

Watson

Studies on gregarines.

Including descriptions of seventeen new species
and a synopsis of the eugregarine
records from the myriapoda
coleoptera and orthoptera
of the world.

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STUDIES ON GREGARINES

Including Descriptions of Seventeen New Species and a
Synopsis of the Eugregarine Records from the Myria-
poda, Coleoptera and Orthoptera of the World

BY

MINNIE ELIZABETH WATSON

A. B. Olivet College, 1909

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THESIS

Submitted in Partial Fulfillment of the Requirements for the

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IN

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OF THE

UNIVERSITY OF ILLINOIS

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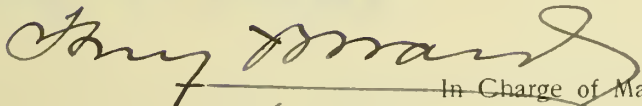
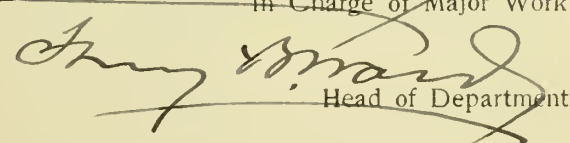
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Minnie Elizabeth Watson

ENTITLED **Studies on Gregarines Including Descriptions of
Seventeen New Species and a Synopsis of the Eugregarine Records
from the Myriapoda, Coleoptera and Orthoptera of the World**
BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF

Doctor of Philosophy


In Charge of Major Work

Head of Department

Recommendation concurred in:

} Committee
on
Final Examination

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T A B L E O F C O N T E N T S

	Page
Introduction	1-8
Scope of the Work	1-2
Technique	2-4
Review of Previous Work	4-5
Glossary	6-8
Part I. Biology	9-34
A. The Hosts Infected	10-12
Partial List of Animals Infected	9-11
Localities Represented	12
Seat of Infection	13-14
Seasonal Variation Within the Host	14-15
Relation to the <u>H</u> ost Tissues	16-23
B. Movement in Gregarines	24-34
Part II. Morphology of Gregarines	35-59
A. Morphology of the Sporonts	
The Stenophoridae	36-42
The Gregarinidae	42-45
B. Life-History of a Typical Cephaline Gregarine	45-47
C. The Question of Sporont Maturity	47-49
D. The Cysts	
Cysts of the Stenophoridae	49-50
Cyst Formation in the Gregarinidae	50-53
Cyst Development and Dehiscence in the Gregarinidae	53-59

1941

1941

1-1-41
1-15-41
1-31-41
2-15-41

1942

1942

1-1-42
1-15-42
1-31-42
2-15-42
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3-15-42
3-31-42
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6-1-43
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6-30-43
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9-15-45
9-30-45
10-1-45
10-15-45
10-31-45
11-1-45
11-15-45
11-30-45
12-1-45
12-15-45
12-31-45

Part III. Synopsis of the Eugregarines of the Myriapoda,
Coleoptera and Orthoptera of the World

60-301

- A. Introduction 61-66
- B. Brief Synopsis of the Cephaline Eugregarinidae of the World 67-72
- C. The Synopses 73-126
 - a) The Diplopoda 73-126
 - List of the Polycystid Gregarines in the Diplopoda 73-4
 - Specific Synopses of the twenty-five Species 75-124
 - Appendix 125-126
 - b) The Chilopoda 127-149
 - List of the Polycystid Gregarines in the Chilopoda 127
 - Specific Synopses of Sixteen Species 128-147
 - Species of Uncertain Determination 148-9
 - c) The Orthoptera 150-197
 - List of the Polycystid Gregarines in the Orthoptera 150-1
 - Specific Synopses of Twenty-seven Species 152-193
 - Indeterminate Species and Miscellaneous 193-197
 - d) The Coleoptera 198-301
 - List of the Polycystid Gregarines in the Coleoptera 198-203
 - Specific Synopses of Ninety Species 204-292
 - Uncertain Species 292-298
 - Appendix 299-301

Part IV. A List of the Cephaline Eugregarinae of the World
Together with their Hosts 302-13

List of References 314-319

List of Drawings and Plates 320-338

1945-1946
1947-1948

1949-1950	1951-1952
1953-1954	1955-1956
1957-1958	1959-1960
1961-1962	1963-1964
1965-1966	1967-1968
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2045-2046	2047-2048
2049-2050	2051-2052
2053-2054	2055-2056
2057-2058	2059-2060
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2065-2066	2067-2068
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2097-2098	2099-2100

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INTRODUCTION

This paper is the natural outcome of an intensive and extensive study of Gregarines found parasitic in various Orthoptera, Coleoptera and Myriapoda during the past three years.

The work was done chiefly in the Zoological Research Laboratory in the University of Illinois, under the supervision of Professor H. B. Ward. I am deeply indebted to Professor Ward for his direction and kindly suggestions throughout the work. One of the species was found and studied at the Biological Laboratory of the Brooklyn Institute, at Cold Spring Harbor, New York, and I wish to thank Dr. C. B. Davenport for the opportunity of carrying on investigation at the Station. I wish also to thank Professor F. D. Barker, Professor H. B. Baker, and Mr. Elmer Shafer for kindly sending me material from which parasites were obtained.

The gregarines were studied with reference to their biology, including habitats, relation to the host, seasonal distribution, and character of movement, and in order to determine the modes of reproduction. They were also studied from a systematic point of view and seventeen new species are here described. A further object in view was the recording in

INDEX

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
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- 24
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- 100

concise form of the facts concerning all the polycystid gregarines which literature records from the Orthoptera, Coleoptera and Myriapoda of the world; and a list was made of all the polycystids known, with their hosts so that species will not be recorded as new which have hitherto been discovered and that new species will not be given names already used.

Technique

The method used in studying the live parasites was as follows: The anterior and posterior ends of the host are clipped off as closely as possible and the alimentary tract is drawn out intact and then slit lengthwise with fine scissors and placed flat on a slide. The masses of food and parasites are teased out carefully to form a layer as thin and nearly transparent as possible.

I find distilled water and normal salt solution the best media for observation of the live material. A minimum amount of water is used and a cover slip placed above to prevent rapid evaporation and the presence of irregular reflecting surfaces. The animals are then in an unnatural medium and will disintegrate sooner or later, so sketches must be drawn for measurement as soon as possible after removal, a minimum amount of light and a medium microscopic power (3 ocular and 3 or 5 Leitz objective) serving for general purposes. When the parasites are nearly transparent (e.g. those in the Coccinelli-

dae) a drop of iodine-iodide solution renders them visible; safranin in water, filtered, serves to bring out in vivo the nucleus and sometimes the longitudinal striations.

Although the parasites are best studied alive, some stained preparations are valuable. In order to preserve parasites in toto for future study, the intestine is slit longitudinally and teased apart gradually to loosen the food masses and the parasites. The whole is then dropped into the fixing solution and agitated gently, when the free parasites drop to the bottom of the dish. The best fixing agent is corrosive-acetic washed with 50% alcohol and iodine and with 70% and iodine, and kept in 70% alcohol until needed. Picro-formol (Bouin) was used in some instances with good results. For staining the totes, two methods were used. The slide was smeared with a very small amount of egg albumen and the animals dropped upon it from a capillary pipette. The slide was then placed horizontally in a dish of 95% alcohol for about two minutes to coagulate the albumen and then carried down the alcohols to a water solution of Ehrlich's hematoxylin or to an alcoholic solution of borax-carmin and counterstained with picric acid. The alcohols and stains should be placed in flat dishes and the slide kept horizontal and gradually immersed and withdrawn from each solution to insure against loss of the parasite from the slide. Many grades of alcohol should be used and the parasite

The first part of the document discusses the general principles of the proposed system. It is intended to provide a comprehensive overview of the project's goals and objectives. The system is designed to be flexible and adaptable to various environments and requirements. The following sections detail the specific components and their interactions.

The system architecture is based on a modular design, allowing for easy integration and future expansion. The core components include the data management layer, the processing engine, and the user interface. Each component is designed to be highly efficient and reliable. The data management layer is responsible for storing and retrieving information, while the processing engine handles the complex calculations and data analysis. The user interface provides a user-friendly way to interact with the system and visualize the results.

The system is designed to be highly secure and robust, capable of handling large volumes of data and complex operations. It is intended to be a valuable tool for researchers and professionals in the field of data analysis and management. The system's performance is optimized for speed and accuracy, ensuring that users can obtain results quickly and reliably. The system is also designed to be easy to learn and use, with comprehensive documentation and training materials provided.

The system is currently under development and will be available for testing in the near future. We are confident that the system will provide a significant benefit to our users and will become an essential part of their workflow. We welcome any feedback and suggestions from our users to help us improve the system and ensure it meets their needs.

kept in each alcohol for fifteen minutes.

If the material is abundant, the parasites may be stained en masse in a small dish but there is always considerable loss in the transfer of stains, etc.

The study of toto mounts should be supplemented as far as possible with sections. In the instance of the small species not visible to the eye, sections afford the only means of study outside of live material. The whole alimentary canal is fixed intact and sectioned. Sections are best cut thin, from two to five micra, and the stain used with best results is Ehrlich's hematoxylin counter stained with erythrosin or eosin or used alone. They reveal either the character of the organ of attachment of the young parasites to the host cells or the fact that their development is intercellular, the position of the sporonts with relation to the cell walls, and various points in structure of the adults. They also disclose the position inside or outside of the alimentary tract or its appendages. If the parasite is able to bore through the walls of the intestine into the coelom, this is often depicted in a series of sections; if the pyloric caeca are seats of infection the fact is revealed in the same manner.

Previous Work

In 1903 Minchin adequately summarized the history of gregarines from the time of Redi, who in 1708 recorded the first

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account of what was possibly a gregarine, through Dufour, who gave the first authentic account of the genus which he called Gregarina in 1828, up to 1903. Other histories of the previous work done were given by Lankester (1863), Bütschli (1882) and Léger (1892).

Since 1903, work on gregarines has been largely systematic, and many new species, a dozen new genera and a very few new families have been named. The suborder Schizogregarinae (Minchin) has received considerable attention from such workers as Léger and Duboscq, Fantham, Siedlecki, Dogeill, and Brasil, and new species have been described by them from Crustacea, tracheate Arthropoda and Holothuria. Some new species have been described among the Eugregarinae abroad since 1903 and in the United States Crawley, Hall and Ellis have contributed data concerning many new species, all parasitic in tracheate Arthropoda.

Lühe (1903) and Sokolow (1911 and 1912) have written on Physiology, Morphology and Reproduction of gregarines in general.

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A List of the Special Terms Which Are Applied
to Gregarine Morphology

- ASSOCIATION.** The group formed by the attachment of two or more sporonts.
- BIASSOCIATIVE.** The adjective referring to an association formed by two sporonts attached by unlike ends.
- CEPHALINE Gregarine.** One which possesses an epimerite at some stage in its life-history.
- CEPHALONT.** A term applied to the young cephaline gregarine with an epimerite, whether it is attached to the host cell or free in the lumen. Synonymous with trophozoite.
- CYST.** The structureless membrane secreted by the associated sporonts at the beginning of reproduction.
- DEUTOMERITE.** The portion of a sporont which is preceded by the septum.
- ECTOPLASM.** The outer zone of the body comprising the epicyte, sarcocyte and myocyte.
- ENDOPLASM.** The granular protoplasm found within the ectoplasm.
- EPICYTE.** The thin fragile external layer of the ectoplasm.
- EPIMERITE.** The temporary or rarely permanent structure at the anterior end of the protomerite by which the young parasite is attached to the host cell. It is derived from the epicyte.
- ISOGAMETES.** The gametes which are morphologically identical. Present in most gregarines.
- KARYOSOME.** A chromatic mass surrounded by plastin and contained within the nucleus. The young individuals possess a single karyosome which buds off others as the animals increase in size.
- LONGITUDINAL Striations.** The very delicate ridges which form the outside of the epicyte.

CHAPTER I. THE EARLY HISTORY OF THE UNITED STATES.

SECTION I. THE DISCOVERY OF AMERICA.

SECTION II. THE EARLY SETTLEMENTS.

SECTION III. THE GROWTH OF THE UNION.

SECTION IV. THE REVOLUTIONARY WAR.

SECTION V. THE CONSTITUTION.

SECTION VI. THE EARLY REPUBLIC.

SECTION VII. THE WESTERN EXPANSION.

SECTION VIII. THE NATIONAL SYSTEM.

SECTION IX. THE CIVIL WAR.

SECTION X. THE RECONSTRUCTION.

SECTION XI. THE PRESENT POSITION.

SECTION XII. THE FUTURE OF THE UNION.

MYOCYTE. An hypothetical ectoplasmic layer consisting of the myonemes.

MYONEMES. The network of contractile fibrillae embedded in the periphery of the endocyte and running around the animal in a crosswise direction. They produce movement of the body.

OCTOZOIC Spore. A spore containing eight sporozoites.

POLYCYSTID. A term applied to gregarines which possess a septum which divides the endocyte into regions. Infrequently several septa are present.

PRIMITE. The first individual in an association of two or more sporonts.

PROTOMERITE. The portion of a sporont which precedes the septum.

PSEUDOCYST. The residual protoplasm after the spores are separated off, which acquires a membranous wall which swells until the true cyst-wall is burst and allows the extrusion of the ripe spores.

SARCOCYTE. A middle layer of the ectoplasm.

SATELLITE. Any sporont in an association which is attached behind the primite. Generally there is but one, but sometimes several are attached in a cluster to the posterior end of the primite or arranged linearly one behind the other.

SEPTUM. The thin layer of sarcocyte which separates the two portions of the sporont, the protomerite and the deutomerite.

SPORE. The body into which the zygote develops after the acquisition of a resistant outer covering.

SPORE Duct. A long tubular outgrowth from the cyst through which the spores are extruded when ripe.

SPOROCYST. The covering or coverings of the spore.

SPORONT. An adult gregarine living free in a cavity and deprived of its epimerite.

CHAPTER I. THE DISCOVERY OF AMERICA. The discovery of America by Christopher Columbus in 1492 is one of the most important events in the history of the world. It opened up a new world of discovery and led to the development of a new civilization.

CHAPTER II. THE EARLY YEARS OF THE COLONIES. The early years of the colonies were marked by a struggle for independence from England.

CHAPTER III. THE REVOLUTIONARY WAR. The Revolutionary War was a struggle for independence from England. It was fought between the colonies and the British Empire.

CHAPTER IV. THE CONSTITUTION. The Constitution is the supreme law of the United States. It was written in 1787 and has since been amended several times.

CHAPTER V. THE WESTERN EXPANSION. The western expansion of the United States was a process of moving westward from the Atlantic coast to the Pacific Ocean. It was marked by the discovery of gold in California and the settlement of the West.

CHAPTER VI. THE CIVIL WAR. The Civil War was a conflict between the Union and the Confederacy. It was fought from 1861 to 1865.

CHAPTER VII. THE RECONSTRUCTION. Reconstruction was the period after the Civil War when the South was brought back into the Union. It was a time of great change and struggle.

CHAPTER VIII. THE GROWTH OF THE UNITED STATES. The growth of the United States was a process of expansion and development. It was marked by the discovery of gold in California and the settlement of the West.

CHAPTER IX. THE PROGRESSIVE ERA. The Progressive Era was a period of reform and change. It was marked by the passage of the Progressive Era laws and the rise of the Progressive movement.

CHAPTER X. THE WORLD WAR. The World War was a conflict between the United States and the Axis powers. It was fought from 1914 to 1918.

CHAPTER XI. THE POST-WAR PERIOD. The post-war period was a time of great change and development. It was marked by the rise of the Cold War and the passage of the New Deal laws.

CHAPTER XII. THE PRESENT. The present is a time of great change and development. It is marked by the rise of the Information Age and the passage of the New Deal laws.

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SPOROZOITE. One of the eight more or less small falciform bodies which is released when the spore walls are absorbed.

TROPHOZOITE. The young parasite which is living either entirely intercellular or attached to an epithelial cell of the host by an epimerite. Synonymous with cephalont.

ZYGOTE. The body formed by the copulation of two gametes.

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Part One

BIOLOGY

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A: THE HOSTS INFECTED

Only the Invertebrates are parasitised with any of the various sorts of gregarines. These Sporozoa have been reported from the following phyla: Coelenterata, Echinodermata, Plathelmonthes, Coelhelminthes (the Archianellida, Gephyrea, Hirudinea, and the Polychaete and Oligochaete Annelida), Arthropoda (the Crustacea, Onycophora, Myriapoda, Hexapoda and Arachnida), Mollusca and Chordata (the Enteropneusta and Tunicata). Thus far the only animals below the vertebrates from which gregarines have not been reported are the phyla Rotifera, Porifera and the Protozoa and the sub-phylum Leptocardii.

Partial List of Animals Examined for
Parasites

MYRIAPODA	No. examined	No. parasitised
Scutigera	10	0
Scolopendra sp.	5	0
Scolopocryptops sexspinosus	10	2
Lithobius sp.	6	..
Geophilus sp.	15	0
Euryurus erythropygus	2	2
Callipus lactarius	24	20
Parajulus impressus	30	25
Polydesmus virginiensis	6	0
Spirobolus marginatus	6	0
HEMIPTERA		
Reduvius sp.	10	0
Many unidentified		0
DIPTERA		
Musca domestica	10	0
Unidentified larvae	50	0

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General List of ...

No.	Description	Value
1	...	10
2	...	2
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4	...	5
5	...	12
6	...	1
7	...	1
8	...	10
9	...	5
10	...	1
11	...	10
12	...	1
13	...	10
14	...	10

NEUROPTERA

Damsel fly larvae	15	0
Dragon fly larvae	30	0

LEPIDOPTERA

Many unidentified larvae		0
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MOLLUSCA

Venus mercenaria	10	0
Mactra solidissima	5	0
Mya arenaria	10	0
Mytilus edulis	5	0
Modiòla sp.	5	0
Pecten irradians	10	0
Ostrea virginica	15	0

CRUSTACEA

Porcellio sp.	8	0
Oniscus asellus	30	0
Talorchestic longicornis	500	200
Orchestia agilis	50	2
Orchestia palustris	10	0
Balanus eberneus	5	0
Balanus balanoides	50	0
Panopeus sayii	10	0
Eupagurus bernhardi	25	0
Gelasimus pugilator	50	40
Gelasimus pugnax	20	20
Cancer irroratus	4	0
Platyonichus sp.	4	0
Libinia dubia)	
Libinia emarginata)50	40

ANNELIDA

Nereis sp.	5	5
Amphitrite sp.	6	2
Enchytraeus albidis	12	5
Heliodrilus caliginosus	6	6
Allobophora foetida	4	4
Lumbricus terrestris	3	3
Cerebratulus lacteus	4	0

COLEOPTERA

Carabidae	25	3
Galuita janus	30	0
Melanotus fissilis	7	0
Hydrophilus triangulis	3	0
Pterostichus stygicus	10	4

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DEVELOPMENT

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CONCRETE

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WOOD

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0	2	Gravel - 2000

Dytiscidae	25	0
Gyrinidae	15	0
Dinetus assimilis	5	0
Agabus semivittatus	4	0
Tenebrionidae	15	7
Passalus cornutus	24	0
Elateridae	7	4
Coccinella sp.	10	3
Coccinellidae	30	0
Amara angustata	5	5
Coptotomus interrogatus	7	5
ORTHOPTERA		
Ceuthophilus stygius	15	8
Forficula auricularia	15	0
Ishnoptera pennsylvanica	10	4
Gryllus abbreviatus	200	150
Gryllus pennsylvanicus	100	80
Melanoplus femur-rubrum	300	200
Melanoplus differentialis	50	10
Melanoplus acrididum	5	5
Melanoplus bivittatus	10	6
Schistocerca americana	2	1
Dissostertia carolina	10	8
Encoptolophus sordidis	25	15
Arphia sulphurea	5	5
Hesperotettix praetensis	10	8

This list is incomplete for many animals were examined and no record kept when no parasites were present. The numbers given above represent approximate estimates.

Localities Represented

The hosts from which the parasites described herein were found chiefly in and around Urbana, Illinois. Some were taken in New Jersey and on Long Island, N.Y., and material was received from Haverford, Pa., Colorado Springs, Colo. and Lincoln, Neb. which afforded new data on distribution of several species.

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This list is intended for your reference and is not to be used for any other purpose. The names are given in the order in which they were received.

Localities mentioned

The first group of localities mentioned in this list are those which are now in the possession of the U.S. Government. The second group are those which are now in the possession of the State of Illinois. The third group are those which are now in the possession of the State of New York. The fourth group are those which are now in the possession of the State of Colorado. The fifth group are those which are now in the possession of the State of California. The sixth group are those which are now in the possession of the State of Texas. The seventh group are those which are now in the possession of the State of Arizona. The eighth group are those which are now in the possession of the State of Nevada. The ninth group are those which are now in the possession of the State of Utah. The tenth group are those which are now in the possession of the State of Idaho. The eleventh group are those which are now in the possession of the State of Montana. The twelfth group are those which are now in the possession of the State of Wyoming. The thirteenth group are those which are now in the possession of the State of Nebraska. The fourteenth group are those which are now in the possession of the State of Kansas. The fifteenth group are those which are now in the possession of the State of Oklahoma. The sixteenth group are those which are now in the possession of the State of Missouri. The seventeenth group are those which are now in the possession of the State of Arkansas. The eighteenth group are those which are now in the possession of the State of Louisiana. The nineteenth group are those which are now in the possession of the State of Mississippi. The twentieth group are those which are now in the possession of the State of Alabama. The twenty-first group are those which are now in the possession of the State of Georgia. The twenty-second group are those which are now in the possession of the State of Florida. The twenty-third group are those which are now in the possession of the State of South Carolina. The twenty-fourth group are those which are now in the possession of the State of North Carolina. The twenty-fifth group are those which are now in the possession of the State of Virginia. The twenty-sixth group are those which are now in the possession of the State of West Virginia. The twenty-seventh group are those which are now in the possession of the State of Maryland. The twenty-eighth group are those which are now in the possession of the State of Delaware. The twenty-ninth group are those which are now in the possession of the State of Pennsylvania. The thirtieth group are those which are now in the possession of the State of New Jersey. The thirty-first group are those which are now in the possession of the State of New York. The thirty-second group are those which are now in the possession of the State of Connecticut. The thirty-third group are those which are now in the possession of the State of Rhode Island. The thirty-fourth group are those which are now in the possession of the State of Massachusetts. The thirty-fifth group are those which are now in the possession of the State of Vermont. The thirty-sixth group are those which are now in the possession of the State of New Hampshire. The thirty-seventh group are those which are now in the possession of the State of Maine. The thirty-eighth group are those which are now in the possession of the State of New Brunswick. The thirty-ninth group are those which are now in the possession of the State of Nova Scotia. The fortieth group are those which are now in the possession of the State of Prince Edward Island. The forty-first group are those which are now in the possession of the State of Quebec. The forty-second group are those which are now in the possession of the State of Ontario. The forty-third group are those which are now in the possession of the State of Manitoba. The forty-fourth group are those which are now in the possession of the State of Saskatchewan. The forty-fifth group are those which are now in the possession of the State of Alberta. The forty-sixth group are those which are now in the possession of the State of British Columbia. The forty-seventh group are those which are now in the possession of the State of Yukon. The forty-eighth group are those which are now in the possession of the State of Northwest Territories. The forty-ninth group are those which are now in the possession of the State of Nunavut. The fiftieth group are those which are now in the possession of the State of the District of Columbia.

Seat of Infection

The most frequently observed location of the sporonts in the hosts is the mid-intestine. The parasites are not found in the oesophagus or crop and in the rectum only when the infection is exceptionally heavy. The cysts are often recovered from the mid-intestine but usually from the rectum. They can be easily procured from the moistened feces of those species in which they are large enough and opaque enough to be distinguished. I have been able to procure them thus only from the Acrididae.

Cross-sections of the host intestine reveal the fact that the sporonts lie close to the epithelium and not scattered through the food masses. In the Myriapoda they lie deeply seated between the lobes of the intestine where they are not easily dislodged. Thus the parasites are in position to absorb the richly laden digestive liquids just before the latter reach the villi. The parasites thus placed are not in danger of being swept along to the exterior by the peristaltic movements in the intestine.

Sporonts and trophozoites are also found in the pyloric caeca of the Acrididae. In the Myriapoda the sporonts are able to bore through the walls of the intestine and are found, though rarely, in the coelom.

The Stenophoridae are intercellular and the trophozoites are embedded in the intestinal cells while the Gregarinidae

The most important element in the system is the nature of the substrate. The material used for the substrate is of great importance and is the only one that is not in an extremely heavy. The plates are often produced by the electrolysis of metals from the water. This can be easily produced from the solution of those metals in which they are found and are often found in a dissolved state.

I have been able to produce them from the electrolysis of the solutions of the most interesting metals in the past.

That the amount of metal in the electrolyte and the amount of current used are of great importance in the production of the metal.

When the amount of metal in the electrolyte is too small, the metal is not produced in the same amount as when the amount is large. This is because the metal is not produced in the same amount as when the amount is large. The amount of metal in the electrolyte is of great importance in the production of the metal.

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are not, one end of the trophozoite only being projected into the epithelial cell.

Seasonal Variation Within the Host

Evidence on seasonal variation was confined to the Acrididae and the Gryllidae and extended over a period of two years. Locusts were collected at Urbana from early spring until June 20 and were very generally parasitised but the number of parasites per host was small, averaging from one to ten. The nymphs of the Acrididae which hatch in the early spring were not infected in April but when examined in June showed a slight infection.

In the fall, observations were again made at Urbana and disclosed considerably greater parasitism than in the spring. Nearly every locust examined was heavily infected, fifty parasites being an approximate minimum.

The same increase in the fall is true of the Cricket parasites. About fifty adults were examined at Urbana in June and it was found that only five or six were infected, and then with very few parasites. In the fall, practically every cricket examined revealed heavy infection.

Crickets were examined frequently throughout July and August at the Biological Laboratory at Cold Spring Harbor, New York. The parasitism here steadily increased from sparse to heavy inside of two months. Conditions here were, however,

General Principles of the Law

It is a well-known fact that the law is not a static body of rules, but a dynamic system that evolves over time. The principles of law are the foundation upon which the legal system is built. These principles are derived from the nature of the law itself, which is a social institution that seeks to regulate human conduct and resolve disputes. The law is not merely a set of commands, but a system of norms that guide the behavior of individuals in a community. The principles of law are therefore essential for understanding the law and its application in various contexts.

In the field of law, the principles of law are the guiding lights that illuminate the path of the lawyer. They provide a framework for analyzing legal issues and resolving disputes. The principles of law are also the basis for the development of the law, as they guide the process of legal reform and the creation of new laws. The principles of law are therefore not only a tool for the lawyer, but also a source of inspiration for the legislator and the judge.

The most important principle of law is the principle of justice. Justice is the goal of the law, and it is the principle that guides the lawyer in the pursuit of the law. The principle of justice is also the basis for the development of the law, as it provides the moral foundation upon which the legal system is built. The principle of justice is therefore the cornerstone of the law, and it is the principle that gives the law its meaning and its purpose.

Other important principles of law include the principle of equality, the principle of proportionality, and the principle of legal certainty. These principles are also essential for understanding the law and its application. The principle of equality is the principle that all individuals are equal before the law. The principle of proportionality is the principle that the law should be applied in a way that is proportionate to the facts of the case. The principle of legal certainty is the principle that the law should be clear and predictable, so that individuals can know what the law requires of them.

particularly favorable for the rapid increase. The crickets were collected on the Sand Spit, a long narrow peninsula separating the Inner and Outer Harbors and they were taken from under the flotsam and jetsam brought to the inside of the spit by the incoming tide. Here there are no waves to change appreciably the upper limite of the tidal zone and the crickets are undisturbed. The cricket population is large because of the influx of organic debris. Thus the insects/^{are} confined to a restricted habitat and as cysts are produced and the spores scattered the animals are reinfected over and over again.

A number of crickets were taken in August from debris along the shores of Northport Harbor and from Huntington Beach, Long Island and all were uninfected. Both these localities are part of the exposed shore of Long Island Sound. A number were also taken inland at Arlington, New Jersey and were also uninfected. Practically every cricket examined in the later summer at Cold Spring Harbor and at Oyster Bay (four miles away) was infected. The only explanation which can be offered by the writer for these phenomena is that the spores, having once become established in restricted areas, have no way of becoming scattered broadcast but reproduce themselves in enormous numbers in these restricted localities.

The following is a list of the islands in the group, with their areas in square miles:

1. St. Thomas 132

2. St. John 52

3. St. John's Reef 1

4. St. John's Bank 1

5. St. John's Shoals 1

6. St. John's Sound 1

7. St. John's Bay 1

8. St. John's Harbor 1

9. St. John's Anchorage 1

10. St. John's Wharf 1

11. St. John's Pier 1

12. St. John's Dock 1

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Relation of Parasite to Host-Tissue

The relation of the parasite to the tissues of the host is a subject still under discussion. It is a field in which very little actual investigation has been undertaken and one which offers many interesting problems in biological chemistry.

In the growing stages, the Eugregarine is either completely intracellular without an epimerite, or possesses an epimerite by which it is attached to the epithelial cells of the host intestine. The Acephalinae (including *Monocystis*) and some of the Cephalinae, e.g. the Stenophoridae and the genus *Frenzelina* of the Gregarinidae, are intracellular; most of the cephaline Eugregarines are, however, not intracellular but possess epimerites which alone penetrate the host-cell.

Thus there are two modes of infection. When the parasite is completely intracellular, the sporozoite penetrates the free end of the cell, works its way inward by ameboid movement (Léger and Duboscq 1909) and comes to lie in the proximity of the nucleus. The parasite at once begins to affect the nucleus, causing the breaking up and rearrangement of the chromatin into small more or less spherical bodies, which reacts differently to the stain than do the normal nuclei. The cytoplasm also is affected chemically for it stains less deeply than the normal cell cytoplasm.

The object of this study is to determine the effect of the various factors mentioned above on the rate of mortality.

The results of this study are given in Table I. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table II. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table III. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table IV. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table V. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table VI. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table VII. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table VIII. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table IX. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

The following table shows the results of the study in the case of the patients who have been treated by the method described above.

The results of this study are given in Table X. It will be seen that the rate of mortality is highest in the case of the patients who have been treated by the method described above.

Siedlecki (1901) thinks these results are due to a substance secreted by the parasite. Using *Monocystis ascidia* as his material, he noted that the parasitised cell is at first greatly enlarged. The parasite within the enlarged cell then increases enormously in size so that the host cell and its contents may be ten or more times the size of the normal epithelial cell; the parasite finally breaks out, for its rate of growth exceeds that of the epithelial cell, and the cell shrinks and finally disappears, the adjoining cells gradually filling in the space left. The author says the chemical substance secreted by the parasite at first stimulates growth in the epithelial cell and later retards it, killing the cell, the parasite escaping when dissolution has set in. The normal excretions must be emptied into the cytoplasm of the host-cell and may provoke changes therein but that the cell is killed is a question. There is no other source of food for the parasite than that by the absorption from the cell which surrounds it and it appears to the writer that the shrinking of the cell is due at least in part to the gradual withdrawal from it of its liquid content and the absorption of the latter by the contiguous parasite. How else the intracellular parasite grows is not easily explainable. If the host-cell is killed by toxins which are the excretory products of the parasite, the dead protoplasm is gradually used up as food for the growing organism. An animal is generally poisoned by its own excretory products;

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and the Allied Professions
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No. 1, January 1917

The Journal of the Royal Society of Medicine and the Allied Professions is published quarterly, in January, April, July, and October. The volume for 1917 consists of four parts, each containing a number of original papers and reviews. The first part, published in January, contains the following papers:

1. The Pathology of the Heart, by Dr. J. H. Greenhalgh.
2. The Pathology of the Lungs, by Dr. J. H. Greenhalgh.
3. The Pathology of the Kidneys, by Dr. J. H. Greenhalgh.
4. The Pathology of the Liver, by Dr. J. H. Greenhalgh.

The second part, published in April, contains the following papers:

1. The Pathology of the Spleen, by Dr. J. H. Greenhalgh.
2. The Pathology of the Pancreas, by Dr. J. H. Greenhalgh.
3. The Pathology of the Gall-bladder, by Dr. J. H. Greenhalgh.
4. The Pathology of the Intestines, by Dr. J. H. Greenhalgh.

The third part, published in July, contains the following papers:

1. The Pathology of the Stomach, by Dr. J. H. Greenhalgh.
2. The Pathology of the Duodenum, by Dr. J. H. Greenhalgh.
3. The Pathology of the Jejunum, by Dr. J. H. Greenhalgh.
4. The Pathology of the Ileum, by Dr. J. H. Greenhalgh.

The fourth part, published in October, contains the following papers:

1. The Pathology of the Caecum, by Dr. J. H. Greenhalgh.
2. The Pathology of the Sigmoid, by Dr. J. H. Greenhalgh.
3. The Pathology of the Rectum, by Dr. J. H. Greenhalgh.
4. The Pathology of the Peritoneum, by Dr. J. H. Greenhalgh.

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the gregarine would seem to be an exception unless we suppose that the host-cell remains alive and that it throws off the parasite's excretions along with its own waste products.

Those parasites which are not intracellular possess epimerites by which they are attached to the free end of the epithelium of the host, the rest of the parasite lying in the lumen of the intestine.

Five questions may be asked in this case: (1) Does the epimerite absorb food from the parasitised epithelial cell? (2) Does the epimerite absorb from the latter all the food that the gregarine receives? (3) Does the epicyte of the gregarine body absorb all the food from the lumen of the intestine and the epimerite act only as a holdfast organ? (4) Is a toxic substance secreted and given out into the parasitised cell through the epimerite of the parasite? (5) Is a toxic substance given out through the walls of the parasite body into the lumen of the intestine, which is absorbed by the parts of the epithelial cells nearest the surface?

Laveran and Mesnil (1900) state that, in *Pyxinia frenzeli*, the cell to which the parasite is attached at first greatly hypertrophies, then atrophies and disappears completely about the time the cephalont is ready to discard the epimerite and live free in the intestine. The hypertrophy, they say, is due to an increase in the liquid content of the cell only, with a de-

The Commission has been informed that the...

It is requested that you advise the Commission...

The Commission is also interested in the...

Very truly yours,
[Signature]

crease in the density of its cytoplasm and nucleus. They do not attempt to give an explanation of the cause of the phenomenon.

Léger and Duboscq (1902) think this hypertrophy is only apparent and not real, for the penetration of the sporozoite into the cell irritates it so that the cell contracts in length at the same time increasing in width, the latter phenomenon giving rise to the idea that there is hypertrophy. They think the parasite absorbs the cell content through the epimerite and that constant and steady increase in the withdrawal of the cell sap accounts for the apparent atrophy.

Pyxinia mobüszi possesses a long tongue-like epimerite which extends through the penetrated cell longitudinally to the mesothelial layer of the intestine. The penetrated cell seems to be uninjured by this epimerite and the authors think the animal absorbs blood from the capillaries in the mesothelium by means of the epimerite.

The Dactylophoridae, e.g. *Nina nobilis*, have epimerites with many long radices which Léger and Duboscq (1902:458) state penetrate at many places several adjoining cells and probably function as an apparatus for nutrition. Many species, *Beloides*, *Pyxinia*, etc., have a long central style in the epimerite which punctures the cytoplasmic vacuoles and absorbs the cell sap directly.

Siedlecki (1901:98) says the long filaments from the

epimerite of *Nina nobilis* penetrate into the epithelial layers between the cells and do not puncture the cells themselves, as Léger and Duboscq think.

Minchin (1912) says that the cytoplasm of the cell is absorbed by the parasite which I infer to mean used as food, and that "when the cytozoic phase is past and the host cell exhausted, the parasite drops off, shedding its epimerite."

The present writer agrees with Léger and Duboscq and with Minchin that there is absorption through the epimerite. When a free cephalont is stained, its epimerite is seen to contain considerable endoplasm and not to be an ectoplasmic structure merely, filled with sap. Moreover, stained sections of parasitised epithelium reveal the presence of attached cephalonts which are transparent or nearly so and do not absorb the stain. Living material often contains large numbers of free cephalonts which contain no or but very little protoplasm. These facts lead to the theory that the epicyte is not yet in physiological condition to absorb fluids from the intestine but that all such absorption takes place through the epimerite. Whether or not the epimerite possesses an epicyte of different structural character from that of the rest of the body is not known. It does, however, possess a very delicate, fragile, highly permeable layer susceptible to slight changes in osmotic pressure. The suggestion may be made that because the chemical constituency of the fluids in the lumen

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of the intestine and in the epithelial cells is obviously dissimilar, the parasite may or may not be able to absorb either of these fluids through the epicyte; and if they are absorbed may not be nourished by one of the ingested fluids. The fact that the epimerite often contains protoplasm while the rest of the cephalont is still transparent or nearly so and that the cephalont remains nearly transparent as long as the epimerite persists leads to the theory that whereas at first all the absorption takes place through the epimerite, as the cephalont develops there occurs a gradual change in food from the predigested cell-sap to the juices free in the intestinal tract as well as a transfer in its mode of absorbing these substances from the epimerite to the general epicyte of the body. The general epicyte of the body may be physiologically different when the cephalont is very young and when it is nearly ready to discard the epimerite.

The third question: Does the epicyte of the gregarine body absorb all the food from the lumen of the intestine and the epimerite only act as a holdfast? has been answered in the negative above. There may come a time when maturity approaches and the epimerite is at the point of being discarded when the question may be answered in the affirmative; during the greater part of the cephalont life, however, the epicyte is probably ineffective in absorbing nourishment.

