

Bibliographie.

1911. Alexeieff, A., Notes sur les Flagellés. Arch. Zool. exp. T. (V), VI, Nr. 14.
 1911a. —, Sur le genre *Herpetomonas* Kent. C. R. Soc. Biol. T. LXXI. p. 455.
 1911. Chatton, E., Sur la systématique des Trypanosomides des Insectes. C. R. Soc. Biol. T. LXXI. p. 578.
 1911. Doflein, F., Lehrbuch der Protozoenkunde. Jena, G. Fischer. 3. Auflage.
 1911. Hamburger, Cl., Über einige parasitische Flagellaten. Verhandl. d. Heidelb. Naturhist.-Med. Vereins. N. F. Bd. XI. 3. Heft.
 1911. Jollos, V., Studien über parasitische Flagellaten. I. *Monocercomonas cetoniae* n. sp. Arch. f. Protistenk. Bd. XXIII.
 1882. Kunstler, J., Sur cinq Protozaires parasites nouveaux. C. R. Acad. Sc. T. VC.
 1911. Mackinnon, D. L., On some more Protozoan Parasites from Trichoptera. Parasitology. Vol. IV. No. 1.
 1911. Prowazek, S. von, Zur Kenntnis der Flagellaten des Darmtractus. Arch. f. Protistenk. Bd. XXIII.
 1911. Roubaud, E., *Cercoplasma* (n. gen.) *Caulleryi* (n. sp.); nouveau flagellé à formes trypanosomiennes de l'intestin d'*Auchmeromyia luteola* Fabr. (Muscide). C. R. Soc. Biol. T. LXXI. p. 503.
 1911. Swellengrebel, N. H., Note on the morphology of *Herpetomonas* and *Criethidia*, with some remarks on »physiological degeneration«. Parasitology. Vol. IV. No. 2.
 1911. Wenyon, C. M., Oriental sore in Bagdad together with observations on a Gregarine in *Stegomyia fasciata*, the Haemogregarine of Dogs and the Flagellates of house flies. Parasitology. Vol. IV. No. 3.

Paris, le 8 Avril 1912.

5. Five polycystid Gregarines from Guatemala.

By Max M. Ellis, Instructor in Biology. University of Colorado.

(With 7 figures.)

eingeg. 11. April 1912.

The Diplopods and Insects which were the hosts for the gregarines here described were taken by Mrs. T. D. A. Cockerell while collecting in the United Fruit Company's reservation in Guatemala, at the ruins of the ancient Maya city of Quirigua. The host animals were sent alive to the University of Colorado where they were studied. These gregarines are of particular interest in that they furnish the first records of polycystid gregarines from Central America. The new world gregarines have been collected only in the United States of America, to any extent. Records of five species from the Argentine Republic were published by Frenzel¹ and two species by Magalhaes² from Brazil.

The writer wishes to express his thanks to Mrs. Cockerell for collecting and sending the host material and to Prof. R. V. Chamberlin and Col. T. L. Casey for the determination of the hosts.

¹ Jenaische Zeitschrift für Naturwissenschaften, Bd. XXVII, NF. XX, pp. 233—336, 1892.

² Arch. d. Parasitol., III, p. 38—45, 1900.

Theregarines were studied alive in the alimentary fluids of the host and also in normal salt solution. Some cleared preparations were made. Unless otherwise stated the drawings are by camera lucida from living specimens.

Stenophoridae.

1) *Stenophora cockerellae* sp. nov.³ (figs. 1, 2 and 3).

Type locality, Quirigua, Guatemala. February, 1912.

Host, *Paraiulus* sp. nov., a Diplopod. Det. Prof. R. V. Chamberlin.

Average specimens, 500 μ to 800 μ ; smallest observed, 186 μ ; largest, 850 μ .

Habitat, intestine.

Length of the protomerite in specimens over 400 μ , 14,5 to 17 in the total length (8,3 to 14 in individuals under 400 μ); maximum width of the protomerite 1,75 to 2 in the maximum width of the deutomerite; maximum width of the deutomerite 4,5 to 7 in the total length.

