrugineum* F. Annot. Zool. Jap. 8 : 435—441.
9. Léger, L. and Duboscq, O. 1904, Nouvelles recherches sur les grégarines et l'épithé lium intestinal des trachéates Arch. Protistenk. 4 : 335—383.
10. Lipa, J.J. 1967, Studies on gregarines (Gregarinomorpha) of arthropods in Poland. Acta Protozool. 5 : 97—179 figs.
11. Obata, K. 1953, Reports on some grgearines from Japanese insects (1). J. Sci. Hiroshima Univ. Series B. Div. 1. Vol. 14 : 1—34.
12. Schneider, A. 1875, Contributions à l'historie des grégarines des invertébr de paris et de Roscoff. Archs. Zool. exp. gen. 5 : 493—604.
13. Théodoridès, j., Desportes. I. and Jolivet, P. 1965, Grégarines parasites de Coléoptères Ténébrionides de la région de Khartoum (République du Soudan) . Bull. Inst. noire. 27A : 139—164. figs.
14. Tsugawa, H. 1951, Studies on the Gregarines from the Coleoptera in Japan I. Yamaguchi Jour. Sci. Vol 2 : 93—106.
15. Watson, m. E. 1916, Studies on Gregarines. Illinois Biol. Monog. 2 : 215—468.

Explanation of Fig.

Fig. 1.

A, B, C. *Stylocephalus japonicus* H. Hoshide.
After H. Hoshide 1951 Plate I, Fig. 1, 2, 3.

D. *Gregarina polymorpha* (Hammerschmidt)
Stein. After H. Hoshide 1957 Plate X, Fig. 147.

E. *Gregarina ulomae* H. Hoshide. After H. Hoshide 1951, Plate II, Fig. 16

F. *Gregarina lypropsi* H. Hoshide. After H. Hoshide 1951, Fig. 1.

G. *Gregarina gonocephala* Obata. After Obata 1953, Fig. 13.

H. *Gregarina pumila* H. Hoshide. After H. Hoshide 1957, Plate XIII, Fig. 196.

I, J. *Gregarina minuta* Ishii. After H. Hoshide 1957, PlateXII, Fig. 174, 176.

K. *Steinina sphaerospora* H. Hoshide. After H. Hoshide 1952, Fig. 1.

L. *Steinina minor Obata*. After Obata 1953, Fig. 27.

M. *Steinina obconica* Ishii. After H. Hoshide 1951, Fig. 7.

N, O. *Steinina ovalis* (Stein) Leger and Duboscq.
After H. Hoshide 1958, Plate XVIII, Fig, 275, 276.