Is a toxic substance given out into the parasitised cell through the epimerite of the parasite? Siedlecki (1901:100)

The first part of the paper discusses the general principles of the theory of the atom, and the second part discusses the application of these principles to the specific case of the hydrogen atom. The theory of the atom is based on the assumption that the electron moves in a circular orbit around the nucleus, and that the angular momentum of the electron is quantized. This leads to the prediction that the energy levels of the atom are discrete, and that the spectrum of the atom consists of discrete lines. The application of these principles to the hydrogen atom leads to the prediction that the spectrum of the hydrogen atom consists of discrete lines, and that the energy levels of the hydrogen atom are given by the formula $E_n = -13.6 \text{ eV} / n^2$.

The third part of the paper discusses the experimental verification of the theory of the atom. The most important experiment is the measurement of the spectrum of the hydrogen atom, which shows that the spectrum consists of discrete lines. This is in agreement with the prediction of the theory. Other experiments, such as the measurement of the fine structure of the spectrum, also support the theory. The theory of the atom is one of the most successful theories in physics, and it has led to the development of quantum mechanics.

It is a great pleasure to have this paper published in the Journal of the Royal Society. I hope that it will be of interest to the members of the Society.

says the presence of the parasite within the cell (Monocystis ascidia) incites hypertrophy, then atrophy and that these phenomena are due to the chemical action of the parasite. In another species, however, *Nina nobilis*, which possesses numerous long protoplasmic filaments which penetrate deeply into the epithelium of the intestine, the author says of these threads

"Tous ces changements provoques dans l'epithelium sont de nature purement mecanique."

They have observed changes in form and of displacement of the cells but regard these as unallied to the hypertrophy and atrophy which is induced by chemical excitation.

Siedlecki finds in one instance a chemical effect excited by the presence of the parasite in or attached to a cell; in another species purely a mechanical effect; while Léger and Suboscq, as mentioned, believe the apparent hypertrophy due to mechanical irritation of the parasite upon the cell rather than to any toxin secreted by the parasite. Yet illustrations given by Léger and Duboscq to illustrate mechanical effect indicate a different staining reaction in the case of many of the parasitised cells and a rearrangement of the chromatin in the nucleus unlike that in normal cells.

The last question is stated as follows: Is a toxic substance given out through the epicyte of the parasite into the lumen which is absorbed by the parts of the epithelium nearest the surface? It is often the case that the free end of the cell is

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shrivelled first. This end is nearest the hypothetical center of influence of the toxin which would be given out through the body of the parasite exposed in the lumen. It is also the end which is penetrated by the epimerite and the part naturally used as food first. The fact that the whole cell often reacts differently to the stain and not the outer end only and that the deep-seated nucleus is affected by the very small parasite indicate the untenability of this theory as a cause of cellular reaction to the parasite.

A theory for the shrivelling of the parasitised cell may be derived from the facts of liquid pressure. The cell-wall is normally under some pressure from within, due to turgor. When the cell is punctured by the sporozoite, some of the cell-sap might ooze out. Most of the liquid content of the cell is, however, contained in vacuoles and not liable to be affected by the puncture. The viscid cytoplasm of the cell would probably be unable to find exit through the small opening. The puncture is as small as is the penetrating sporozoite and closed by the same. The parasite grows rapidly, enlarging the opening only as fast as the parasite grows. I have in no instance seen a section wherein the cell-wall was torn by the growing animal, and in every instance the two fitted tightly together so as to form seemingly one layer at the neck of the epimerite. Thus the theory of loss of cell-contents by the oozing out through the puncture made is untenable.

The first of these is the fact that the cell is not a simple bag of protoplasm, but a highly organized structure. It is bounded by a cell membrane which is permeable to some substances and impermeable to others. This membrane is not merely a barrier, but it is also a selective barrier, allowing certain substances to pass while excluding others. The cell is also bounded by a cell wall in some organisms, which provides additional structural support and protection. Inside the cell, the cytoplasm is filled with various organelles, each performing specific functions. The nucleus, for example, contains the genetic material (DNA) and is the site of transcription. Mitochondria are responsible for energy production through cellular respiration. The endoplasmic reticulum is involved in protein synthesis and transport. The Golgi apparatus is the site of modification, sorting, and packaging of proteins. The cell membrane is also involved in cell signaling and communication with other cells. The cell is a highly dynamic and organized structure, capable of responding to its environment and maintaining its internal order.

B. MOVEMENT IN GREGARINES

Movement in Gregarines has probably been observed as long as the animals themselves. Dufour (1837:11) said

"Leurs mouvemens sont fort obscurs et leur locomobilité est d'une lenteur extrême; cependant je les ai constatés."

Siebold (1837:408) doubted that Gregarines were animals for he saw no movements. Kölliker (1848:32-3) described movement of the gliding type as

"Eine langsam vorwärtsschreitende Bewegung ohne sichtbare Contractionen der Leibeshülle".

He also noted the bending movement and described it as follows:

"Bewegungen nach dieser oder jener Richtung durch mehr oder minder energische, auf verschiedene Weisen sich combinirende Zusammenschnurungen der Leibeshülle."

Kölliker did not attempt to explain the cause of these movements but he answered the question raised by Siebold "Are the Gregarines animals?" by describing the violent contractions seen in many of his new species, movements which only animals possess.

Leidy (1849:232) "detected movements of an animal character" and discovered the longitudinal striations of the epicyte which he thought were muscular in function.

Van Beneden (1872) discovered the network of transverse fibrillae which Schneider (1875:505-6) called the myocyte. Contractility of the elements in this myocyte has since then been assigned as the basis for the bending movements of Gregarines.

DECLARATION OF CONSENT

I, the undersigned, do hereby certify that the following is a true and correct copy of the original as the same appears in the records of the Board of Health of the City of New York.

Witness my hand and seal this 10th day of June, 1901.

JOHN W. WARD, Mayor of the City of New York.

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The first explanation for the gliding movement was offered by Schewiakoff (1894) who supposed a gelatinous secretion from the posterior end of the body formed a stalk and that as the animal secreted new additions to this stalk it pushed itself forward by that amount.

Porter (1897) probably without knowledge of Schewiakoff's theory, proposed the following hypothesis:

"It (locomotion) is a 'very slow movement of translation in a straight line' without any apparent contraction of the walls of the body. It is probably caused by a very slight undulatory motion of the under surface of the animal."

Crawley (1902:420; 1903a:57), unaware of porter's hypothesis, came to the same conclusion that an undulatory movement on the under side of the body is the basis for locomotion, and disagreed with Schewiakoff's explanation.

My observations on movement in Gregarines have been chiefly confined to the species *Leidyiana salitaria*, of the family Gregarinidae because of its activity and the readiness with which material is obtained.

In the normal intestinal juices of the host when the intestine is first opened, practically none of the animals are in motion; they lie rather in inert masses from which the name Gregarine is derived. Since the juices rapidly evaporate and cannot be secured from other animals in sufficient abundance to observe normal movement over a considerable portion of time,

$$p = 1 - \frac{1}{n}$$

The probability of success in a single trial is $p = 1 - \frac{1}{n}$. The probability of failure is $q = \frac{1}{n}$. The probability of success in k trials is p^k . The probability of failure in k trials is q^k .

$$P(X = k) = \binom{n}{k} p^k q^{n-k}$$

The binomial distribution is a discrete probability distribution that models the number of successes in a fixed number of independent trials, each with a constant probability of success. The probability mass function is given by $P(X = k) = \binom{n}{k} p^k q^{n-k}$, where n is the number of trials, k is the number of successes, p is the probability of success in a single trial, and $q = 1 - p$ is the probability of failure.

$$E(X) = np$$

The expected value of the binomial distribution is $E(X) = np$, where n is the number of trials and p is the probability of success in a single trial. The variance of the binomial distribution is $Var(X) = npq$.

$$Var(X) = npq$$

The variance of the binomial distribution is $Var(X) = npq$, where n is the number of trials, p is the probability of success in a single trial, and $q = 1 - p$ is the probability of failure.

$$P(X \leq k) = \sum_{i=0}^k \binom{n}{i} p^i q^{n-i}$$

The cumulative distribution function of the binomial distribution is $P(X \leq k) = \sum_{i=0}^k \binom{n}{i} p^i q^{n-i}$, where n is the number of trials, k is the number of successes, p is the probability of success in a single trial, and $q = 1 - p$ is the probability of failure.

$$P(X \geq k) = 1 - P(X \leq k-1)$$

The probability of at least k successes is $P(X \geq k) = 1 - P(X \leq k-1)$, where n is the number of trials, k is the number of successes, p is the probability of success in a single trial, and $q = 1 - p$ is the probability of failure.

$$P(X = k) = P(X \leq k) - P(X \leq k-1)$$

The probability of exactly k successes is $P(X = k) = P(X \leq k) - P(X \leq k-1)$, where n is the number of trials, k is the number of successes, p is the probability of success in a single trial, and $q = 1 - p$ is the probability of failure.

artificial media must be used, the most common being distilled water. This causes the animals to disintegrate after periods varying from fifteen minutes to three or four hours, depending on the age of the parasites and their ability to adapt themselves to a change in external pressure. The young fragile animals disintegrate rapidly; the oldest often resist the change in external pressure for several hours. When an epimerite is present on a free individual, it is quickly ruptured in a water medium.

Egg-albumen is not a satisfactory medium in which to observe motion, for the parasite has great difficulty in ploughing its way through the thick substance. Rupture of the walls is prevented by its use because of a similarity in density between the body and the medium.

Various acids in 0.5% solution were used and their effects on motion noted, among the acids being hydrochloric, nitric, acetic, sulphuric, and tannic. All of them killed the animals very quickly and caused the protoplasm to collect in masses; the epicyte was also often ruptured. Chloroform and sulphuric ether in 0.5% solutions produced no apparent structural changes but the parasites were quickly anaesthetised.

Normal salt solution acts as a stimulant on motion and in it the parasites remain alive and active longer than in water. It is therefore the best medium in which to observe motion. Sea water has practically the same effect as normal saline.

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Movement of locomotion consists of a uniform gliding progression with no apparent localized motion of the body. It is best seen in animals from a freshly opened host intestine mounted on a slide and supplied with an abundance of light. The parasites are negatively heliotropic and consequently attempt to avoid the light rays by moving rapidly from the tissues toward the periphery of the cover slip and down the sides until they encounter masses of debris under which they try to hide.

The rate of progression has been measured in several instances. It averaged 0.8 micron per sec. in *Leidyana solitaria*. The same individual is able to increase or decrease its rate of motion through a considerable range. A sample set of successive rates, measured at intervals of 15 sec., reads as follows: 0.7 μ per sec., 1.8; 4; 5.6; 2.8; 2.6; 1.5; 0.8; and 0.0. An accompanying diagram illustrates progression combined with bending movement and the distances covered in successive intervals, Fig. 233. In the *Stenophoridae*, motion of progression is slower, an average reading .007 per sec. for two species, one of which was five times the length of the other and of correspondingly greater volume.

Just how the progressive movement is effected is a matter much discussed. Schewiakoff (1894) makes the statement that it is caused by the secretion of a hollow gelatinous "stalk" formed of contiguous threads at the posterior end of the

body which pushes the animal forward. He says that the gregarine is able to move only until its store of secretion is exhausted and cannot go on until it has accumulated the materials from which to secrete a new addition to the "stalk."

Upon cutting off most of the light from the field, there can be seen many fine threads leading from the posterior end of the gregarine back to a mass of debris from which it is apparently trying to extricate itself. A slight motion of the microscope or of the table beneath will cause the threads to tremble; but moving the cover-slip a trifle does not rupture them. I have often observed the animal swinging about in an arc at the end of this fastened thread or strand of threads without breaking it. This was noted in twenty-five instances in a single field and was repeated by the parasites until their walls were ruptured and the protoplasm oozed out.

After a mount has been made for some time and the gregarines have become scattered about in the debris, many animals can often be seen headed away from inert masses, moving a short distance forward and then being jerked quickly back as if by some invisible spring. Rarely is an animal able to free itself. When it does so, the release is sudden and the distance traversed often as surprisingly great as the time it takes is short. The release may be compared to the cutting of a tense cord. Generally, however, the parasite is not able to effect its release and keeps

on trying until the walls are ruptured or death ensues from some other cause.

I have never observed backward gliding movement. The only backward motion seen was the sudden jerking mentioned above. This phenomenon may possibly be accounted for in the following manner: The animal exerts considerable effort to move forward against the backward pull of the threads and debris behind it. Its body becomes stretched out long and narrow by the contraction of the myonemes. These myoneme fibrillae suddenly relax and the body becomes shorter and normal in shape. As the tension on the caudal threads is thus released, the body is drawn backward with a sudden jerk. The motion is thus passive and simply reaction and not actively incited motion in a backward direction.

It is not to be denied, then, that under some circumstances there are formed gelatinous threads which seem to fuse and form a thick thread or strand from the posterior end of the body, but they are obviously an hindrance rather than an incentive to progression. My theory concerning the reason why there is such a group of threads present will be discussed later.

Granted here that such a group is present, it obviously comes from the animal itself and is carried to the posterior end of the body by the longitudinal ridges which gregarines possess (See fig. 243 for illustration of these longitudinal ridges). The animal in a mass of debris tries to liberate itself. In this motion there is secreted a lubricating substance which in a medium

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other than the normal digestive juices adheres to the debris. In endeavoring to get free, a great deal of energy is expended and considerable lubrication secreted and so the thread is formed from which the animal is unable to extricate itself. Each added trial only causes more secretion to be poured forth and makes the snare the more secure. The body becomes drawn out long and slender indicating the strain which the animal undergoes. (Fig. 236).

I have made the hypothesis that normally there is a secretion from the body which reaches the posterior end of the body. When a parasite is moving through a medium in which there is fine scattered debris, it picks up much of it. After a considerable accumulation has taken place, one of two things may happen. The end-masses may drop off by their own weight, the force exerted by the strand of threads being less than that exerted either by the progressing animal or by the dead weight behind. If the strand withstands the stress exerted by the moving animal but the dead weight exerts greater force than the combination of the other two, the strand and the animal, the parasite is caught and eventually dies.

The presence of the caudal threads can often be demonstrated with carmine. In a freshly made mount, the carmine does not seem to adhere and I have never been able to demonstrate the presence of threads in a freshly opened intestine. The medium must then be other than the normal digestive juices. It thus

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. The text also mentions the need for regular audits to ensure the integrity of the financial data. Furthermore, it highlights the role of the accounting department in providing timely and accurate information to management for decision-making purposes. The document concludes by stating that adherence to these principles is essential for the long-term success and stability of the organization.

The second part of the document outlines the specific procedures for handling cash payments. It details the steps from the receipt of cash to the recording of the transaction in the accounting system. The text also discusses the importance of proper cash management, including the use of cash registers and the timely deposit of funds into the company's bank account. Additionally, it mentions the need for proper documentation and the retention of receipts for a specified period. The document ends with a reminder to always exercise caution and follow established protocols when dealing with cash.

seems possible that no strands are present in the normal condition but that they harden only after being for some time in an unnatural medium. Instead of hardening and condensing in the host, the constituents of the secretion are probably dissolved in the digestive juices as fast as formed.

As for the reason for the presence of the semi-gelatinous secretion from the body, I accept the hypothesis which Porter states, that movement is probably caused by a very light undulatory motion of the under surface of the animal. Just as *Limax* moves forward by slight ventral, and dorsally imperceptible, muscular movements in a vertical direction on an underlying surface the friction of which is caused by the secretion of a sticky mucous, the gregarine moves forward by imperceptible vertical movements in the myonemes on that side of the body which happens to be vertical at the time, friction being produced with the under surface by the exudation of mucous from the body. That there is a secretion from the whole body and not only from the posterior region is demonstrated by carmine which adheres in fine particles to all parts of the animal.

It was shown by Schewiakoff that there are tiny pores between the longitudinal ridges. These probably serve as exits for the secretion. The longitudinal ridges carry it backward and away after it has served its usefulness in effecting motion. The secretion is in the form of threads simply because it is

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constricted into narrow lines by passing backward between the tiny ridges. The threads are not necessarily continuous but may be often broken.

Thus I am of the opinion that the secretion at the posterior end of the body does not produce motion, but that it is a waste product by the time it has reached this end; it is likewise effective as shown above in inhibiting motion in an unnatural medium as well as of producing it.

Besides the simple progressive movement, a twisting or bending movement is commonly observed. The body bends or twists often with little or no change of position.

This bending motion involves chiefly the anterior half of the deutomerite. The protomerite is turned from side to side like the head of a higher animal while the parasite is progressing from place to place. The protomerite, of itself, appears, however, to be incapable of movement and not the slightest change in form has been noticed. The region of greatest capacity for motion is the anterior end of the deutomerite. The endocyte of this region flows out into small pockets made in the elastic epicyte and as a group of two or three small outpushings is made on one side, close together, the protomerite falls to the opposite side. An outpushing of several small pockets just below the bent-over protomerite tends to straighten it; if half a dozen or more are formed in a circle around the anterior end of the

The first part of the book is devoted to a general introduction to the subject of the history of the English language. The author discusses the various influences that have shaped the English language over the centuries, from Old English to Modern English. He also touches upon the geographical spread of the language and the role of literature in its development.

The second part of the book is a detailed study of the English language in its various stages. It begins with Old English, the language of the Anglo-Saxons, and traces its evolution through Middle English and Early Modern English to the English of the 18th and 19th centuries. The author examines the changes in vocabulary, grammar, and pronunciation that have taken place over time.

The third part of the book is devoted to a study of the English language in its various dialects. The author discusses the differences between the dialects of the North, Midlands, and South of England, and also touches upon the dialects of Scotland, Ireland, and Wales. He also discusses the influence of foreign languages on the English dialects.

The fourth part of the book is a study of the English language in its various registers. The author discusses the differences between the language of the court, the language of the church, the language of the law, and the language of the people. He also discusses the influence of these registers on the standard English language.

The fifth part of the book is a study of the English language in its various varieties. The author discusses the differences between the language of the literate and the language of the illiterate, the language of the educated and the language of the uneducated, and the language of the urban and the language of the rural. He also discusses the influence of these varieties on the standard English language.

The sixth part of the book is a study of the English language in its various contexts. The author discusses the differences between the language of the written and the language of the spoken, the language of the formal and the language of the informal, and the language of the public and the language of the private. He also discusses the influence of these contexts on the standard English language.

The seventh part of the book is a study of the English language in its various functions. The author discusses the differences between the language of the communication and the language of the education, the language of the entertainment and the language of the science, and the language of the religion and the language of the politics. He also discusses the influence of these functions on the standard English language.

The eighth part of the book is a study of the English language in its various future. The author discusses the differences between the language of the present and the language of the future, the language of the past and the language of the future, and the language of the world and the language of the future. He also discusses the influence of these future on the standard English language.

deutomerite, the protomerite will sink into the central depression and often be obscured from sight.

The parasite is able to move through a place much narrower than the width of the body by the contraction and expansion of the epicyte, as in the instance of an amoeba.

Bending movement when the animal is out of its normal habitat may be due to external stimuli such as the endeavor to avoid light and the water medium. When in the normal habitat, the animal does not need to move about in search of food; there is no light to avoid; and the chief function of the bending movement when the parasite is in the intestine is probably the formation of cysts. The animals rotate about an imaginary axis coming closer and closer together by bending more and more, and finally forming a perfect sphere. (See figs. 234, 235 and 238). The formation of cysts by the use of normal saline occurred in twenty-five minutes. The salt solution was removed as soon as the cyst was completely formed and the cyst washed with distilled water. It developed to completion with the exudation of ripe spores. Cysts have, however, developed in but little longer time in distilled water.

Summary

1. Normal salt solution is the best artificial medium in which to study motion.
2. Locomotion is effected by means of a progressive gliding movement with no apparent localized motion of the body.

The first part of the report deals with the general situation of the country and the progress of the work during the year. It is followed by a detailed account of the various projects and the results achieved. The report concludes with a summary of the work done and the plans for the future.

Summary

The work done during the year has been very satisfactory and has resulted in many important discoveries. It is hoped that the results of this work will be of great value to the scientific community.

3. Progression takes place at the average rate of 0.8 μ per sec. in *Leidyana solitaria*.
4. In artificial media, there are formed gelatinous threads from the posterior end of the deutomerite.
5. These threads may be seen with a high power and a minimum amount of light and in a mount which has been made for some time.
6. They do not occur in a freshly made mount.
7. The threads may be demonstrated with carmine granules in solution.
8. The animal probably moves by imperceptible vertical movements of the myonemes of the side which is ventral at the time, and upon a surface whose friction is caused by an exudation of slime from the body of the parasite.
9. This slime (mucous) is secreted by the body and runs out through pores between the longitudinal ridges in the epicyte.
10. The mucous runs backward along the longitudinal ridges to the posterior end and is discharged as a waste product in the form of broken threads or strands.
11. The anterior half of the deutomerite is the region chiefly involved in bending movement.
12. The protomerite is incapable of independent bending movement.
13. The normal object of contortion is the formation of cysts.

1. The first part of the report deals with the general situation of the country and the progress of the work done during the year.

2. It then goes on to describe the various projects which have been carried out, and the results which have been obtained.

3. The next part of the report deals with the financial position of the organization, and the accounts for the year.

4. The following part of the report deals with the personnel of the organization, and the work which has been done by the various departments.

5. The final part of the report deals with the conclusions which have been reached, and the recommendations which are made for the future.

Part Two
MORPHOLOGY OF GREGARINES

THE
UNIVERSITY OF MICHIGAN

A: MORPHOLOGY OF THE
SPORONTS

The structural characteristics of the Gregarines have been described by many writers, including Delage and Herouard (1896), Bütschli (1882), Minchin (1903 and 1912), Doflein (1911), and others. For this reason, I have not attempted to describe the general morphology of the group but rather facts of form and structure that I have observed in the two families which have been under observation, viz. the Stenophoridae and the Gregarinidae.

a) The Stenophoridae

All of the species of this family are solitary. In all gregarines which reproduce sexually, the union of two sporonts is necessary but in the Stenophoridae this intimate association lasts only while the cyst is being made and not, as in some families, during the greater part of the sporont-life. The cyst is probably formed quickly and this union very brief; no sporonts were seen in the process of cyst-formation.

One characteristic of almost all the described Stenophoridae is the great length of the deutomerite as compared with the protomerite. The ratio is seldom less than 10:1 and often as high as 30:1.

The protomerite is not constant in shape; it is, however, generally more or less conical, rounded at the apex, either as a simple cone (Fig. 7) or constricted or dilated slightly half-

The historical importance of the Revolution was
 seen clearly in the events, including the Battle of Bunker
 Hill, the Siege of Fort Mifflin, and the Battle of the Clouds,
 and others. For this reason, I have not attempted to describe
 the general history of the Revolution, but rather to describe
 the events which I have chosen to describe in the British
 and Continental Histories, and the Revolution.

of the Revolution

All of the events of the Revolution are written in
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way from apex to base (Figs. 14, 16, etc.); there is generally, but not always a small papilla at the anterior end (Fig. 24).

The epimerite, which is superimposed upon the protomerite of the cephalont, contains some endoplasm which is continuous with that of the protomerite through the narrow neck connecting epimerite and protomerite. At the apex of the protomerite of the sporont, i.e. an individual which has lost its epimerite, the epicyte is very thin and the endocyte reaches nearly to the top. When the epicyte of the sporont upon the slide is ruptured, this rupture takes place at the apex and is accompanied by an extrusion of protoplasm at this point; the endocyte breaks first at its weakest place, and in this family the apex of the protomerite is the weakest place. The thinness of the ectoplasm at the apex gives rise to the idea that there is a pore here.¹ I am of the opinion that there is no pore present but that the epimerite severs its connection with the trophozoite by gradual constriction at its short neck and drops off as a ball. The apex of the protomerite closes over completely, leaving a trace of the narrow channel in the epicyte by which the endoplasm of the two parts was in connection. That there is an opening to the exterior at this point in the sporont seems doubtful for I have never seen the extrusion of endoplasm in a freshly taken sporont to which a slight pressure was applied; it occurred only when the animal had been kept on a slide in a

1. As stated by Ellis (1912c) in the Diolopoda.

normal saline or water medium, and then only after from fifteen minutes to an hour or until the decrease in the density/ outside medium had had time to affect the parasite.

Not all protomerites of the Stenophoridae are conical in shape. In *Stenophora Brolemanni* Leger and Duboscq/ (Fig. 13) the protomerite is shaped like a flattened cork fitting into the neck of a bottle, the deutomerite surrounding it in a thin layer nearly to the apex; in *Stenophora spiroboli* Crawley, it is almost hemispherical in shape (Fig.70).

In the sporonts of the Stenophoridae I have seen, the deutomerite is long and slender. Leger and Duboscq record dimorphism in several species, *Stenophora silene* (Figs. 22 and 23), *S. chordeume* (Figs. 24 and 25), *S. varians* (Figs. 16 and 17), etc., wherein the sporonts are both elongate and subglobular in shape. The writer has not observed an authentic and unquestionable case of dimorphism. The long, slender sporonts are, however, able to contract so as to be of quite a different shape from the normal. Immature specimens of several species are subglobular and stain more deeply than the sporonts but no mature subglobular specimens have been seen.

There is generally a constriction at the septum which distinctly differentiates protomerite and deutomerite; this is lacking in *Stenophora spiroboli* Crawley (Fig. 70) and in *S. robusta* Ellis (Fig. 26) and only slightly developed in *S. poly-*

The first part of the paper discusses the general theory of the process of the formation of the state in the USSR.

The second part of the paper is devoted to the analysis of the role of the state in the development of the national economy of the USSR.

The third part of the paper is devoted to the analysis of the role of the state in the development of the national culture of the USSR.

The fourth part of the paper is devoted to the analysis of the role of the state in the development of the national science of the USSR.

The fifth part of the paper is devoted to the analysis of the role of the state in the development of the national art of the USSR.

desmivirginiensis Leidy. The widest part of the deutomerite is generally the anterior third; sometimes the deutomerite is a cylinder more or less equal in width throughout. A combination of the two shapes is seen in *Stenophora diplocorpa* (Fig. 21), in which the deutomerite gradually broadens and then contracts in the anterior half, being conspicuously constricted at the middle, and cylindrical posterior to the constriction. The deutomerite terminates in a broadly rounded, truncated, or conical extremity.

The protomerite and deutomerite differ greatly in endoplasmic content, and therefore in color and consistency. The protomerite is always the less dense, being often nearly or quite transparent; the granular content is sparse and the large irregular granules often clustered near the septum, the rest of the space being filled with a colorless fluid. Staining reactions of the two parts differ also. The deutomerite contains fairly homogeneous endoplasm always densest at the center of mass, which is generally in the anterior third of the body. In the posterior part of the attenuated forms, there is often so little endoplasm that the animal is transparent in the last fifth to third of its body. The deutomerite is generally gray or black in its denser regions and a lighter gray in regions of lesser density.

The nucleus may be either spherical or ellipsoidal in the sporonts, and varies considerably in relative size in different species. It generally contains one karyosome in mature

The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is equivalent to a certain type of boundary value problem for a second order elliptic equation. The second part of the paper is devoted to the construction of a certain type of integral representation for the solution of the problem. The third part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to infinity. The fourth part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to zero. The fifth part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to a certain value. The sixth part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to a certain value. The seventh part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to a certain value. The eighth part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to a certain value. The ninth part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to a certain value. The tenth part of the paper is devoted to the study of the asymptotic behavior of the solution of the problem as the parameter tends to a certain value.

sporonts of this family, sometimes more than one, but never many, and the karyosomes stain deeply, often revealing the presence of one or two very small centrioles within.

Longitudinal striations in the epicyte seem to be characteristic of the family, and myonemes have been observed in a great many instances. (See fig. 243 for these structures in *Leidyana solitaria*, one of the Gregarinidae). It is probable that both types of structures are invariably present in motile gregarines and form the material foundation for prevailing ideas as to the cause of motion.

The epimerite seems to be an inconstant factor. Sometimes it is well-developed and even retained in specimens free in the lumen of the intestine (*Stenophora nematoides* (Fig. 15), *S. diplocorpa* and *S. lactaria*). Generally, however, workers who have not sectioned the intestines of hosts have failed to find any trace of an epimerite. This is possible from the fact that development is intracellular and not extracellular as in the Gregarinidae, in which family the epimerite alone penetrates the cell. The whole trophozoite lies embedded and is able to obtain nourishment by osmosis, just as it does when it becomes a sporont, taking food in the former instance from the cell originally penetrated and those surrounding it rather than from the lumen. Often intracellular parasites never possess epimerites (Léger and Duboscq, 1904, Pl. XIV, figs. 1, 3, and 4); and yet in the same section

The first part of the paper is devoted to a general survey of the history of the theory of the differential equations of the second order. The author then proceeds to a detailed study of the particular case of the linear differential equations of the second order.

The author then proceeds to a detailed study of the particular case of the linear differential equations of the second order. He first considers the case of the homogeneous equation, and then the case of the inhomogeneous equation. He shows that the general solution of the homogeneous equation is a linear combination of two linearly independent solutions. In the case of the inhomogeneous equation, he shows that the general solution is the sum of a particular solution and the general solution of the homogeneous equation.

The author then proceeds to a detailed study of the particular case of the linear differential equations of the second order. He first considers the case of the homogeneous equation, and then the case of the inhomogeneous equation. He shows that the general solution of the homogeneous equation is a linear combination of two linearly independent solutions. In the case of the inhomogeneous equation, he shows that the general solution is the sum of a particular solution and the general solution of the homogeneous equation.

there may be smaller specimens which show the epimerite. The presence or absence is undoubtedly due to age of the parasite. The reason for the presence of an epimerite at all is not evident; unless it is an ancestral vestige, for it disappears while the animal is still living an intracellular existence.

The larger embedded trophozoites are found in various positions in the host cells, generally however, headed away from the lumen, i.e. with their protomerites contiguous with the mesothelial lining of the intestine. Infrequently one is met with which has the protomerite turned toward the lumen (Leger and Duboscq, *ibid*, fig. 5) or turned in some other direction (Leger and Duboscq, *ibid*, fig. 6). Individuals of *Stenophora lactaria* have frequently been found boring their way, protomerite first, through the mesothelial walls of the intestine into the coelom, and in sections of the host, some specimens have actually been found in the coelom, lying close to the coelom-wall of the intestine. During the boring process, the muscular tissue in the wake of the parasite is destroyed, leaving the surrounding tissue shredded and contorted.

The adult parasites seem to prefer lying loose between lobes or clusters of intestinal cells, rather than to living in the open lumen. The interstices of the lobes are very frequently occupied by large adult gregarines.

The sporozoite is spindle-shaped and swells in the lumen. It penetrates the free end of a cell between the cilia and

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22

undergoes development within the cell. The first trophozoic stage I have seen is the small, completely formed body without a protomerite lying embedded with its epimerite at the distal end of the cell, next to the mesothelial layer. It undergoes considerable growth here with the consequence that the cell is destroyed and the parasite comes to lie in a self-formed cyst between two cells, often affecting parts of these contiguous cells and causing the cells for some distance around to be greatly compressed. Then the epimerite disappears and the protomerite develops and becomes more or less flattened against the basement layer of the cell. The trophozoites emerge into the lumen through the space left by the originally destroyed cell. The nucleus of the trophozoite of *Stenophora lactaria* is spherical; it begins however to acquire its ellipsoidal form while still in the intercellular stage.

b) The Gregarinidae

The parasites of this family become associative while they are quite immature and long before they are ready to form cysts. The shape of the sporonts remains fairly constant whether they are young or fully mature. The sporonts of the genus *Gregarina* are always more or less obese, and very frequently doliform. The protomerite is much larger in comparison to the size of the body than in the *Stenophoridae*. In length it varies from one-half to one-eighth the total length of the body. It is frequently hemispherical, and as often cylindrical rounded in front, but is

The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various stages of human civilization, from the primitive state of nature to the establishment of the modern world. He traces the development of the human mind, the growth of the human race, and the progress of the human arts and sciences. The second part of the book is devoted to a detailed account of the history of the world, from the beginning of the Christian era to the present day. The author discusses the various events and circumstances that have shaped the world, from the birth of Christ to the present day. He traces the development of the human mind, the growth of the human race, and the progress of the human arts and sciences. The third part of the book is devoted to a detailed account of the history of the world, from the beginning of the Christian era to the present day. The author discusses the various events and circumstances that have shaped the world, from the birth of Christ to the present day. He traces the development of the human mind, the growth of the human race, and the progress of the human arts and sciences.

Of the Revolution

The revolution is a great event in the history of the world, and it has shaped the world in many ways. It has changed the course of human civilization, and it has brought about the establishment of the modern world. The revolution has been a great blessing to the human race, and it has brought about the progress of the human arts and sciences. The revolution has been a great event in the history of the world, and it has shaped the world in many ways. It has changed the course of human civilization, and it has brought about the establishment of the modern world. The revolution has been a great blessing to the human race, and it has brought about the progress of the human arts and sciences.

never more than twice as high as wide; it is rarely conical.

There is sometimes a slight indentation at the apex.

The epicyte is fairly thick over the entire body but thicker at the anterior end and at the septum than elsewhere.

The deutomerite is nearly always wider than the protomerite. It is fairly regular in shape throughout the family, being generally widest in the middle portion or slightly anterior thereto and gradually tapering both anteriorly and posteriorly. The posterior end is always rounded; it is never sharply acute.

The endoplasmic contents of the protomerite and deutomerite differ more in density than in character of the granules. The protomerite contains homogeneous granules about the same size and consistency as those of the deutomerite but fewer in number, rendering this portion always less dense.

Myonemes are difficult to detect in the Gregarinidae, even with an oil immersion objective when the animals are alive. They can be seen in longitudinal sections of adults as large, deeply staining dots, seemingly larger protoplasmic granules, situated at the edge of the endoplasm. (Fig. 232). Cross-sections naturally do not reveal their presence. In total mounts and with an intravital stain, they can be seen as a delicate network of fibrillae extending around the animal horizontally. (Fig. 243).

Longitudinal striations in the epicyte are rendered visible by simply crushing the animal on the slide and liberating the dense endocyte. They are very delicate parallel striations

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The people are beginning to feel the effects of the new administration.

The country is now in a state of excitement.

The government is now in a state of confusion.

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The country is now in a state of excitement.

The government is now in a state of confusion.

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visible with the oil immersion lens and situated on the outside of the epicyte. They may be seen in both protomerite and deutomerite and traced continuously from one end of the animal to the other. (Fig. 243). They do not converge at the anterior and posterior ends, being rather continuous over the ends as at other portions of the body. The writer has never seen between the striations the pores which Schewiakoff says serve for the extrusion of mucous.

The nucleus in the genus *Gregarina* is always spherical. In the trophozoites and in immature sporonts, there is often but one large karyosome and never more than five or six. As size of the animal increases, the karyosomes increase in number and decrease in size, and are scattered irregularly throughout the nucleus. In mature sporonts they are often arranged in a twisted chaplet and are always too numerous to count. One of the reasons why maturity of the cyst and its dehiscence occurs in so short a time in the *Gregarinidae* (two days) may be that the nucleus of the mature sporonts has already broken up into numerous small elements before cyst-formation has taken place and only needs to lose its wall while in the cyst for these particles to surround themselves with a portion of the sporont endoplasm and become gametes. In the *Stenophoridae*, the nucleus of a mature sporont contains but one large karyosome which, after cyst-formation has taken place, must break up into constituent elements.

The epimerite of all the *Gregarinidae* in which it has

The following is a list of the names of the persons who have been admitted to the office of the Secretary of the Board of Education of the City of New York, since the first meeting of the Board on the 1st day of January, 1857, to the 31st day of December, 1880.

The names of the persons who have been admitted to the office of the Secretary of the Board of Education of the City of New York, since the first meeting of the Board on the 1st day of January, 1857, to the 31st day of December, 1880, are as follows:

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been observed is a large globular slightly stalked or sessile structure which is often retained after its usefulness is over and the trophozoite is liberated in the lumen. (Figs. 224-7). There is a little endoplasm present in the nearly transparent epimerite which can be demonstrated with an intravital stain.

B: THE LIFE HISTORY OF A
TYPICAL CEPHALINE
GREGARINE

The life history may be outlined briefly as follows:

Sporozoite trophozoite sporont gamete zygote sporont sporo-
zoite. The sporozoite is a very minute falciform body liberated from the spore by the action of the digestive juices of the host which has swallowed it.¹ This small body possesses no means of locomotion other than the extrusion of protoplasm. It lodges among the cilia of the intestinal epithelium and bores its way into the cell by ameboid movement. (Leger and Duboscq, 1909).

Penetration is probably effected by the excretion of a toxin which lowers the resistance of the cell wall. It either merely punctures the wall and projects a small portion of its body into the cell, as in most Gregarinidae, or completely embeds itself in the cell mass, deriving its nourishment from the cell sap, as in the Steno-

1. There is some evidence to substantiate the theory that autoinfection occurs and accounts for the enormous number of parasites which is often present in a host. See last page of chapter on Cysts.

THE LIFE OF
JAMES EARL RAY
BY
GORDON RAY

The life of James Earl Ray is a story of a man who became a legend. He was born in 1928 in Mississippi and grew up in a poor family. He was a brilliant student and a talented writer. He worked for the FBI and then for the CIA. He was involved in the assassination of Dr. Martin Luther King Jr. in 1968. He was captured in London in 1969 and returned to the United States. He was convicted of the assassination and sentenced to death. He was later sentenced to life in prison. He was released in 1991 and lived in London until his death in 1994. This book is a biography of James Earl Ray, written by his brother, Gordon Ray. It is a detailed and honest account of his life, from his childhood to his death. It is a must-read for anyone who is interested in the life of this man.

phoridae. As soon as the sporozoite begins to absorb nourishment and to grow, it becomes a trophozoite. A combination of factors determines when the trophozoite shall be liberated into the lumen. The destruction of epithelial cells and the growth of the parasite go hand in hand and when the cells no longer supply sufficient nourishment or when the activity of the parasite causes it to release its hold, the trophozoite is liberated into the intestine or coelom and thenceforth absorbs nourishment from the fluids of that cavity.