Protomerite more or less globose and capable of being partly telescoped by the deutomerite; region of its maximum width usually in the posterior half, less frequently near the middle; anterior margin regularly rounded except for a small, median, truncate papilla which generally extends beyond the rest of the protomerite for a distance equal to from one-sixteenth to one-tenth of the width of the protomerite; this papilla may be reduced to about one-twentieth of the width of the protomerite or it may be expanded into a very mobile, globose structure, equal to about one-sixth of the width of the protomerite in length; posterior portion of the protomerite slightly constricted in the region of the posterior margin of the contained endocyte; septal region thick, part of the time forming a distinct collar between the protomerite and deutomerite, collar almost or entirely wanting in large specimens when the papilla is not expanded.

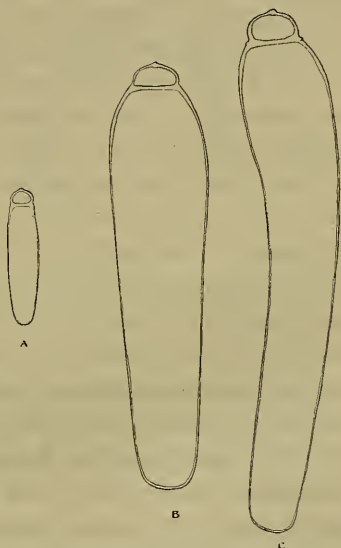


Figure 1. *Stenophora cockerellae*.
"A", 186 μ ; "B", 600 μ ; "C", 786 μ .

Deutomerite elongate; region of its maximum width, in large indi-

³ To Mrs. T.D.A. Cockerell.

viduals, in the anterior sixth, in those under 400 μ , in the anterior third; tapering very gradually posterior to the region of maximum width, and abruptly squared at the end.

Nucleus about two-thirds as large as the endocyte of the protomerite, obscured in all large living individuals and barely visible in small living specimens; easily demonstrated with Potassium Iodid Iodine solution and apparent in all cleared specimens.

Epicyte thin and very flexible; of uniform thickness over the entire animal except in the anterior portion of the protomerite where it is much thickened to form the walls of the base of the papilla and very thin over the anterior end of the papilla; showing distinct longitudinal striations by oblique light in living or cleared specimens.

Sarcocyte very thin near the middle of the deutomerite, becoming thicker both anteriorly and posteriorly, thickest in the region of the septum and quite thick in the median anterior portion of the protomerite just behind the papilla, where it fills a slight depression in the endocyte in specimens in which the papilla is not expanded.

Endocyte of the protomerite pale gray and rather opaque, filling the protomerite quite completely except in the median anterior portion; anterior margin convex when the papilla is extended and somewhat concave away from the papilla, when the papilla is not extended; posterior margin feebly convex towards the deutomerite. Endocyte of the deutomerite dark lead gray to almost black, dense and opaque.

The specimens of this gregarine observed were not very active but were capable of bending in any direction as they moved. After bending about for a few seconds they suddenly resumed their normal form. They were never seen to become short and thick as has been observed in the case of *Stenophora juli* (Frantz).

This species may be distinguished from *Stenophora larvata* (Leidy), *Stenophora juli* (Frantz), and *Stenophora elongata* sp. nov., by the following table. The measurements are for full size specimens.

	Deutomerite	Posterior Margin	Protomerite in Body Length	Special
<i>S. larvata</i>	Elongate to Flask-shaped	Square	9—11	Proportions of Deutomerite } Changeable }
<i>S. juli</i>	Elongate to Oval	Pointed	10—17	
<i>S. cockerellae</i>	Always Elongate	Very Square	14—17	Expansible Papilla
<i>S. elongata</i>	Always Elongate	Square	18—26	Pentagonal Protomerite

Each of the three specimens of the host of this species examined was considerably infected.