P. *Hirmocystis mirabilis* H. Hoshide. After H. Hoshide 1951, Fig. 9.

Q. *Gregarina tokonoi* Obata. After Obata 1953, Fig. 23.

R. *Gregarina cuneata* Stein After Obata 1953, Fig. 11.

S. *Gregarina plesiophthalmi* H. Hoshide. After H. Hoshide 1952, Fig. 8.

T. *Gregarina platycephala* H. Hoshide. After H. Hoshide 1952, Fig. 5.

U. *Gregarina cuneata* Stein. After H. Hoshide 1951, Fig. 14.

Fig. 1

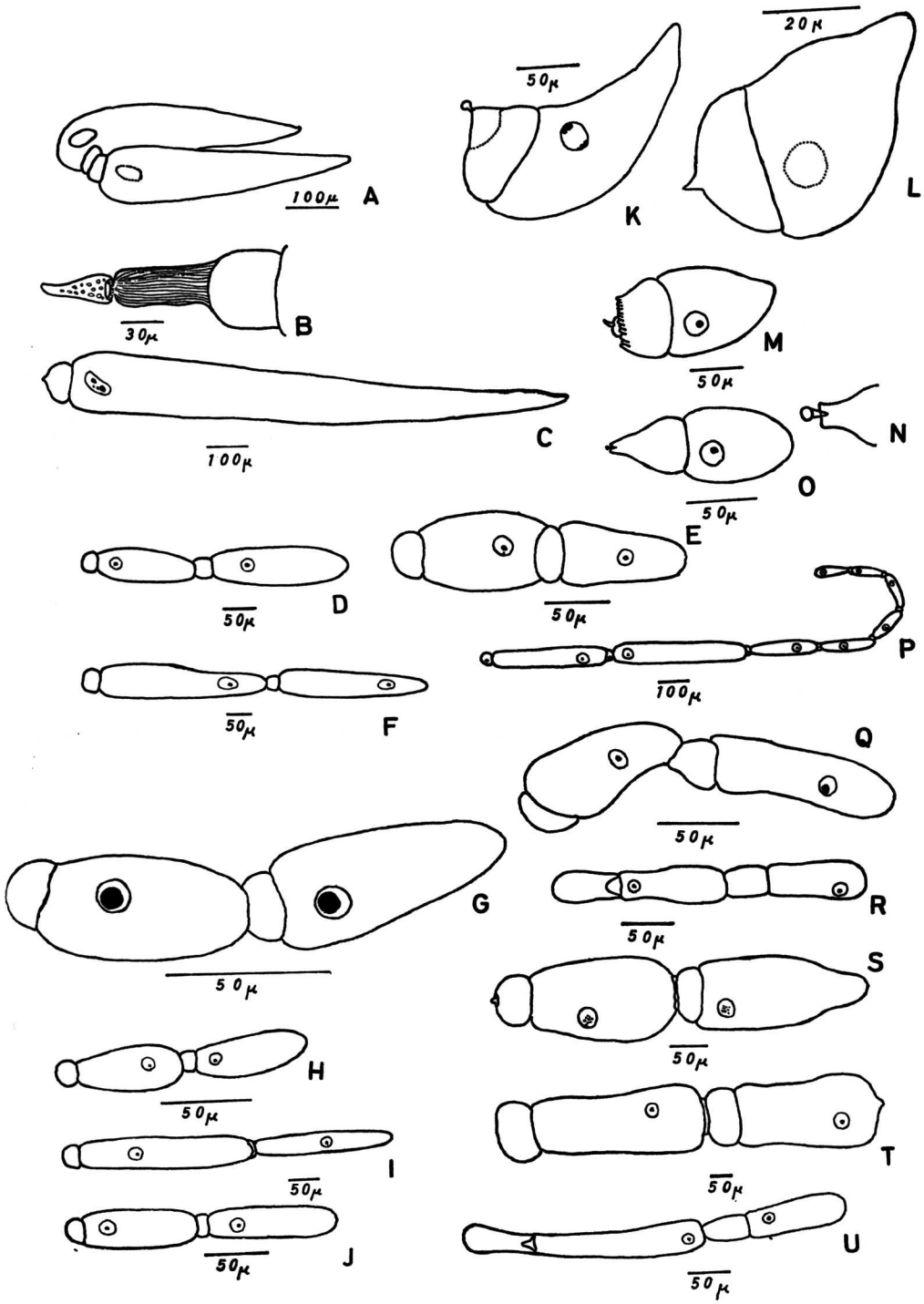
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Fig. 2.

Gregarina inclinata n. sp.

A, B, C. Associated sporadin.

D. Small associated sporadin.

E. Mature cyst with sporeduct.

F. Spore.

Fig. 3.

Gregarina derispiae n. sp.

A. Mature association. The protomerite of primite is irregularly crenated at its anterior margin.

B. Another mature association.

C. Small association.

D. Fairly large association. Anterior end of protomerite is conical and irregular crenated fold surrounds its base.

E1, E2. Two types of protomerite of sporadins.

F1, F2. The anterior and posterior parts of primite and satellite are shown.