After the cell has been destroyed and the parasite liberated, the epimerite is no longer useful and drops off. With the loss of the epimerite and the change in habitat, the animal becomes a sporont. At some stage in sporont life, generally an early one, a member of the genus Gregarina attaches to one end of the body another sporont, the two forming an association. In general in which the sporonts are solitary, attachment of two sporonts takes place just previous to cyst-formation. Upon reaching a certain size or density or because of some unknown internal factor, the two sporonts rotate about a common axis and form a sphere. This spherical mass acquires a relatively thick gelatinous covering, the cyst, and leaves the body of the host with the feces. If it remains in a moist place for 48 hours, development proceeds as follows: The sporont nucleus breaks up into a myriad of small chromidial bodies, each small body acquiring a small amount of the residual protoplasm of the sporont. These nucleated

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particles are gametes. The gametes of the two sporonts are allowed to mingle by the breaking down of the separation walls, when they fuse two by two and form zygotes. The zygote acquires a tough, resistant transparent covering and the content breaks up into eight parts, each with a portion of the zygote-nucleus. The resulting body is an octozoic spore. The spores are liberated from the cyst through sporeducts which are formed from the residual protoplasm of the cyst. They are scattered over the grass and ground by the wind and rain and are eaten by a new or by the same host along with its food. Parasitism is thus accidental. The spores upon reaching the alimentary canal of the host are acted upon by the digestive juices and the spore wall absorbed. Upon the removal of this wall, the eight sporozoites are set free and the life-history is repeated.

C: THE QUESTION OF SPORONT MATURITY

The question may be raised in connection with the development of the sporonts and cysts: Can one detect a sporont which is fully mature and ready for cyst-formation? After many months of observation upon a number of species of several genera, I have come to the conclusion that full maturity can be detected and the imminent cyst-formation predicted. In a genus like Gregarina, in which the association of sporonts is a characteristic feature, the fact that specimens are in associations of two does not indicate that the sporonts are mature for associations are

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PHILOSOPHY DEPARTMENT

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often formed early in sporont life, while the animals are very small and obviously immature. In fact many sporonts are seen in association which are much smaller than some cephalonts of the same species free in the intestine. So the fact that sporonts are linked together in twos is not an indication that maturity has been reached.

Density of the animals is often a criterion of maturity but not one upon which to depend. Cephalonts are transparent or nearly so; the small sporonts are but slightly opaque and opacity increases steadily with age, the oldest in many species being very dense and practically black in transmitted light. If, however, a host is starved a few days before being opened, the parasites are likewise starved and all become more or less transparent.

Size increases with age and only the large individuals in any case may be expected soon to form cysts.

While no one of these three characteristics can be used as a test for maturity of the sporonts, an association of large sporonts in which the individuals are well filled with protoplasmic granules and hence opaque, indicates without doubt that the sporont is mature.

Movement of such an association is no longer active motion of translation; the sporonts have become sluggish and tend to revolve. When the revolution becomes fairly well established, it takes a spiral form and gives place to rotation. The animals finally become a compact spherical mass with a cyst wall which has

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been secreted during rotation.

The sporonts are now in position to reproduce themselves.

D: T H E C Y S T S

Observations on cyst-formation and development, like those on Movement, have been confined chiefly to one species. In the family Stenophoridae, I have not been able to procure the dehiscence of any cysts; in the Gregarinidae observed, however, it was an easy matter to procure cysts and watch their development. Cysts were taken from moistened fecal masses or from the intestine by means of a needle and placed on slides. Bits of broken glass were used to raise the cover slip, and distilled water added. The cell was sealed with vaseline and placed in a petri dish well vaselined. along the edges.

a) Cysts of the Stenophoridae

observed were spherical or slightly ellipsoidal. They are generally found in the posterior part of the intestine and were not seen until fully developed and rotation had ceased. It is not difficult to determine in most cases that two individuals were involved in making a cyst. The line of separation is often indicated in the cyst and there is often a slight difference in density of the two conjugants. In one instance one sporont was nearly black and the other pale tan, This fact was not noted until after the cyst had been in the damp chamber half an hour. In all

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cases observed the cysts became lighter in color after being in the damp chamber a few hours. In freshly opened intestines, cysts do not show a clear hyaline layer but after being out the extrusion of water causes the inner mass to shrivel and the epicyst to swell so that the whole diameter is greater than at first. Although cysts were kept in the damp chamber nine days, no spores developed. Whenever still intact, the cysts were crushed at the end of that time but there was no apparent differentiation of the protoplasm and none was revealed by staining. Most of the cysts, however, shrivelled and disintegrated.

b) Cyst-formation in the Gregarinidae
(*Leidyana solitaria* n.sp.)

This species is in its normal sporont stage non-associative. The young sporonts which have but recently lost their epimerites are nearly transparent but as age increases density increases and is due to the absorption of food. The oldest sporonts are very dense and practically black in the deutomerite so that the nucleus is not visible when they are alive. The body in the young sporonts is long and rather slender, but it widens appreciably in the older ones. The middle-aged animals are very active in their movements but the older individuals become very sluggish and tend to lie motionless in masses (See fig. 230).

In dense, sluggish individuals one may expect cyst-formation to take place. The sporont retains its power to bend and twist after it has apparently ceased to use its progressive

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Yours faithfully,
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powers. Sluggish individuals in rotation set in motion currents in the surrounding medium and slowly attract into this ever-widening circle of influence particles of debris or nearby gregarines. If debris is drawn into the whirlpool, it is not retained, but slips to the outside again. Another gregarine is, however, attracted and held, probably because of the mucous on its exterior, and caused to rotate with the first one. If two gregarines are attracted, the force exerted by the first is too weak to hold both and one is invariably liberated. A sporont is apparently unable to make a cyst alone. A single sporont has been seen to rotate for three hours without succeeding in attracting another and then to straighten out suddenly and move to another part of the field.

When such an association is formed, the sporonts are not attached by particular parts of the body, as are associations of the genus Gregarina, but are held together in a haphazard fashion by secretions only. In rotation, the sporonts come closer and closer together laterally, slipping by a few sudden jerks until one does not project beyond the other, the protomerites bend around so as to meet the posterior ends of the deutomerites (Figs. 234, 5, 8), the deutomerites projecting and contracting so as to leave no unfilled interstices until the result is a compact sphere. In one such process, there was formed in the middle of one side of each deutomerite a tiny cupped indentation and the two cups fitted together to form a perfect sphere. This sphere became smaller and smaller as the cyst developed and finally disappeared in the gen-

The first section of the document discusses the importance of maintaining accurate records of all transactions. It states that every entry should be clearly documented with the date, amount, and purpose of the transaction. This ensures transparency and allows for easy reconciliation of accounts.

The second section provides a detailed breakdown of the financial data for the first quarter. It includes a table showing the following figures:

Category	Amount
Total Revenue	125,000
Total Expenses	85,000
Net Profit	40,000

The third section outlines the budget for the upcoming year and compares it to the actual performance of the previous year. It notes that while revenue has increased by 10%, expenses have also risen, resulting in a 5% increase in net profit.

The final section concludes with a summary of the company's financial health and offers recommendations for future growth. It suggests focusing on reducing operational costs and expanding into new markets to further increase profitability.

eral breaking down of the inclosed sporont walls. (Figs. 235, 8).

The mass continues its slow rotation for hours. After a compact mass has been formed, one can still distinguish the nuclei and the protomerite and deutomerite of each sporont, the former by the pale tan color. (Figs. 239, 40). This demarkation is lost and soon after the faintly visible lighter nuclear areas disappear. The straight line which separates the two sporonts (their lateral walls) remains visible for twenty-four hours after the cyst has begun to form. It disappears finally and the cyst-mass becomes perfectly homogeneous throughout (Fig. 241).

All the time that the mass is revolving, there is being exuded from the two bodies the sticky gelatinous and transparent secretion. This exude follows after the animals as very slender spiral threads and forms a spirally arranged layer constantly increasing in width as rotation continues. When rotation ceases there is formed around the cyst-mass an appreciable layer of this gelatinous matter arranged as very fine concentric threads.

Motion of the mass was watched in one instance to completion. My notes opposite the time of each successive complete rotation read as follows: "Brings another gregarine into the vortex; the two rotate together; shove a third gregarine out of the way; protrudes out a protomerite as if feeling the way; retracts same; the two slip and slide until form a perfect sphere; central spherical area left between the two sporonts; gelatinous layer form-

The first part of the report deals with the general situation in the country and the progress of the work done during the year. It then goes on to discuss the various projects which have been undertaken and the results which have been achieved. The report concludes with a summary of the work done and a list of the names of the persons who have been engaged in the work.

The second part of the report deals with the financial statement for the year. It shows the total income and expenditure for the year and the balance carried forward to the next year. It also shows the details of the various items which have been included in the statement.

The third part of the report deals with the personnel of the organization. It gives a list of the names of the persons who have been employed during the year and the positions which they have held. It also gives a list of the names of the persons who have been engaged in the work on a part-time basis.

The fourth part of the report deals with the work done during the year. It gives a list of the various projects which have been undertaken and the results which have been achieved. It also gives a list of the names of the persons who have been engaged in the work.

The fifth part of the report deals with the work done during the year. It gives a list of the various projects which have been undertaken and the results which have been achieved. It also gives a list of the names of the persons who have been engaged in the work.

ing around the rotating sphere; the outer layer wider and distinct."

The time for the first complete rotation of the solitary individual was one and one-fourth minutes. Approximately this rate is retained during fifteen rotations. The rotations become slower as the mass more and more nearly approximates a sphere. two and one-third min; four min.; five min. are recorded for successive rotations. At the end of forty-five minutes, the cyst was complete but still slowly rotating at the rate of one rotation in from four to five minutes. When next observed, two hours later, motion had ceased and there was present a gelatinous layer one-third the radius of the cyst in thickness.

Fully-formed cysts which are still in the process of rotation are frequently taken from the host and they continue to rotate a half hour or more after removal.

c) Cyst Development and Dehiscence

When the mass has finished rotating, it is a beautifully homogeneous opaque gray spherule surrounded by a thick transparent cyst-wall fifty micra in width, or half the radius of the inner mass. The mass begins to disintegrate in twelve or fifteen hours, the protoplasm becoming arranged in many dense areas (Fig. 242). The diameter of the inner mass decreases and that of the transparent cyst-wall increases by the exudation of water from the inner regions. In twenty-four hours the protoplasm within the cyst-wall has begun to shrink from the periphery. Five hours later (29 hrs.) the spore-ducts are clearly indicated (Fig. 245), by

The first part of the report deals with the general situation of the country and the progress of the war. It then goes on to discuss the economic situation and the measures taken to deal with the shortage of food and clothing. The report also mentions the progress of the military operations and the state of the morale of the troops. It concludes with a summary of the main points and a list of references.

The second part of the report deals with the economic situation and the measures taken to deal with the shortage of food and clothing. It discusses the various schemes that have been proposed and the progress of their implementation. It also mentions the state of the economy and the measures taken to deal with the inflation and the black market.

The third part of the report deals with the military operations and the state of the morale of the troops. It discusses the various campaigns and the progress of the military operations. It also mentions the state of the morale of the troops and the measures taken to deal with the shortage of food and clothing.

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dense accumulations of protoplasm around the periphery of orange colored disc on the cyst surface. From three or four to a dozen of these discs are delineated. The orange color is due to an accumulation of orange-colored oil which dissolves and loses its color in ether. Soudan III stains it red. The oil can be pressed out from the cyst in large globules. The origin of this oil in the cyst is of course the endoplasm of the sporonts. The protomierite is tan in color and probably contains considerable oil; the deutomerite may contain as much or more but the color is obscured by the great number of protoplasmic granules which renders the whole very opaque.

After 35 hrs. the ducts leading from the periphery to the center of the cyst-mass appear and resemble spokes of a wheel. In a few hours more the spore-ducts begin to project from the surface of the sphere, the center depressed. (Figs. 247, 8). By this time the individual spores are visible within the mass (Fig. 246). At the end of from 42-60 hours, the spores are liberated. (Fig. 249). Although from one to a dozen spore-ducts begin to grow outward, not more than one has been seen to complete itself. This is accounted for probably by the fact that pressure is exerted on most of the incipient ducts by the slide and cover-slip, and growth to completion inhibited. One duct is often directed horizontally between the two surfaces and it always is this lateral duct which develops and through which spores are extruded. When there has been considerable debris in the vicinity of the developing cysts,

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the ducts are often coiled and twisted about the cyst itself. I ⁵⁵
have never been able to incite spore-exudation without the use of
a cover slip for even in a carefully sealed damp chamber there is
enough volume within the chamber itself to cause sufficient evapor-
ation to take place to dry up the unprotected cyst.

The duct which is formed is very long, 25 mm. or eight
times the radius of the cyst. (Fig. 249). The ducts grow inward
from the periphery, where they first appear, to the region of the
residual mass of protoplasm. Then they grow outward from the peri-
pheral region until they acquire the enormous length attained in
a few species. The growth outward seems to be from the region of
the periphery, the older portion pushed ahead. The tip of the long
duct is orange-colored as is the disc from which growth began,
showing that the oil globules are pushed along with the first out-
growths of the tube. There does not seem to be an eversion of the
duct here, as in *Gregarina rigida* and other species (Lankester,
1903:183).

The spores emerge in chains which soon break up into
small segments. The spores (Fig. 255) are barrel-shaped and
truncate at the ends. They possess an epispore and endospore easily
discernible when a stain is used on the slide. They are slightly
cupped at the ends. I think there is a corona of very delicate
spines or cilia at each end which serves to hold the spores to-
gether in chains and to furnish a means of locomotion for the iso-
lated spores. That spores do move from place to place is easily

The first part of the report is devoted to a general survey of the situation in the country. It is followed by a detailed account of the work done during the year. The report concludes with a summary of the results and a list of the publications issued during the year.

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determined by watching a few chains of freshly liberated spores on a slide. (Care should be taken that the slide is undisturbed and yet not allowed to evaporate.) In a few hours no two spores will be left attached but they will lie in small clusters or scattered over a whole field.

Sometimes spore-ducts do not develop and the cyst has superficially undergone but little differentiation, yet upon crushing the walls after a day or so, or when the spore-ducts should have been formed, perfectly formed spores emerge, to all appearances and staining reactions identical with those liberated in the normal way. Of course nothing is known of their potency as compared with those extruded in the normal manner.

The contents of the spores vary greatly. If the cyst is broken before the spore-ducts have had a chance to form, and apparently before the spores are ripe, they will be found to contain many small clustered or isolated chromosomes which stain deeply. All the spores from a given cyst are in approximately the same stage of development. Another broken cyst will yield spores with fewer chromosomes, from ten to fifteen, for instance. A cyst brought to completion yielded spores each of the many examined containing eight large chromosomes. These spores were watched for a day and at the end of that time delicate partitions were seen between each two of which was contained one large chromidial body. These partitions represented lines of separation between the eight

57

sporozoites which were being developed (Fig. 255). I was unable to procure or else to find any liberated sporozoites by any of the following methods: 1) Some spores were left on the slide in a water medium; 2) others were placed in normal sodium chloride solution; 3) the intestinal juice of a freshly killed cricket was run under a third cover slip on which were a few spores; and 4) spores were placed on a small mass of fresh intestinal epithelium. In the last two instances putrefaction was soon set up in the non-sterile tissues. Using spores of another gregarine from a crab, (parasite still unnamed) I sterilized some of the colorless blood from the heart of the crab by boiling it in a test tube and used the liquid as a medium but without inciting the spores to develop.

Cysts were crushed at various developmental stages and stained. The spores were found to be well developed before the spore-ducts are formed, so the early stages of development are the sources of greatest change.

Immediately after the protoplasm of the cyst becomes collected in masses, small clear papillae begin to appear on the periphery of each mottled mass. (Fig. 244). This layer of papillae being formed, another is seen beneath, until the three or four outer layers of the cyst show these papillae, the inner mass being residual non-metamorphosed protoplasm.

The papillae soon become constricted off to form tiny globular bodies, each of which contains a deeply-staining particle

The first part of the document is a letter from the Secretary of the State to the President, dated January 1, 1865. The letter discusses the state of the Union and the progress of the war. It mentions the recent victories of the Union forces and the hope that the war will soon be over. The Secretary also discusses the issue of Reconstruction and the need to rebuild the South. The letter is signed by the Secretary of the State, William H. Seward.

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inside. These globular bodies are the gametes (Fig. 251). Upon crushing and staining a cyst in the gamete stage, I have repeatedly been unable to find the least evidence of a difference in shape or size or in staining reaction between the gametes from opposite poles of the cyst, i.e. from each of the two constituent sporonts. The gametes are isogametes. That there is, however, a difference between them is shown by the attraction of certain gametes for others. Before the partition wall between the two sporonts is absorbed, the gametes of each side do not attract others from the same side of the partition. But when the partition wall has disappeared and the cyst is examined, it is seen to contain very many 'double' gametes, i.e. gametes in pairs. (Fig. 252). If taken early enough, the gametes are seen to be barely contiguous at one point. The next stage observed is that in which each retains its identity but is flattened on the side of attachment to the other (Fig. 253). Then the identity of each becomes lost and the result is a body twice the size of the original gamete, with a nuclear content made up of the fusion of that of the two gametes. This larger body, which in staining reaction is identical with that of the gametes, is the zygote. In a cyst of twenty-four hours, no spore-ducts had begun to appear but the cyst was full of zygotes.

The zygotes when fully formed are ellipsoidal in shape, contain many small deeply-staining bodies, and possess a rather thin wall (Fig. 254). They develop gradually into spores. The

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outline becomes more spore-like by the gradual flattening of the ends and the decrease in the number of chromidia while the outer wall increases in thickness. In a cyst of about thirty hours, the zygotes have attained the shape of the ripe spores but the content is still that characteristic of the zygote.

From the thirtieth hour on, the chromidia rearrange themselves and decrease in number by fusion, and the perfection of the mechanism for the expelling of the ripe spores proceeds.

It is probable that the cyst can develop and spores be expelled while within the intestine, possibly resulting in the re-infection of the host and accounting for the enormous numbers of parasites found in some hosts. I have seen cysts dense and opaque, cysts pearly gray and mottled, cysts with orange-colored discs, the incipient spore-ducts, and even cysts with spore-ducts well developed and nine in number, all within the body of a freshly caught cricket. The same advanced stages of the cysts of another species have been found in the bodies of freshly opened locusts and also in certain Crustacea.

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Part Three

SYNOPSIS OF THE EUGREGARINE RECORDS OF THE
MYRIAPODA, COLEOPTERA AND ORTHOPTERA
OF THE WORLD

Part Two

KNOWLEDGE OF THE ECONOMICS OF THE
INDUSTRIAL REVOLUTION AND THE
AGE OF IMPERIALISM

Introduction

The synopses and list of species which follow were made in order to obtain the essential features of all the known species of eugregarines parasitic in three groups of animals so that in placing on record some twenty species which I had found during the last year there would be no danger of redescribing a species under a new name or of describing a new species under a name already used. It is hoped that the synopses will be useful in future researches on the gregarines of these groups wherever library facilities are limited.

Species have been included from the whole world and not from the United States only for many species of protozoa are notably cosmopolitan and not by any means restricted to one portion of the globe. The study of gregarines is as yet scarcely begun in the United States and very few species have been found both in the Old World and in the New, but workers in the United States must be on the outlook for Old World species and should not describe forms new to this country as actually new species without considering the parasites of other regions of the world.

Every effort has been made to include in these synopses all the species mentioned in the literature. Sources of information are as follows: Dufour (1837), Kölliker (1848), Stein (1848),

The present and list of countries which follow are

made in order to detail the numerical features of all the
species of mammals recorded in this series of islands.
as they are placed in groups according to their
forms during the last year there would be no danger of
the species being a new one or of describing a new species
which is now extinct. It is found that the mammals will
be found in those regions on the islands of the
group which are listed.

Species here are included from the whole world and
from the United States only. The last species of mammals are
entirely new to the world and are in no way related to any
portion of the group. The study of mammals is as yet
scarcely begun in the United States and yet the species here
are found both in the Old World and in the New, but nowhere
else. These species are on the whole for Old World species
and should not describe them now in this country as actually
new species without considering the possibility of other species
of the world.

From among the mammals included in these groups all
the species mentioned in the literature beyond of importance
are as follows: (before list), (after list), (new list).

Frantzius (1848), Diesing (1851), Lankester (1863), Minchin (1903), Labbé (1899), Sokolow (1911), Ellis (1913c), Zoologischer Anzeiger indices from 1848 to 1895, the Concilium Bibliographicum from 1895 to date, and current periodicals, Archiv für Protistenkunde, Archives de Parasitologie, etc., for the past and the present calendar years. These references have to a great extent acted as checks on each other although the original sources have not infrequently revealed other species not elsewhere mentioned. Many of the older species which are recorded in the synopses do not appear in Labbé's Sporozoa.

Labbé repeatedly regards as synonyms species which occurred in the same host genus or in allied genera without regard to whether or not the species of parasites were identical. In most instances the species are not the same although the same species or genus of host is involved, and unlike parasites have been separated. For example, Phialoides ornata Léger and Gregarina brevirostra Kölliker were regarded as synonymous because they infest the same host. In some instances Labbé regarded as synonyms species which actually belong together, for example, Actinocephalus lucanus Stein and Stephanophora radiosa Léger, which are identical, the species now being known as Actinocephalus conicus (Dufour) Stein.

The law of priority has been adhered to strictly and many parasites known by later assigned names have been referred

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to names given to them many years before, e.g. Actinocephalus conicus which was known for long as Actinocephalus lucanus. Labbe in most instances calls such species by the later assigned names in his treatise.

In the descriptions of species, well-developed sporonts have been taken as the standard except where such have not been described, these rare instances being noted in the synopses. Shape of the cephalonts is often quite unlike that of the sporonts and thus of no systematic value in diagnosis. Whenever the epimerite is mentioned in the literature, it is described in this paper; when it is not mentioned in the literature, as is often the case, the generic determination of the author is based on other characters. The sporonts are often polymorphic and the synopsis records are based on expanded, quiescent and, as far as known, normal specimens except where the polymorphism is marked. In these instances such facts are noted.

In the description of each new species, I have given measurements of several sporonts. In most published descriptions the length and width of one sporont only are stated, generally of the largest one observed and the ratios of various parts are based on this one parasite.

As the discovery of new species proceeds, I am of the opinion that many will be very similar to others already described and not easily differentiated from them unless a wide range of

measurements and ratios is taken from parasites in different hosts and selections made therefrom for use in a table. This applies in particular to the genus Gregarina, where differences between species appear to be limited. One observer might find the maximum length to be a and the ratio of two parts 1:2. Another worker on the same species might find his largest specimen to be 2a long and the ratio of parts 1:3 and describe the species as different from the former. A table showing lengths and ratios selected from measurements of many parasites in the same host and from as many hosts and under as varying conditions as possible (habitat, season, etc.), thus eliminating the danger of duplication of species.

I have differentiated new species in the same genus by the following characteristics: size, both maximum and average; ratio of length protomerite to total length; ratio of width protomerite to width deutomerite; general shape of the body; shape of the protomerite; shape of the deutomerite; character of the interlocking device; size and shape of the nucleus; color and character of the protoplasm; and the size and shape of the cysts and their method of dehiscence.

It is true of many species that the family or generic determination or both are uncertain because important diagnostic features such as the epimerite and spores are often lacking. The correct family can sometimes be determined when only one of these

The first part of the paper is devoted to a general discussion of the
 various methods which have been employed for the determination of the
 relative amounts of the different components of a mixture. In the
 first place, it is pointed out that the most common method is that
 of gravimetry, which consists in weighing a known quantity of the
 mixture and then determining the weight of one or more of the
 components. This method is simple and accurate, but it is only
 applicable to those cases in which the components are stable and
 do not undergo any change during the process. In the second
 place, it is mentioned that the method of volumetry is also
 frequently employed. This consists in measuring the volume of a
 known quantity of the mixture and then determining the volume of
 one or more of the components. This method is also simple and
 accurate, but it is only applicable to those cases in which the
 components are gases or liquids. In the third place, it is
 mentioned that the method of colorimetry is also frequently
 employed. This consists in measuring the color of a known
 quantity of the mixture and then determining the concentration of
 one or more of the components. This method is also simple and
 accurate, but it is only applicable to those cases in which the
 components are colored.

It is now necessary to consider the question of the accuracy of
 the different methods. It is pointed out that the accuracy of
 gravimetry depends upon the accuracy of the weighing and the
 accuracy of the analysis. It is also mentioned that the accuracy
 of volumetry depends upon the accuracy of the measurement of
 volume and the accuracy of the analysis. Finally, it is pointed
 out that the accuracy of colorimetry depends upon the accuracy
 of the measurement of color and the accuracy of the analysis.

It is now necessary to consider the question of the range of
 application of the different methods. It is pointed out that
 gravimetry is applicable to all cases in which the components are
 stable and do not undergo any change during the process. It is
 also mentioned that volumetry is applicable to all cases in which
 the components are gases or liquids. Finally, it is pointed out
 that colorimetry is applicable to all cases in which the
 components are colored.

factors is present. In some instances the correct genus can be ascribed even though important data are lacking, e.g. the genus Gregarina, by its biassociative factor and the host involved. If there is any doubt about the position of a given animal, the parasite is placed at the end of the particular genus to which it probably belongs.

In describing the associative gregarines, generally only specific measurements of the primate are given for the proportions of the satellite differ considerably within the same species as it happens to be more or less flattened while those of the primate remain fairly constant. The shape given for the posterior end of the deutomerite is that of the satellite, where the deutomerite is free at its posterior end; in the primate it is altered by contiguity with the protomerite of the primate.

The species of gregarines indigeneous to each of the three groups are arranged in families, and under each family the genera are placed in alphabetical order. In each genus the species are arranged in chronological order, the oldest first, the latest additions last. New species not hitherto found are described in detail in the groups to which their hosts belong.

In as many instances as possible, the names of the hosts have been checked and corrected to accord with the best

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authorities. This has often, however, been impossible and the names had to be left as in the original citation. Especially is this true of the older species of parasites, many of which have not been found since the original discovery seventy-five years ago or more.

The names of the Myriapod hosts have been corrected those abroad in accordance with Latzel (1884) and those endemic to the United States with Bollman (1893). Coleopteran literature seems not to be in condition to warrant the finding of synonyms for many of the early-described species. For instance, the name by which a beetle is known today will be recorded, but not the name by which it was known some fifty years ago and by which it was called when the parasites infesting it were described. When names have been corrected to accord with present-day knowledge, the older name is placed in parenthesis after the now-accepted name.

The spelling of the name of the diplopod Julus as given by Linnaeus (1766) has been used throughout wherever the word appears, whether in the name of the host or in the name of a species of parasite where the name is used as a prefix. The Iulus of some authors is, then, disregarded in the nomenclature of the species.

A Brief Synopsis of the Families and Genera of the
Tribe Cephalina (Delage) of the Suborder
Eugregarinae (Leger)

This synopsis is based on the classifications of Minchin (1903 and 1912) and Poche (1913).

Subphylum Sporozoa Leuckart 1879:241.

Class 1. Telosporidia Schaudinn. Sporulation ends the life of the individual.

Order 1. Gregarinida Bütschli 1882:503. Reproduction by spore-formation only or by both spore-formation and budding.

Suborder 1. Schizogregarinae Leger.

2. Eugregarinae Leger. Reproduction limited to spore-formation. Spores octozoic.

Tribe 1. Acephalinae Kölliker (Monocystoidae Poche).

2. Cephalinae Delage 1896:269. Eugregarinae with an epimerite at some stage in the life-history. Body usually divided by septum into protomerite and deutomerite. Spores with two coats. Mainly parasitic in the gut of arthropods.

Family 1. Didymophyidae Leger 1892:105. In associations of two or three. No septa in satellites.

Genus 1. Didymophyes Stein 1848:186. Characters of the family. Epimerite a small pointed papilla, cyst dehiscence by simple rupture. Spores ellipsoidal.

Family 2. Gregarinidae Labbe 1899:9. Associative or solitary, satellite with septum. Epimerite symmetrical, simple. Cysts with or without spore-ducts.

Genus 2. Gregarina Dufour 1828:366. Biassociative. Epimerite small, globular or cylindrical. Spores doliform to cylindrical. Cysts dehiscence by sporeducts.

Genus 3. Hirmocystis Labbe 1899:12. Associations of from two to twelve or more. Epimerite a small cylindrical papilla. Cysts dehiscence by simple rupture. Spores ovoidal.

Genus 4. Hyalospora Schneider 1875:583. Biassociative. Epimerite a simple globular knob. Cysts dehiscence by simple rupture. Spores ellipsoidal. Endoplasm yellow-orange.

Genus 5. Cnemidospora Schneider 1882:446. Solitary. Epimerite not known. Anterior half of proto-

merite gray, posterior half yellow-green. Dehiscence of cysts by simple rupture. Spores ellipsoidal.

- Genus 6. *Euspora* Schneider 1875:582. Biassociative. Epimerite not known. Cysts dehiscence by simple rupture. Spores prismatic.
- Genus 7. *Sphaerocystis* Leger 1892:115. Protomerite only in young stages. Solitary, subspherical. Dehiscence by simple rupture. Spores ovoidal.
- Genus 8. *Camocystis* Schneider 1875:587. Protomerite only in young stages. Associative. Sporulation partial, with sporeducts. Spores cylindrical.
- Genus 9. *Frenzelina* Leger & Duboscq 1907:773-4. (Cephaloidophora Mawrodiadi 1908:101-33). Biassociative. Epimerite not known. Cysts dehiscence by simple rupture. Spores ovoidal, with dark equatorial line. Intercellular development.
- Genus 10. *Uradiophora* Mercier 1912:198. Bi- or tri-associative. Epimerite simple style, forked at end. Cysts dehiscence by simple rupture. Spores doliform.
- Genus 11. *Leidyiana* Watson 1915. Solitary. Epimerite a simple globular sessile knob. Dehiscence by spore-ducts. Spores doliform.
- Family 3. *Dactylophoridae* Leger 1892:165. Epimerite complex. Sporonts solitary. Cysts dehiscence with lateral pseudocyst or by simple rupture. Spores elongate, cylindrical or ellipsoidal.
- Genus 12. *Dactylophorus* Balbiani 1889:41. Protomerite dilated laterally with peripheral digitiform processes. Sporonts solitary. Spores in chains obliquely.
- Genus 13. *Nina* Grebnecki 1873:? Protomerite formed of two long narrow horizontal lobes fused and upturned spirally at one end. Periphery set with teeth from which project long slender filaments. Spores in chains obliquely.
- Genus 14. *Trichorhynchus* Schneider. 1882:438. Epimerite a very long slender neck with dilation at end. Cysts with papillae and indentations on surface. Lateral pseudocyst for dehiscence. Spores cylindrical or ellipsoidal, not in chains.
- Genus 15. *Echinomera* Labbé 1899:16. Epimerite an eccentric cone with eight or more short digitiform processes from sides. Dehiscence by simple rupture. Spores cylindrical, in chains.

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- Genus 16. *Rhopalonia* Léger 1893:1285. No protomerite in sporonts. Epimerite a subspherical cushion with ten or more short thick digitiform processes. Pseudocyst. Spores cylindrical.
- Genus 17. *Acutispora* Crawley 1903:632. Epimerite not seen. Pseudocyst. Spores biconical, thick blunt endosporic rod at each end.
- Genus 18. *Metamera* Duke 1910: 261-86. Epimerite subconical, apex eccentric, surrounded by numerous branched digitiform appendages. Dehiscence by simple rupture. Spores biconical.
- Family Actinocephalidae Léger 1892:166. Sporonts solitary. Epimerites varied. Cysts dehiscence by simple rupture. Spores irregular, biconical or cylindrobiconical.
- Genus 19. *Actinocephalus* Stein 1848:196. Epimerite small, sessile or on a short neck, with 8 or 10 short sharp spines or simple bifurcate digitiform processes. Spores biconical.
- Genus 20. *Geneiorhynchus* Schneider 1875:594. Epimerite a tuft of short bristles set at the apex of a long slender neck. Spores cylindrobiconical.
- Genus 21. *Pyxinia* Hammerschmidt 1838:357. Epimerite a flat drenulate crateriform disc from center of which rises a short or long style. Spores biconical.
- Genus 22. *Beloides* Labbé 1899:27. Epimerite a spiny globule with a long apical style set on a short stout neck. Spores biconical.
- Genus 23. *Phialoides* Labbé 1899:24. Epimerite a broad cushion with peripheral row of teeth and a thickened collar placed on a long slender neck. Spores biconical.
- Genus 24. *Legeria* Labbé 1899:24. Epimerite not known. Protomerite dilated and massive. Septum convex upward. Spores cylindroconical.
- Genus 25. *Coleorhynchus* Labbé 1899:23. Epimerite not known. Protomerite a round shallow disc depressed in center. Septum convex upward. Spores biconical.
- Genus 26. *Bothriopsis* Schneider 1875:596. Epimerite an ovoidal structure with 6 or more long slender filaments. Protomerite very large, septum convex upward. Spores biconical.
- Genus 27. *Asterophora* Léger 1892:129. Epimerite a thick horizontal disc with a milled border and a stout style projecting from center. Spores cylindrobiconical.

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- Genus 28. *Schneideria* Léger 1892:153. (*Rhabdocystis* Boldt 1910:289-93). Epimerite like that of *Astropophora*. Style shorter. No protomerite in sporonts. Spores biconical.
- Genus 29. *Stictospora* Léger 1893:129-31. Epimerite spherical, centrally depressed, armed with a dozen backwardly directed mucrones set on a short neck. Spores biconical, slightly curved.
- Genus 30. *Stylocystis* Leger 1899:526-33. Epimerite a recurved sharply pointed cone. Spores biconical.
- Genus 31. *Steinina* Léger & Duboscq 1904:352-5. Epimerite a short mobile digitiform process changing into a flattened button. Spores biconical.
- Genus 32. *Taeniocystis* Léger 1906:307-29. Epimerite a small sphere set with 6 or 8 recurved hooks. Deutomerite divided by septa into numerous linear segments. Spores biconical.
- Genus 33. *Discorhynchus* Labbé 1899:20. (Syn. *Sycia* Leger 1892:52. Epimerite a large globular structure with a thick collar around base. Short stalk. Spores biconical, slightly curved.
- Genus 34. *Amphoroides* Labbé 1899:20. Epimerite a globular sessile papilla. Protomerite cup-shaped. Spores curved.
- Genus 35. *Pileocephalus* Schneider 1875:591. Epimerite a lance-shaped or simple cone. Spores biconical.
- Genus 36. *Anthorhynchus* Labbé 1899:19. Epimerite a large fluted flattened button. Spores ovoidal, pointed.
- Genus 37. *Sciadophora* Labbé 1899:18. Epimerite large, compressed laterally, peripherally crenulate. Protomerite bears numerous backwardly directed mucrones. Spores biconical.
- Genus 38. *Hoplorhynchus* Carus 1863:570. Epimerite a flat button with 8 to 10 digitiform processes carried on a long collar. Spores biconical.
- Genus 39. *Amphorocephalus* Ellis 1913a:462-3. Epimerite dilated in middle, terminating in concave peripherally fluted disc at anterior end. Spores not known. Protomerite constricted across middle.
- Family 5. *Acanthosporidae* Léger 1892:167. Sporonts solitary, epimerite simple or appendicular. Dehiscence by simple rupture. Spores with equatorial and polar spines.
- Genus 40. *Acanthospora* Léger 1892:145. Epimerite a simple conical papilla. Spores biconical or ovoidal with row of equatorial spines and a tuft of four spines at each pole.

- Genus 41. *Corycella* Léger 1892:144. Epimerite globular with 8 large recurved hooks. Spores biconical, 4 spines at each pole.
- Genus 42. *Ancyrophora* Léger 1892:146. Epimerite a globule with 8 or 10 backwardly directed digitiform processes. Spores biconical with equatorial and polar spines.
- Genus 43. *Cometoides* Labbé 1899:29. Epimerite a spherical button with long slender filaments. Spores cylindro-biconical, with polar and two rows of equatorial spines.
- Family 6. *Menosporidae* Léger 1892:168. Sporonts solitary, epimerite a large cup bordered with hooks and placed on a long slender collar. Cysts dehiscence by simple rupture. Spores crescentic, smooth.
- Genus 44. *Menospora* Léger 1892:168. Characters of the family.
- Family 7. *Stylocephalidae* Ellis 1912:25. Sporonts solitary, epimerites varied. Nucleus ovoidal. Dehiscence by pseudocyst. Spores irregularly shaped, brown or black, extruded in chains.
- Genus 45. *Stylocephalus* Ellis 1912:25. Epimerite a dilated papilla at end of a long slender neck. Cyst covered with small papillae and indentations. Spores hat-shaped.
- Genus 46. *Spaerorhynchus* Labbé 1899:32. Epimerite a small sphere or ellipsoid at end of a long slender neck.
- Genus 47. *Lophocephalus* Labbé 1899:31. Epimerite a large sessile flattened crateriform disc, the periphery crenulate and set at base with numerous short upwardly directed digitiform processes. Spores hat-shaped, black.
- Genus 48. *Cystocephalus* Schneider 1886:99. Epimerite a large lance-shaped papilla set on a short stout cylindrical collar. Spores irregularly shaped.
- Genus 49. *Oocephalus* Schneider 1886:101. Epimerite a spherical button upon a short conical neck. Spores not known.
- Family 8. *Stenophoridae* Léger & Duboscq 1904:361. Development intercellular. Sporonts solitary. Epimerite absent or a simple structure. Cysts dehiscence by simple rupture. Spores ovoidal with equatorial line. Not extruded in chains.
- Genus 50. *Stenophora* Labbé 1899:15. Characters of family. Confined to Diplopoda.