The most unique structure noted in connection with this species was the expansible papilla at the anterior end of the protomerite. This papilla was expanded at irregular intervals, for periods of from a few seconds to a minute or more. The process of expanding could be completed in about ten seconds although it usually consumed thirty to forty seconds. When completely expanded the papilla was very mobile. As this structure was moved about in all directions both by moving gregarines and by those at rest it probably has no connection with the locomotion of the individual. Its movements on the other hand were such as to suggest a tactile function. The expansion of this papilla seemed the result of the outflowing of the sarcocyte. As the process was ob-

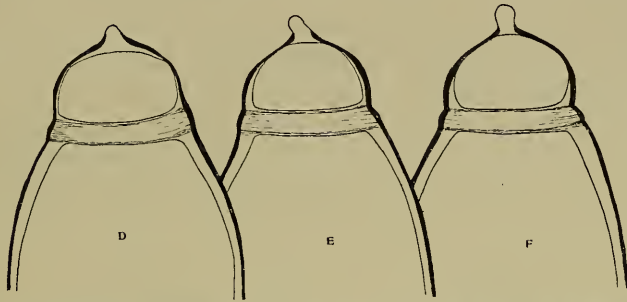


Figure 2. *Stenophora cockerellae*. Anterior portion of a $650\ \mu$ gregarine showing three stages in the expansion of the papilla. "F" was drawn from a completely expanded specimen.

served under the microscope it resembled the formation of a pseudopodium by a Rhizopod like *Amoeba* except that the endocyte did not enter the papilla. The anterior margin of the endocyte of the protomerite did change form however. In individuals in which the papilla was not expanded the anterior margin of the endocyte was always more or less concave away from the papilla (see fig. 3). The first apparent step in the expansion of the papilla was the obliteration of this concavity in the endocyte correlated with a thickening of the epicyte in the collar region above the septum. Fig. 2D shows a gregarine in this stage. With the enlargement of the papilla the endocyte of the protomerite became more and more convex towards the papilla until the maximum expansion was attained (figs. 2E and 2F). This process would naturally force out the sarcocyte in front of the endocyte producing the expanded papilla if there where any portion of the epicyte in that region elastic enough to give under the strain. Fig. 3 shows the anterior end of the protomerite of a cleared specimen highly magnified. It may be noticed that the

epicyte is thinnest in the median line and very thick on each side of the median line, i. e., at the base of the papilla. This variation in the thickness of the epicyte produces the appearance in optical section of a small canal opening to the outside. This structure has been recognized by several observers in other species of *Stenophora*. Leidy⁴ in his description of *Gregarina larvata* = *Stenophora larvata*, calls attention to this apparent canal as follows: "Superior cell placed in a depression of the inferior, surmounted by a slight papilla in which may be detected two lines apparently the outlines of an oral canal to the interior of the cell which is filled with granular matter". This he shows in his fig. 17. Schneider⁵ figures the same type of a structure for *Stenocephalus juli* = *Stenophora juli*. The explanation for this apparent canal in the present species and perhaps for the other species of *Stenophora*, is found in the expansion of the papilla, the thickened portion of the epicyte serving to form the base of the papilla and to concentrate the strain of the sarcocyte against the thin median portion which becomes inflated, as it were, by the sarcocyte.

By a comparison of figs. 2 and 3 it may be seen that there are five steps in the expansion of this papilla. 1) A thickening of the collar region around the septum which renders the protomerite more globose. 2) An increase in the distance between the endocyte of the protomerite and that of the deutomerite. 3) A change in the shape of the anterior margin of the endocyte of the protomerite from concave to convex toward the papilla. 4) A reduction of the space occupied by the sarcocyte in the anterior portion of the protomerite. 5) The enlargement of the papilla.

From this sequence of changes it was concluded that the contraction of the gregarine in the region of the septum, perhaps throughout the whole of the protomerite, forced the sarcocyte into the extreme end of the protomerite and inflated the thin median portion of the epicyte forming the projecting globose papilla. This view is further substantiated by the shape of the expanded papilla. The globose end of the papilla with the narrow neck joining it to the anterior end of the protomerite is precisely of the shape assumed by an elastic membrane held across a slightly projecting tube and inflated from the inside.