Fig. 2

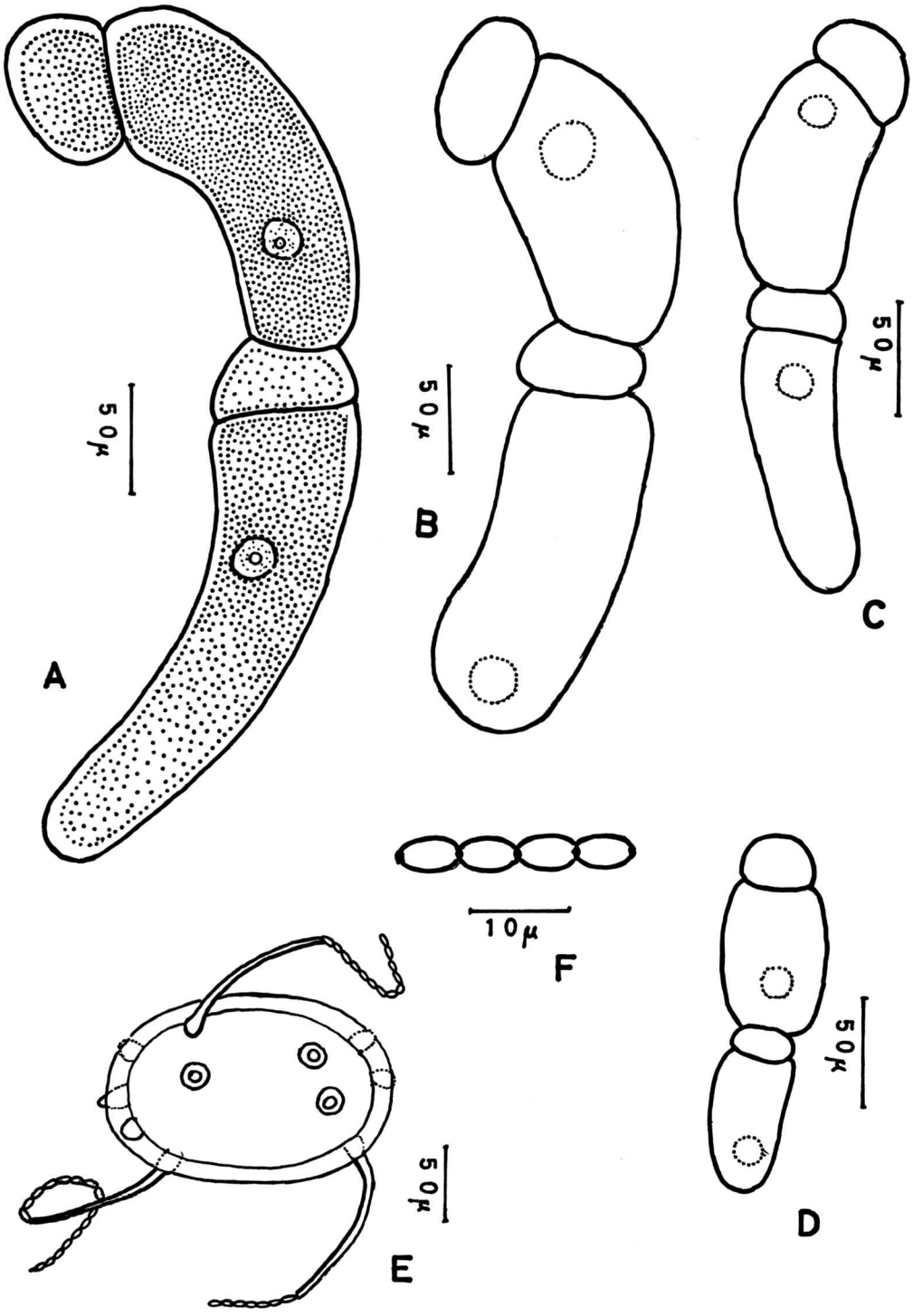

Fig. 3

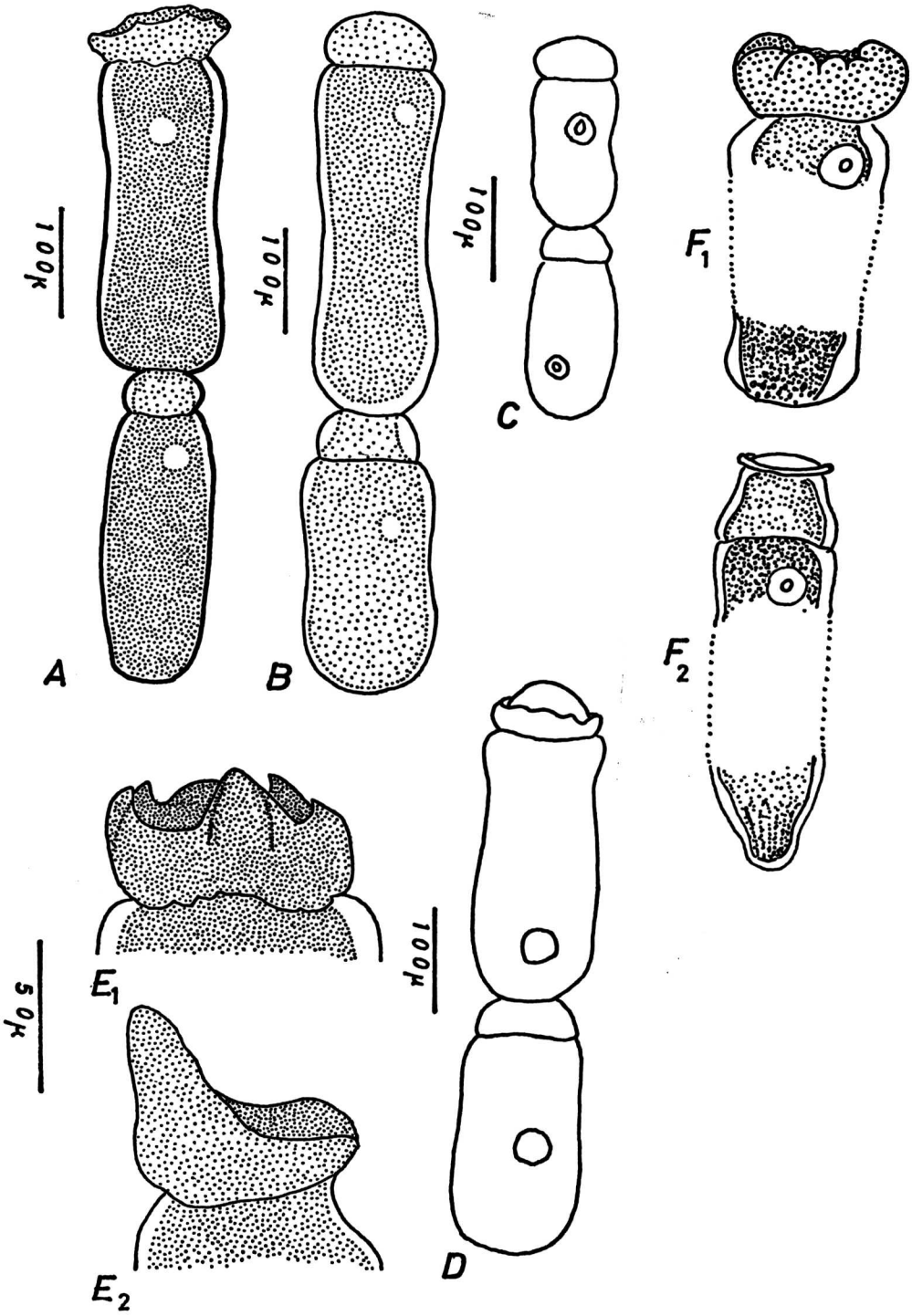

Fig. 4.

Asterophora hemicerae n. sp.

A. Well mature sporadin.

B. Another type of mature sporadin.

C. Large cephalin with epimerite.

D. Epimerite

E, F. Cephalin without epimerite.

G. Young cephalines stay in the enteric caeca of the host.

H. Small cephalin.

Fig. 5.

Stylocephaloides sedenis (H. Hoshide) K. Hoshide

A. Young cephalin with epimerite.

B. Fairly large cephalin with epimerite.

C. Matured Sporadin.

D, E. Pair of sporadins attached head to head for cyst formation.