1. The first thing I noticed when I stepped out of the plane was the fresh air. It felt like a breath of life after being cooped up in a small cabin for hours. The sun was shining brightly, and the birds were chirping happily. I took a deep breath and smiled. This was my chance to see the world from a different perspective.

2. As I walked through the airport, I noticed how busy everyone was. People were rushing to catch their flights, carrying bags and luggage. I felt a bit out of place, but I knew I had to get going. I found my gate and waited for my flight to board. The pilot came out and greeted everyone. He seemed friendly and professional. I took my seat and fastened my seatbelt. The plane started to move, and I felt a slight vibration. I looked out the window and saw the runway stretching out before me.

3. The flight was smooth and comfortable. The cabin was clean and well-maintained. The flight attendant was very helpful and attentive. She offered me a drink and a snack. I felt relaxed and at ease. The view from the window was beautiful. The clouds were white and fluffy, and the sun was shining brightly. I felt like I was flying over a sea of clouds. I closed my eyes and listened to the soft music playing in the cabin. I felt like I was in a dream.

4. When the plane landed, I felt a sense of accomplishment. I had made it! I stepped out of the plane and took a deep breath. The fresh air was still there, and the sun was still shining. I felt like I had reached a new world. I walked through the airport and found my luggage. I took a taxi home and felt like I had completed a journey. I was tired but happy. I had seen the world from a different perspective, and I felt like I had grown a little bit. I was ready for whatever came next.

Genus 51. *Ulivina* Mingazzini 1891:235. ?

Genus 52. *Nematoides* Mingazzini 1891:233. Dicytid, no septum in sporonts. Epimerite forked, situated on a long collar.

Genus 53. *Ganymedes* Huxley 1910:155-75. Associative, epimerite not known. Complete fusion of two individuals into one cytoplasmic mass. Cup at posterior end to aid in attachment. Spores unknown. Liver of crustaceans.

Genus 54. *Agrippina* Strickland 1912:108. Sporonts solitary, epimerite a circular disc armed with digitiform processes on periphery, short neck. Spores ellipsoidal.

1871
The following is a list of the names of the persons who have been admitted to the office of Justice of the Peace for the year 1871.

Name	Residence
John A. Smith	St. Louis
James B. Jones	St. Louis
William C. Brown	St. Louis
George D. White	St. Louis
Charles E. Black	St. Louis
Thomas F. Green	St. Louis
Robert H. Gray	St. Louis
Henry I. King	St. Louis
John K. Lee	St. Louis
James L. Miller	St. Louis
William M. Moore	St. Louis
George N. Taylor	St. Louis
Charles O. Walker	St. Louis
Thomas P. Young	St. Louis

1872
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John K. Lee	St. Louis
James L. Miller	St. Louis
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George N. Taylor	St. Louis
Charles O. Walker	St. Louis
Thomas P. Young	St. Louis

List of the Polycystid Gregarines
in the Diplopoda

The parasites are arranged in chronological order, under each genus

Page	Name of parasite	Name of host
	<i>Stenophora larvata</i> (Leidy) Ellis	<i>Spirobolus spinigerus</i> Wood
75-78	<i>Stenophora polydesmivirginiensis</i> (Leidy) Watson	
79-81		<i>Fontaria virginiensis</i> (Drury)
	<i>Stenophora julipusilli</i> (Leidy) Crawley	<i>Julus</i> and <i>Parajulus</i>
81-83	<i>Stenophora juli</i> (Frantzius) Schneider	<i>Julus sabulosus</i> (L.)
84-88		<i>Julus boleti</i> C. Koch
	<i>Stenophora dauphinia</i> Watson	<i>Julus mediterraneus</i> Latzel
88-91		<i>Julus boleti</i> C. Koch <i>Julus fallax</i> Meinert
	<i>Stenophora spiroboli</i> (Crawley) Ellis	<i>Spirobolus</i> sp.
91-92		
	<i>Stenophora fontaria</i> (Crawley) Watson	<i>Polydesmus</i> sp.
92-94		<i>Fontaria</i> sp.
	<i>Stenophora brolemanni</i> Léger & Duboscq	<i>Blaniulus hirsutus</i> Bröl.
94-95		<i>Brachydesmus superus</i> Latzel <i>Brachyiulus pusillus lusitanus</i> Verh.
	<i>Stenophora nematoides</i> Léger & Duboscq	<i>Strongylosoma italicum</i> Latz.
96-96		
	<i>Stenophora varians</i> Léger & Duboscq	<i>Schizophyllum corsicum</i> Bröl.
97-99		
	<i>Stenophora producta</i> Léger & Duboscq	<i>Julus varius</i> Fabricus
99-100		
	<i>Stenophora aculeata</i> Léger & Duboscq	<i>Craspedosoma rawlinsii</i> simile Verh.
100-1		
	<i>Stenophora polyxeni</i> Léger & Duboscq	<i>Polyxenus lagurus</i> (L.) Lat.
101		
	<i>Stenophora silene</i> Léger & Duboscq	<i>Lysiopetalum foetidissum</i> Savi
102-4		
	<i>Stenophora chordeume</i> Léger & Duboscq	<i>Chordeuma silvestre</i> C. Koch
104-7		
	<i>Stenophora corsica</i> Léger & Duboscq	<i>Craspedosoma légeri</i> Bröl.
107		

Table of Contents

1	Introduction
2-4	Chapter I: The History of the Book
5-10	Chapter II: The Structure of the Book
11-15	Chapter III: The Language of the Book
16-20	Chapter IV: The Style of the Book
21-25	Chapter V: The Influence of the Book
26-30	Chapter VI: The Future of the Book
31-35	Chapter VII: The Conclusion
36-40	Appendix A: Bibliography
41-45	Appendix B: Index
46-50	Appendix C: Glossary
51-55	Appendix D: Notes
56-60	Appendix E: References
61-65	Appendix F: Acknowledgments
66-70	Appendix G: Author's Biography
71-75	Appendix H: Author's Address
76-80	Appendix I: Author's Contact Information
81-85	Appendix J: Author's Website
86-90	Appendix K: Author's Social Media
91-95	Appendix L: Author's Publications
96-100	Appendix M: Author's Awards
101-105	Appendix N: Author's Honors
106-110	Appendix O: Author's Achievements
111-115	Appendix P: Author's Legacy
116-120	Appendix Q: Author's Impact
121-125	Appendix R: Author's Influence
126-130	Appendix S: Author's Contribution
131-135	Appendix T: Author's Role
136-140	Appendix U: Author's Significance
141-145	Appendix V: Author's Importance
146-150	Appendix W: Author's Value
151-155	Appendix X: Author's Worth
156-160	Appendix Y: Author's Merit
161-165	Appendix Z: Author's Excellence
166-170	Appendix AA: Author's Superiority
171-175	Appendix AB: Author's Preeminence
176-180	Appendix AC: Author's Prominence
181-185	Appendix AD: Author's Distinction
186-190	Appendix AE: Author's Uniqueness
191-195	Appendix AF: Author's Originality
196-200	Appendix AG: Author's Creativity
201-205	Appendix AH: Author's Innovation
206-210	Appendix AI: Author's Ingenuity
211-215	Appendix AJ: Author's Resourcefulness
216-220	Appendix AK: Author's Inventiveness
221-225	Appendix AL: Author's Resourcefulness
226-230	Appendix AM: Author's Ingenuity
231-235	Appendix AN: Author's Creativity
236-240	Appendix AO: Author's Innovation
241-245	Appendix AP: Author's Ingenuity
246-250	Appendix AQ: Author's Resourcefulness
251-255	Appendix AR: Author's Inventiveness
256-260	Appendix AS: Author's Resourcefulness
261-265	Appendix AT: Author's Ingenuity
266-270	Appendix AU: Author's Innovation
271-275	Appendix AV: Author's Ingenuity
276-280	Appendix AW: Author's Resourcefulness
281-285	Appendix AX: Author's Inventiveness
286-290	Appendix AY: Author's Resourcefulness
291-295	Appendix AZ: Author's Ingenuity
296-300	Appendix BA: Author's Innovation
301-305	Appendix BB: Author's Ingenuity
306-310	Appendix BC: Author's Resourcefulness
311-315	Appendix BD: Author's Inventiveness
316-320	Appendix BE: Author's Resourcefulness
321-325	Appendix BF: Author's Ingenuity
326-330	Appendix BG: Author's Innovation
331-335	Appendix BH: Author's Ingenuity
336-340	Appendix BI: Author's Resourcefulness
341-345	Appendix BJ: Author's Inventiveness
346-350	Appendix BK: Author's Resourcefulness
351-355	Appendix BL: Author's Ingenuity
356-360	Appendix BM: Author's Innovation
361-365	Appendix BN: Author's Ingenuity
366-370	Appendix BO: Author's Resourcefulness
371-375	Appendix BP: Author's Inventiveness
376-380	Appendix BQ: Author's Resourcefulness
381-385	Appendix BR: Author's Ingenuity
386-390	Appendix BS: Author's Innovation
391-395	Appendix BT: Author's Ingenuity
396-400	Appendix BU: Author's Resourcefulness
401-405	Appendix BV: Author's Inventiveness
406-410	Appendix BW: Author's Resourcefulness
411-415	Appendix BX: Author's Ingenuity
416-420	Appendix BY: Author's Innovation
421-425	Appendix BZ: Author's Ingenuity
426-430	Appendix CA: Author's Resourcefulness
431-435	Appendix CB: Author's Inventiveness
436-440	Appendix CC: Author's Resourcefulness
441-445	Appendix CD: Author's Ingenuity
446-450	Appendix CE: Author's Innovation
451-455	Appendix CF: Author's Ingenuity
456-460	Appendix CG: Author's Resourcefulness
461-465	Appendix CH: Author's Inventiveness
466-470	Appendix CI: Author's Resourcefulness
471-475	Appendix CJ: Author's Ingenuity
476-480	Appendix CK: Author's Innovation
481-485	Appendix CL: Author's Ingenuity
486-490	Appendix CM: Author's Resourcefulness
491-495	Appendix CN: Author's Inventiveness
496-500	Appendix CO: Author's Resourcefulness
501-505	Appendix CP: Author's Ingenuity
506-510	Appendix CQ: Author's Innovation
511-515	Appendix CR: Author's Ingenuity
516-520	Appendix CS: Author's Resourcefulness
521-525	Appendix CT: Author's Inventiveness
526-530	Appendix CU: Author's Resourcefulness
531-535	Appendix CV: Author's Ingenuity
536-540	Appendix CW: Author's Innovation
541-545	Appendix CX: Author's Ingenuity
546-550	Appendix CY: Author's Resourcefulness
551-555	Appendix CZ: Author's Inventiveness
556-560	Appendix DA: Author's Resourcefulness
561-565	Appendix DB: Author's Ingenuity
566-570	Appendix DC: Author's Innovation
571-575	Appendix DD: Author's Ingenuity
576-580	Appendix DE: Author's Resourcefulness
581-585	Appendix DF: Author's Inventiveness
586-590	Appendix DG: Author's Resourcefulness
591-595	Appendix DH: Author's Ingenuity
596-600	Appendix DI: Author's Innovation
601-605	Appendix DJ: Author's Ingenuity
606-610	Appendix DK: Author's Resourcefulness
611-615	Appendix DL: Author's Inventiveness
616-620	Appendix DM: Author's Resourcefulness
621-625	Appendix DN: Author's Ingenuity
626-630	Appendix DO: Author's Innovation
631-635	Appendix DP: Author's Ingenuity
636-640	Appendix DQ: Author's Resourcefulness
641-645	Appendix DR: Author's Inventiveness
646-650	Appendix DS: Author's Resourcefulness
651-655	Appendix DT: Author's Ingenuity
656-660	Appendix DU: Author's Innovation
661-665	Appendix DV: Author's Ingenuity
666-670	Appendix DW: Author's Resourcefulness
671-675	Appendix DX: Author's Inventiveness
676-680	Appendix DY: Author's Resourcefulness
681-685	Appendix DZ: Author's Ingenuity
686-690	Appendix EA: Author's Innovation
691-695	Appendix EB: Author's Ingenuity
696-700	Appendix EC: Author's Resourcefulness
701-705	Appendix ED: Author's Inventiveness
706-710	Appendix EE: Author's Resourcefulness
711-715	Appendix EF: Author's Ingenuity
716-720	Appendix EG: Author's Innovation
721-725	Appendix EH: Author's Ingenuity
726-730	Appendix EI: Author's Resourcefulness
731-735	Appendix EJ: Author's Inventiveness
736-740	Appendix EK: Author's Resourcefulness
741-745	Appendix EL: Author's Ingenuity
746-750	Appendix EM: Author's Innovation
751-755	Appendix EN: Author's Ingenuity
756-760	Appendix EO: Author's Resourcefulness
761-765	Appendix EP: Author's Inventiveness
766-770	Appendix EQ: Author's Resourcefulness
771-775	Appendix ER: Author's Ingenuity
776-780	Appendix ES: Author's Innovation
781-785	Appendix ET: Author's Ingenuity
786-790	Appendix EU: Author's Resourcefulness
791-795	Appendix EV: Author's Inventiveness
796-800	Appendix EW: Author's Resourcefulness
801-805	Appendix EX: Author's Ingenuity
806-810	Appendix EY: Author's Innovation
811-815	Appendix EZ: Author's Ingenuity
816-820	Appendix FA: Author's Resourcefulness
821-825	Appendix FB: Author's Inventiveness
826-830	Appendix FC: Author's Resourcefulness
831-835	Appendix FD: Author's Ingenuity
836-840	Appendix FE: Author's Innovation
841-845	Appendix FF: Author's Ingenuity
846-850	Appendix FG: Author's Resourcefulness
851-855	Appendix FH: Author's Inventiveness
856-860	Appendix FI: Author's Resourcefulness
861-865	Appendix FJ: Author's Ingenuity
866-870	Appendix FK: Author's Innovation
871-875	Appendix FL: Author's Ingenuity
876-880	Appendix FM: Author's Resourcefulness
881-885	Appendix FN: Author's Inventiveness
886-890	Appendix FO: Author's Resourcefulness
891-895	Appendix FP: Author's Ingenuity
896-900	Appendix FQ: Author's Innovation
901-905	Appendix FR: Author's Ingenuity
906-910	Appendix FS: Author's Resourcefulness
911-915	Appendix FT: Author's Inventiveness
916-920	Appendix FU: Author's Resourcefulness
921-925	Appendix FV: Author's Ingenuity
926-930	Appendix FW: Author's Innovation
931-935	Appendix FX: Author's Ingenuity
936-940	Appendix FY: Author's Resourcefulness
941-945	Appendix FZ: Author's Inventiveness
946-950	Appendix GA: Author's Resourcefulness
951-955	Appendix GB: Author's Ingenuity
956-960	Appendix GC: Author's Innovation
961-965	Appendix GD: Author's Ingenuity
966-970	Appendix GE: Author's Resourcefulness
971-975	Appendix GF: Author's Inventiveness
976-980	Appendix GG: Author's Resourcefulness
981-985	Appendix GH: Author's Ingenuity
986-990	Appendix GI: Author's Innovation
991-995	Appendix GJ: Author's Ingenuity
996-1000	Appendix GK: Author's Resourcefulness

Stenophora cockerellae Ellis 108	Parajulus sp.
Stenophora elongata Ellis 109	Orthomorpha coarctata (Sauss.)
Stenophora robusta Ellis 107-8	Parajulus venustus Wood Orthomorpha gracilis (C.Koch) Orthomorpha sp.
Stenophora impressa Watson 109-12	Parajulus impressus (Say)
Stenophora diplocorpa Watson 117-19	Euryurus erythropygus (Brandt)
Stenophora lactaria Watson 112-7	Callipus lactarius (Say)
Cnemidospora lutea Schneider 119-21	Glomeris sp.
Amphoroides polydesmi (Léger) Labbé 121-3	Polydesmus complanatus (L.) Polydesmus dispar Silvestri
Amphoroides calverti (Crawley) Watson 123-4	Callipus lactarius (Say)

100-1	100-1
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100-4	100-4
100-5	100-5
100-6	100-6
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100-33	100-33
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100-48	100-48
100-49	100-49
100-50	100-50

Stenophora larvata (Leidy) Ellis

Fig. 1.

1849	<i>Gregarina larvata</i>	Leidy	1849:232
1851	<i>Gregarina larvata</i>	Diesing	1851:553
1853	<i>Gregarina juli marginati</i>	Leidy	1853:237
1863	<i>Gregarina juli</i>	Lankester	1863:94
1875	<i>Stenocephalus juli</i>	Schneider	1875:584-5
1899	<i>Stenophora juli</i>	Labbé	1899:15
1903	<i>Stenophora juli</i>	Crawley	1903a:51
1904	<i>Stenophora iulimarginati</i>	Léger & Duboscq	1904:362
1913	<i>Stenophora larvata</i>	Ellis	1913b:286

Stenophora: S^Poronts solitary, elongate. Max. length 800_μ, max. width 23_μ. Ratio length prot:total length :: 1:20; width prot:width deut :: 1:2. Protomerite small, subglobular, slightly flattened top and bottom, a flat circulat papilla at apex with an apparent pore in center. A conspicuous constriction at septum. Deutomerite elongate-cylindrical, tapering gradually from center to an acute but bluntly pointed cone. Eⁿdocyte of protomerite clear, granular; of deutomerite dense and opaque. Nucleus small, spherical.

Taken at Philadelphia, Pa.

Host: S^Dirobolus spinigerus Wood. (*Julus marginatus* Say).

Habitat: Iⁿtestine.

This species was observed by Leidy in 1849 and was the first gregarine that he observed. His general statement regarding the parasite is quoted here nearly in full because of its quaintness.

"*Gregarina* is probably the larva condition of some more perfect animal, but in the 116 individuals of *Julus* which I

Year	Volume	Page
1917	10	1
1917	11	1
1917	12	1
1917	13	1
1917	14	1
1917	15	1
1917	16	1
1917	17	1
1917	18	1
1917	19	1
1917	20	1

The following table shows the number of articles published in the Journal of the American Medical Association during the year 1917. The total number of articles published was 1,100. The number of articles published in each volume is as follows: Volume 10, 100; Volume 11, 110; Volume 12, 120; Volume 13, 130; Volume 14, 140; Volume 15, 150; Volume 16, 160; Volume 17, 170; Volume 18, 180; Volume 19, 190; Volume 20, 200.

The following table shows the number of articles published in the Journal of the American Medical Association during the year 1917. The total number of articles published was 1,100. The number of articles published in each volume is as follows: Volume 10, 100; Volume 11, 110; Volume 12, 120; Volume 13, 130; Volume 14, 140; Volume 15, 150; Volume 16, 160; Volume 17, 170; Volume 18, 180; Volume 19, 190; Volume 20, 200.

have examined, I have not been able to detect any form which could be derivable from it. Creplin doubts its animality. - - - I detected movements of an animal character, and this led me to seek for muscular structure, which resulted in the discovery of the longitudinal lines of the inferior cell. These escaped the observation of Siebold - - -. In the state in which Gregarina is found, it would probably hold a rank between the Trematoda and Trichina, the lowest of the Nematoidea."

To Leidy, then, must be attributed the discovery of the longitudinal striations in the epicyte and it is interesting to note that he discovered them during his first observations on the Gregarines.

Leidy renamed the species four years later from the host in which it was found.

Lankester (1863:94), in a classification of the gregarines, grouped three of Leidy's forms---G. larvata, G. juli marginati and G. juli pusilli--together with Gregarina juli Frantz. under the name of the latter, apparently because they were all parasites of and the only known parasites of the same diplopod.

Schneider (1875:585) disregarding the rule of priority united Gregarina juli marginati and a species which he discovered under the name Stenocephalus juli (Leidy). His remarks are as follows:

"Cette espèce est commune et me paraît être identique à celle décrite par Leidy sous le nom de Gregarina juli marginati. Dans ce cas, elle serait probablement répandue chez les différentes espèces du genre Julus, puisqu'on la connaîtrait déjà chez trois d'entre elles. - - - L'espèce est légèrement polymorphe; elle est tantôt très-allongée et relativement étroite, tantôt remarquablement massive; mais son protomérite demeure toujours identique à lui-même et suffit amplement au diagnostic."

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Leidy gave no measurements of his species and Schneider based the⁷⁷ identity of the two forms on the similarity of Leidy's figures with his material. It is true that the general shapes of the two are very similar but the protomerites differ slightly and the color differs markedly. Leidy's species is white; Schneider's yellow to yellow-orange. Because of these dissimilarities, the two forms should be separated.

Labbé (1899:15) changed the name of the genus *Stenocephalus* of Schneider to *Stenophora*.

Crawley (1903b:634) did not consider the two species identical. His words are as follows:

"There is a good deal of confusion regarding the gregarines occurring in the Diplopod family Julidae. These gregarines all bear a certain amount of resemblance to one another, and it has been usual to relegate all of them to the species *Stenophora juli* Frantz. Leger & Duboscq (1903) have recently shown that such a procedure is not warranted for the fauna of Corsica and the case is certainly the same for that of the eastern U.S. The Julidae of this region are infected with certainly two and possibly three species of *Stenophora*, while the classic *S. juli* apparently does not occur."

Léger and Duboscq (1904:361-2) take up the same discussion in their history of the Stenophoridae, and their words are:

"Leidy fit connaître une Grégarine assez particulière, parasite de l'intestin de *Iulus marginatus* Say. Il l'appela d'abord (1851) *Grégarina larvata*, puis changea son nom en celui de *Grégarina iuli marginati* dans un travail postérieur (1853) où il décrit une autre Grégarine, *G. iuli pusilli*, parasite d'un petit iule--qui n'est pas *Iulus pusillus* Leach.

Ray Lankester (1863) réunit les deux Gregarines de Leidy au *Stenophora iuli* de Frantzius, et cette synonymie fut admise par tous les auteurs qui suivirent.

Schneider (1875) le premier, décrivit avec précision la Grégarine parasite des *Iulus sabulosus* et *Iulus terrestris*. Il nota l'absence d'épimérite, la striation de l'épicyte très

1955
The first part of the report is devoted to a general survey of the situation in the field of the study of the history of the United States. It is then followed by a detailed study of the work of the various departments of the University of Chicago.

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The sixth part of the report is devoted to a study of the work of the various departments of the University of Chicago. It is then followed by a detailed study of the work of the various departments of the University of Chicago.

78
marquée sur les 2 segments, la coloration jaune ou orangée de l'entocyte et le caractère des spores. Ces particularités lui firent créer le genre *Stenocephalus* pour cette Grégarine qu'il identifia à la Grégarine décrite par Leidy dans *Spirobolus marginatus* Say. Il l'appela *Stenocephalus iuli* Leidy, nonobstant les règles de la nomenclature.

Stenocephalus iuli devint ainsi la seule Grégarine des Iules et Gabriel (1880) y rapporta de lui-même sa Grégarine *paradoxa*.

Dans les Sporozoa du Tierreich (1899) Labbé consacra les habitudes prises en ne reconnaissant pour Grégarine parasite des Iules que le *Stenophora iuli*. Il se contenda de remplacer le nom générique de Schneider par celui de *Stenophora*, le nom de *Stenopcehalus* ayant été attribué antérieurement à un genre d'Hemipteres.

Howard Crawley (1903a) étudiant les Grégarines des Iules et *Prairulus* des Etats-Unis, rapporta les diverses espèces de Leidy au *Stenophora iuli*, tout en créant une nouvelle espèce pour un *Stenophora* d'un *Spirobolus*. Mais, dans un travail sur la faune de Corse (1903a) nous avons montré que les *Stenophora* étaient représentés par plusieurs espèces reconnaissables à la seule vue du céphalin. Notre façon de voir est adoptée par Crawley dans un second travail (1903b) et il restaure le *Stenophora iulipusilli* Leidy en soutenant que le classique *Stenophora iuli* n'existe pas en Amérique.

Les espèces américaines de *Stenophora* se trouvent ainsi bien séparées du *Stenophora iuli* (Frantzius) Schneider. Nous (1903b) en avons détaché également un certain nombre de *Stenophora* des Diplopodes de Corse ou de Provence."

Stenophora larvata has not been found since Leidy's discovery of the species and its validity must be questioned until his work is substantiated by rediscovery of this parasite.

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Stenophora polydesmivirginiensis (Leidy) Watson
Figs. 2, 3 and 4.

1853	<i>Gregarina polydesmi virginiensis</i>	Leidy	1853:238
1863	<i>Gregarina Polydesmi</i>	Lankester	1863:94
1899	<i>Amphoroides polydesmi</i>	Labbe	1899:20
1903	<i>Gregarina polydesmivirginiensis</i>	Crawley	1903a:45-46
1913	<i>Amphoroides polydesmivirginiensis</i>	Ellis	1913c:274
1915	<i>Stenophora polydesmivirginiensis</i>	Watson	

Stenophora: Sporonts solitary, elongate. Length 400-900¹ μ ; width of deutomerite through widest part 25-60¹ μ . Ratio--length prot:total length :: 1:15 to 1:17; width prot:width deut :: 1:1.5 to 1:2 in normally extended individuals. Protomerite subglobular to elongate, length twice the width. Slight constriction, if any, at septum. Protomerite as wide or wider than deutomerite at the septum. Deutomerite cylindrical, well rounded at posterior end. Endocyte translucent. Nucleus visible in vivo, ellipsoidal, one spherical karyosome.

Cyst and spores unknown.

Taken at Philadelphia and Wyncote, Pa. and Raleigh, N.C.

Host: *Fontaria virginiensis* (Drury) (*Polydesmus virginiensis*).

Habitat: Intestine.

This species was described first by Leidy (1853:238).

Leger (1892)132) described a species, *Amphorella polydesmi*, from the intestine of *Polydesmus complanatus* (L.). He created for the species a new genus, characterized by the presence of a short circular cup-like protomerite.

1. Crawley (1903:46) gives 400 μ as a maximum while Leidy gives 900 μ .

1908	Journal of the American Medical Association	Chicago, Ill.
1909	Journal of the American Medical Association	Chicago, Ill.
1910	Journal of the American Medical Association	Chicago, Ill.
1911	Journal of the American Medical Association	Chicago, Ill.

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Business Manager: J. C. Brantley, M.D., 535 North Dearborn Street, Chicago, Ill.
Editorial Board: J. C. Brantley, M.D., 535 North Dearborn Street, Chicago, Ill.

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Labbé (1899:20) united the *A. polydesmi* of Leger and *G. polydesmivirginiensis* of Leidy as one species and because *Amphorella* was invalid, called the genus *Amphoroides* and the species *Amphoroides polydesmi* (Léger).

But the protomerite of *G. polydesmivirginiensis* does not coincide in shape with that of the genus *Amphoroides*, for it is subglobose and bears no indication of a cup-like depression which is characteristic of the latter genus; therefore it must be placed elsewhere. The three following factors coincide with those of the genus *Stenophora*, viz: a) subglobose protomerite b) relative length of protomerite as compared with total length c) solitary sporonts. The spores and the epimerite still remain undiscovered and until they are found the generic determination is, of course, not absolute.

Crawley (1903a:45-6) called the species *G. polydesmivirginiensis* (Leidy), but in a later paper (1903b:640) he included it in a group of doubtful forms, all of which, however, he placed in the genus *Gregarina*.

Ellis (1913c:274) erroneously attributes to Crawley the assignment of the species name *Amphoroides polydesmivirginiensis*. It is Ellis, himself, (1913c:274) who names the species *Amphoroides polydesmivirginiensis* (Leidy). He offers no explanation therefor.

For reasons given above, the species is now removed

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from the genus *Amphoroides* and placed in the genus *Stenophora*, the name now standing *Stenophora polydesmivirginiensis* (Leidy).

This is a well defined species, having been found and drawn by Crawley in 1903 and taken from the host in which it was originally found. The writer has examined a half dozen specimens of this diplopod taken at Urbana, Illinois without finding an instance of infection.

Stenophora julipusilli (Leidy) Crawley
Fig. 6.

1853	<i>Gregarina juli pusilli</i>	Leidy	1853:238
1863	<i>Gregarina juli</i>	Lankester	1863:94
1899	<i>Gregarina julipusilli</i>	Labbe	1899:35
1903	<i>Stenophora juli</i>	Crawley	1903a:51
1904	<i>Stenophora iulipusilli</i>	Léger & Duboscq	1904:362

Stenophora: Sporonts solitary, elongate, rather stout.

Max. length 400 μ , max. width not given. Ratio--length prot:total length :: 1:9 in adults; ratio width prot:width deut :: 1:1.5.

Shape protomerite conical with a rather sharp apex, widest below median portion, papilla with an apparent pore at anterior end, deep constriction at septum. Slightly broader than high. Deutomerite irregularly cylindrical, four times as long as broad, sometimes widest through middle, sometimes posterior to middle.

E¹¹docyte very dense in adults. Granules of protomerite different from those of deutomerite. Nucleus spherical and large, attaining half the width of deutomerite. Contains a large karyosome.

Cyst and spores unknown.

The first part of the report deals with the general situation of the country and the progress of the work during the year. It is followed by a detailed account of the work done in each of the various departments.

Department of Agriculture
1911

1911	1910	1909	1908	1907
1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
1,000,000	1,000,000	1,000,000	1,000,000	1,000,000

The second part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The third part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The fourth part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The fifth part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The sixth part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The seventh part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The eighth part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The ninth part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments. The tenth part of the report deals with the work done in each of the various departments. It is followed by a detailed account of the work done in each of the various departments.

Taken at Philadelphia, Pa.

Hosts: ^UJulus and Parajulus.

Habitat: Intestine.

This parasite was found and described by Leidy as *Gregarina juli pusilli*. Both figures he gives appear to be those of immature specimens (See fig. 5). From Leidy's data alone, I should consider the species invalid.

Crawley (1903a:51) includes both *G. juli pusilli* and *G. juli marginati* with the classic *Stenophora juli* Frantzius under the name of the latter. That this determination was erroneous Crawley later discovered and (1903b:634-5) he separated the three species.

"This species is easily separated from *S. juli* by the size of the protomerite. In *S. juli* the length of the protomerite, according to the figures given by Schneider (1875) makes up only about 6% of the total length. In *S. julipusilli* this proportion increases to 10% in the adults and 15% in the young."

Crawley 1903b:635.

Stenophora julimarginati therefore stands as a separate, well-defined species; the species described as *Gregarina juli pusilli* Leidy was renamed by Crawley as *Stenophora julipusilli* (Leidy). Crawley's words concerning the confusion of names are as follows:

"There is a good deal of confusion regarding the gregarines occurring in the Diplopod family Julidae. These gregarines all bear a certain amount of resemblance to one another, and it has been usual to relegate them all to the species *Stenophora juli* Frantzius. - - -The Julidae of this region are infected with certainly two and possibly three species of *Stenophora*, while the classic *S. juli* apparently does not

The first part of the document is a letter from the Secretary of the State to the President of the Senate. It is dated October 10, 1910. The letter is addressed to the President of the Senate and is signed by the Secretary of the State.

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occur. Of these species, one is unquestionably the form described by Leidy (1853) as *Gregarina julipusilli*. As indicated by the specific name, Leidy considered its host to be *Julus pusillus* Say. According to Bollman (1887) this millipeds, correctly *Julus minutus* Brandt, does not occur in Pennsylvania, and it may be that Leidy was mistaken in his identification. This matter is not, however, of any great importance, and the specific name of the gregarine must stand. Leidy spelled the specific name of the host pusullus, whereas Say's memoir (1821) renders it pusillus, which spelling will be used for the name of the gregarine."

Leidy's original spelling of the host name (1853:238) pusillus, is the correct one and the last remark of Crawley is uncalled for. The correct name of the diplopod, according to Bollman (1893) is now *Nemasoma minutum* (Brandt).

Since Leidy's description and figures are so inadequate and even his determination of the host possibly in error, there was no valid reason for Crawley's having retained the specific name *julipusilli* when he redescribed the species (1903b:634-5).

Leger & Duboscq mention (1904) *S. iulipusilli* (Leidy) Crawley as a distinct species.

"notre façon de voir est adoptée par Crawley dans un second travail (1903b) et il restaure le *Stenophora iulipusilli* Crawley ---."

In the specific diagnosis above Leidy's description was excluded. It is as follows:

"*Gregarina Juli pusilli*. White, translucent, oval. Cephalic sac hexahedral, with the sides rounded or forming a double cone, base to base, with the upper apex subacute or truncated in younger individuals. Posterior sac robust, oval; granular contents, fine, translucent; interior corpuscle, globular, transparent; nucleus transparent, without nucleolus. Whole length from the 1;1500th in. to the 1.275th in. Breadth of largest the 1.500th in. Diameter of head of largest 1.1500th in. Hab. Int. *Julus pusillus*."

Stenophora juli (Frantzius) Schneider

Figs. 7 and 8.

1848	Sporadina Juli	Frantzius	1848:195
1851	Gregarina juli	Diesing	1851:15
1863	Gregarina juli	Lankester	1863:94
1875	Stenocephalus juli	Schneider	1875:584-5
1880	Gregarina paradoxa	Gabriel	1880:371.
1899	Stenophora juli	Labbe	1899:15
1903	Stenophora juli	Crawley	1903a:51
1904	Stenophora juli	Léger & Duboscq	1904:363-8

Stenophora: Sporonts solitary, elongate. Dimensions not given. Ratio--length prot:total length :: 1:20 (Approx.); width: prot :: width:deut :: 1:2. Prptomerite small, cylindrical at base, sharply conical above, little wider than high, a small papilla with an apparent pore at apex. Deutomerite elongate, slightly wider in anterior third than elsewhere, tapering gradually to an acute but blunt cone. Endocyte yellow to orange. Nucleus spherical, diameter half that of the deutomerite at its widest portion, containing one large karyosome.

Cysts dehisce by simple rupture. Spores fusiform with equatorial line.

Taken at Roscoff, France.

Hosts: *Julus sabulosus* (L.); *Julus fallax* Meinert (*Julus terrestris*) .

Habitat: Intestine.

Stenophora juli has been the source of more confusion and of greater discussion than any other gregarine parasitic in the diplopods. The too concise descriptions and the lack of any measurements of the animals by the earlier writers have led later

workers to place a number of different parasites in this same group and to regard them all as *Stenophora juli*.

Frantzius' beautiful drawings are accompanied by no description beyond the statement that the parasite was found in *Julus*.

Diesing called the parasite *Gregarina juli* Frantzius.

His description is as follows:

"Proboscis ? . Receptaculum capitellatum acutum brevissimum. Corpus longum fusiforme. Hab. *Julus terrestris*.--"

Lankester (1863:94) relegated to this species the following: *Gregarina juli pusilli* Leidy, *G. juli marginati* Leidy, and *G. larvata* Leidy, all of which belong elsewhere, the last two being synonymous.

Schneider (1875:584-5) described a species as *Stenocephalus juli* from the intestine of *Julus sabulosus* and what he regarded as *Julus terrestris*.¹ He considered his species as related if not synonymous with a species described by Leidy in 1853 as *Gregarina juli marginati*. His words are these:

"Cette espèce est commune et me paraît être identique à celle décrite par Leidy sous le nom de *Gregarina juli marginati*. Dans ce cas, elle serait probablement répandue chez les différentes espèces du genre *Julus*, puisqu'on la connaîtrait déjà chez trois d'entre elles. - - -. L'espèce est légèrement polymorphe; elle est tantôt très-allongée et relativement étroite, tantôt remarquablement massive; mais son protomerite demeure toujours identique à lui-même et suffit amplement au diagnostic."

Schneider overlooked the color factor in correlating the two species. Leidy described his *G. juli marginati* as "opaque,
1. Léger & Duboscq (1904:364) say that *J. fallax* Mein. (*J. albipes* C.Koch) is probably the *J. terrestris* of Schneider.

Faint, illegible text, likely bleed-through from the reverse side of the page. The text is mirrored and difficult to decipher.

white." Schneider's *Stenocaphalus juli* has the endocyte colored yellow or orange. Schneider gives no dimensions, but from the figure the proportions of his species agree perfectly with those of Leidy's species. The protomerites of the two species are slightly different in shape in the character of the papilla at the apex. The papilla in Leidy's species is large and flattened and the apparent pore is widest at the apex, narrowing as it approaches the endocyte; in Schneider's figure the papilla is smaller, more conical, either sharp or blunt at the end and slender in the middle, broadening at the base next the endocyte.

While the two species are obviously closely related, I am of the opinion that they are not identical. Crawley (1903b: 634) says "the classic *Stenophora juli* apparently does not occur" in the United States and to date, 1915, it has not been described from this country.

If Schneider had given a set of dimensions for his species that were identical with those of Leidy, the personal equation might have been considered to such an extent as to eliminate the color consideration and the variation in the two protomerites.

Leidy's *Gregarina juli marginati* is thus seen to be distinct from Schneider's *S. juli* and stands to day as *Stenophora larvata* (Leidy) Ellis.

In 1880, Gabriel (p. 371) mentioned a species which

he calls Gregarina paradoxa and says it is identical with G. juli (Frantz.) Schn. Neither description nor drawings accompany this statement and the reason for giving the species a new name, if it be S. juli, is not apparent.