Unfortunately material was not at hand to investigate the function of this expansible papilla. Should it be shown that it were a prehensile structure by means of which the gregarine could anchor itself, it might contribute to the understanding of the elaborate type of epimerite as is

⁴ Proc. Acad. Nat. Sci. Philad., Vol. IV, p. 231, 1848—49.

⁵ Arch. Zool. exper., 4, Pl. XX, figs. 29, 30, 32, 33, 1876.

found in the genera *Stephanophora* and *Dactylophorus*. Its method of extrusion is suggestive of the pseudopodia of Rhizopods.

2) *Stenophora elongata* sp. nov. (fig. 4).

Type locality, Quirigua, Guatemala. February 1912.

Host, *Orthomorpha coarctata* (Saussure), a Diplopod. Det. Prof. R. V. Chamberlin.

Average specimens, 200 μ to 350 μ ; smallest observed, 21 μ ; largest, 390 μ .

Habitat, intestine.

Length of the protomerite from 18 to 26 in the total length of the gregarine in specimens over 100 μ ; width of the protomerite 1 to 1,6 in the maximum width of the deutomerite.

Protomerite always more or less pentagonal, with the two exposed lateral angles somewhat rounded and the anterior median angle rather truncate; always wider than long and increasing very little in diameter after the gregarine has

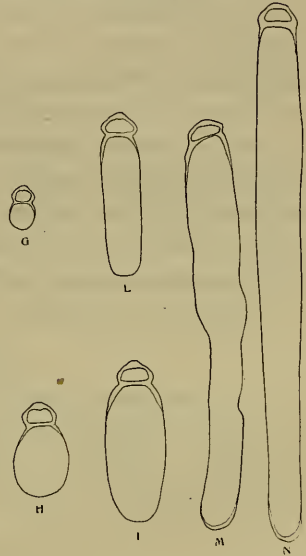
Fig. 3.



Figure 3. *Stenophora cockerellae*. Anterior portion of a 600 μ gregarine showing the condition in the protomerite of the sarcocyte and endocyte in a specimen with an unexpanded papilla. This gregarine had partly telescoped the protomerite into the deutomerite. Drawn from a cleared preparation.

Figure 4. *Stenophora elongata*. "G", 21 μ ; "H", 45 μ ; "I", 86 μ ; "L", 88 μ ; "M", 230 μ ; "N", 370 μ .

Fig. 4.



reached the length of 100 μ ; capable of being telescoped to some extent by the deutomerite; region of maximum width in the posterior half; line of demarcation between the protomerite and deutomerite very distinct.

Deutomerite in specimens over 100 μ , much elongate and very mobile; region of maximum width in the anterior third; tapering very gradually from the region of maximum width to a region about the length of the protomerite from the posterior end of the deutomerite, beyond this rather rounded with the extreme end somewhat square; in specimens under 100 μ , varying from slightly elongate through oval to almost spherical in very small specimens, much less mobile than the larger specimens, extreme posterior end usually somewhat square.

Nucleus only visible after the use of reagents, from one-half to seven-eighth of the size of the endocyte of the protomerite.

Epicyte thin and flexible, showing a thickened area in the extreme anterior portion of the protomerite, thinner in the median line thus producing the 'apparent pore and canal' noted for the previous species.

Sarcocyte very thin over the major portion of the deutomerite, much thickened in the anterior portion of the deutomerite, in the protomerite, and in large specimens, in the posterior tenth of the deutomerite.

Endocyte of the protomerite gray and very dense, irregularly circular or pentagonal in outline, not filling the protomerite completely; the median portion of the anterior margin always straight or slightly concave away from the anterior end. Endocyte of the deutomerite dark gray, dense and opaque, filling the deutomerite quite completely.

A very active gregarine continually bending the long deutomerite and moving rather rapidly. Although the same structure of protomerite was noted for this species as for the proceeding one, *S. cockerellae*, it was not observed to protrude an expansible papilla. For the comparative measurements for this species see the table under *S. cockerellae*.