F. Cyst.

G. Epimerite.

H. Spore.

Fig. 4

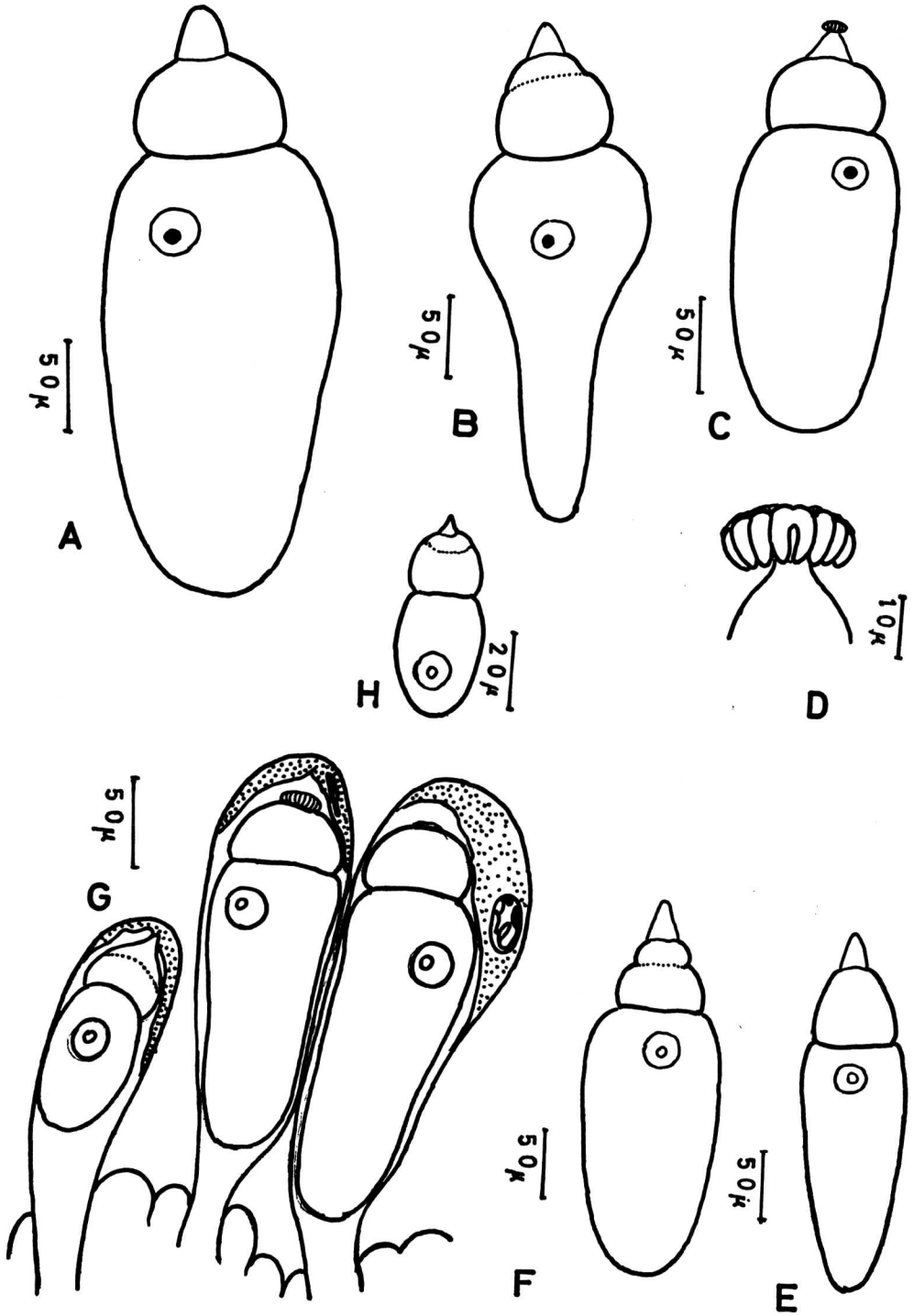

Fig. 5

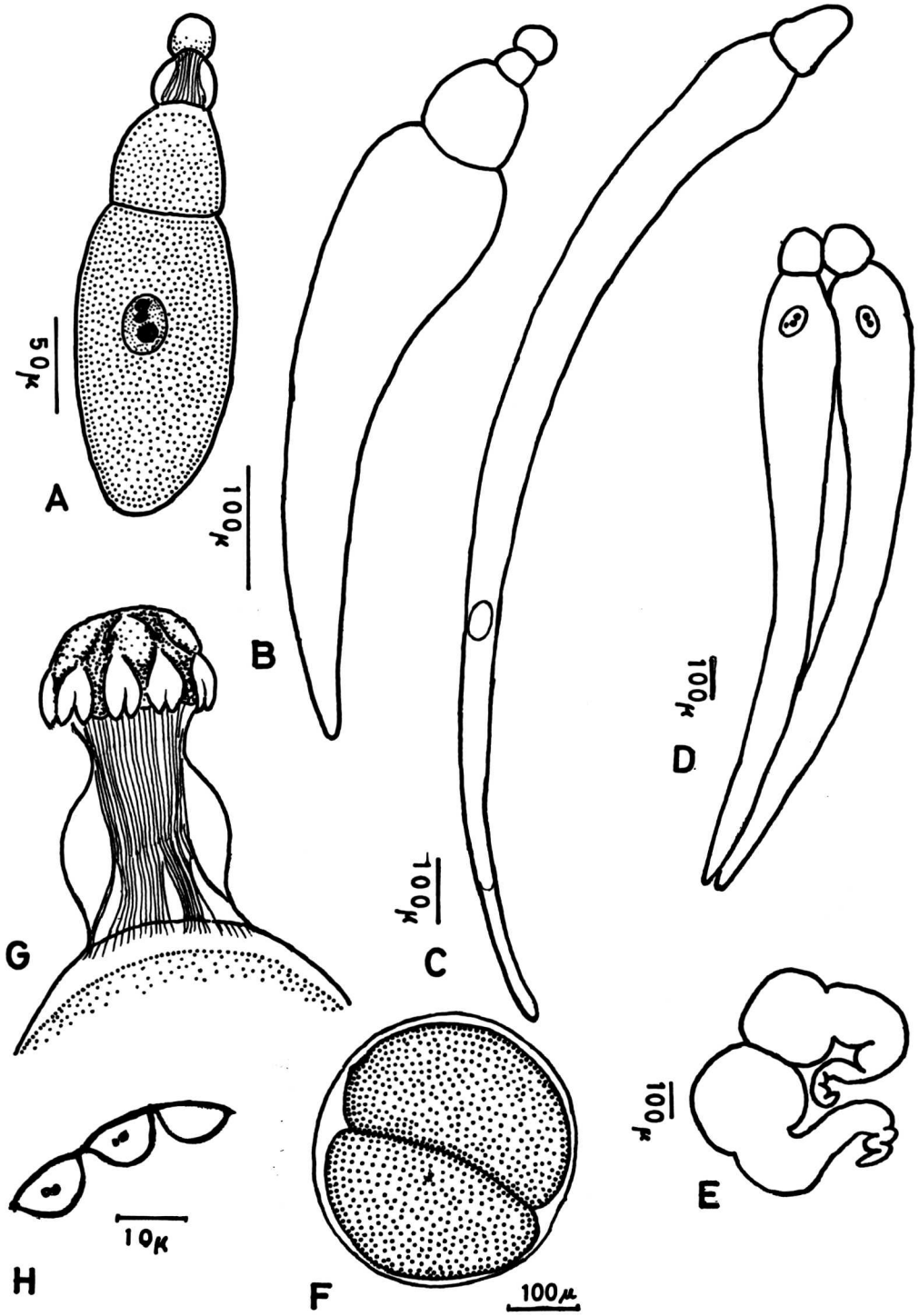

Fig. 6.

Gregarina inclinata n. sp.

A, B, C, D, E. Associated sporadin.

F. Cyst.

G. Cyst with sporeduct.

H, I. Spore.

Fig. 7.

Gregarina derispiae n. sp.