Labbe (1899:15) unites under the name S. juli (Frantz.)

all of the following:

- 1848 Gregarina juli Frantzius
- 1875 Stenocephalus juli Schneider
- 1851 Gregarina larvata Leidy
- 1853 Gregarina juli marginati Leidy
- 1880 Gregarina paradoxa Gabriel

Why Labbe regards them all as synonymous, he does not state. They appear to be alike only in that they are all parasites of the same diplopod, Julus. With the exclusion of the last three the species stands as containing the original G. juli Frantz. and Stenocephalus juli Schn. The ratios obtained from figures given by Frantzius and Schneider are almost identical. Neither author gives any dimensions, so the animals may agree not at all in actual size. The character of the endoplasm, its granular content and color, may differ considerably.

Léger and Duboscq give a detailed account of the various species which have been confused in the literature. For the entire quotation, see under the heading Stenophora larvata (Leidy) Ellis.

From a lack of positive evidence to the contrary, the

1. The third and fourth are synonymous, being now S. larvata; the fifth is synonymou with S. juli.

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- 1970 - 1971
- 1971 - 1972
- 1972 - 1973
- 1973 - 1974
- 1974 - 1975

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two species Gregarina juli Frantz. and Stenocephalus juli Schön. stand as a single species, now called Stenophora juli (Frantz) Schneider.

Léger and Duboscq (1904:363-8) described a parasite as Stenophora juli and considered it synonymous with the S. juli above. The animal which they described differs greatly from the classic S. juli in shape of all its parts, in its proportions, the density of its endoplasm, and in the shape of its nucleus (!). I detailed consideration of these factors is taken up under Stenophora dauphinia.

Stenophora dauphinia Watson

Fig. 9.

1904 Stenophora juli Léger & Duboscq 1904:363-8
1915 Stenophora dauphinia Watson

Stenophora: Sporonts solitary, elongate. Total length 250-300 μ . Width 19 μ . Ratio--length prot:total length :: 1:10; width prot:width deut :: 1:0.9. Protomerite dilated in posterior two-thirds, separated from anterior part by a deep circular constriction. Apex broadly conical, papillate anterior end, with an apparent pore. Deutomerite cylindrical, attaining ten times the length of the protomerite. Width nearly the same throughout and ending in a blunt rounded posterior extremity. Endocyte not described. Nucleus ellipsoidal, 1.7 times as long as wide. Cysts spherical, 250 μ in diameter. Spores regularly ovoidal, episporer present. Equatorial line on spores.

1. The first part of the report deals with the general situation of the industry in 1957. It is pointed out that the industry has been in a state of depression since 1954 and that the situation is expected to continue for some time.

2. The second part of the report deals with the financial position of the industry. It is pointed out that the industry has a high level of indebtedness and that its financial position is weak.

3. The third part of the report deals with the production and sales of the industry. It is pointed out that production and sales have declined since 1954 and that the industry is expected to continue to produce and sell at a low level.

4. The fourth part of the report deals with the employment situation in the industry. It is pointed out that employment has declined since 1954 and that the industry is expected to continue to employ a small number of workers.

5. The fifth part of the report deals with the outlook for the industry. It is pointed out that the industry is expected to continue to be in a state of depression for some time and that the outlook is pessimistic.

STATISTISKE BUREAU
KØBENHAVN

1958
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6. The sixth part of the report deals with the foreign trade of the industry. It is pointed out that the industry has a high level of exports and that its foreign trade is expected to continue to be high.

7. The seventh part of the report deals with the research and development activities of the industry. It is pointed out that the industry has a high level of research and development activities and that these activities are expected to continue to be high.

8. The eighth part of the report deals with the labor relations in the industry. It is pointed out that the industry has a high level of labor relations and that these relations are expected to continue to be high.

9. The ninth part of the report deals with the social conditions in the industry. It is pointed out that the industry has a high level of social conditions and that these conditions are expected to continue to be high.

10. The tenth part of the report deals with the general conclusions of the report. It is pointed out that the industry is expected to continue to be in a state of depression for some time and that the outlook is pessimistic.

Taken at Turin, Italy and in Dauphine, France.

Hosts: *Julus mediterraneus* Latzel (*Schizophyllum mediterraneum* Latz.); *Julus boleti* C. Koch (*Julus londinensis* Mein.); *Julus fallax* Mein. (*Julus albipes* C. Koch.)

The authors described a parasite found in the same host as that upon which Schneider based his observations in his discovery of *Gregarina juli* (Frantzius). The species named by Schneider as the host of his parasites was *Julus terrestris* (Linnaeus) Porat but Léger and Duboscq observed that this species does not occur in France (1904:363).

"Nous décrivons d'abord *Stenophora iuli* (Frantzius) Schneider, qui nous a fourni de bons documents pour l'étude du développement des Sténophorides, et dont il importe de préciser la diagnose. Nous entendons par *Stenophora iuli* (Frantz.) Schn. le parasite de *Schizophyllum sabulosum* L. qui correspond à la description de Schneider. Cet auteur trouvait aussi *Stenophora iuli* dans *Iulus terrestris*, Mais *Iulus terrestris* L. n'est pas une détermination. Depuis un siècle, les anatomistes appellent de ce nom tous les Iules qui sont de couleur noire, et le véritable *Iulus terrestris* (Linné) Porat ne paraît pas exister en France. - - - Et en effet, nous voyons dans un certain nombre d'Iules une Gregarine bien voisine du parasite de *Schizophyllum sabulosum* L. Citons notamment parmi les hôtes de *Stenophora iuli*, *Schizophyllum mediterraneum* Latz. de la Tourraine, *Iulus londinensis* Mein. de la Tourraine, *Iulus albipes* C.K. du Dauphiné."

These authors base their observations on the parasites found chiefly in *Julus albipes*. In *Julus sabulosus* the gregarine attains a length of 450 μ ; in *J. fallax* Mein. and *J. boleti* C.K., of 300 μ . Besides the elongate form, they mention a globular form nearly as wide as long, and reaching 130 μ in length.

1. The first part of the document is a list of names and addresses. The names are: John Doe, Jane Smith, and Bob Johnson. The addresses are: 123 Main St, 456 Elm St, and 789 Oak St.

2. The second part of the document is a list of items and their quantities. The items are: Apples, Bananas, and Oranges. The quantities are: 10, 5, and 3 respectively.

3. The third part of the document is a list of dates and times. The dates are: 1/1/2023, 2/1/2023, and 3/1/2023. The times are: 10:00 AM, 2:00 PM, and 5:00 PM.

4. The fourth part of the document is a list of locations and their descriptions. The locations are: New York, Los Angeles, and Chicago. The descriptions are: Big Apple, City of Angels, and Windy City.

They do not illustrate this form. The elongate sporont, only, is figured. The authors do not describe the shape of the various parts and make no comparison of their form with the classic *S. juli*. basing their identification rather on a similarity of hosts than of parasites.

The data and figures given by Léger and Duboscq (1904) and by Schneider (1875) compare as follows:

	Schn.	L & D
Total length	----	450 max.
Total width	----	---
Ratio l prot:total l	1:20	1:10
Ratio W prot:w deut.	1:2	1:0.9
Shape prot.	Apex papillate, with pseudo-canal, lower part cylindr. upper part broadly conical, no constr. in protomerite	Apex papillate with pseudo-canal, lower part broader than upper and separated from above by a deep circular constriction. Deep constr. at septum.
Shape deutomerite	Irregularly cylindrical, tapering from anterior third to a sharp but rather broad cone. Twice as wide at shoulder as protom.	Regularly cylindrical, of approx. same width throughout, tapering slightly at post. tip. Slightly narrower than protomerite.
Nucleus	Spherical. One large karyosome.	Ellipsoidal (1:1.7) with one large karyosome.
Shading in figure:		
	Prot: Dark	Very light
	Deut: Dark	Dark

The proportions of the body-dimensions, the shape of the two protomerites and the shape of the two nuclei indicate at a glance that more than one species is under consideration and the species

The first part of the report is devoted to a general description of the project and its objectives. The second part contains a detailed account of the work done during the period covered by the report. The third part is a summary of the results obtained and a discussion of their significance. The fourth part contains the conclusions drawn from the work and the recommendations made for further research.

TABLE OF CONTENTS

Page	Chapter
1	Introduction
10	General description of the project
20	Objectives of the project
30	Methodology
40	Results
50	Conclusions
60	Recommendations

The first part of the report is devoted to a general description of the project and its objectives. The second part contains a detailed account of the work done during the period covered by the report. The third part is a summary of the results obtained and a discussion of their significance. The fourth part contains the conclusions drawn from the work and the recommendations made for further research.

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described by Léger and Duboscq should be renamed. I therefore designate it *Stenophora dauphinia*.

Stenophora spiroboli (Crawley) Ellis
Fig. 10.

1903	<i>Stenophora spiroboli</i>	Crawley	1903a:51
1903	<i>Cnemidospora spiroboli</i>	Crawley	1903b:638-9
1913	<i>Stenophora spiroboli</i>	Ellis	1913c:286

Stenophora: Sporonts solitary, elongate. Max. length 1000 μ ; width not given. Ratio--length prot: total length :: 1:32; width prot:width deut :: 1:1.5. Protomerite small, rounded at anterior end, one-third as high as wide. Septum concave upward, thus forming a protomerite in the shape of a double convex lens. No constriction at the septum; perfectly smooth contour throughout, from end to end. Deutomerite elongate cylindrical, broadest just below septum where it attains 1 $\frac{1}{2}$ times the maximum width of the protomerite. Slightly wider in anterior third than elsewhere, tapering slightly and terminating bluntly. Endocyte opaque in both protomerite and deutomerite. Nucleus undescribed, not visible in vivo.

Cysts spherical, 350-500 μ in diam. with thick epicyst. Dehiscence by rupture, spores fusiform 12 $\frac{1}{2}$ x 7 $\frac{1}{2}$ μ .

Taken at Raleigh, N.C.
Host: *Spirobolus* sp.
Habitat: Intestine (?).

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 The total amount of the account is \$10,000.00.
 The account is currently in good standing.
 All payments are due on or before the 15th of each month.
 If you have any questions, please contact our office.
 Thank you for your business.

Sincerely,
 John Doe
 123 Main Street
 City, State 12345
 Phone: (555) 123-4567
 Email: john.doe@example.com

Crawley first described this species as *Stenophora spiroboli* transferring it later to the genus *Cnemidospora* when the cyst and spores had been examined, probably because of the character of the spore-integument. The genus *Cnemidospora* Schn. (1882:446-7) is diagnosed thus:

Protomerite subglobular, divided into two parts, the upper greenish gray, the lower yellow to brown; deutomerite elongate, cylindrical, spores ellipsoidal (nearly spherical) with a thick integument. No sporeducts in cyst.

The species in question does not coincide with the characters of the genus *Cnemidospora*. Neither the coloration of the protomerite nor the shape of the spores fits the generic description.

Ellis has replaced the species in the originally assigned genus, where it undoubtedly belongs because of the form and coloration of the sporonts, the character of the cyst-dehiscence and the shape of the spores.

Stenophora fontaria (Crawley) Watson
Figs. 11 and 12.

1903	^{III} <i>Amphoroides fontariae</i>	Crawley	1903a:53
1913	^{III} <i>Amphoroides fontariae</i>	Ellis	1913c:274
1915	^M <i>Stenophora fontaria</i>	Watson	

Stenophora: Sporonts solitary, ovoidal. Max. length 135 , width not given. Ratio--length prot:total length :: 1;4 to 1:5.5 ; width prot:width deut :: 1:1.5 to 1:2. Protomerite subglobose, widest in posterior two-thirds, tapering to a blunt cone. Deep constriction at septum. Deutomerite elongate ovoidal, terminating bluntly. Endocyte nearly transparent in protomerite,

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very opaque in deutomerite. Nucleus not always visible in vivo, small, spherical, with one karyosome.

Cysts and spores unknown.

Taken at Wyncote, Pa., Raleigh, N.C., and at East Falls Church, Va.

Hosts: *Polydesmus* sp. and *Fontaria*, sp.

Habitat: Intestine.

Léger (1892) created the genus *Amphorella*, afterwards renamed *Amphoroïdes* by Labbé (1899:20) to include species with solitary ovoidal sporonts having a protomerite short, compressed and crateriform, and spores rhombus-shaped (seen in one plane) and biconical, with but one integument.

Léger and Duboscq (1904:375) compared one of their new species with the species in question. Their remarks are:

"*Stenophora chordeume* nous paraît, par sa forme, une espèce très voisine de la *Gregarine* des *Polydesmus* et *Fontaria* des Etats-Unis, signalée par Crawley (1903a) sous le nom d'*Amphoroïdes fontariae*. Les figures qu'en donne cet auteur dans sa Pl. I fig. 12, 13, 14 nous portent à croire, d'après les caractères de l'épimérite, qu'il s'agit plutôt d'un *Stenophora* que d'un *Amphoroïdes*. Il est d'ailleurs impossible de se prononcer avec certitude sur ce point, car Crawley ne nous fait pas connaître les sporocystes de sa *Gregarine*, et on sait que, outre la forme de l'épimérite, celle des sporocystes distingue nettement les *Amphoroïdes* des *Stenophora*; dans *Amphoroïdes*, ils sont biconiques; chez *Stenophora*, ils sont ovoïdes."

Thus the basis for the original inclusion of the species in the genus *Amphoroïdes* is not that of spore-characteristics and until the spores are known the generic position of the species

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Section 2 (1900) - The second part of the document, containing several lines of text.

Section 3 (1900) - The third part of the document, containing several lines of text.

will not be absolute. The shape of the protomerite of the species under question is, however, very unlike that of the type species of this genus, *A. polydesmi* Léger, and hence the species cannot consistently be left in this genus. Its logical position seems to be with the *Stenophoridae* because of elimination from any other genus rather than from any positive character, and I should designate it *Stenophora fontaria* (Crawley).

Stenophora brölemanni Léger & Duboscq
Fig. 13.

1903 *Stenophora Brölemanni* Léger & Duboscq 1903b:339-40

Stenophora: This gregarine is small, from 40-54 ^μ long and is compressed laterally, especially in the anterior part. It lives within the cell of the host during the greater part of its life-cycle. The older intracellular individuals are subspherical and occupy a cavity larger than that occupied by the younger ones, which is formed by the greater destruction and compression of surrounding cells. The protomerite is invaginated into the anterior end of the deutomerite like a cork into the neck of a bottle. When the animal leaves the epithelium the protomerite still retains its invaginated position. The protomerite in profile is cylindrical, rather flattened at the top, and when seen from the front it is as broad as high, widest anterior to the middle and possesses at the summit a small plate slightly concave upward and bearing in the center a small spher-

ical papilla. Léger and Duboscq say this papilla may correspond to a protractile epimerite, for fibrillae seem to radiate from the apex outward over the anterior third of the protomerite. The deutomerite seen in profile is much larger at its posterior end than elsewhere, i.e. the animal is compressed chiefly in the anterior half. A front view shows a deutomerite as broad as it is high. The nucleus is large, spherical or slightly ovoidal and contains one large karyosome. The parasite is characterised then by its compression, the invagination of its protomerite and by its inter- or intra- cellular location (the authors are not sure which).

Taken in Provence, France, and on the island of Corsica.

Hosts: *Blaniulus hirsutus* Brol., *Brachyiulus superus* Latzel, *Brachyiulus pusillus lusitanus* Verh.

Habitat: Intestine.

Stenophora nematoides Léger & Duboscq
Figs. 14 and 15.

1903 *Stenophora nematoides* Léger & Duboscq 1903b:335-7

Stenophora: Sporonts solitary, elongate. Average length 170μ , max. length 300μ . Width not given. Ratio--length prot:total length :: 1:10; width prot:width deut :: 1:3. Protomerite cylindrical, slightly dilated a little anterior to septum. Twice as long as wide, dome-shaped at apex; constriction at septum. Deutomerite normally with constriction at end of anterior third, or half, above this point considerably dilated,

The first part of the document is a letter from the Secretary of the State Department to the Secretary of the War Department. The letter is dated August 1, 1918, and is addressed to the Secretary of the War Department, Washington, D. C. The letter is signed by the Secretary of the State Department, Robert Lansing.

The second part of the document is a letter from the Secretary of the War Department to the Secretary of the State Department. The letter is dated August 1, 1918, and is addressed to the Secretary of the State Department, Washington, D. C. The letter is signed by the Secretary of the War Department, Woodrow Wilson.

The third part of the document is a letter from the Secretary of the State Department to the Secretary of the War Department. The letter is dated August 1, 1918, and is addressed to the Secretary of the War Department, Washington, D. C. The letter is signed by the Secretary of the State Department, Robert Lansing.

especially in posterior portion. Posterior half or two-thirds of deutomerite, i.e. part below constriction, cylindrical, ending in a broadly rounded or somewhat truncate extremity. The largest sporonts without the peculiar dilated portion of the deutomerite; nematoid in shape, long, slender, cylindrical often slightly curved and with a body as much as seventeen times as long as the protomerite ($170\mu : 10\mu$), and not more than 7μ wide throughout. Endocyte granules fine, homogeneous except in anterior end of protomerite where deeply staining chromatic granules are accumulated. Nucleus large and ovoidal, the long axis parallel to the long axis of the body. One large karyosome. Epimerite a large subglobular hyaline body. Cyst and spores not known. Taken at Bastia, Corsica. Host: *Strongylosoma italicum* Latzel. Habitat: Intestine.

The authors' conclusion concerning this species is as follows:

"Bien que nous ne ^{ss}consaions pas l'évolution complète de cette Grégarine, nous avons la conviction qu'il s'agit d'une espèce voisine du *Stenophora iuli*, car à part la forme générale nématôide qui est ici très caractéristique de l'espèce, toutes les autres particularités structurales (forme du protomérite, caractère du noyau, présence de grains chromatôides accumulés surtout dans le protomérite, etc.) se retrouvent aussi chez les autres espèces du genre *Stenophora*, lequel d'ailleurs est spécial aux Diplopodes."

Stenophora varians Leger & Duboscq
Figs. 16 and 17.

1903 *Stenophora varians* Leger & Duboscq 1903b:337-9

Stenophora: Sporonts solitary, dimorphic, elongate and globular. The elongate forms cylindrical or slightly compressed, slightly attenuate at both extremities, attaining a maximum length of 250μ . Width not stated. Ratio--length prot: total length :: 1:6 to 1:7; ratio width prot:width deut :: 1:1. Protomerite cylindro-conical, $1\frac{1}{2}$ times as long as wide, its summit depressed, with an apparent pore. Constriction at septum. Deutomerite just below septum a little narrower than protomerite a short distance above. Deutomerite irregularly cylindrical, slightly curved in adults, truncate or broadly rounded behind. Nucleus spherical with a large karyosome. Endocyte or protomerite consisting of large deeply staining bodies, of deutomerite large non-staining bodies with a few scattered chromatic bodies.

The globular sporonts more rare than the elongate ones but coexisting with the latter. Max. length $35-40\mu$. Deutomerite large, globular, protomerite cylindro-conical and shorter than in the elongate forms. A small papilla at anterior end. Protomerite shows same staining reaction and the nucleus is relatively larger, with a much larger karyosome.

Taken at Ajaccio, Corsica.

Host: *Schizophyllum corsicum* Brol.

Habitat: Intestine.

1957

Department of Chemistry

Chicago, Illinois

Dear Sir:

I have your letter of the 15th and am glad to hear that you are interested in the work of the Department of Chemistry at the University of Chicago.

The Department of Chemistry at the University of Chicago is one of the largest and most active in the United States. It is a department of the highest international reputation and is engaged in a wide variety of research in all branches of chemistry.

The Department is organized into several divisions, each headed by a professor. These divisions are: Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Analytical Chemistry, and Applied Chemistry.

The Department also has a number of research centers and laboratories. These include the Center for Advanced Study, the Center for Environmental and Estuarine Science, and the Center for Environmental and Estuarine Science.

If you are interested in the work of the Department, I would be glad to discuss it with you. You may write to me at the address given below or call me at the telephone number given below.

Sincerely,
[Name]

Director, Department of Chemistry

University of Chicago

Chicago, Illinois

Enclosed are two copies of the Department of Chemistry brochure.

Very truly yours,
[Name]

Director, Department of Chemistry

University of Chicago

Chicago, Illinois

Enclosed are two copies of the Department of Chemistry brochure.

Very truly yours,
[Name]

Director, Department of Chemistry

University of Chicago

Chicago, Illinois

Enclosed are two copies of the Department of Chemistry brochure.

Very truly yours,
[Name]

Relative to the dimorphism, the authors make these

remarks:

"Au sujet de interprétation de ces deux formes de Stenophora dans un même hôte, on peut émettre plusieurs hypothèses: Ou bien la forme globuleuse, en raison de sa petite taille représente un stade très jeune de la Gregarine; ou elle représente une espèce distincte de la Forme allongée; ou bien enfin il s'agit d'un dimorphisme sexual dans des individus d'une seule et même espèce. Nous nous rattachons d'autant plus volontiers à cette dernière hypothèse que l'on observe assez souvent de jeunes formes allongées de volume bien inférieur à celui des formes globuleuses."

The great difference in maximum lengths recorded of the elongate (250 μ) and the globular (40 μ) forms of this species, would hardly indicate that the latter is mature. The immature specimens of most species of gregarines are more or less globular, stain deeper, have a protomerite which changes but little in shape as maturity approaches, and possess nuclei much larger in proportion than the adults, and often of a different shape from that of the adults. I have often seen these globular individuals as large or a little larger than other individuals which had already assumed their adult form, and have attributed the difference to a difference merely in the amount of nourishment they have received. I think if we are to assume that there is a sexual dimorphism, we must look for two individuals of somewhere nearly the same size rather than one six times the size of the other.

While sexual dimorphism is a factor to be looked for among gregarines, it has never been definitely proven for a single species. There may be a difference in sexes among the sporonts,

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Main body of the document containing several paragraphs of text, which is extremely faint and difficult to read.

but if so, this difference seems to be of a chemical nature or of so slight morphological significance as to have been generally overlooked; and it should be evident among all or most of the members of the same family rather than confined to a few species only.

Stenophora producta Léger and Duboscq
Fig. 18.

1903 *Stenophora juli* Léger & Duboscq 1903b:315
1904 *Stenophora producta* Léger & Duboscq 1904:375-7

Stenophora: Sporonts solitary, very elongate. Sporonts 1000 μ long, width not given. Ratio--length prot:total length :: 1:20; ratio width prot:width deut :: 1:21. Protomerite globular, slightly flattened top and bottom, sometimes slightly invaginated at the deutomerite. At apex a small papilla with an apparent pore. Deutomerite very long, cylindrical, broadly rounded behind. Endocyte of protomerite finely granular, staining deeper than the deutomerite. The nucleus ellipsoidal, with one large karyosome. An inverted xiphoid cone rounded at the summit, projecting from the septum downward into the deutomerite and consisting of homogeneous protoplasm staining deeper than that of the deutomerite. Probably consisting of a nutrient substance manufactured by the protomerite and filtered through the septum, to be eventually diffused throughout the deutomerite. Epimerite a small simple knob.

Cysts spherical, size not given. Spores ovoidal, 5 μ long.

Taken at Corte, Corsica.

Host: *Julus varius* Fabricus (*Parajulus varius* Fab.).

Habitat: Intestine.

The reason for the confusion of names mentioned above appears in the following quotation from Léger and Duboscq (1904: 375).

"Nous avons déjà signalé la présence de cette Grégarine dans l'intestin de *Pachyiulus varius* Fab. de la Corse (1903) et nous l'avons tout d'abord confondue avec *Stenophora iuli*, ne l'ayant observée à cette époque que sur le vivant. Depuis, une étude plus approfondie sur des préparations colorées nous a convaincu qu'il s'agit d'une espèce morphologiquement différente de *Stenophora iuli* (Frantzius) Schneider et nous la distinguerons de cette dernière sous le nom de *Stenophora producta* n. sp. - - -
Nous n'avons pas remarqué de ligne équatoriale à la surface des sporocystes de *Stenophora producta*, ce qui distingue encore cette espèce de *Stenophora iuli*."

Stenophora aculeata Léger & Duboscq
Figs. 19 and 20.

1904 *Stenophora aculeata* Léger & Duboscq 1904:368-70

Stenophora: Sporonts solitary, elongate. Max. length 60 μ ; width not given. Ratio--length prot:total length :: 1:4 (approx.); width prot:width deut :: 1:1.5. Protomerite subglobular, a short cylindrical portion at base, somewhat dilated in middle, terminating in a small delicate elongate papilla 1 to 2 long. A conspicuous constriction at septum. Deutomerite cylindrical, broadly rounded behind. The endocyte of the deutomerite with protoplasmic granules smaller than those of the protomerite and less deeply staining. Nucleus very large, subspherical, in diameter two-thirds to seven-eighths the width of the deutomerite,

Text: John Smith (1950-1980)

Text: 1950-1980

The name of the person is John Smith. He was born in 1950 and died in 1980.

(10)

John Smith was born on 10/10/1950 in London, England. He was a member of the British Royal Air Force and served in the Middle East during the 1970s. He was married to Jane Smith and had two children, Peter and Susan. He died on 10/10/1980 in London, England.

John Smith (1950-1980)

1950-1980

John Smith (1950-1980)

John Smith (1950-1980)

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John Smith (1950-1980)

John Smith (1950-1980)

John Smith (1950-1980)

John Smith (1950-1980)

John Smith (1950-1980)

with a large karyosome.

Cyst and spores not known.

Taken in Dauphine, France.

Host: *Craspedosoma rawlinsii* simile Verh.

Habitat: Intestine.

Stenophora polyxeni Léger & Duboscq

1900 <i>Stenophora polyxeni</i>	Léger & Duboscq 1900:1566-8
1903 <i>Stenophora polyxeni</i>	Léger & Duboscq 1903a:xciii
1904 <i>Stenophora polyxeni</i>	Léger & Duboscq 1904:370-1

Stenophora: Sporonts solitary, obese. Average length 80 μ . Width not given. Ratio--length prot:total length :: 1:10; width prot: width deut :: 1:2 (approx.). Protomerite very small, hemispherical or somewhat flattened. No apparent pore in anterior end, as in many *Stenophoridae*. Protomerite twice as wide as high. Widest at or just above base. Slight constriction at septum. Deutomerite elongate ovoidal in young and sac-shaped in older sporonts. Endocyte fairly homogeneous. Nucleus spherical, half the width of deutomerite, with a large karyosome.

Cyst and spores not known.

Taken at Grenoble, France.

Host: *Polyxenus lagurus* (Linn.) Latreille.

Habitat: Intestine.

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Interact: Interact.

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1905 Stenographic	1905 Stenographic
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Interact: Interact.

Stenophora silene Léger & Duboscq
Figs. 22 and 23.

1904 *Stenophora silene* Léger & Duboscq 1904:371-2

Stenophora: Sporonts solitary, dimorphic, an elongate and a globular form. The elongate form 100 in max. length, width not given. Ratio--length prot:total length :: 1:10; width prot:width deut :: 1:1. Protomerite cylindrical, slightly dilated top and bottom, nearly flattened at top, an apparent pore at apex. Constriction at septum. Deutomerite cylindrical, gradually tapering toward posterior end, this end truncate. Endocyte of protomerite with large achromatic bodies, of deutomerite very finely granular and deeply-staining. Nucleus large, half the maximum width of deutomerite, ovoidal, its longitudinal axis parallel to that of the body, containing one large karyosome.

The globose form 55-60 in max. length. Width not given. Ratio--length prot)total length :: 1:6; width prot:width deut :: 1:2.3. Protomerite similar to that of elongate form, but containing finely granular endoplasm as deeply staining as that of deutomerite. Deutomerite broadly ovoidal, widest below center. Nucleus less ellipsoidal than in elongate form.

Cyst and spores not known.

Taken in Dauphine, France.

Host: *Lysiopetalum foetisissimum* Savi.

Habitat: Intestine.

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"Howard Crawley (1903a) a signalé dans *Lysiopetalum lactarium* des Etas-Unis deux espèces de Grégarines: l'une qu'il nomme *Grégarina Calverti* dont la forme générale et la taille sont si différentes de celles de la précédente que l'on ne peut établir de confusion; l'autre espèce est rapportée au *Stenophora iuli*. Il est possible que celle-ci soit identique à notre *Stenophora silene*, mais on ne peut l'affirmer, car Crawley ne donne pas de dimensions de son *Stenophora*." (Léger & Duboscq 1904:372).

Stenophora silene is not the species described by Crawley (1903a:51; 1903b:634-5) as *Stenophora juli*. Crawley's species attains a length of 400 μ , *S. silene* of only 100 μ . The protomerite of *S. juli* is broadly conical, 1.4 times as wide as high; of *S. silene* cylindrical, flattened at the apical end. Crawley's *Grégarina Calverti* is still another species, now called *Amphoroides calverti*.

Whether or not there is an actual dimorphism in the *Stenophoridae* is a problem still far from settled. The finding of elongate and globose forms in the same species and the difference in staining reactions can, I think, hardly be considered sexual dimorphism unless the two sporonts are of somewhere nearly the same size. In *S. silene*, the difference in length of the two is 100%. The difference in lengths of the elongate and globular sporonts is not to be accounted for by a mere shortening of the body, for the staining reaction and shape of the nucleus differs as well. The nucleus of the globular form is less ellipsoidal than that of the elongate form. In all *Stenophoridae* I have observed, the young trophozoites and younger sporonts have not

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yet attained that elongation of the nucleus which is characteristic of the adults, and a gradual transition can be observed in the same series of sections from a spherical to sub-spherical and finally to the elongate ellipsoidal nucleus of the adult sporonts. In all the gregarined I have studied, the young globular trophozoites contain less protoplasm and stain more readily and deeper than the adults.

If globular and elongate specimens of approximately the same length can be procured or, at least, with protomerites of the same approximate size, and a young cyst shown to contain two individuals with different staining reactions and differently shaped nuclei, then there will be sufficient data to make a positive statement that there is sexual dimorphism among the Stenophoridae. This has not yet been reported and there is too great a discrepancy in size of the elongate and globose forms to warrant calling them sexually unlike and the phenomenon sexual dimorphism.

Stenophora chordeume Léger & Duboscq
Figs. 24 and 25.

1904 *Stenophora chordeume* Léger & Duboscq 1904:372-5

Stenophora: Two forms described for the sporonts.

The elongate form 140 μ long, width not given. Ratio--length prot: total length :: 1:7.5; width prot:width deut :: 1:2. Protomerite nearly twice as wide as high, widest along central portion, flattened above, with papilla and an apparent pore at apex. A

conspicuous constriction at septum. Deutomerite an elongated irregularly-shaped sac widest below the middle and tapering rapidly to a point. Endocyte of protomerite clear, containing large non-staining granules. Endocyte of deutomerite homogeneous with a few scattered irregularly shaped chromatic granules. The nucleus spherical with a large karyosome.

The globular form with maximum length of 100 μ . Width not given. Ratio--length prot:total length :: 1:5; width prot:width deut :: 1:2.5. Protomerite same shape as in elongate form except that the constriction at the septum is deeper and the protomerite sometimes partially invaginated into anterior end of deutomerite. Deutomerite ellipsoidal and nearly spherical. Endocyte of protomerite deeply staining, like that of deutomerite. Deutomerite with long scattered chromatic filaments. Nucleus spherical, with a large karyosome and numerous irregular chromatic granules. Cyst and spores not known.

Taken at Grenoble, France.

Host: *Chordeuma silvestre* C. Koch (*C. silvestre* C.K.).

Habitat: Intestine.

Concerning the long chromatic filaments in the deutomerite, the authors say (1904:374):

"Sur la signification de ces singulières formations, on ne peut qu'émettre des hypothèses: ou bien ce sont des productions parasitaires, ce qui nous paraît peu probable, car toutes les formes globuleuses en montrent à l'ex-

The first part of the paper discusses the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics and the laws of electrodynamics. The second part of the paper discusses the application of these principles to the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics and the laws of electrodynamics.

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The seventh part of the paper discusses the application of these principles to the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics and the laws of electrodynamics. The eighth part of the paper discusses the application of these principles to the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics and the laws of electrodynamics.

clusion des formes allongées, ou bien ce sont des produits dérivés de l'activité cellulaire. Tout en nous rattachant plus volontiers à cette manière de voir, nous ne saurions dire si ces produits prennent naissance dans le cytoplasme comme substances de réserve ou de déchet comparables aux cristalloïdes déjà signalés chez certaines Grégarines, ou bien s'ils dérivent de la chromatine nucléaire. Dans tout les cas, nous ne croyons pas devoir les considérer comme des éléments chromatiques ou chromatides, destinés à jouer un rôle important dans les phénomènes sexuels et nous les regardons plutôt comme des produits ergastoplasmiques."

As heretofore, the size of the two dimorphants is considerable (50%). The deutomerite of the smaller contains many long chromatic filaments. At the same time, the deutomerite of the elongate form is not devoid of scattered chromatin, which may be the broken remnants of threads in a younger stage. Only two diplopods were parasitised, one

"renfermait beaucoup de parasites, l'autre, au contraire, très peu."

It is possible, from the limited material at hand, that still longer and more mature elongate forms may exist and bring up the percentage still higher.

"Stenophora chordeume nous paraît, par sa forme, une espèce très voisine de la Grégarine des P^olydesmus et Fontaria des Etats-Unis, signalée par Crawley (1903a) sous le nom d'Amphoroïdes fontariae. Les figures qu'en donne cet auteur dans sa Pl. I fig. 12, 13, 14 nous portent à croire, d'après les caractères de l'épimérite, qu'il s'agit plutôt d'un Stenophora que d'un Amphoroïdes. Il est d'ailleurs impossible de se prononcer avec certitude sur ce point, car Crawley ne nous fait pas connaître les sporocystes de sa Grégarine, et on sait que, outre la forme de l'épimérite, celle des sporocystes distingue nettement les Amphoroïdes des Stenophora; dans Amphoroïdes ils sont biconiques; chez Stenophora, ils sont vœoides."

From the data given, then, it is impossible to state with certitude that the species are or are not the same. Dimensions correspond closely. I have not included Crawley's species here because of differences in shape of the sporonts but have left it as a distinct species and placed it among the Stenophoridae, the name now being *Stenophora fontaria* (Crawley).

Stenophora corsica Léger & Duboscq

1903 *Stenophora corsica* Léger & Duboscq 1903b:314

No description or figure is given for this species.

It is merely mentioned as a parasite found in *Craspedosoma légeri* Brol. at Vizzanova, on the island of Corsica.

Stenophora robusta Ellis

Fig. 26.

1912 *Stenophora robusta* Ellis 1912b:8-10

Stenophora: Sporonts solitary, relatively short and thick. Average length 153 μ ; minimum 140 μ ; maximum 180 μ . Width 67 μ , average. Ratio--length prot:total length :: 1:8; width prot:width deut :: 1:2.5. Protomerite small, dome-shaped or conical. Slight concavity in apical portion, widest at junction with deutomerite. No constriction at septum. Deutomerite broadly ellipsoidal, widest in center, slightly rounded behind. Endocyte fairly clear in all parts but especially so in protomerite. Nucleus spherical, faintly visible or obscured in vivo. One or more karyosomes.

Cyst and spores not known.

Taken at Boulder, Colo.

Hosts: *Parajulus venustus* Wood; *Orthomorpha gracilis* (Koch);

Orthomorpha sp.

Habitat: Intestine.

Stenophora cockerellae Ellis

Fig. 27.

1912 *Stenophora cockerellae*

Ellis 1912a:681-5

Stenophora: Sporonts solitary, elongate. Average length 500-800 μ . Minimum length 186 μ , maximum 850 μ . Width deutomerite not given. Ratio--length prot:total length :: 1:14.5 to 1:17 in adults; width prot:width deut :: 1:2. Protomerite more or less globose, widest in posterior half. Slightly constricted at septum. Peculiar in that the protomerite protrudes and retracts a short rounded papilla. Deutomerite widest in anterior sixth. Posterior end broadly rounded to square. Endocyte of protomerite pale gray, rather opaque, nearly filling the protomerite. Endocyte of deutomerite dense, lead gray to almost black. Nucleus spherical, diameter two-thirds the width of the deutomerite. Not visible in vivo.

Cyst and spores unknown.

Taken at Quirigua, Guatemala.

Host: *Parajulus* sp.

Habitat: Intestine.

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Board of Directors: [illegible]

Philadelphia, Pa.

Date: [illegible]

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Stenophora elongata Ellis

Fig. 28.

1912 *Stenophora elongata*

Ellis 1912a:685-6

Stenophora: Sporonts solitary, very elongate. Length 200-300 average. Minimum length 21 , maximum 390 . Width of deutomerite not given. Length of prot:total length :: 1:18 to 1:26; width prot:width deut :: 1:1.6. Protomerite more or less pentagonal (seen from the side), truncate, wider than long. Constriction at septum distinct. Deutomerite widest in anterior third, posterior end rounded. Endocyte of protomerite dense, opaque, dark gray; of deutomerite gray, very dense. Nucleus not visible in vivo, spherical, one-half to seven-eighths the width of the deutomerite.

Cyst and spores not known.

Taken at Quirigua, Guatemala.

Host: *Orthomorpha coarctata* (Saussure).

Habitat: Intestine.

Stenophora impressa n.s.

Fig. 53.

This parasite was found to be very common in the intestine of *Parajulus impressus* (Say), one of the common small diplopods found at Urbana, Illinois.