Infection considerable in the hosts examined.

Stylocephalidae.

3) *Stylocephalus ensiferus* sp. nov. (fig. 5).

Type locality, Quirigua, Guatemala. February 1912.

Host, *Leptochirus edax* Sharp, a Staphylinid beetle: Det. Col. T. L. Casey, who states that the specimens are a variety of this species.

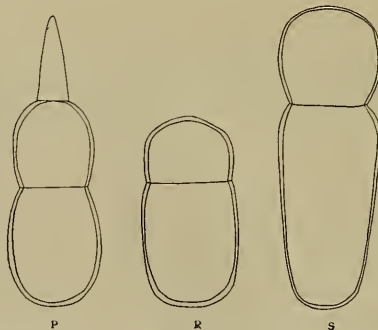


Figure 5. *Stylocephalus ensiferus*. "P", cephalont 60μ ; "R", sporont 47μ ; "S", sporont 65μ .

Average specimens, 40μ to 65μ .

Habitat, intestine.

Length of the epimerite about equal to, width of the epimerite at base 2,5 to 3 in the length of the protomerite; length of the protomerite

2,3 to 3,2 in the length of the gregarine without the epimerite; maximum width of the protomerite 1 to 1,4 in the maximum width of the deutomerite.

Epimerite long and regularly conical, ending in a rather blunt point.
Protomerite subglobose to oval.

Deutomerite oval in cephalonts and small sporonts, rather ovoid in large sporonts.

Epicyte thin and rigid.

Sarcocyte thick over the entire gregarine.

Endocyte dark gray, of a uniform finely granular structure and densely opaque.

Sporonts all solitary.

Distinguished from all other species of *Stylocephalus* by its small size and large epimerite without basal structures.

A very sluggish gregarine found in large numbers in the two specimens of the host examined. It has been referred to the genus *Stylocephalus* here, although the epimerite does not have the basal enlargements common to the epimerites of the other species of this genus, since it did not seem advisable to define a new genus without the spores.

Gregarinidae.

4) *Gregarina guatemalensis* sp. nov. (fig. 6).

Type locality, Quirigua, Guatemala. February 1912.

Host, *Ninus interstitialis* Esch., a Lucanid beetle. Det. Col.

T. L. Casey.

Average associations, 400 μ to 490 μ .

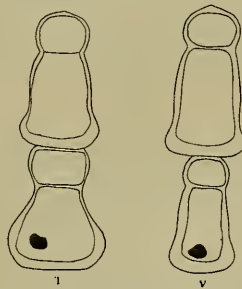


Figure 6. *Gregarina guatemalensis*. "T", primate 229 μ , satellite 200 μ ; "V", primate 243 μ , satellite 157 μ .

Habitat, intestine.

Primate. Length of the protomerite 3 to 3,5 in the total length; width of the protomerite 1,25 to 1,75 in the maximum width of the deutomerite; maximum width of the deutomerite 1,6 to 1,8 in the total length; protomerite globose except in the median line, where it is very

slightly pointed; deeply separated from the deutomerite; deutomerite narrowest at its junction with the protomerite, widening rapidly to the middle, beyond the middle narrowing somewhat but remaining wider than at its junction with the protomerite, widening rapidly again posteriorly to the region of its maximum width which is about one-half the length of the protomerite anterior to the posterior margin, narrowing suddenly back of the region of maximum width; posterior margin of the deutomerite squared; epicyte thin but rigid; sarcocyte very thick, thickest in the posterior portion of the deutomerite where it equals about one-fifth of the length of the protomerite; endocyte of the protomerite very finely granular, much darker and denser than that of the deutomerite; endocyte of the deutomerite quite clear except for several large spherical masses contained in it, (these masses are made up of large granules and vary both in size and number in different gregarines, some being of a diameter equal to about one-fifth of the length of the protomerite; the number counted in six gregarines varied from 17 to 23 as follows, 17, 19, 20, 22, 23, 23); nucleus obscured but easily demonstrated with Iodine solution.