A. Two associations.

B. Mature association : fixed specimen. One nucleolus distinguished in each nucleus.

C. Another association.

D. Association of three sporadins

Fig. 6

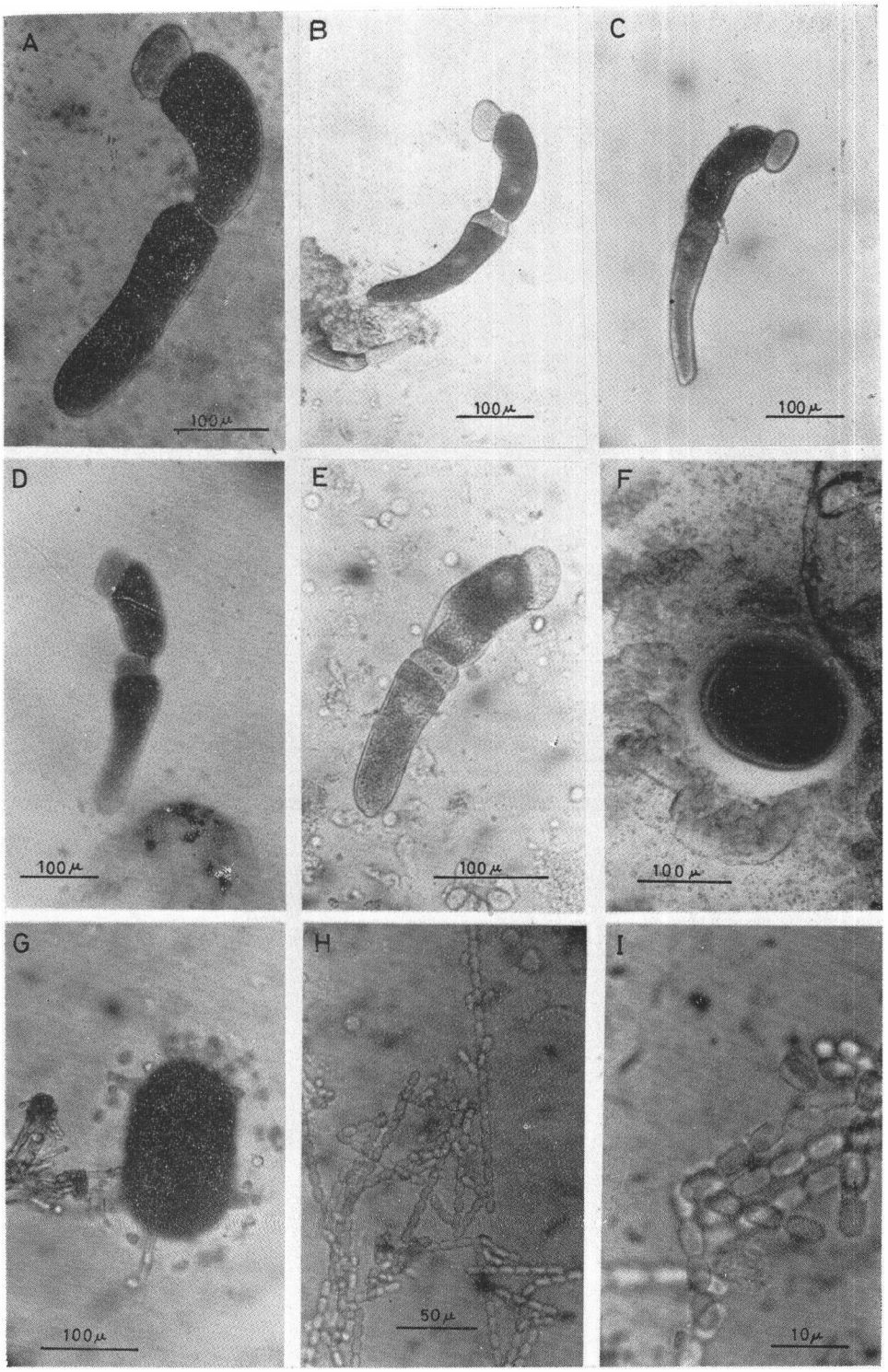

Fig. 7

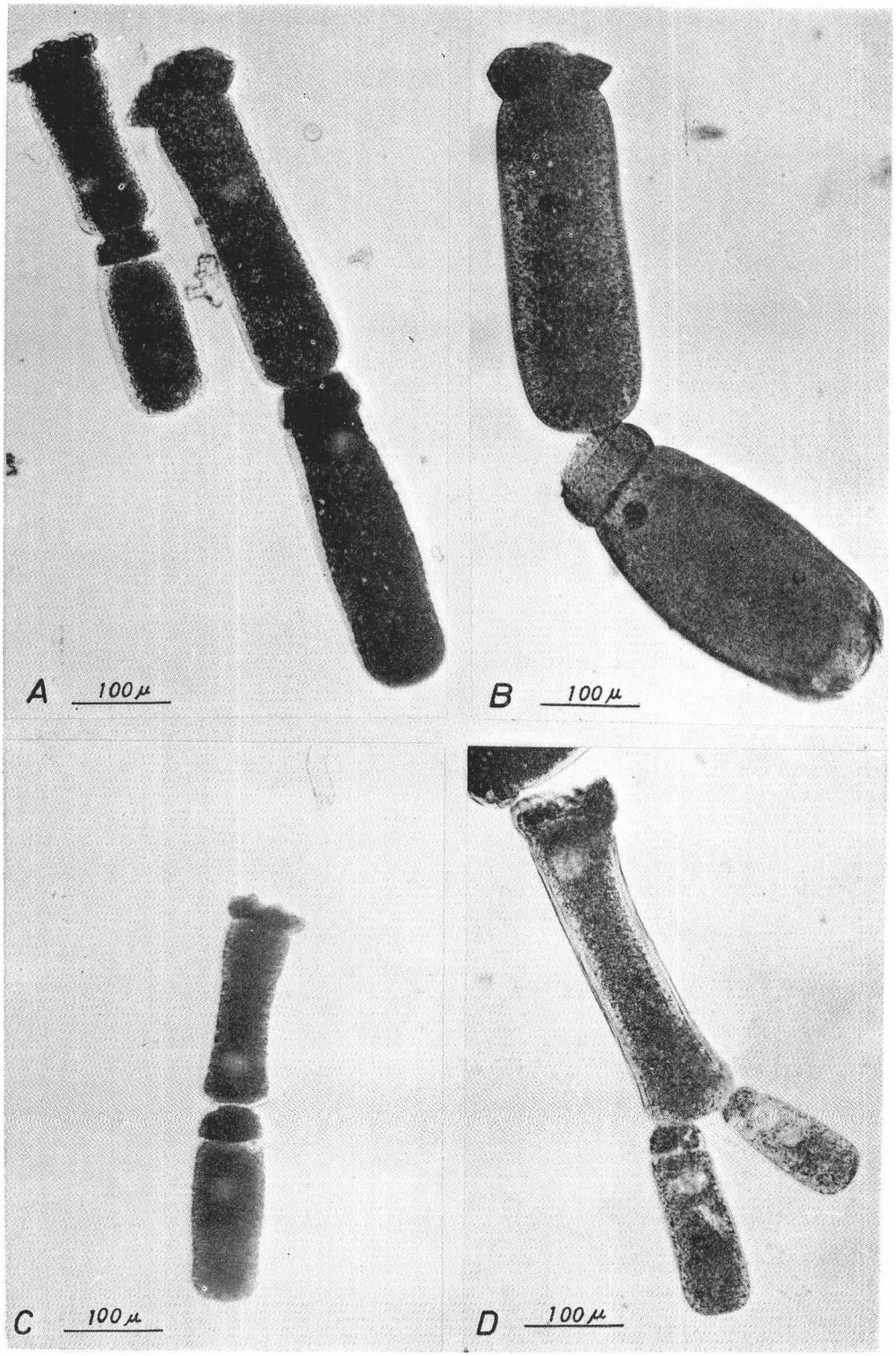

Fig. 8.