The sporonts are isolated, none being associative. They are elongate-ellipsoidal in shape, widest through the central

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Advisor: [Name]

Committee: [List of names]

Abstract: [Abstract text]

Keywords: [Keywords]

Summary: [Summary text]

Table of Contents

Chapter 1: Introduction

Chapter 2: [Chapter Title]

Chapter 3: [Chapter Title]

Appendix A

Appendix B

References

Index

Biography

Statement of Acknowledgments

Statement of Originality

portion of the deutomerite or at the beginning of the posterior two-thirds. The protomerite is conical, dilated just above the base and tapering rather acutely but with a blunt point at the apex. The widest part is some little distance anterior to the septum, the constriction at the septum being conspicuous but not deep. The length of the protomerite is about one-tenth of the total length of the sporont. The deutomerite broadens gradually from the septum to the central region and then as gradually becomes narrower, ending in a very blunt rounded extremity of much the same general shape as the anterior end of the protomerite. At its widest part the deutomerite is about twice the greatest width of the protomerite.

The endocyte is gray with no trace of tan. The protomerite contains a few large granules of more or less transparent protoplasm and the deutomerite content is finely granular, homogeneous, and often so dense as to appear black in transmitted light. The epicyte is thin, transparent, of even width throughout, and is longitudinally striated. At the anterior end of the protomerite there is an invagination of the epicyte. The latter is here very thin and readily breaks, with a consequent extrusion of the endocyte. The nucleus is spherical, generally visible in the adults and contains one large karyosome which is visible without staining.

The trophozoite of *Stenophora impressa* was studied in

The first part of the book is devoted to a general introduction to the subject of the history of the English language. The author discusses the various influences that have shaped the language over time, including the contributions of Old English, Middle English, and Modern English. He also touches upon the role of dialects and the impact of foreign languages, particularly French and Latin, on the development of the English lexicon and grammar.

The second part of the book is a detailed study of the English language in its various stages. The author examines the phonetic, morphological, and syntactic changes that have taken place from Old English to the present day. He also discusses the evolution of the English vocabulary and the influence of new words and phrases on the language. The book concludes with a chapter on the future of the English language, where the author discusses the challenges and opportunities that lie ahead.

The author's approach is both scholarly and accessible, making this book a valuable resource for students and scholars alike. The book is well-organized and easy to read, with a clear and concise style that makes it a pleasure to read.

sections made of the intestine of the parasitised Parajuli. The young parasites lie embedded between the cells of the intestinal epithelium, having made a place for themselves by the destruction of the cell originally entered, and by the absorption and destruction and pushing aside of contiguous cells; and they lie with the apex of the protomerite next the mesothelial wall. As is often the case with the Stenophoridae, there is never developed an epimerite. Since the whole parasite lies embedded, there is abundant surface through which osmosis may take place without the additional presence of an epimerite. The protomerite of trophozoites is often deeply embedded in the deutomerite, like a cork in the neck of a bottle.

Two types of movement were observed. A rapid gliding over the surface at the rate of .006 mm. per sec. was very common. This form of movement persists for an hour or more after the animals are placed on the slide. Partial rotation of the body on its own axis and a bending of the body to an angle of about 45° were frequent. The epicyte in the region just below the septum is very flexible, resulting in a nodding of the protomerite from side to side. The extension of the upper part of the deutomerite which causes the protomerite to drop is effected slowly, but withdrawal of protoplasm is done by a sudden jerking movement which restores the normal shape.

Cysts of .16 mm. diameter were found, but none could be induced to develop to completion in a water medium.

The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the origin of life is a problem of the first importance, and that it is one of the most interesting and important problems of the present day. The author discusses the various theories of the origin of life, and shows that the most plausible is the theory of spontaneous generation. He then discusses the evidence in favor of this theory, and shows that it is supported by the facts of the case. The second part of the paper is devoted to a discussion of the evidence in favor of the theory of spontaneous generation. It is shown that the evidence is of the highest quality, and that it is of the most convincing nature. The author discusses the various experiments which have been conducted, and shows that they all support the theory of spontaneous generation. He then discusses the various objections which have been raised, and shows that they are all unavailing. The third part of the paper is devoted to a discussion of the evidence in favor of the theory of spontaneous generation. It is shown that the evidence is of the highest quality, and that it is of the most convincing nature. The author discusses the various experiments which have been conducted, and shows that they all support the theory of spontaneous generation. He then discusses the various objections which have been raised, and shows that they are all unavailing.

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This species differs from *Stenophora lactaria* n.sp.

in a) general shape of the deutomerite b) shape of the posterior end of the body and c) shape of the nucleus.

A table showing data relative to the various dimensions follows:

Total length of body						
in mm.	.155	.27	.24	.27	.39	.345
Length of protomerite	.02	.03	.025	.025	.035	.03
Length of deutomerite	.135	.24	.215	.245	.355	.315
Width of protomerite	.03	.035	.035	.03	.048	.048
Width of deutomerite	.07	.07	.07	.07	.115	.10
Ratio <u>length prot</u>	1:7.5	1:9	1:10	1:10	1:10	1:11
<u>total length</u>						
Ratio <u>width prot</u>	1:2.3	1:2	1:2	1:2.3	1:2.4	1:2.1
<u>width deut</u>						

Stenophora lactaria n.sp.

Fig. 55.

A gregarine which was found with relative frequency is this one from the intestinal tract of the small diplopod *Callipus lactarius* (Say), taken at Urbana, Illinois, during the month of October, 1914. The infection per host was heavy and sections of the alimentary tract showed the latter half of the same to be heavily parasitised with trophozoites.

A table of various dimensions of the parasites at different ages follows. There is considerable discrepancy in the ratios given but the fact that there is a gradual transition from one extreme to the other indicates that a single species is involved. Measurements were made only of individuals which to all appearances were equally expanded.

follows:

Total length of fish		Length of head		Length of body		Length of tail	
100	100	100	100	100	100	100	100
200	200	200	200	200	200	200	200
300	300	300	300	300	300	300	300
400	400	400	400	400	400	400	400
500	500	500	500	500	500	500	500
600	600	600	600	600	600	600	600
700	700	700	700	700	700	700	700
800	800	800	800	800	800	800	800
900	900	900	900	900	900	900	900
1000	1000	1000	1000	1000	1000	1000	1000

Statistical Analysis

A statistical analysis was conducted on the data presented in the table above. The results of this analysis are as follows: (1) The mean length of the fish is 500 units. (2) The standard deviation of the length of the fish is 100 units. (3) The distribution of the length of the fish is approximately normal.

A table of the results of the statistical analysis is presented in the table below. This table shows the mean, standard deviation, and other statistical measures for the length of the fish. The results of this analysis are as follows: (1) The mean length of the fish is 500 units. (2) The standard deviation of the length of the fish is 100 units. (3) The distribution of the length of the fish is approximately normal.

Total length								
in mm.	.173	.216	.293	.304	.339	.455	.480	
Length prot.	.028	.027	.03	.03	.02	.036	.03	
Length deut.	.145	.189	.263	.264	.310	.419	.450	
Width prot.	.03	.03	.039	.029	.039	.035	.039	
Width deut.	.054	.053	.090	.061	.09	.065	.09	
Ratio <u>l. prot</u>								
total l.	1:6	1:7.5	1:10	1:10	1:17	1:13	1:16	
Ratio <u>w. prot</u>								
w. deut	1:1.8	1:1.8	1:2.3	1:2.1	1:2	1:1.9	1:1.6	

The sporonts, as in all members of this family, are solitary until just previous to cyst formation. The body, when moderately expanded, is shaped like a classic vase, widest near the top and tapering very gradually. The protomerite is small in comparison with the deutomerite, being from one-eighth (in young specimens) to one-sixteenth the total length. It is conical, widest just anterior to the base, and its breadth exceeds its height. (.039 mm. x .03 mm; .032 x .029). It is from .4 to .6 as wide as the deutomerite at its widest part. There is a slight invagination at the anterior end. The deutomerite is widest a short distance below the constriction at the septum and tapers gradually toward the posterior end, terminating in a blunt cone.

The protomerite is quite or nearly transparent, containing but few large crystal-like granules of protoplasm which stain deeply. There is an apparent pore at the anterior end. The deutomerite is more or less dense and opaque, being pearly white in reflected light and light or dark gray, depending on the amount of protoplasm present, in transmitted light. The density depends on age, the young trophozoites containing few pale gray granules,

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Table 1. 1998

Table 2. 1999

Table 3. 2000

Table 4. 2001

Table 5. 2002

Table 6. 2003

Table 7. 2004

Table 8. 2005

Table 9. 2006

Table 10. 2007

Table 11. 2008

Table 12. 2009

Table 13. 2010

Table 14. 2011

Table 15. 2012

Table 16. 2013

112

the oldest and largest sporonts being filled with protoplasm which gives to them a blackish appearance. The deutomerite stains a fairly homogeneous shade, and the small granules here do not absorb as much of the stain as do the larger protomerite granules.

The epicyte is colorless and very thin, even at the septum. Longitudinal striations are discernible. This epicyte is much more resistant than in many gregarines studied, for animals remain alive on the slide in a water medium or in normal saline for many hours, and when they finally become immotile, retain their shape. After several days on the slide, they have been noted to be intact with the body only a little more nearly globular from osmosis than in the normal parasites. This may be due to the thinness of the epicyte and to its great permeability. Myonemes were seen in stained, sectioned specimens as deeper-staining dots, larger than the deutomerite granules and lying along the periphery of the endocyte in the longitudinal sections.

The nucleus of sporonts is an elongate-ellipsoid, generally placed diagonally and reaching almost entirely across that part of the deutomerite in which it lies. In large specimens, it approximates .055 mm. x .03 mm. It contains one large spherical or slightly ovoidal karyosome which stains evenly and lightly throughout with Ehrlich's hematoxylin. The nucleus is not visible in vivo in the large and dense individuals. In young specimens, it is spherical, becoming ellipsoidal as the sporont stage approaches.

The first thing I noticed when I stepped out of the car was the smell of fresh air. It was a relief after being stuck in traffic for hours. I looked around and saw a beautiful view of the city. The buildings were tall and modern, and the streets were clean and well-maintained. I felt like I had arrived in a new world. I took a deep breath and smiled. I was finally here.

I walked towards the entrance of the building. The door was open, and I saw a sign that said "Welcome". I felt a little nervous, but I knew I had to do this. I took a deep breath and walked in. The interior was bright and airy. There were people everywhere, and I felt like I was part of something big. I looked around and saw a lot of things I had never seen before. I was in a new world, and I was finally here.

I walked towards the entrance of the building. The door was open, and I saw a sign that said "Welcome". I felt a little nervous, but I knew I had to do this. I took a deep breath and walked in. The interior was bright and airy. There were people everywhere, and I felt like I was part of something big. I looked around and saw a lot of things I had never seen before. I was in a new world, and I was finally here.

The trophozoite is much less dense than the sporont. The epimerite is a round, sessile transparent knob.

The sporozoite is a deeply-staining, spindle-shaped body which penetrates the cell at its free end, becomes embedded, grows, and absorbs the host cell which it entered. The whole trophozoite, not merely the epimerite, lies embedded and after it has destroyed the originally entered cell distorts and compresses those adjoining. It remains embedded until it has practically outgrown the cells of the epithelium and easily escapes into the lumen through the canal it has formed by cell destruction. The trophozoite is able to move about while embedded. In cross-sections of the intestine, the parasite, still embedded, is sometimes cut cross-wise, indicating that it lies with its longitudinal axis parallel to that of the host, and in one instance it lay with the protomerite pointed toward the lumen rather than toward the mesothelial wall, the normal position.

The gliding movement common to most Polycystids is functional here and the animal moves forward very rapidly in a straight line, often with a constant turning of the protomerite from side to side which affects neither the rapidity nor the direction of motion. Progression has been observed at the rates of .0065 mm. and .0075 mm. per sec. Each of these rates is for a different specimen and each movement extends at a uniform rate over several minutes. No gelatinous stalk was seen trailing

The country is a vast, fertile plain, with a few scattered hills and mountains.

The population is about 100,000,000, and is rapidly increasing.

The climate is temperate, with a long growing season and a short winter.

The soil is rich and fertile, and produces a variety of crops.

The principal cities are New York, Philadelphia, and Washington.

The government is a republic, and is based on the principles of justice and equality.

The people are free and independent, and enjoy the rights of citizenship.

The country is a land of opportunity, and offers a wide field for enterprise.

The people are industrious and enterprising, and have made great progress.

The country is a land of hope, and offers a bright future for all.

The people are united in their love of country, and are determined to maintain their freedom.

The country is a land of peace, and offers a safe haven for all who seek it.

The people are kind and generous, and are always ready to help those in need.

The country is a land of beauty, and offers a wonderful view of nature's wonders.

The people are proud of their country, and are determined to make it a better place.

The country is a land of progress, and offers a bright future for all.

The people are free and independent, and enjoy the rights of citizenship.

The country is a land of opportunity, and offers a wide field for enterprise.

The people are industrious and enterprising, and have made great progress.

The country is a land of hope, and offers a bright future for all.

The people are united in their love of country, and are determined to maintain their freedom.

The country is a land of peace, and offers a safe haven for all who seek it.

The people are kind and generous, and are always ready to help those in need.

behind the animal either with or without the use of a stain on the slide. Ameboid movement was noted, chiefly confined to the anterior part of the deutomerite; it results in the nodding of the 'head' as many as thirty times without ceasing or decreasing speed. The protomerite does not change in shape or size, neither does the posterior two-thirds of the deutomerite. The epicyte of the shoulder region stretches on one side, the endocyte flows into the pocket thus formed, and the inactive protomerite, its equilibrium disturbed, drops to one side and then to the other as the pockets form now on one side and now on the other. Structures which cause movement must therefore be much more numerous or else much more active physiologically in this restricted area than elsewhere.

Cysts are spherical and vary from 150 to 270 μ in diameter. I have as yet been unable to procure development of the cysts. Quite a number were kept from two days to two weeks in water and normal saline media and when opened revealed no indication of having undergone progression beyond the dissolution of the walls separating the two conjugants. Staining revealed no differentiation whatever in the apparently homogeneous protoplasm.

This species is distinguished from *Stenophora larvata* (Leidy) Ellis by the considerable difference in size. Leidy's species varies from 100 μ to 800 μ in length, while *S. lactaria* does not exceed 480 μ . Its form varies in width from 30 μ to 200 μ ; the other never exceeding 90 μ . The ratio of length prot:total

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length in *S. larvata* (largest individual) is 1:26; in *S. lactaria* it never exceeds 1:16. The nucleus in the former is spherical and about 70μ in diameter; in the latter it is ellipsoidal and smaller, $55\mu \times 30\mu$ in the largest measured. The habitant is a different diplopod found, however, in the same habitat.

S. lactaria differs from *S. elongata* Ellis and from *S. cockerellae* Ellis in size, shape of the protomerite and of the deutomerite, and in shape especially of the posterior end of the deutomerite.

Stenophora diplocorpan. sp.
Fig. 54.

A number of most peculiar polycystid gregarines were found in the common small diplopod, *Euryurus erythropygus* (Brandt), at Urbana, Illinois, in October, 1914. The parasites were found in each of two specimens of this diplopod, each host containing about a dozen parasites in the intestine.

The sporonts are solitary. The shape is more or less cylindrical, the body being very much attenuated. The protomerite is as wide as it is long and is from one-sixteenth to one-twenty-fifth of the total length of the body, and there is no indentation at its anterior end as in many *Stenophoridae*. The anterior half of the protomerite is rather broadly conical and is blunt at the apex. There^{is} but a slight constriction at the septum in expanded individuals. The anterior end of the deutomerite is but little wider than the protomerite just in front of the septum. The deuto-

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merite gradually widens, becoming widest just anterior to the middle where it is twice the maximum width of the protomerite. It is incompletely separated into two nearly equal parts by a deep constriction at about the middle and behind this constriction the body is cylindrical, of practically the same width throughout, terminating in a blunt, well rounded cone.

The protomerite is transparent or nearly so, containing a few large irregular deeply-staining granules clustered near the septum. The deutomerite is pale tan and contains smaller homogeneous granules densest just anterior to the constriction, least dense at the posterior end, and otherwise fairly evenly distributed. The endoplasm is much less opaque than in many gregarines. The epicyte is thick, transparent and of even width throughout except at the constriction in the deutomerite, where it becomes considerably thicker. Longitudinal striations are easily discernible in the epicyte. The myonemes are well developed, especially at the constriction and at the septum, and are indicated by a series of delicate reticular fibrillae embedded in the peripheral layer of the endocyte and running crosswise of the body. The nucleus is visible in vivo; it is spherical and, in diameter, two-thirds the width of the body just back of the deutomerite constriction. It lies just posterior to this constriction. One large karyosome is visible within.

The epimerite evidently persists after its usefulness

is over, and was seen in one instance on a fairly large specimen free in the lumen of the intestine. It is a large hyaline smooth knob with a short stalk broad at the base.

Neither sporozoite nor cyst was seen.

The parasite is fairly active. Gliding motion, accompanied by no bodily contortion was observed at the rates of .011 and .007 mm. per sec. Each rate given was fairly constant for the given gregarine for a period extending over several minutes. A contortion of the body is common, either with no displacement of the body as a whole or in connection with the gliding motion. In fact, it was difficult to find an animal in simple progression which was not at the same time performing some sort of contortion. The region of the septum is very motile. Here the epicyte expands and contracts, with an inflow or withdrawal of the endocyte, just as in the case of an amoeba. Tiny processes can be seen extruded several at a time or a large portion of the endoplasm of the region may be pushed out at one time. In the latter case, the heavy and rigid protomerite is overbalanced and drops to one side. Immediately thereupon an outpushing of protoplasm on the other side either restores the normal condition or causes a nodding to the opposite side. This movement may continue with surprising rapidity and extend over a long period of time. The deutomerite above its median constriction is very motile, but the portion below is never involved in violent contortions.

The first part of the book is devoted to a general introduction to the subject of the history of the world. It is a very interesting and well-written work, and it is highly recommended to all who are interested in the history of the world.

The second part of the book is devoted to a detailed account of the history of the world from the beginning of time to the present day. It is a very comprehensive and well-written work, and it is highly recommended to all who are interested in the history of the world.

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The tenth part of the book is devoted to a detailed account of the history of the world from the beginning of time to the present day. It is a very comprehensive and well-written work, and it is highly recommended to all who are interested in the history of the world.

This species is similar in general outline to *Stenophora nematoides* Léger & Duboscq (1903b:335-7). Both have the peculiar and hitherto unique constriction at the middle of the deutomerite. They differ in the shape of the protomerite, which in Léger and Duboscq's species is much longer than wide; in the shape of the nucleus, which in *S. nematoides* is elongate-ovoidal and in *S. diplocorpa* is spherical; and in the character of movement. I have in no case observed the nematoid shape which is assumed by *S. nematoides* and is due to the elongation of the body and the entire disappearance of the constriction. Motion in *S. diplocorpa* is confined chiefly to regions above the constriction and the latter never entirely disappears.

A table of measurements follows:

Total length of body					
in mm.	.297	.325	.262	.335	.359
Length of protomerite	.019	.02	.012	.015	.014
Length of deutomerite	.278	.305	.25	.32	.345
Width of protomerite	.02	.02	.02	.015	.015
Width of deutomerite	.045	.057	.040	.045	.045
Ratio <u>length prot</u>					
total length	1:16	1:16	1:22	1:22	1:25
Ratio <u>width prot</u>					
width deut	1:2.2	1:2.8	1:2	1:3	1:3
Diameter nucleus	.02	.022	.018	.022	.024

Cnemidospora lutea Schneider
Figs. 56 and 57.

1882 *Cnemidospora lutea* Schneider 1882:446-8

Cnemidospora: Sporonts solitary, elongate. Total length 500 μ . Width not given. Ratio--length prot:total length :: 1:15; width prot:width deut :: 1:1.6. Protonemite subglobular,

The following table shows the results of the experiment. The first column shows the number of trials, the second column shows the number of correct responses, and the third column shows the percentage of correct responses. The data is as follows:

Number of Trials	Number of Correct Responses	Percentage of Correct Responses
10	7	70%
20	14	70%
30	21	70%
40	28	70%
50	35	70%

Table 1. Results of the experiment.

Number of Trials	Number of Correct Responses	Percentage of Correct Responses
10	7	70%
20	14	70%
30	21	70%
40	28	70%
50	35	70%
Total		70%

The results of the experiment are shown in the table above. The percentage of correct responses is consistently 70% across all trial counts.

The following table shows the results of the experiment. The first column shows the number of trials, the second column shows the number of correct responses, and the third column shows the percentage of correct responses. The data is as follows:

The following table shows the results of the experiment. The first column shows the number of trials, the second column shows the number of correct responses, and the third column shows the percentage of correct responses. The data is as follows:

Number of Trials	Number of Correct Responses	Percentage of Correct Responses
10	7	70%
20	14	70%
30	21	70%
40	28	70%
50	35	70%

broader than long, in the ratio of 4:3. Divided into two parts, the anterior the shape of a double convex lens, without the characteristic endocyte granules and tinted greenish; the posterior, larger, portion containing yellow or brown endoplasmic granules. Deep constriction at septum. Deutomerite cylindrical, tapering very slightly and ending in a broad flattened extremity. Endocyte of deutomerite brown, rather dense. Nucleus ellipsoidal, twice as long as wide, containing one or more karyosomes. Myocyte apparent.

Cysts not described. Spores ellipsoidal with a thick integument. Taken at Poitiers, France.

Host: Glomeris sp.

Habitat: Intestine.



There is but one species in this genus. Crawley (1903b:638-9) described a species as *Cnemidospora spiroboli* but it has been removed to another genus, *Stenophora*, because it has none of the characters of the genus *Cnemidospora*. Schneider's discovery has never been corroborated.

Amphoroides polydesmi (Léger) Labbé
Fig: 58.

1892	<i>Amphorella polydesmi</i>	Léger	1892:132-4
1899	<i>Amphoroides polydesmi</i>	Labbé	1899:20
1903	<i>Amphoroides polydesmi</i>	Léger & Duboscq	1903b:314

Amphoroides: Sporonts solitary, ovoidal, rather short and broad. Length 170-200. Width not given. Ratio--length

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prot:total length :: 1:20; width prot:width deut :: 1:2.6. Pro-^{1:2}
tomerite very short, depressed and cup-shaped within. Three times
as broad as high. Widest part at the top, where it is wider than
the deutomerite just below the septum. A constriction at septum.
Septum pushed up in the middle to form a dome which is higher at
its summit than the protomerite itself, the latter appearing as a
crenulate flaring collar about it. The deutomerite is cylindrical
through the anterior third, widening appreciably to form a shoulder
below which it gradually tapers, ending in a broad flattened
extremity of approximately the same width as the anterior third of
the deutomerite. The endocyte is yellow-brown, the nucleus
spherical, its diameter as great as the width of the base of the
deutomerite and contains one large karyosome. The epimerite is
a cylindro-conical or globular papilla.

Cysts are spherical, 150 μ in average diameter, dehisce by simple
rupture, and the spores are biconical, 7.8 x 3.8 μ .

Taken in the valleys of the Vienne and the Loire, France, and at
Vizzanova and Corte, Corsica.

Hosts: *Polydesmus complanatus* (L.); *Polydesmus dispar* Silvestri.

Habitat: Intestine.

This species was first described by Léger as *Amphor-
ella polydesmi*. The generic name was preoccupied and Labbé changed
the name to *Amphoroides*. At the same time Labbé included with
A. polydesmi as a synonym *Gregarina polydesmivirginiensis* of Leidy.

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probably because of the identity of the generic name of the hosts.^{1:3}
The character of the protomerites alone would radically differentiate the two species. The latter has since been named *Stenophora polydesmivirginiensis*.

Labbé says of the Actinocephalidae, to which the genus *Amphoroides* belongs, the members are parasites of the

"tube digestif d'Arthropodes carnassiers"

but the diplopod *Polydesmus* is surely not carnivorous.

Amphoroides calverti (Crawley) Watson
Fig. 52.

1903	<i>Gregarina Calverti</i>	Crawley	1903a:48
1903	<i>Gregarina Calverti</i>	Crawley	1903b:638
1915	<i>Amphoroides calverti</i>	Watson	

Amphoroides: Sporonts solitary, elongate. Max. length 1670 μ , average length 1400 μ . Average width 120 μ . Ratio--length prot:total length :: 1:47; width prot:width deut :: 1:2.5 to 1:3. Protomerite greatly compressed in sporonts, shallow, five times as wide as high. Deep crater within the top. Constriction at septum sharp and deep. Deutomerite elongate, widest in anterior third, tapering to a sharp point. Endocyte of protomerite tan in color, not dense; of deutomerite opaque, white. Nucleus small, spherical, not visible in vivo. Myocyte well developed. Cysts spherical, 380 μ in average diameter. Dehiscence by simple rupture. Spores not known.

Taken at Wyncote, Pa. and Urbana, Illinois.

The first part of the report deals with the general situation of the country and the position of the various branches of industry and commerce.

The second part of the report deals with the financial situation of the country and the position of the various branches of industry and commerce.

The third part of the report deals with the social situation of the country and the position of the various branches of industry and commerce.

The fourth part of the report deals with the political situation of the country and the position of the various branches of industry and commerce.

1900	1901	1902	1903	1904	1905
1000	1000	1000	1000	1000	1000
1000	1000	1000	1000	1000	1000

The fifth part of the report deals with the economic situation of the country and the position of the various branches of industry and commerce.

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The eighth part of the report deals with the military situation of the country and the position of the various branches of industry and commerce.

The ninth part of the report deals with the naval situation of the country and the position of the various branches of industry and commerce.

The tenth part of the report deals with the diplomatic situation of the country and the position of the various branches of industry and commerce.

Host: *Callipus lactarius* (Say) (*Lysiopetalum lactarium* (Say)).

Habitat: Intestine.

This species was described by Crawley (1903a) as belonging to the genus *Gregarina*. Later (1903b) he described the cysts and spores as follows:

"Cysts spherical - - -250-360 μ in diameter - -. Dehiscence effected by sporeducts, from 4 to 8 in number, not exceeding in length the diameter of the cyst. - - -Spores doliform, 13 x 5 μ . A single thick spore wall - - -."

I have seen one cyst from this species which measured 380 μ in diameter and indicated dehiscence by rupture and not by sporeducts. Crawley probably confused the cysts of this species with those of another species which may have been in the damp chamber developing at the same time.

This gregarine bears no resemblance to the members of the genus *Gregarina* whose cysts dehiscence by sporeducts, either in its habitat, in a diplopod, or in any of the characteristics of the sporont. The elongate shape, character of movement by slow contortions, great size of the individual, and, chiefly, the fact that all the animals are solitary, tend to prove conclusively that this species is not a member of the genus *Gregarina*. I think, when the unauthentic species species have all been properly placed, it will ultimately be shown that members of the genus *Gregarina* are all associative during the greater part of their adult sporont life. I place this species in the genus *Amphoroides* because of the shape of the protomerite.

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Two and only two species have been described as Stenophoridae which are not parasitic in diplopods. These are *Stenophora erratica* Crawley (1907:220-8) and *S. gimbeli* Ellis (1913a:462-5). The former was placed in this family on very slender evidence, viz. at the anterior tip of the protomerite is a

"low papilla within which are traces of a pore. It is this character which led me to place the gregarine in the genus *Stenophora*."

The author notes later the following: (1907:221)

"The suggestion is permissible that this form is actually the common *Stenophora julipusilli* Leidy, somewhat altered in appearance from being in the wrong host. Crickets and Julidae frequently occur in the same environment, and the former might readily swallow spores derived from the feces of the latter. This done, the spores might readily develop, although producing slightly atypical gregarines."

The present writer has otherwise disposed of the species and considers it *keidiana solitaria*. For argument relative to this position, see chapter on Orthopteran parasites.

Ellis (1913a) described from a Coleopteran of the family a parasite which he calls *Stenophora gimbeli*.

"The epicyte of the apex of the protomerite is quite thin and the sarcocyte of this region is driven into a papilla which results from the expansion of the thin epicyte."

Such a papilla has been found nowhere else among the Stenophoridae except in *S. cockerellae*. The present writer has often observed an expansion of the epicyte at the apex of the protomerite after the animal has been on the slide for some time in a water medium

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description of the country and its resources.

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mineral resources of the country.

The third part is devoted to a description of the

climate and the habits of the people.

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mineral resources of the country, with a description of each.

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and it is due to osmosis and the expansion of the epicyte at its weakest point. This gregarine has been removed from the genus *Stenophora* and placed in the genus *Gregarina*. The name now stands *Actinocephalus gimbeli*.

With this disposition of the above two species, the family *Stenophoridae* is found nowhere outside of the family *Diplopoda* and the diplopods are parasitised almost but not exclusively by the *Stenophoridae*.¹

We are led to believe that each family of gregarines has its unique order or narrowly restricted orders of insects which it infests and that each genus of gregarine is confined to a single host or to very closely related species.

1. An interesting note in this connection is the fact that very rarely is the same species of gregarine found in more than one species of host. Each species of diplopod may be expected to yield its specific parasite, although this is not without exception.

The species of parasites among the *Stenophoridae* do not appear to be as widely distributed, i.e. as cosmopolitan, as do those of other gregarines, e.g. of the genus *Gregarina*, widely separated localities seemingly yielding different parasites from the same host or from closely allied hosts. It is true, however, that much less work has been done in different parts of the world on the diplopod parasites than on those of beetles and orthopterans.

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List of the Polycystid Gregarines in the
Chilopoda

Page

DACTYLOPHORIDAE

Dactylophorus robustus Léger	Cryptops hortensis Leach
128-30	Verh.
Nina gracilis Grebnecki	Cryptops anomalons lusitanus
130-1	Scolopendra cingulata (Latr.)
Nina giardi (Léger) Sokolow	Scolopendra oraniensis ?
131-2	
Nina giardi corsicum (Léger & Duboscq) Sokolow	
132-3	Scolopendra oraniensis lusi- tanica Verh.
Nina indicia Merton	Scolopendra subspinipes Leach
133-4	
Echinoderma horrida (Léger) Watson	Lithobius calcaratus Koch
134-5	
Echinoderma hispida (Schneider) Labbé	
136	Lithobius forficatus Linn. Lithobius coloradensis Cock.
Acutispora macrocephala Crawley	Lithobius forficatus Linn.
136-7	
Trichorhynchus pulcher Schneider	Scutigera sp.
137-9	Scutigera forceps (Raf.)
Rhopalonia geophili Léger	Himantarium gabrielis Linn.
139-40	Stigmatogaster gracilis Mein.
Rhopalonia stella Léger	Himantarium gabrielis Linn.
141	
ACTINOCEPHALIDAE	
Actinocephalus striatus Léger & Duboscq	
141-2	Scolopendra cingulata Latr.
Actinocephalus dujardini Schneider	Lithobius forficatus Linn.
142-3	
Amphorocephalus amphorellus Ellis	Scolopendra heros Giard
143-4	
Hoplorhynchus actinotus (Leidy) Crawley	
144-6	Scolopocryptops sexspinosus (Say)
Hoplorhynchus scolopendras Crawley	Scolopendra woodi Meinert
147	

INDEX OF THE ...

...	100-101
...	102-103
...	104-105
...	106-107
...	108-109
...	110-111
...	112-113
...	114-115
...	116-117
...	118-119
...	120-121
...	122-123
...	124-125
...	126-127
...	128-129
...	130-131
...	132-133
...	134-135
...	136-137
...	138-139
...	140-141
...	142-143
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...	146-147
...	148-149
...	150-151
...	152-153
...	154-155
...	156-157
...	158-159
...	160-161
...	162-163
...	164-165
...	166-167
...	168-169
...	170-171
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Dactylophorus robustus (Léger) Labbé

Fig. 29.

1887	<i>Dactylophorus</i> sp.	Schneider	1887:67
1889	<i>Dactylophorus</i> sp.	Balbiani	1889:41
1892	<i>Dactylophora robusta</i>	Léger	1892:124-7
1899	<i>Dactylophorus robustus</i>	Labbé	1899:17
1903	<i>Dactylophorus robustus</i>	Léger & Duboscq	1903b:310-1

Dactylophorus: Sporonts solitary, elongate. Length 700-800 μ . Width not given. Ratio--length prot:total length :: 1:30; width prot:width deut :: 1: $\frac{1}{2}$. Protomerite at top approximately twice as wide as deutomerite, broadest at top, six times as wide as high. Periphery of upper margin set with numerous small upwardly directed digitiform processes which constitute the epimerite. Deutomerite elongate, regularly cylindrical in anterior third then becoming much narrower and ending in a long acuminate point. Nucleus ovoidal, twice as long as wide, containing several karyosomes. Endocyte yellow. Cysts spherical, 200 μ in diam., dehiscence by pseudocyst, spores cylindrical, rounded at ends, 11 x 4.3 μ .

Taken at Grenoble, France and on the island of Corsica.

Hosts: *Cryptops hortensis* Leach; *Cryptops anomalus lusitanus* Verh.

Habitat: Intestine.

Labbé (1899:17) attributed the naming of the genus *Dactylophorus* to Balbiani. The latter, however, says:

"C'est d'abord une Grégarine que je crois nouvelle, à moins qu'elle ne soit l'espèce que M. A. Schneider dit avoir découverte chez les *Cryptops*, et à laquelle il donne le nom de *Dactylophorus* - - -. C'est sans doute la présence

de cet appendice qui a valu à notre espèce le nom de Dactylophorus, qui lui a été donné par M. Schneider." ¹²⁹

Balbiani described a polycystid gregarine from the digestive tract of *Cryptops* sp. as follows:

"La Gregarine a la forme d'une massue étroite, étirée en une longue pointe à sa partie postérieure. Sa longueur moyenne est de 0.41 mm. et sa largeur, prise dans la portion renflée du corps, de 0.35 mm.. Le segment antérieur ou protomerite est petit, conoïde, et prolongé sur un de ses côtes, en un court appendice obtus, dirigé en avant."

Labbe considered this species identical with that later described by Léger as *D. robustus*, probably from the fact that the specimens were taken from the same chilopod (*Cryptops*). It is evident, however, from figures of the two species, that they are quite unlike. Balbiani's species lacks the dilated flattened protomerite with its digitiform processes, which is characteristic of the genus *Dactylophorus*, but has rather a high irregular cylindrical protomerite with an eccentric, conical, forwardly-directed projection. Moreover, the deutomerite is quite different in shape from that of *D. robustus* (compare figs. 29 and 47) and the nucleus in one species is spherical, in the other ovoidal. Balbiani's figure compares favorably with figures of sporonts of *Echinomera hispida* (Schneider) Labbe in the following respects: a) the eccentrically placed cone at the apex of the animal, b) shape of the protomerite, c) shape of the nucleus. In the case of *E. hispida*, the epimerite persists and the cone is a part thereof. Balbiani's figure shows no epimerite, neither does it indicate the digitiform processes character-

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istic of the other. For these reasons, I do not wish to regard the two species as identical, but rather to leave the one as indefinitely placed. Its original position is obviously incorrect; and the epimerite which is needed to correctly diagnose it not having been discovered, its correct systematic position cannot be determined. Fig. 47 is copied from Balbiani's drawing.

Nina gracilis Grebnecki
Fig. 30.

1873 <i>Nina gracilis</i>	Grebnecki	1873: ?
1887 <i>Pterocephalus nobilis</i>	Schneider	1887:68-9
1909 <i>Nina gracilis</i>	Léger & Duboscq	1909:33-68

Nina: Sporonts solitary, very elongate. Length 4 to 5 mm. Width not given. Ratio--length prot:total length :: 1:26; width prot:width deut :: 1:1/10. Protomerite bisymmetrical, divided into two equal lobes by a perpendicular constriction, these two lobes widely separated at one extremity to form an upturned cornucopia. The free upper extremity of each lobe bordered with a longitudinal row of short sharp spines, from which project long thread-like filaments. Deutomerite constricted just below septum then dilated slightly, the lower half regularly cylindrical, and terminating in a short bluntly pointed extremity. Nucleus slightly ovoidal with several small karyosomes.

Cysts not known. Spores regularly ellipsoidal with one integument, united in chains diagonally, not pole to pole.

Taken at Grenoble (?), France.

Host: *Scolopendra cingulata* Latr. (*Scolopendra cingulata* var. *hispanica* Newp.).

Habitat: Intestine.

Labbé (1899:17) says Kölliker's (1849:35) *Gregarina scolopendra*, from *Scolopendra morsitans* Sieb., is probably the same gregarine as the above. But the protomerite is very different from that of the genus *Nina* and indicates at once Labbé's error. Kölliker gives no description of the epimerite and it is impossible to say in what genus his specimen should be placed. Hⁱ's drawing is reproduced in my fig. 48.

Léger and Duboscq recognize the species and fully discuss its cyst-formation.

Nina giardi (Léger) Sokolow

1899 <i>Pterocephalus Giardi</i>	Léger	1899:390-3
1911 <i>Nina giardi</i>	Sokolow	1911:281

Nina: Sporonts solitary, elongate. Length 4 mm. Width not given. Protomerite very broad at the upper extremity, bisymmetrical, consisting of two long parallel horizontal lobes separated at one extremity and confluent and upturned at the other, with a small vesicular body near this end. Each lobe set with a row of short upwardly directed teeth from which project long slender sinuous filaments. Deutomerite long, slender, cylindrical, tapering slightly at the posterior extremity and

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ending bluntly.

Cysts spherical. Spores with two envelopes, 14 x 7 .

Taken at Wimereux, Pas-de-Calais, France.

Host: *Scolopendra oraniensis* (Africana Verh.).

Habitat: Intestine

Nina giardi corsicum (Léger and
Duboscq) Sokolow
Fig. 31.

1903 *Pterocephalus Giardi corsicum* Léger & Duboscq 1903b:333

1911 *Nina giardi corsicum* Sokolow 1911:281-2

Nina: Sporonts solitary, very elongate. Length 2 mm.

Width not given. Ratio--length prot:total length :: 1:10.