Satellite. Slightly smaller but much the same as the primate; maximum width more variable than in the primate; endocyte rather clear in both protomerite and deutomerite, that of the deutomerite containing fewer of the spherical masses than the primate; nucleus usually apparent in the living specimen.

Associations. Always in association. The length of three typical associations are given here.

Primate		Satellite		Total
Protomerite	Deutomerite	Protomerite	Deutomerite	
72 μ	172 μ	43 μ	114 μ	401 μ
86 μ	140 μ	47 μ	140 μ	413 μ
86 μ	190 μ	70 μ	150 μ	496 μ

This species may be distinguished from *Gregarina passalicornuti* Leidy as it is a broader, stouter, gregarine and much more irregular in outline than Leidy's species. The measurements also show the difference between these two species. The maximum width of the deutomerite goes 1,6 to 1,8 in the total length of *G. guatemalensis* and 2,6 in the length of *G. passalicornuti*; the protomerite of *G. guatemalensis* is contained 3 to 3,5 in the length, and that of *G. passalicornuti*, 4,5. *G. guatemalensis* was abundant in each of the several host beetles examined.

Actinocephalidae.

5) *Stephanophora* (?) *crassa* sp. nov. (fig. 7).

Type locality, Quirigua, Guatemala. February 1912.

Host, *Leptochirus edax* Sharp var., a Staphylinid beetle. Det. Col. T. L. Casey.

Average specimens, 50 μ to 60 μ .

Habitat, intestine.

Length of the protomerite 3,3 to 3,5 in the total length; width of the protomerite 1 to 1,5 in the maximum width of the deutomerite; maximum width of the deutomerite 2,3 to 2,5 in the total length.

Protomerite somewhat oval, always wider than long; region of maximum width near the middle; distinctly marked off from the deutomerite.

Deutomerite rather obconical; region of maximum width in the anterior fifth, posterior to this tapering to the posterior third, where its width is less than half its maximum width; posterior third elongate and conical.

Epicyte thin and rigid; sarcocyte thick over the entire gregarine, thinnest in the anterior portion of the protomerite and thickest in the posterior portion of the deutomerite; nucleus diameter equal to about one-fourth of the width of the protomerite.

This gregarine was found in all of the specimens of *Leptochirus edax* examined, but only a few specimens in each host, in contrast to the large numbers of *Stylocephalus ensiferus* present in the same host. It is here referred to the genus *Stephanophora* for two reasons, the general shape of the gregarine and the fact that the host is a beetle, consequently the generic determination is uncertain. Neither cysts nor cephalonts of this species were taken so that further generic characters were not available.

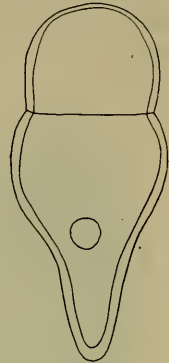


Figure 7. *Stephanophora crassa*.
55 μ .

6. Über Doppeldeckelbildungen bei *Nassa mutabilis* (Linné).

Von Hans Leo Honigmann, Magdeburg.

(Mit 3 Figuren.)

eingeg. 16. April 1912.

Über Doppelbildungen des Operculums bei Gastropoden finden sich in der Literatur nur wenige Angaben. Zuerst wären hier zu erwähnen, Jeffreys' Beobachtungen bei *Buccinum undatum* (Linné) [1, S. 287 und 288], der als Monstrositäten bi- und trioperculate Tiere beschreibt, und zwar befand sich bei einem Exemplar das eine Operculum auf einem stielartigen Auswuchse des Metapodiums, während das andre die gewöhnliche Form hatte. Bei einem andern standen die beiden Deckel in einem rechten Winkel zueinander.

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Jahr/Year: 1912

Band/Volume: [39](#)

Autor(en)/Author(s): Ellis M.M.

Artikel/Article: [Five polycystid Gregarines from Guatemala. 680-689](#)