Asterophora hemicerae n. sp.

A, B. Matured sporadin.

C, D. Young cephalin

E. Cephalin with epimerite.

F, G, H, I. Young cephalin stay in the enteric caeca of the host.

Fig. 9.

Stylocephaloides sedenis (H. Hoshide) K. Hoshide

A, B. Well matured sporadin.

C. Cephalin with epimerite.

D, E, F. Pair of sporadins attached head to head for cyst formation.

G. Cyst.

H, I. Spore.

Fig. 8

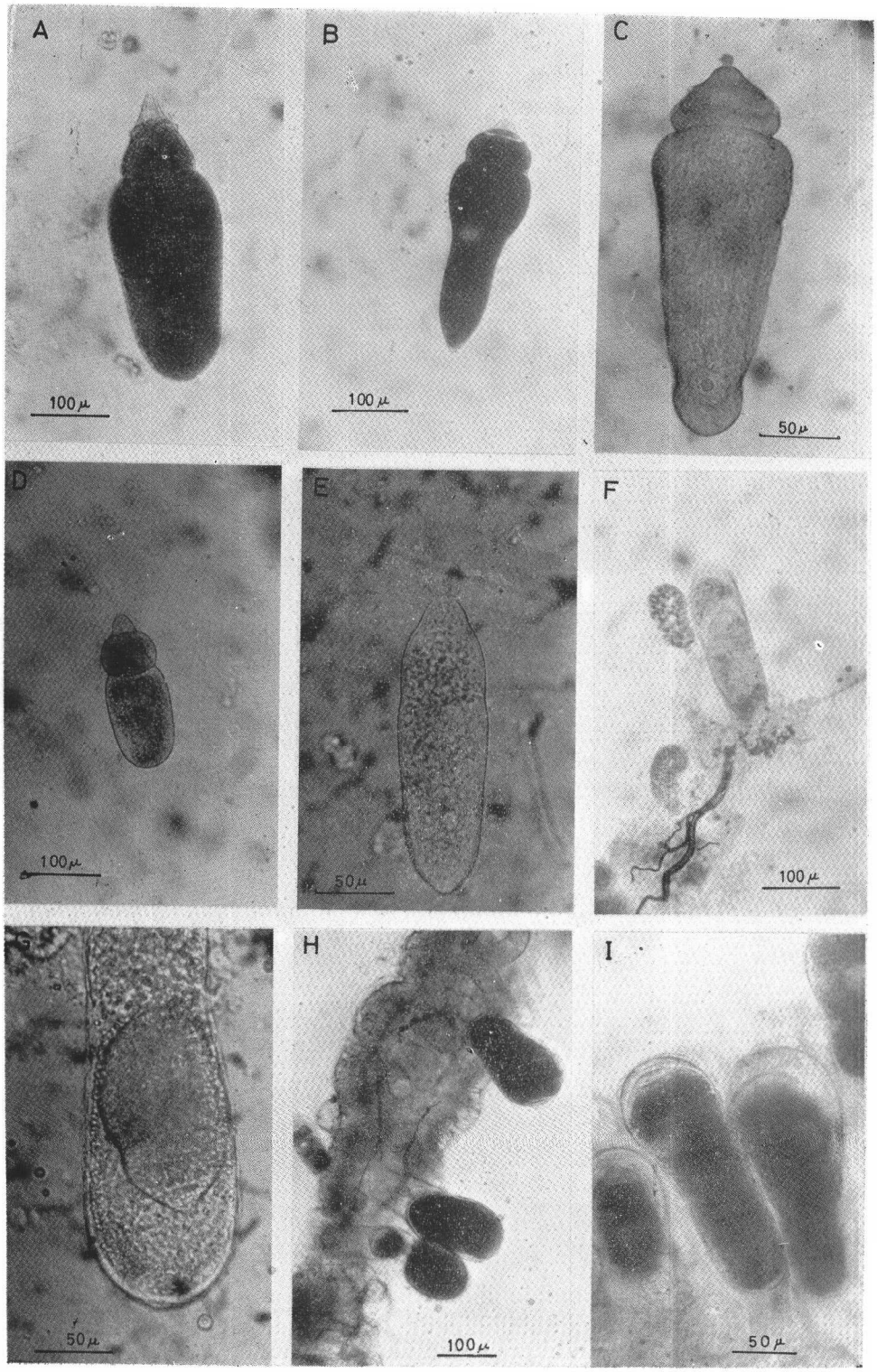

Fig. 9