Ratio width prot:width deut :: 4.5:1. Protomerite bisymmetrical, formed by two long horns which meet at one end and curve upward nearly 90°. Very wide, 4½ times maximum width of deutomerite. Extending beyond the deutomerite three times as far on one side as on the other. The periphery of the horns densely set with a row of small denticles with long slender filaments. The shorter lobes thick and blunt. A pseudo-nuclear vacuole near the apex of the opposite lobe, i.e. at the end of fusion. Protomerite transparent. Deutomerite regularly cylindrical, tapering slightly and ending bluntly. Nucleus large, spherical.

Cyst and spores not known.

Taken on the island of Corsica.

Host: *Scolopendra oraniensis lusitanica* Verh.

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Habitat: Intestine.

This species differs from *N. giardi* type only in that a) it attains but half the length of the former, b) the confluent lobes of the protomerite are upturned farther in the adult, c) the lobes of the protomerite are shorter and blunter.

Nina indicia Merton
Fig. 33.

1911 *Nina indicia*

Merton 1911:119-26

Nina: Sporonts solitary, elongate. Length 500-1300 μ .

Width not given. Ratio--length prot:total length :: 1:20;
width prot:width deut :: 4:1. Protomerite bilaterally symmetrical, low and very broad, eight times as wide as high, formed of two long sinuous narrow plates separated at one end for a very short distance. Each bearing a narrow ridge at the upper margin set on both sides with short sharp teeth. The two ridges never confluent but nearly parallel throughout their length. Deutomerite elongate, irregularly cylindrical, dilated a short distance below the septum and tapering from the middle to a long slender and pointed posterior extremity. Endocyte dense in deutomerite, much less dense in protomerite. A deeply staining vesicle at one end of protomerite. Nucleus spherical with chromatin arranged in one much convoluted band.

Cyst and spores not described.

Taken at Heidelberg, Germany.

Host: Scolopendra subspinipes Leach.

Habitat: Intestine.

Echinomera hispida (Schneider) Labbé
Fig. 32.

1875	<i>Echinocephalus hispidus</i>	Schneider	1875:593-4
1899	<i>Echinomera hispida</i>	Labbé	1899:16

Echinomera: Sporonts solitary, obese. Measurements not given. Ratio--length prot:total length :: 1:7 to 1:11; width prot: width deut :: 1:2 to 1:2.3. Protomerite broad, flattened, surmounted by a persistent epimerite in the shape of an irregular asymmetrical cone as broad at its base as the protomerite and terminating in an eccentrically placed point. Sides of this cone set with eight digitiform, upwardly directed processes. Deutomerite regularly ellipsoidal, widest in the anterior half or nearly globular, terminating in a broadly rounded extremity eight to ten times the length of the epimerite and protomerite together. Endocyte dense, finely granular. Nucleus large, spherical, with several karyosomes.

Cysts spherical, dehiscence by simple rupture. Spores elongate-cylindrical, united in chains. Dimensions not given.

Taken at Paris, France; Cambridge, Mass.; Wyncote, Pa.; Raleigh, N.C.; and Boulder, Colo.

Hosts: *Lithobius forficatus* Linn. (*L. forcipatus*) and *Lithobius coloradensis* (Cock.).

Habitat: Intestine.

Crawley (1903a:52) found this gregarine rather common in *Lithobius forficatus* in eastern United States, and Ellis (1913a:465) found it in the West. Neither gives figures of the species. Since Schneider' gave no dimensions, these writers based their determinations on a comparison of their material with his figures. Ellis gives these measurements: length 180 μ width 80 μ . He says

"---processes of the epimerite disappearing shortly after the animal frees itself from the intestinal wall of the host but the conical portion - - - persists in the sporont stage giving an asymmetrical margin to the front of the protomerite."

"In some specimens the ratio of the length of the protomerite to the length of the deutomerite was as low as one to seven, while Schneider's original figures give it as one to eleven or more. Other specimens seemed intermediate between *E. hispida* (Schn.) and *E. horrida* (Léger). It seems probable then that *E. horrida* (Léger) is synonymous with *E. hispida*, leaving a single species in this genus."

That Ellis found the ratio of length prot:length deut as low as 1:7 is not out of harmony with Schneider's proportions of *E. hispida*, for the latter says

"Deutomerite huit à dix fois environ plus long que le segments supérieure réunis - - -."

E. horrida is much more nearly globose than such proportions indicate and there is no good argument for considering the two species synonymous.

Echinomera horrida (Léger) Watson

1899	<i>Echinocephalus horridus</i>	Léger	1899:390-5
1911	<i>Echinocephalus horridus</i>	Sokolow	1911:281
1915	<i>Echinomera horrida</i>	Watson	

Echinomera: Sporonts ovoidal, almost spherical, 100-150 μ in length. Width not given. Protomerite in shape of a narrow, elongate, blunt cone, the apex eccentric and carrying a papilla which represents a primitive epimerite.

Cysts spherical or cylindrical, rounded at ends.

Taken at Wimereux, France.

Host: *Lithobius calcaratus* Koch.

Habitat: Intestine.

Acutispora macrocephala Crawley

Fig. 34.

1903	<i>Acutispora macrocephala</i>	Crawley	1903b:632-3
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Acutispora: Sporonts solitary, elongate. Maximum length 600 μ , width not given. Ratio length prot:total length :: 1:3; width prot:width deut :: 1:1.3. Protomerite one-third the length of the sporont. Conical papilla at apex, deep constriction in posterior third and a constriction of equal depth at septum. Deutomerite just behind septum wider than protomerite just in front of it, regularly conical, tapering from shoulder to a blunt point. Endocyte dense. Nucleus not visible. Cysts spherical, 410 μ in diam., dehiscence by pseudocyst. Spores navicular, slightly curved, slender, two integuments, thin and

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blunt refractile rod of endospore at each end, 6μ long; spores
 $19 \times 4\mu$.

Taken at Raleigh, N.C.

Host: *Lithobius forficatus* L.

Habitat: Intestine.

The genus *Acutispora* was created by Crawley for this
 unique species.

Trichorhynchus pulcher Schneider
 Figs. 35 and 36.

1882	<i>Trichorhynchus insignis</i>	Schneider	1882:439-42
1882	<i>Trichorhynchus pulcher</i>	Schneider	1882:439-42
1889	<i>Gregarina megacephala</i>	Leidy	1889:10-11..
1899	<i>Trichorhynchus pulcher</i>	Labbe'	1899:16

Trichorhynchus: Sporonts solitary, elongate, length
 $420-750\mu$. Width 240μ . Ratio--length prot:total length ::
 $1:4$ to $1:7$; width prot:width deut :: $1:1$ to $1:1.6$. Epimerite
 nearly half the total length of the body without it. Proto-
 merite conical, rounded at summit. Slight constriction at
 septum. Deutomerite just below septum same width as protomerite
 just above it, widest in anterior third. Constricted below
 middle portion then dilated and ending in a broad but sharply
 pointed cone. Epimerite a very long flexible 'tongue' preceding
 from the apex of the protomerite, slightly dilated at the
 extremity. Endocyte in both parts dense. Nucleus ovoidal with
 one large karyosome.

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Cysts ovoidal, 316 x 303, dehiscing by pseudocyst. Spores cylindrical, rounded at ends, 9.7 x 5.8.

Taken at Poitiers, France; Philadelphia, Pa.

Hosts: Scutigera sp.; Scutigera forceps (Raf.) (Cermatia f.).

Habitat: Intestine.

This gregarine was described by Schneider under the name *T. insignis*, but his reference to his plates are to figures of *T. pulcher*. It was probably an error in the proof which is accountable for the incorrect naming of the species, for the name of the species immediately preceding is *Lophorhynchus insignis*.

Labbé referred to the species as *T. pulcher*.

Crawley referred to the gregarine which was described by Leidy as *G. megacephala* (fig. 35) to the present species because of the elongate appendage on the protomerite. That this position is correct is attested by the fact that Crawley himself found the species, the specimens agreeing with Schneider's figures and with the dimensions as given by Leidy. Crawley's description is as follows:

*This form is well described by A. Schneider whose figure also is excellent, giving a very accurate idea of the actual animal. Schneider, however, gives no dimensions, while Leidy says that the dimensions vary from 420-750 microns, these figures agreeing very closely with those which I obtained.

My own observations on this species show it to be an active, very polymorphic gregarine, with the ability to undergo extensive alterations in shape. Thus, the anterior end of

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the protomerite, normally a blunt curve, frequently protrudes in a long tongue-shaped process. The peristaltic movement so frequently displayed by gregarines, may, in this species, pass forward as well as backward. This indicates that here the contractile elements are capable of operating as well in one direction as another, which is certainly not the case in most polycystid gregarines. Fusion, preparatory to encystment, was seen to take place 'head to head.'

Leidy's brief account of the species is as follows:

"One morning- - -I found a fine *Cermatia* forceps in my bedroom. Iⁿ it was - -species which may be named *Gregarina macrocephala*. The body is elongated ovate and acute or short clavate and obtuse with an unusually large ovoid and often constricted head, surmounted by a small rounded or elongated appendage. Length .0.42 to 0.75 mm. to 0.24 broad; head about one-fourth the length of the body. It approximates *Duforia agilis* of Schneider, found in the larva of a *Hydracantharis*."

The latter species lacks the elongated proboscis; it is now known as *Legeria agilis* (Schm.) Labbé. For description and drawing, see chapter on Coleoptera.

Rhopalonia geophili Léger
Fig. 51.

1893 <i>Rhopalonia geophili</i>	Léger	1893:1285-66
1896 <i>Rhopalonia geophili</i>	Léger	1896:29

Rhopalonia: Sporonts solitary, dicystid, obese. Widest at anterior end, tapering to a point. Length 500 μ . Epimerite a large, hyaline, subspherical plate with a corona of ten to fifteen backwardly directed digitiform processes placed above the protomerite on a short neck. Endocyte with large yellow-orange granules. Nucleus ovoidal, containing several karyosomes. Cysts spherical, 200-250 μ , the fertile half brown, the sterile

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white, a black equatorial band marking the future line of dehiscence. Spores cylindrical, rounded at ends, double walled, 16 x 6.5 μ .

Taken in Provence, France and on the island of Corsica.

Hosts: *Himantarium gabrielis* Linn. (*Geophilus g.*); *Stigmatogaster gracilis* Meinert.

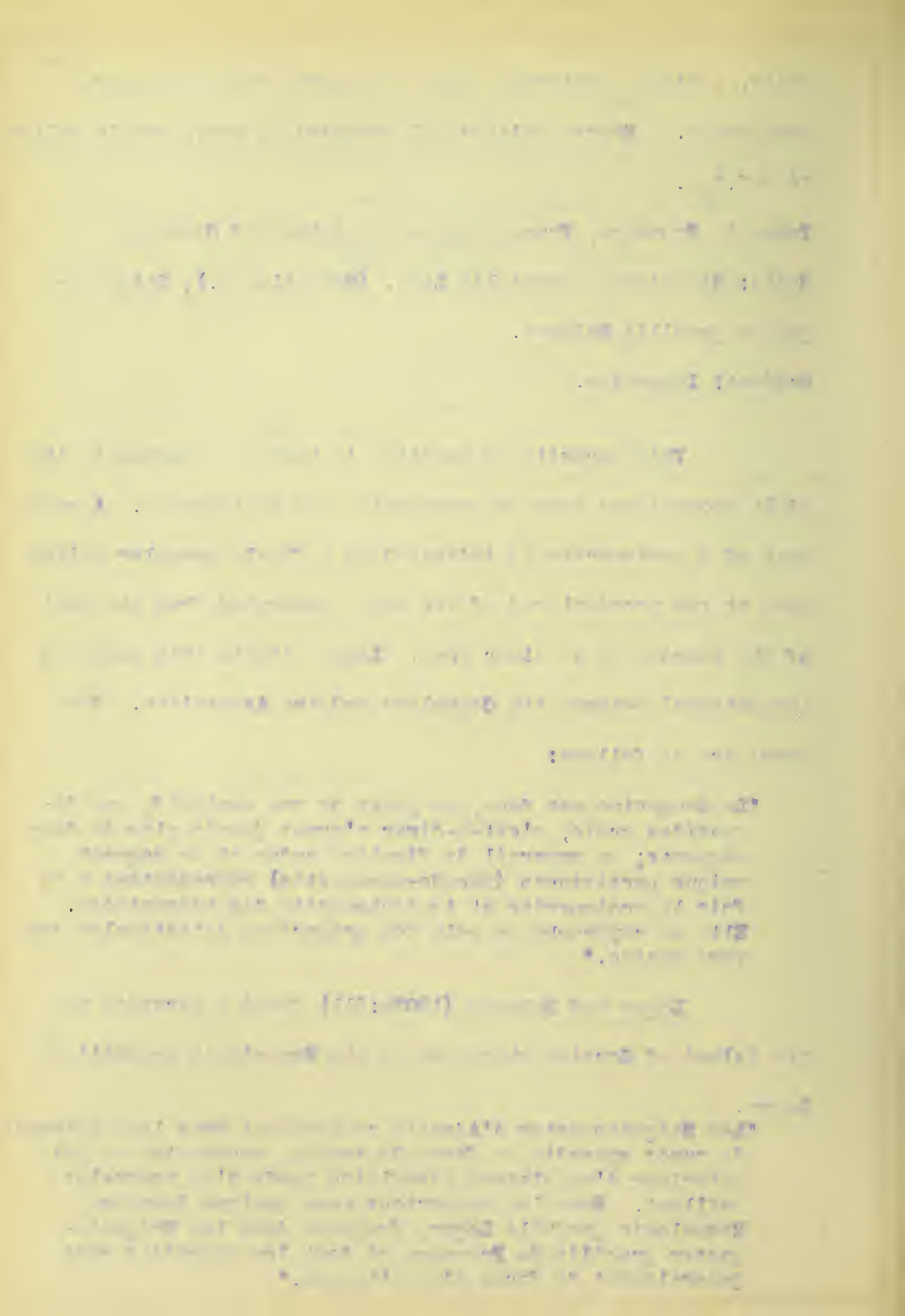
Habitat: Intestine.

This parasite is peculiar in having no septum in the adult sporont and thus no protomerite and deutomerite. A rudiment of a protomerite is indicated by a finely granular yellow mass at the proximal end of the body, separated from the rest of the sporont by a clear area. Leger thinks this genus is transitional between the *Cephalina* and the *Acephalina*. His words are as follows:

"La Grégarine est donc, au point de vue évolutif, une dicystidée vraie, c'est-à-dire n'ayant jamais plus de deux segments; un appareil de fixation caduc et un segment unique persistants (pseudo-monocystis) représentant à la fois le protomerite et le deutomerite des tricystidées. Elle se rapproche en cela des grégarines intestinales des vers marine."

Léger and Duboscq (1903b:311) found a parasite on the island of Corsica which may be the *Rhopalonia geophili* of Léger.

"Les *Stigmatogaster* d'Ajaccio contenaient dans leur intestin de rares sporadins en forme de toupie, surmontés au pôle antérieur d'un plateau circulaire bordé d'un bourrelet saillant. Nous les rapportons avec quelque doute au *Rhopalonia geophili* Léger, fréquent dans les *Stigmatogaster gracilis* de Provence et dont les sporadins sont généralement de forme plus allongée."



Rhopalonia stella Léger1899 *Rhopalonia stella*

Léger 1899:390-5

Rhopalonia: Sporonts solitary, ovoidal, elongate or spindle-shaped. Length about 130 μ . WIDTH not given. Body not differentiated into protomerite and deutomerite. The epimerite is like that of *R. geophili* Léger and

"- -rapelle assez bien une fleur de syanthérée."
(Sokolow 1911:281).

Host *Himantarium gabrielis* Linn.

Habitat: Intestine.

The comparison of the epimerite with the flower of one of the Compositae is a good one, as seen in fig. 51.

Actinocephalus striatus Léger and Duboscq
Fig. 37.

1903 *Actinocephalus striatus* Léger & Duboscq 1903b:334-5

Actinocephalus: Sporonts solitary, minute. Length 30-35 μ . Width not given. Ratio length prot:total length :: 1:4; width prot:width deut :: 1:0.7. Protomerite wider than deutomerite, dome-shaped, broadly rounded in front with a small flattened circular papilla surmounted centrally by a short digitiform process which is surrounded by a circle of small teeth. Constriction at septum, which is curved upward. Deutomerite irregularly cylindrical, terminating in a sharp cone. EPicyte marked with very apparent longitudinal striations, from

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John Doe, of the County of ... State of ...

Whom it is shown that he is guilty of the crime of ...

as charged in the indictment returned against him ...

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whence the name. Nucleus ovoidal with its longitudinal axis perpendicular to that of the body.

Cyst and spores unknown.

Taken in Provence, France.

Host: *Scolopendra cingulata* Latreille.

Habitat: Intestine.

This gregarine is placed in the genus *Actinocephalus* from the character of the dentate papilla of the protomerite.

"- - - au sommet du protomerite fait saillie un petit bouton aplati, à bord régulièrement festonné, comme dentelé, au centre duquel s'élève un rostre mobile assez droit. C'est là l'épimerite qui, comme on le voit, présente de grandes analogies avec celui des *Actinocephalus*."

Actinocephalus dujardini Schneider
Figs. 38, 39, 40.

1875 *Actinocephalus dujardini* Schneider 1875:589-90

Actinocephalus: Sporonts solitary, rather obese.

Length of body and width not given. Ratio length prot:total length :: 1:2.4; width prot:width deut :: 1:1. Protomerite very large, cylindrical, longer than wide, nearly one-third total length of sporont, terminating in a truncated cone, the apical region being hyaline, slight constriction at septum. Deutomerite widest just behind septum and tapering gradually to a sharp point. Endocyte of equal density in protomerite and deutomerite. Epimerite a globose sessile body resting on the apex of the protomerite, drawn out in its apical region to

a short neck upon which is set a flat corona of 16 to 20 backwardly directed rigid spines. Nucleus small, spherical.

Cyst and spores not known.

Taken at Paris, France.

Host: *Lithobius forficatus* Linn. (*L. forcipatus*).

Habitat: Intestine.

 Crawley (1903a:55) records finding this little gregarine several times in *L. forficatus*. He gives no drawings and does not state where it was taken.

Amphorocephalus amphorellus Ellis
 Figs. 45 & 46.

1913 *Amphorocephalus amphorellus* Ellis 1913a:463-4

Amphorocephalus: Sporonts solitary, elongate, length 500-970. Width not given. Ratio--length prot:total length :: 1:1.7; width prot:width deut :: 1:2.5. Protomerite dome-shaped, broadly rounded in front, a distinct constriction near middle. Deutomerite cylindrical, tapering slightly to a sharp point. Endocyte dense, nearly black. Epimerite flask-shaped with fluted apical disc, sessile on the protomerite, persisting on large free cephalonts. Nucleus not noted.

Cyst and spores not known.

Taken at Boulder, Colo.

Host: *Scolopendra heros* Giard.

Habitat: Intestine.

This genus contains the unique species above. It is characterised by the flask-shaped epimerite with finger-like processes at the apex and by the protomerite having a constriction at the middle, extending horizontally around the same.

Hoplorhynchus actinotus (Leidy) Crawley
Figs. 42 & 43.

1889	<i>Gregarina actinotus</i>	Leidy	1889:10
1903	<i>Hoplorhynchus actinotus</i>	Crawley	1903a:55-56
1913	<i>Amphorocephalus actinotus</i>	Ellis	1913c:277
1915	<i>Hoplorhynchus actinotus</i>	Watson	

Hoplorhynchus: Sporonts solitary. Maximum length recorded that of Leidy, 520 μ . Max. width 80 μ . Crawley's max. recorded length 485 μ , width 105 μ . Ratio--length prot: total length :: 1:9 (Leidy) to 1:12 (Cr.); width prot:width deut :: 1:2 (Leid. & Cr.). Protomerite dome, shaped, twice as broad as high. Deutomerite roughly triangular, wider than protomerite at septum. Attaining maximum width at shoulder, thence tapering to a more or less sharp point. Epimerite 80-100 long, vase-shaped, broadest near base and tapering to a neck where it again widens into a broad disc of short digitiform processes from 8 to 20 in number. Crawley says:

" - - - amphora-shaped. Differentiated in front into four dichotomously branched lobes. - - - In the small animals making up nearly $\frac{1}{2}$ the total length; in the adults from $\frac{1}{4}$ to $\frac{1}{5}$ of the total length."

Endocyte dense and opaque. Nucleus ovoidal, diagonally placed.

Cyst and spores not known.

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Table with multiple columns containing handwritten entries, possibly a ledger or list.

Main body of handwritten text, including several paragraphs and possibly a list or detailed notes.

Taken at Philadelphia, Wyncote and Wallingford, Pa., and 140

Raleigh, N.C.

Hosts: *Scolopocryptops sexspinosus* (Say) and *Scolopocryptops* sp.

Habitat: Intestine.

Crawley says (p. 56):

"Apparently in this gregarine the septum tends to disappear. It is much more evident in some cephalonts than in others, and in one sporont seen no septum could be made out, and the endocyte of the protomerite was not distinguishable from that of the deutomerite."

Ellis (1913c) placed this gregarine in his genus *Amphorocephalus*. He characterises the genus as follows:

"Protomerite with a constriction near the middle dividing it into two lobes, the anterior of which is the smaller; epimerite longer than wide, but not extremely elongate, widest in its posterior third, narrowed at its junction with the protomerite terminating in a somewhat concave enlargement, the edge of which has a fluted appearance because of the presence of numerous small finger-like processes; deutomerite elongate."

It is readily seen that the species in question does not fit this generic diagnosis for the following reasons: 1) the protomerite is not constricted in the middle, with a small anterior part; 2) the epimerite is elongate, from two to four times as long as wide (in Ellis' described species it is but little longer than wide, 1:1.2); 3) the apex does not terminate in a broad disc the edge of which has a fluted appearance because of the presence of numerous small finger-like processes, but terminates in a disc edged with dichotomously branched, distinctly separated digitiform processes, from eight to twenty in

Section 1: Introduction

Section 2: [Illegible]

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Section 3: [Illegible]

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number; 4) the deutomerite is not elongate as in Ellis' figure in which it is from eighteen to twenty-two times the length of the protomerite, but is only from six to twelve times the length of the protomerite. I have therefore replaced the species in the genus designated by Crawley.

Hoplorhynchus scolopendras Crawley
Fig. 41.

1903 Hoplorhynchus scolopendras	Crawley	1903b:636-7
1913 Amphorocephalus actinotus	Ellis	1913c:277
1915 Hoplorhynchus scolopendras	Watson	

Crawley's description of the species is quoted:

"This species is created for a gregarine parasitic in *Scolopendra woodi* Meinert from Raleigh, N.C. Two specimens were present. One of these, when first seen, was a balloon-shaped sac, 350 microns long by 200 broad. The epicyte and sarcocyte were each nearly or quite 3 microns thick, and the former was plainly marked with longitudinal striations. Both of the individuals were very flexible, readily changing shape and showing extensive contortions. After having been upon the slide for perhaps an hour, the parasites became quiescent and assumed what was probably something like the typical shape. The larger then measured 825 microns long by 120 microns broad. The anterior end, as shown in fig. 19, was much narrower than the balance of the animal, but it is somewhat questionable if this narrowing is permanent. A distinct septum extended across this narrower region, cutting off a portion of granular entocyte. Backward from the broadest portion, the animal's body tapered gradually, ending behind in a point. This species is placed in the genus *Hoplorhynchus* on account of its close resemblance to *H. actinotus* Leidy and its occurrence in a centipede related to *Scolopocryptops*, the host of the latter."

Its position is doubtful from insufficient evidence and will not remain authentic unless corroborated and better described by some future worker.

Ellis included this species with *H. actinotus* under the name *Amphorocephalus actinotus* (Leidy). I have referred the species to the original position. The protomerite does not have the constriction necessary to place it in the genus *Amphorocephalus*.

1911	1911	1911
1911	1911	1911
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THE UNIVERSITY OF CHICAGO

The University of Chicago is a leading center of research and learning in the United States. It was founded in 1837 and has since that time been a source of intellectual leadership. The university is composed of several divisions, including the Faculty of Arts and Sciences, the Faculty of Divinity, the Faculty of Education, the Faculty of Engineering, the Faculty of Law, the Faculty of Medicine, the Faculty of Music, the Faculty of Social Sciences, and the Faculty of Theology. The university is also home to several world-renowned research centers and institutes, such as the James Franck Institute, the Enrico Fermi Institute, the Center for Experimental Research and Education, the Center for the Study of Language, the Center for the Study of the History of Ideas, the Center for the Study of the History of the United States, the Center for the Study of the History of the World, the Center for the Study of the History of the Human Mind, the Center for the Study of the History of the Human Body, the Center for the Study of the History of the Human Soul, the Center for the Study of the History of the Human Spirit, the Center for the Study of the History of the Human Heart, the Center for the Study of the History of the Human Mind, the Center for the Study of the History of the Human Body, the Center for the Study of the History of the Human Soul, and the Center for the Study of the History of the Human Spirit.

The University of Chicago is a leading center of research and learning in the United States. It was founded in 1837 and has since that time been a source of intellectual leadership. The university is composed of several divisions, including the Faculty of Arts and Sciences, the Faculty of Divinity, the Faculty of Education, the Faculty of Engineering, the Faculty of Law, the Faculty of Medicine, the Faculty of Music, the Faculty of Social Sciences, and the Faculty of Theology. The university is also home to several world-renowned research centers and institutes, such as the James Franck Institute, the Enrico Fermi Institute, the Center for Experimental Research and Education, the Center for the Study of Language, the Center for the Study of the History of Ideas, the Center for the Study of the History of the United States, the Center for the Study of the History of the World, the Center for the Study of the History of the Human Mind, the Center for the Study of the History of the Human Body, the Center for the Study of the History of the Human Soul, the Center for the Study of the History of the Human Spirit, the Center for the Study of the History of the Human Heart, the Center for the Study of the History of the Human Mind, the Center for the Study of the History of the Human Body, the Center for the Study of the History of the Human Soul, and the Center for the Study of the History of the Human Spirit.

Species of Uncertain Determination

Trichorhynchus lithobi Crawley. Fig. 44.

Crawley's statement concerning this species is as follows (1903b:637):

"This animal, which is apparently specifically distinct from any of the other gregarines parasitic in *Lithobius*, was found in a specimen of that centipede from Raleigh, N.C. An epimerite was not found. The protomerite was subcordiform, and displayed in front a differentiation the exact nature of which could not be determined. The deutomerite varied considerably in shape, the animal being quite polymorphic. Both epicyte and sarcocyte were distinct and of about equal thickness. The septum was thick and curved backward. The endocyte was not dense; the nucleus large, with several karyosomes. The largest individual seen was 195 microns long."

There seems to be no basis for placing the parasite in the named genus. None of the characteristics of this genus are named above, the elongate epimerite, ovoidal cysts which dehisce by pseudocyst, cylindrical spores. Enough data are lacking so that the species cannot be definitely placed in any genus.

A parasite is described by Leger and Duboscq (1903b: 312) but not named. It was found on the island of Corsica, in *Chaetechelyne vesuviana* Newport. Their statement in full follows:

"Sur plusieurs individus examinés, un seul (d'Ajaccio) était parasité par une Grégarine rencontrée seulement au stade de sporadin. Sous cette forme, la Grégarine est allongée et mesure 100 μ . Le deutomerite est, dans sa partie antérieure, plus large que le protomerite dont il atteint 5 ou 6 fois la longueur, puis il va en s'attenuant

THE JOURNAL OF THE ROYAL SOCIETY OF MEDICINE

1918

THE JOURNAL OF THE ROYAL SOCIETY OF MEDICINE
 is published weekly, except on public holidays, at 11, BEDFORD SQUARE, W.1. The subscription price, which includes postage, is £2 10s. per annum in advance. Single copies are 3s. 6d. net. The price of the advertisement is 10s. per line per week. The advertisement is published in the order in which it is received. The advertisement is published in the order in which it is received. The advertisement is published in the order in which it is received.

There seems to be no need for the Editor to apologise for the delay in the publication of the Journal. The Editor of the Journal is sorry to hear that the Journal is not published as often as it should be. The Editor of the Journal is sorry to hear that the Journal is not published as often as it should be. The Editor of the Journal is sorry to hear that the Journal is not published as often as it should be.

A summary of the contents of the Journal is given on the inside of the front cover. The Journal is published by the Royal Society of Medicine, 11, Bedford Square, W.1. The Journal is published by the Royal Society of Medicine, 11, Bedford Square, W.1. The Journal is published by the Royal Society of Medicine, 11, Bedford Square, W.1.

pour se terminer en pointe mousse. Ces caractères ne sont pas suffisants pour rapporter ces sporadins à un Rhopalonia plutôt qu'à un Actinocephalus."

A third species of indeterminate situation is that called by Balbiani *Dactylophorus* sp. (1889:41). This species has been discussed in detail under the heading *Dactylophorus robustus* (Leger) Labbe and illustrated in fig. 47.

A fourth species of doubtful position is that described by Kolliker as *Gregarina scolopendra* (fig. 48). See discussion under *Nina gracilis* Grebnecki.

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DEPARTMENT OF CHEMISTRY
5408 SOUTH DIVISION STREET, CHICAGO, ILL. 60637

A series of experiments were conducted to determine the effect of temperature on the rate of reaction between hydrogen peroxide and potassium iodide in the presence of ceric sulfate as a catalyst. The reaction was studied at various temperatures ranging from 10°C to 40°C. The rate of reaction was found to increase with increasing temperature, and the activation energy was determined to be approximately 50 kJ/mol.

A series of experiments were conducted to determine the effect of the concentration of ceric sulfate on the rate of reaction between hydrogen peroxide and potassium iodide. The reaction was studied at a constant temperature of 25°C. The rate of reaction was found to increase with increasing concentration of ceric sulfate, and the order of reaction with respect to ceric sulfate was determined to be approximately 1.5.

Gregarina kingi Crawley 168-9	Gryllus abbreviatus Serv. GRYLLIDAE
Gregarina longiducta Ellis 169-70	Ceuthophilus latens Scudder C. maculatus (Say) LOCUSTIDAE
Gregarina consobrina Ellis 170	Ceuthophilus valgas Scudder "
Gregarina illinensis Watson 170-4	Ischnoptera pennsylvanica (deGeer) BLATTIDAE
Gregarina galliveri Watson 174-8	Gryllus abbreviatus Serv. GRYLLIDAE
Gregarina stygia Watson 179-81	Ceuthophilus stygius (Scudder) L. LOCUSTIDAE
Gregarina nigra Watson 181-3	Various Acrididae
Leidyiana solitaria Watson 183-6	Gryllus abbreviatus Serv. GRYLLIDAE
Leidyiana gryllorum (Cuenot) Watson 186-8	Gryllus domesticus (L.) GRYLLIDAE
Hyalospora roscoviana Schneider 188	Petrobius maritimus ?
Hyalospora affinis Schneider 188-9	Machilus cylindrica E. Geoff. ?
Gamocystis tenax Schneider 189-90	Blatella laponica ? BLATTIDAE
Hirmocystis gryllotalpae (Leger) Labbe 190-1	Gryllotalpa gryllotalpa (L.) GRYLLIDAE

ACTINOCEPHALIDAE

Pileocephalus blaberae Frenzel 191	Blabera claraziana Sauss. ?
Actinocephalus pachydermus (Crawley) Ellis 192-3	Dissosteria carolina (L.) ACRIDIDAE

INDETERMINATE SPECIES

Gregarina conica Dufour ? 193-4	Coleoptera and Gryllus
Gregarina davini Leger and Duboscq 195	Gryllomorpha dalmatina Ocsk. GRYLLIDAE

MISCELLANEOUS

Gregarina sphaerulosa Dufour 195-6	
Gregarina soror Dufour 196-7	

1-5-1
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1-7-1
1-8-1
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1-24-1
1-25-1
1-26-1
1-27-1
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1-31-1

APPENDIX

1-32-1
1-33-1
1-34-1
1-35-1
1-36-1
1-37-1
1-38-1
1-39-1
1-40-1
1-41-1
1-42-1
1-43-1
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Gregarina oblonga Dufour
Figs. 177 & 178

1837	<i>Gregarina oblonga</i>	Dufour	1837:13
1848	<i>Gregarina oblonga</i>	Frantzius	1848:195
1851	<i>Gregarina oblonga</i>	Diesing	1851:11
1863	<i>Gregarina oblonga</i>	Lankester	1863:94

The only description extant is the original one of Dufour, which is as follows:

"*Oblonga flavescens conico-cylindroidea*; cephalo-
thorace abdominis quintam partem vix adaequante.
Hab--Oedipodae migratoriae et
Grylli campestris

Beaucoup moins conique que la *G. conica* elle a une couleur jaunâtre qui ne s'observe pas dans les autres especes."

Here, as in the case of *Gregarina conica*, Dufour confused more than one species under a single name. *Oedipoda* is a genus of the order Diptera and also of the Orthoptera. If the Dipteran order is meant, the same species of gregarine would not be looked for in both Diptera and Orthoptera. Such an instance has not yet been recorded for a single species.

Dufour's drawings from both insects are, however, similar (l. I, figs. 9 and 9a; my figs. 177 and 178), although the protomerites are slightly different in their relation to the deutomerites.¹

Frantzius lists the species as from *Oedipoda* only. He

l. I have not attempted to separate the parasite in the two hosts as two species from the meagre description we have, but have recorded this species in this chapter as well as in the chapter on the list of polycystid gregarines, under the Diptera.

1. The first part of the document is a list of names and addresses. The names are: John Doe, Jane Smith, and Bob Johnson. The addresses are: 123 Main St, 456 Elm St, and 789 Oak St.

Section 1: Introduction

The purpose of this document is to provide information about the project.

The project is a study of the effects of climate change on the environment. It will be conducted over a period of six months. The results of the study will be published in a report.

The study will be conducted in three phases. The first phase will be to collect data on the current state of the environment. The second phase will be to analyze the data and identify trends. The third phase will be to develop recommendations for reducing the effects of climate change.

The study will be conducted in three locations: the city of New York, the state of California, and the state of Texas.

The study will be conducted by a team of researchers from the University of California, Berkeley, and the University of Texas at Austin.

The study will be funded by the National Science Foundation and the State of California.

The study will be published in the journal *Environmental Science and Technology*.

The study will be available to the public through the National Science Foundation's Open Access program.

The study will be available to the public through the University of California, Berkeley's Open Access program.

The study will be available to the public through the University of Texas at Austin's Open Access program.

The study will be available to the public through the National Science Foundation's Open Access program.

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The study will be available to the public through the University of California, Berkeley's Open Access program.

The study will be available to the public through the University of Texas at Austin's Open Access program.

places it in his genus *Gregarina*

"stets zu zwei aneinander geheftet."

Diesing mentions it with hosts as *Oedipoda migratoria* and *O. stridula*, and from *Gryllus campestris*.

Lankester gives the host as *Gryllus*. After this mention, the species passes out of the literature. I have listed it among the parasites of the genus *Gregarina* because Dufour states

"cephalothorace abdominis quintam partem"

and because Frantzius lists it among the parasites with both primitive and satellite.

This species may be identical with *Gregarina macrocephala* Schm. from the identity of one of the hosts, but the two cannot be correlated. Dufour describes only sporonts and Schneider only cephalonts and until the cephalonts of the former or the sporonts of the latter or both will have been described, the two species must remain separate.

The only other parasite described from a host belonging to the sub-family *Oedipodinae* (*Acrididae*) is *Gregarina locustae-carolinae* Leidy but the sporonts of the two species are not identical.

The second host named is now known as *Nemobius sylvestris* (F.).

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Gregarina hyalocephala Dufour

Figs. 181 and 182.

1837	<i>Gregarina hyalocephala</i>	Dufour	1837:13
1851	<i>Gregarina hyalocephala</i>	Diesing	1851:11
1863	<i>Gregarina hyalocephala</i>	Lankester	1863:94
1899	<i>Gregarina hyalocephala</i>	Labbe	1899:34

Dufour's description is as follows:

"Oblongo-conica; cephalothorace hemisphaerico diaphano, abdominis quartam partem subadaequante - - -

Hab. in ventriculo Tridactyli."

The species is, from this description, and from the character of the epimerite (Fig. 182) quite evidently a member of the genus *Gregarina*.

Frantzius does not mention the species; Diesing and Lankester merely do so and Labbé places it among his Uncertain Species.

Gregarina ovata Dufour

Fig. 183.

1826	<i>Gregarina ovata</i>	Dufour	1826:18
1837	<i>Gregarina ovata</i>	Dufour	1837:12
1837	<i>Gregarina ovata</i>	Siebold	1837:408
1838	<i>Clepsidrina conoidea</i>	Hammerschmidt	1838:356
1845	<i>Gregarina ovata</i>	Desmarest	1845: ?
1848	<i>Gregarina ovata</i>	Frantzius	1848:95
1851	<i>Gregarina ovata</i>	Diesing	1851:10
1863	<i>Gregarina ovata</i>	Lankester	1863:94
1873	<i>Clepsidrina ovata</i>	Schneider	1873:515-33
1875	<i>Clepsidrina ovata</i>	Schneider	1875:578-9
1885	<i>Clepsidrina ovata</i>	Schneider	1885: ?
1899	<i>Gregarina ovata</i>	Labbe	1899:10
1904	<i>Gregarina ovata</i>	Paehler	1904:14-18
1905	<i>Clepsidrina ovata</i>	Schnitzler	1905:309
1915	<i>Gregarina ovata</i>	Watson	

Gregarina: Sporonts biassociative. Measurements not given in any description. Ratio--length prot:total length :: 1:5 to

Table 1
Summary of data

1950	100	100
1951	100	100
1952	100	100
1953	100	100
1954	100	100
1955	100	100
1956	100	100
1957	100	100
1958	100	100
1959	100	100
1960	100	100

Table 2
Summary of data

Table 3
Summary of data

Table 4
Summary of data

Table 5
Summary of data

Table 6
Summary of data

1950	100	100
1951	100	100
1952	100	100
1953	100	100
1954	100	100
1955	100	100
1956	100	100
1957	100	100
1958	100	100
1959	100	100
1960	100	100

Table 7
Summary of data

1:6; width prot:width deut :: 1:2. Protomerite of primitive hemispherical, slightly constricted at septum. Protomerite of satellite flattened. Deutomerite ovoidal, widest below middle in primitive, above middle in satellite. Posterior end rounded. Nucleus spherical with many small karyosomes, visible in vivo. Epimerite a simple hyaline knob.

Cysts spherical or slightly ovoidal, dehiscence by sixteen, more or less, sporeducts; spores cylindrical, truncate at ends (not barrel-shaped), macrospores and microspores (15.8 x 7.9; 8.3 x 3.7).

Taken in France, and at Berlin and Danzig, Germany.

Host: *Forficula auricularia* L.

Habitat: Intestine.

Dufour designated as hosts *Gryllus campestris* and *Forficula*. He gave a good figure of biassociative sporonts taken from *Forficula* and a figure of a single sporont from *Gryllus* which differs considerably in shape from the other and probably represents another species, although I have not attempted to place it systematically.

Siebold accidentally found this species in *Forficula* but he did not think the organisms were animals for no motion was observed.

Frantzius represented an accurate figure of the species. He named *Forficula* only as host, recognizing Dufour's

1870
The first part of the book is devoted to a general survey of the history of the English language from its origin to the present time. The author discusses the various dialects of the language and the influence of foreign languages upon it. He also traces the development of the English language from its roots in the Germanic and Latin languages to its present form. The second part of the book is devoted to a detailed study of the English language in its various aspects. The author discusses the grammar, syntax, and semantics of the language. He also discusses the history of the English language in its various aspects. The book is written in a clear and concise style and is suitable for students of the English language. It is a valuable reference work for anyone interested in the history and development of the English language.

error in including a parasite from *Gryllus*.

Diesing indicated that Hammerschmidt had described a synonymous species, *Clepsidrina conoidea*, from the same host. He also included as a synonym *G. Psocorum* Sieb. but from the fact that the host *Psocus quadripunctatus* is a Neuropteran, I doubt the authenticity of this statement. Siebold's paper is not available and the conjecture cannot be verified.

Schneider agreed with Diesing that *Clepsidrina conoidea* is a synonym of *Gregarina ovata*. He discussed at length (1873: 515-33) the cyst-formation in this species. In 1885, he worked upon the species in greater detail, finding and giving measurements of two kinds of spores.

The species was the subject of a monograph by Paehler in 1904.

Gregarina blattarum Siebold

Fig. 184.

1839	<i>Gregarina blattarum</i>	Siebold	1839:57
1848	<i>Gregarina blattarum</i>	Stein	1848:223
1848	<i>Gregarina Blattarum</i>	Frantzius	1848:193, 5
1851	<i>Gregarina Blattarum</i>	Diesing	1851:10
1853	<i>Gregarina Blattae</i>		
	<i>orientalis</i>	Leidy	1853:239
1863	<i>Gregarina blattarum</i>	Lankester	1863:94
1875	<i>Clepsidrina blattarum</i>	Schneider	1875:580
1881	<i>Gregarina blattarum</i>	Bütschli	1881:384-409
1891	<i>Gregarina blattarum</i>	Wolters	1891:115-24
1893	<i>Gregarina blattarum</i>	Marshall	1893:25-45
1899	<i>Gregarina blattarum</i>	Labbe	1899:10
1900	<i>Clepsidrina blattarum</i>	deMagalhaes	1900:38-44
1903	<i>Gregarina blattarum</i>	Crawley	1903a:44
1907	<i>Gregarina blattarum</i>	Hall	1907:149
1913	<i>Gregarina blattarum</i>	Ellis	1913c:265
1913	<i>Gregarina blattarum</i>	Ellis	1913d:83-4

Table of Contents

101	Introduction	101
102	Chapter I	102
103	Chapter II	103
104	Chapter III	104
105	Chapter IV	105
106	Chapter V	106
107	Chapter VI	107
108	Chapter VII	108
109	Chapter VIII	109
110	Chapter IX	110
111	Chapter X	111
112	Chapter XI	112
113	Chapter XII	113
114	Chapter XIII	114
115	Chapter XIV	115
116	Chapter XV	116
117	Chapter XVI	117
118	Chapter XVII	118
119	Chapter XVIII	119
120	Chapter XIX	120
121	Chapter XX	121
122	Chapter XXI	122
123	Chapter XXII	123
124	Chapter XXIII	124
125	Chapter XXIV	125
126	Chapter XXV	126
127	Chapter XXVI	127
128	Chapter XXVII	128
129	Chapter XXVIII	129
130	Chapter XXIX	130
131	Chapter XXX	131
132	Chapter XXXI	132
133	Chapter XXXII	133
134	Chapter XXXIII	134
135	Chapter XXXIV	135
136	Chapter XXXV	136
137	Chapter XXXVI	137
138	Chapter XXXVII	138
139	Chapter XXXVIII	139
140	Chapter XXXIX	140
141	Chapter XL	141
142	Chapter XLI	142
143	Chapter XLII	143
144	Chapter XLIII	144
145	Chapter XLIV	145
146	Chapter XLV	146
147	Chapter XLVI	147
148	Chapter XLVII	148
149	Chapter XLVIII	149
150	Chapter XLIX	150
151	Chapter L	151
152	Chapter LI	152
153	Chapter LII	153
154	Chapter LIII	154
155	Chapter LIV	155
156	Chapter LV	156
157	Chapter LVI	157
158	Chapter LVII	158
159	Chapter LVIII	159
160	Chapter LIX	160
161	Chapter LX	161
162	Chapter LXI	162
163	Chapter LXII	163
164	Chapter LXIII	164
165	Chapter LXIV	165
166	Chapter LXV	166
167	Chapter LXVI	167
168	Chapter LXVII	168
169	Chapter LXVIII	169
170	Chapter LXIX	170
171	Chapter LXX	171
172	Chapter LXXI	172
173	Chapter LXXII	173
174	Chapter LXXIII	174
175	Chapter LXXIV	175
176	Chapter LXXV	176
177	Chapter LXXVI	177
178	Chapter LXXVII	178
179	Chapter LXXVIII	179
180	Chapter LXXIX	180
181	Chapter LXXX	181
182	Chapter LXXXI	182
183	Chapter LXXXII	183
184	Chapter LXXXIII	184
185	Chapter LXXXIV	185
186	Chapter LXXXV	186
187	Chapter LXXXVI	187
188	Chapter LXXXVII	188
189	Chapter LXXXVIII	189
190	Chapter LXXXIX	190
191	Chapter LXXXX	191
192	Chapter LXXXXI	192
193	Chapter LXXXXII	193
194	Chapter LXXXXIII	194
195	Chapter LXXXXIV	195
196	Chapter LXXXXV	196
197	Chapter LXXXXVI	197
198	Chapter LXXXXVII	198
199	Chapter LXXXXVIII	199
200	Chapter LXXXXIX	200
201	Chapter LXXXXX	201

Gregarina: Sporonts biassociative, rather stout-bodied, more or less irregular in outline. Length of sporonts 450-500, width 185 -200. Ratio--length prot:total length :: 1:5 (primate); width prot:width deut :: 1:2. Protomerite of primate cylindrical in posterior two-thirds, rounded anteriorly, no constriction at septum. Very little wider than high. Protomerite of satellite flattened, wider than protomerite of primate, twice as wide as high. Deutomerite irregularly cylindrical, widest in posterior half of primate and in anterior half in deutomerite. More or less pointed at posterior extremity. Sarcocyte layer thick. Nucleus small, spherical, (44 in diam., deMagalhaes) with from four to six karyosomes. Epimerite a simple hyaline knob. C

Cysts spherical or ovoidal. Sporeducts reaching to outside of transparent covering of cyst. Sporeducts eight to ten in number.

Spores cylindrical to barrel-shaped, truncate at ends, 8.3 x 3.7 and 4 x 3.

Hosts: *Periplaneta orientalis* (L.) (Blatte or.); *P. americana* (L.); *Blatella germanica* (L.) (*Ectobia germ.*).

Taken at Danzig, Berlin, Heidelberg, Bonn, and Leipsic, Germany, Paris, France, Philadelphia, Pa., and Rio de Janeiro, Brazil.

Habitat: Intestine.

 This is a remarkably cosmopolitan species, as seen from the locations in which it has been taken. It is remarkable from another point of view, viz. the name has remained unchanged

and undisputed since the discovery of Siebold, save in two instances.

Leidy described briefly *Gregarina Blattae orientalis* from the United States, which species proved to be synonymous with the earlier named species, coinciding in measurements, proportions and host.

Schneider gave a brief description, with a good figure of an association and a dehiscing cyst.

Bütschli admirably described the process of cyst-formation from beginning to end, a process never before seen and very rarely described since.

Wolters observed some of the nuclear changes in the cyst.

Marshall contributed the third long paper on the development of the species.

deMagalhaes found *G. blattarum* in Brazil in 1900; three years later Crawley found it in the United States, both from the original host. The specimens found by these writers were no doubt those of the true old-world *G. blattarum*. The shape and proportions correspond, and in hosts of the nature of the cockroach, there is little wonder that both the host and the parasites are widely distributed.

Faint, illegible text, possibly bleed-through from the reverse side of the page. The text is arranged in several paragraphs and appears to be a formal document or report.

Gregarina locustaecarolinae Leidy
Fig. 188.

1853	Gregarina Locustae Carolinae	Leidy	1853:239
1856	Gregarina Locustae Carolinae	Leidy	1856:47
1859	Gregarina fimbriata	Diesing	1859:730
1863	Gregarina Locustae	Lankester	1863:94
1899	Gregarina locustaecarolinae	Labbe	1899:35
1903	Stephanophora locustaecarolinae	Crawley	1903a:54
1907	Gregarina locustaecarolinae	Crawley	1907:225
1913	Gregarina locustaecarolinae	Ellis	1913c:268

Gregarina: Sporonts biassociative. Maximum length of sporonts 350 μ , average length 250 μ . Ratio length prot:total length :: 1:6.8 (primitive); width prot:width deut :: 1:1.7. Protomerite a little more than hemispherical, one and one-half times as wide as high. Deutomerite cylindrical, rather square-cornered posteriorly, nearly twice as wide as the protomerite. Nucleus large, spherical, with one karyosome. Epimerite a small rounded knob with a very short neck.

Taken at Philadelphia and Wyncote, Pa.

Host: Dissosteria carolina (L.).

Habitat: Intestine.

Crawley recognized (1907) the fact that Leidy described and illustrated two distinct species under the same name. Leidy's figures 35 and 36 (1853), the former my fig. 188, represent isolated sporonts typical of the genus Gregarina, in relative length and width of the protomerite and deutomerite. Associations were not mentioned, however. His fig. 37 (fig. 189) is quite different in shape and the epimerite is an inverted campanular

100	0	0	0	0	0
101	0	0	0	0	0
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197	0	0	0	0	0
198	0	0	0	0	0
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200	0	0	0	0	0

The following table shows the results of the experiment. The first column is the number of trials, the second column is the number of correct responses, and the third column is the percentage of correct responses. The data is as follows:

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198	0	0%
199	0	0%
200	0	0%

The results show that the percentage of correct responses is 0% for all trials. This indicates that the subjects were unable to perform the task correctly.

structure furnished with slender upwardly directed digitiform processes. Because of the epimerite, Crawley (1903a) placed the species in the genus *Stephanophora*. In 1907, he found cephalonts in locusts quite unlike those seen by Leidy. They possessed simple knobbed epimerites, like those of other species of the genus *Gregarina*. He saw the sporonts also, and they compared favorably in length with those described by Leidy. At the same time Crawley substantiated Leidy's discovery of the digitiform epimerite for he found similar cephalonts and also sporonts which compared. Thus it was discovered that two species were involved, the one a true *Gregarina*, the other not. The latter species is now known as *Actinocephalus pachydermus* (Crawley) Ellis.

Gregarina achetaeabbreviatae Leidy
Figs. 191 & 192.

1853	<i>Gregarina Achetae Abbreviatae</i>	Leidy	1853:238
1856	<i>Gregarina Achetae Abbreviatae</i>	Leidy	1856:47.
1859	<i>Gregarina oviceps</i>	Diesing	1859:1730
1863	<i>Gregarina Achetae</i>	Lankester	1863:94
1899	<i>Gregarina achetaeabbreviatae</i>	Labbe	1899:35
1903	<i>Gregarina achetaeabbreviatae</i>	Crawley	1903a:45
1903	<i>Gregarina achetaeabbreviatae</i>	Crawley	1903b:639
1907	<i>Gregarina achetaeabbreviatae</i>	Crawley	1907:220-1
1913	<i>Gregarina achetaeabbreviatae</i>	Ellis	1913c:266

Gregarina: Sporonts biassociative, obese. Maximum length 500. Average sporonts 450 in length, 225 in width. Ratio length prot:total length primate :: 1:3. Ratio width prot:width deut :: 1:1.1. Protomerite hemispherical to subglobose, width twice the height. Slight constriction at septum. Deuto-

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. The second part outlines the procedures for handling discrepancies and errors, including the steps to be taken when a mistake is identified. The final section provides a summary of the key points and offers advice on how to prevent future errors.

Appendix A: Sample Receipt Form
 Form No. 123

No.	Description	Quantity	Unit Price	Total
1	Item A	10	5.00	50.00
2	Item B	5	10.00	50.00
3	Item C	2	25.00	50.00
4	Item D	1	50.00	50.00
5	Item E	1	50.00	50.00
6	Item F	1	50.00	50.00
7	Item G	1	50.00	50.00
8	Item H	1	50.00	50.00
9	Item I	1	50.00	50.00
10	Item J	1	50.00	50.00

The total amount for the items listed above is \$500.00. This receipt is valid for 30 days from the date of issue. If you have any questions or concerns, please contact our customer service department. We are committed to providing the highest quality products and services to our customers.

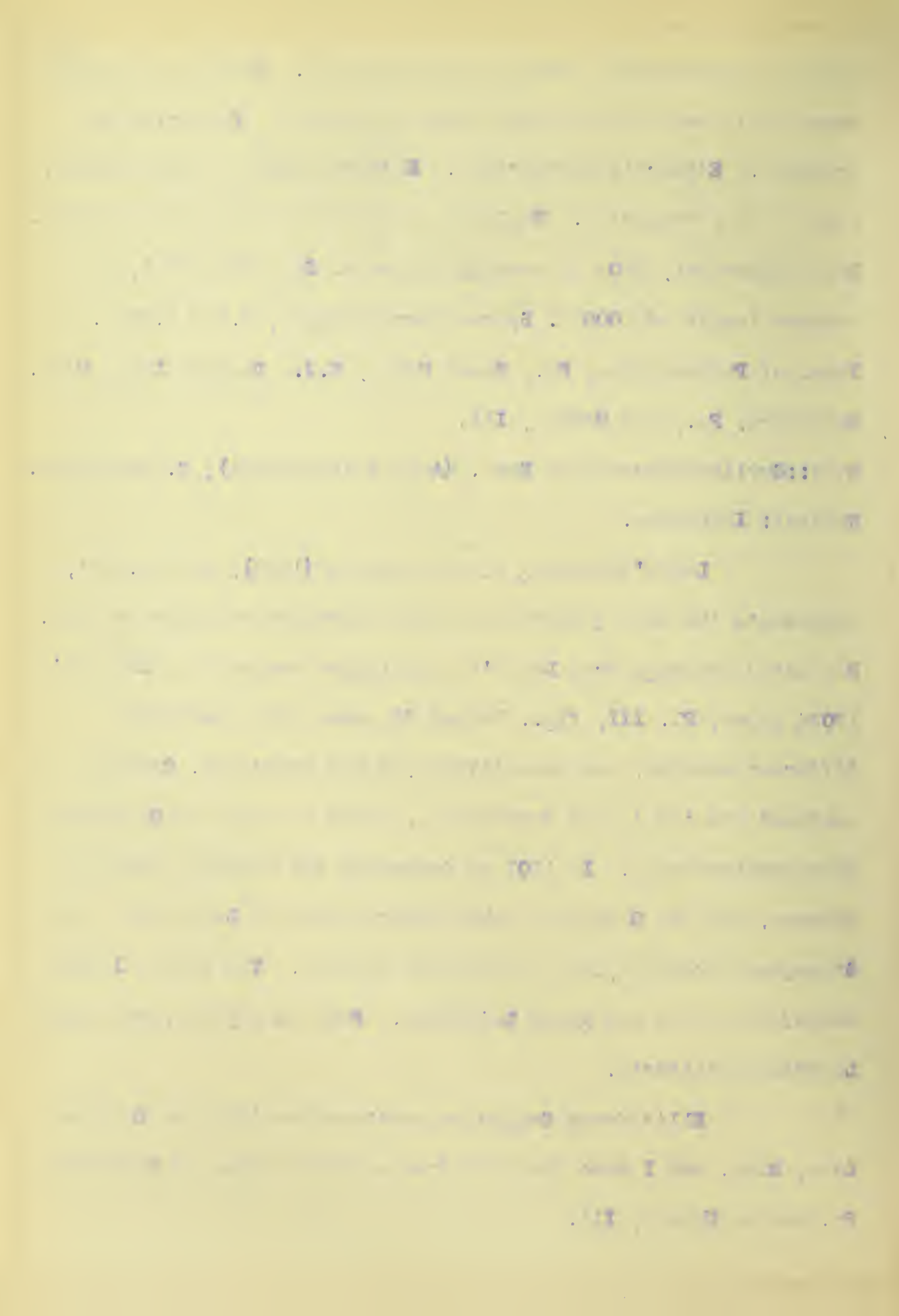
merite stout-bodied, nearly as wide as long. Widest at shoulder where it is very little wider than protomerite. Posterior end truncate. Epimerite undescribed. Endocyte dense in deutomerite, less so in protomerite. Nucleus not visible in vivo and not seen. Cysts spherical, 250 μ in average diameter. Sporeducts 2-5, of maximum length of 1000 μ . Spores barrel-shaped, 4.5 x 2.25 μ . Taken at Philadelphia, Pa., Beach Haven, N.J., Douglas Lake, Mich., Haverford, Pa., and Urbana, Ill.

Hosts: *Gryllus abbreviatus* Serv. (*Acheta abbreviata*); *G. americana*.

Habitat: Intestine.

 Leidy's drawing of the species (1853), my fig. 191, represents the same gregarine as that described by later writers. But later drawings from Leidy's unpublished manuscript, Crawley's 1903a paper, Pl. III, figs. 34 and 35, show two distinctly different species, one associative and the other not. Crawley confused the two in his description, under the name of *Gregarina achetaeabbreviatae*. In 1907 he described two distinct species however, one the *Gregarina achetaeabbreviatae* of Leidy and a new *Stenophora erratica*, for the solitary species. The latter I have transferred to a new genus *Leidyiana*. For description, see under *Leidyiana solitaria*.

Ellis found *Gregarina achetaeabbreviatae* at Douglas Lake, Mich. and I have found it from material taken at Haverford, Pa. and at Urbana, Ill.



Gregarina macrocephala (Schneider) Labbé
Fig. 199.

1875	<i>Clepsidrina macrocephala</i>	Schneider	1875:574
1882	<i>Clepsidrina macrocephala</i>	Schneider	1882:442
1887	<i>Clepsidrina macrocephala</i>	Schneider	1887:73
1895	<i>Clepsidrina</i> sp.	Cuénot	1895:321
1897	<i>Clepsidrina gryllorum</i>	Cuénot	1897:54
1899	<i>Gregarina macrocephala</i>	Labbé	1899:10

Gregarina: Sporonts biassociative.

The following synopsis refers to the cephalont only, there being no available description of the sporont.

Ratio--length prot:total length primate :: 1:5;
width prot:width deut :: 1:1.2. Protomerite rounded laterally, as wide as high. Constriction at septum. Epimerite superimposed upon protomerite on a short stout neck. Epimerite a large hyaline ovoidal body a little longer than the protomerite of the cephalont. Deutomerite elongate cylindrical, tapering suddenly to a sharp point. Endocyte with large irregularly arranged protoplasmic granules.

Cysts spherical, dehiscing by sporeducts. Spores doliform.

Taken in the Departments of Aisne, Indre-et-Loire, and Vienne, France.

Host: *Nemobius sylvestris* (F.) (*Gryllus sylv.*); *Gryllus domesticus* L.

Habitat: Intestine.

In 1875 Schneider merely mentioned the character of the epimerite of the undescribed species. In 1882 he described

the cephalont only.

This species may be identical with *Gregarina oblonga* Dufour, from the same host. It is impossible, however, to correlate the two named species for the reason that Dufour described only sporonts and Schneider only sporonts.

Leidyiana gryllorum (Clepsidrina g.) was erroneously included with this species by Labbe. For discussion, see under *Leidyiana gryllorum*.

Gregarina panchlorae Frenzel

Fig. 187.

1892 *Gregarina panchlorae* Frenzel 1892:299-300

Gregarina: Sporonts biassociative, long and slender.

Sporonts 180 long, 35 wide. Protomerite of satellite cylindrical, constricted slightly in anterior half. Deutomerite of primate fits into a deep depression in anterior end. Deutomerite cylindrical.

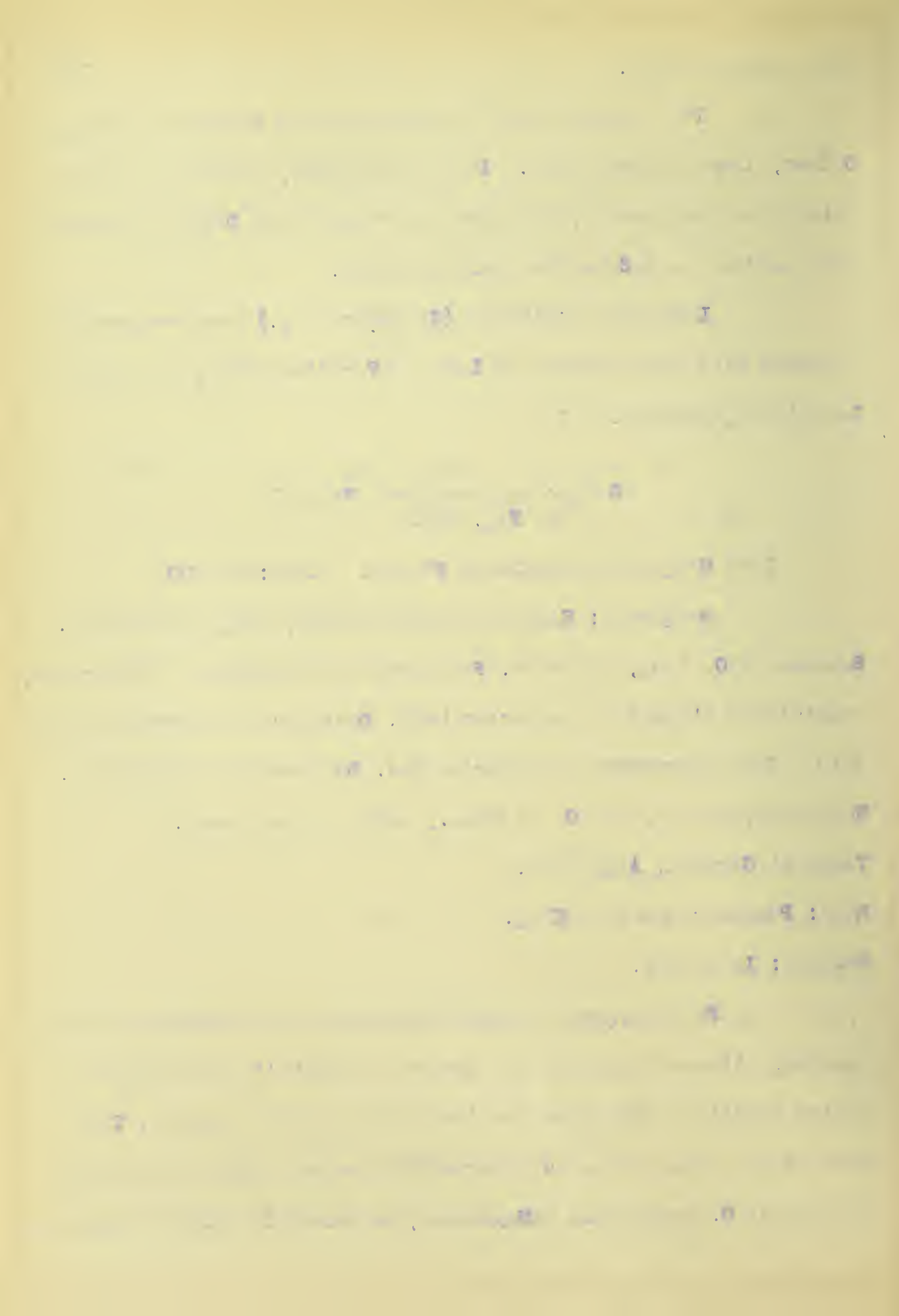
Nucleus spherical, 18-20 in diam., with one karyosome.

Taken at Cordoba, Argentina.

Host: *Panchlora exoleta* Klug.

Habitat: Intestine.

Frenzel gave a meagre description and drawing of this species, illustrating only the manner in which the protomerite of the satellite fits into the deutomerite of the primate. This part of the association is intermediate between that of the same portion of *G. serpentula* deMagalhaes, as shown in his two figures,



the one of a young, the other of a mature association. (Figs. 135¹⁶⁴ and 136.)

The lengths of the two species are, however, widely at variance so they are not identical.

Gregarina acridiorum Leger

1893	<i>Clepsidrina acridiorum</i>	Leger	1893:811-13
1896	<i>Clepsidrina acridiorum</i>	Leger	1896:27
1899	<i>Gregarina acridiorum</i>	Labbe	1899:10

Gregarina: Sporonts biassociative, cylindrical.

Maximum length of associations 1000 μ . Sporonts average 400 μ in length, 160 μ in width. Ratio--length prot:total length ::1:5; protomerite subglobular in primate, indented at anterior end in satellite. Deutomerite cylindrical, rounded at posterior end.

Sarcocyte thick, especially in protomerite near septum. Endocyte yellow-orange. Epimerite a simple spherical globe.

Cysts spherical, 500 μ in diameter. Sporeducts 12 to 15 in number.

Very long, yellow at base. Spores extruded in long chains. Spores doliform, 7.6x 3.3 μ .

Hosts: Various Acrididae, especially *Pamphagus* sp., *Tryxalis* sp. (*Truxalis*), and *Sphingonotus* sp.

Taken at Nemours, Algeria.

Habitat: Intestine.

Gregarina paranensis (Kunckel d'
Herculais) Watson

1899	<i>Clepsidrina paranensis</i>	Kunckel d'Herculais	1899:622
1915	<i>Gregarina paranensis</i>	Watson	

Gregarina: Sporonts biassociative. Length not given.

Deutomerite four times as long as protomerite. Ellipsoidal, pale yellow.

The author says the species differs from *G. acridiorum* Leger in having the deutomerite ellipsoidal instead of cylindrical, and the endocyte pale yellow instead of yellowish-red. He says between the moults of the insect the parasites are abundant. They diminish in numbers after each moult.

Taken at Parana, Argentina.

Host: *Schistocerca paranensis*.

Habitat: Intestine.

Gregarina serpentula Magalhaes

Fig. 185

1900 *Gregarina serpentula* Magalhaes 1900:40-44

Gregarina: Sporonts biassociative, slender, elongate.

Length association 1200 μ . Width 180 μ . Average length 800 μ , width 60 μ . The protomerite is 50 long. Ratio length prot:total length :: 1:8; width prot:width deut :: 1:1.3. Protomerite subspherical, flattened at septum, width equal to length. Constriction at septum. Deutomerite elongate cylindrical, broadly rounded behind. Nucleus spherical with several karyosomes. Young associations more slender, protomerites greatly attenuated.

Cysts spherical or ovoidal.

Host: *Periplaneta orientalis*.

Taken at Rio de Janeiro, Brazil.

1. The first part of the document is a letter from the Secretary of the State to the Governor, dated the 10th of January, 1862. It contains a report on the state of the treasury and the public debt, and a request for an increase in the tax on the sale of land.

2. The second part is a report from the Board of Commissioners of the State, dated the 15th of January, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

3. The third part is a report from the Board of Commissioners of the State, dated the 20th of January, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

4. The fourth part is a report from the Board of Commissioners of the State, dated the 25th of January, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

5. The fifth part is a report from the Board of Commissioners of the State, dated the 30th of January, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

6. The sixth part is a report from the Board of Commissioners of the State, dated the 5th of February, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

7. The seventh part is a report from the Board of Commissioners of the State, dated the 10th of February, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

8. The eighth part is a report from the Board of Commissioners of the State, dated the 15th of February, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

9. The ninth part is a report from the Board of Commissioners of the State, dated the 20th of February, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

10. The tenth part is a report from the Board of Commissioners of the State, dated the 25th of February, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

11. The eleventh part is a report from the Board of Commissioners of the State, dated the 30th of February, 1862. It contains a report on the state of the public debt, and a request for an increase in the tax on the sale of land.

Habitat: Intestine and coelom.



Magalhaes names the species serpentula from the manner of movement.

"- - m'ont paru rappeler la forme de la tête d'un serpent et ses mouvements."

The author found instances in which more than two sporonts were attached:

"Celle-ci (espèce) fournit fréquemment des exemples d'association de plusieurs individus disposés en file; deux trois et plus sont accolés par leurs extrémités opposées. D'autres fois, ils forment des groupes constitués d'un plus gros exemplaire, à l'extrémité postérieure duquel sont accolés deux, trois, cinq satellites plus petits."

These phenomena are observed in rare instances throughout the genus Gregarina.

This species is quite distinct in characteristics from G. blattarum Sieb., from the same host and its authenticity is not questioned.

Gregarina rigida (Hall) Ellis
Figs. 194, 197 & 198.

1907	Hirmocystis rigida	Hall	1907:
1907	Gregarina melanopli	Crawley	1907:223
1913	Gregarina rigida	Ellis	1913c:267
1913	Gregarina melanopli	Ellis	1913d:82-3

Gregarina: Sporonts biassociative but rather stout-bodied. Max. length of association 1425 μ . Average length 550 μ . Sporonts 250-750 μ long, 130-210 μ wide. Ratio length prot:total length :: primitive :: 1:3 to 1:6; length prot:total length satellite :: 1:5 to 1:16; width prot:width deut :: 1:1.4. Protomerite

100	100	100
100	100	100
100	100	100
100	100	100

somewhat flattened, width sometimes three times the height, generally less. Constriction at septum more or less indistinct. Deutomerite cylindrical or barrel-shaped, little wider than protomerite, ending in a broadly rounded or flattened square-cornered extremity. Endocyte very dense and brownish-yellow in deutomerite, tan in protomerite. Epimerite a small spherical hyaline knob.

Cysts yellow-orange, 300 μ in diameter, sporeducts short, ten or more in number. Spores extruded in chains, barrel-shaped, 5 x 8.

Taken at Wyncote, Pa.; Douglas Lake, Mich.; Lincoln, Nebr.; Colorado Springs, Colo.; Boulder, Colo.; Urbana, Illinois.

Hosts: *Melanoplus femoratus* (Burm.); *M. luridis* (Dodge); *M. femur-rubrum* (deGeer); *M. atlantis* (Riley) *M. atlantis*; *M. differentialis* (Uhler); *M. coloradensis* ? ; *M. angustipennis* (Dodge); *Encoptolophus sordidis* (Burm.); *Schistocerca americana* Burm.; *M. bivittatus* (Say); *Hesperotettix pratensis* Scudder; *Brachystola magna* Giard.

Location: Intestine and caeca.

This species was first described by Hall as *Hirmocystis rigidis*. He mentioned dehiscence of the cysts by rimple rupture, and he saw neither the spores nor the epimerite. The only character in common with the genus *Hirmocystis* was the simple rupture of the cysts, and this character is possessed by some thirty genera. Crawley (1907), two months later published an article

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describing a new species, *Gregarina melanopli* which proves to be the same species. He found dehiscence to be by means of numerous sporeducts. The epimerite was still unknown.

Ellis changed the name of the species to *Gregarina rigida* (Hall).

The present writer has taken the parasite from various Acrididae in material from Colorado Springs, Lincoln and Urbana.

Gregarina kingi Crawley
Fig. 193.

1907 <i>Gregarina kingi</i>	Crawley	1907:221-3
1913 <i>Gigaductus kingi</i>	Ellis	1913c:271
1915 <i>Gregarina kingi</i>	Watson	

Gregarina: Sporonts biassociative, rather stout-bodied.

Maximum length of associations 350 μ . Sporont measurements not given. Ratio--length prot:total length :: 1:3; width prot:width deut :: 1:1. Protomerite saddle-shaped, i.e. broadly dilated and nearly flattened apically, with deep constriction just below middle, dilated again less extremely below. Widest part twice the width of narrowest part. Protomerite equal in length to its greatest width, a slight constriction at septum. Deutomerite widening out rapidly from septum to shoulder, and quite regularly cylindrical from thence downward. Very broadly rounded at distal end. Nucleus spherical, small. Eⁿdocyte not dense.

Cysts spherical, 110 μ in max. diam., one sporeduct only, spores barrel-shaped, 5 x 2.75 μ in dimensions.

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(1911)

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Section header or title, possibly "The ... of ..."

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Taken at Wyncote, Pa.

Host: *Gryllus abbreviatus* Serv.

Habitat: Intestine.

Ellis placed the species in question in the genus *Gigaductus*, originally created by Crawley himself, for *G. parvus*. I have allowed the genus to drop out, removing the type species to the genus *Gregarina*, for its only differentiating character was the large single sporeduct. A discussion of the matter is found in the chapter on Coleoptera, under the species *Gregarina parva*.

Gregarina longiducta Ellis
Fig. 195.

1913 *Gregarina longiducta* Ellis 1913d:78-82

Gregarina: Sporonts biassociative, obese. Length associations 800-900. Ratio length prot:total length primate :: 1:3.5; width prot:width deut :: 1:1. Protomerite broadly rounded in front, widest through middle, twice as wide as high, and deeply constricted at septum. Deutomerite slightly broader than high, barrel-shaped, widest through middle. Very broadly rounded or flattened at posterior end. Satellite longer than primate in all associations observed. Nucleus not observed. Endocyte very dense, black. Epimerite a short digitiform process equal in length to protomerite of cephalont.

Cysts spherical, 560 in avg. diam. Sporeducts 3 to 3.5mm. in length, four in number, arranged around one pole of cyst. Spores

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discharged in chains. Cylindrical , 3 x 6.5 μ .

Taken at Douglas Lake, Mich.

Hosts: *Ceuthophilus latens* Scudder and *C. maculatus* (Say).

Habitat: Iⁿtestine.

Gregarina consobrina Ellis
Fig. 196.

1913 *Gregarina consobrina* Ellis 1913c:267

Gregarina: Sporonts biassociative, obese. Average length of sporonts 600 μ , average width 450 μ . Ratio--length prot:total length :: 1:3.5 to 1:4; width prot:width deut :: 1:1.5. Protomerite hemispherical, no constriction at septum. Deutomerite subspherical to ovoidal, nearly or quite as wide as long, broadly rounded posteriorly. Endocyte not described. Nucleus not seen. Epimerite short, simple, digitiform.

Cysts spherical, 250-300 μ in diameter. Sporeducts 4-6, all in one hemisphere, 900-1200 μ in length. Spores extruded in chains.

Cylindrical, 3.2 x 8 μ .

Taken at Boulder, Colo.

Host: *Ceuthophilus valgas* Scudder.

Habitat: Intestine.

Gregarina illinensis n.sp.
Fig. 207.

Host *Ischnoptera pennsylvanica* (deGeer).

The species was taken at Urbana, Illinois in November 1914. The intestine of one field cockroach was found to contain

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Department of Chemistry
Chicago, Illinois

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I have the pleasure to inform you that your application for admission to the Ph.D. program in Chemistry for the fall semester has been approved. You will receive a letter from the Registrar regarding the registration process and the required documents.

Very truly yours,
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Yours sincerely,
[Signature]

Enclosed are the necessary forms and information.

Very truly yours,
[Signature]

twenty-five associations. A dozen or more immature specimens of the cockroach were collected at various times throughout the fall but only this one was infected.

The sporonts are biassociative and elongate-cylindrical in shape. The maximum length of an association seen was 1110 μ , length of the primate being 540 μ , its width 180 μ . Ratio length prot:total length primate :: 1:5; width prot:width deut :: 1:1.1 to 1:1.5. The protomerite of the primate is dome-shaped, the width equalling the height. The widest part of the primate is the middle portion. There is a constriction, not very deep, at the septum. The protomerite of the satellite is rectangular in shape, 1.5 times as wide as high and depressed at the anterior end into which concavity the primate fits. The deutomerite is regularly cylindrical, elongate and well rounded at the posterior end. The nucleus is large and spherical, and contains many small chromidia. The endocyte is dense in both protomerite and deutomerite and is black in transmitted light. The nucleus is not visible in vivo.

Cephalonts and cysts were not recovered from the host.

A table of measurements follows:

Total length association	1.110	1.110	1.080	1.050 mm.
Primate:				
Length protomerite	.10	.10	.10	.09
Length deutomerite	.45	.45	.44	.41
Width protomerite	.13	.13	.11	.11
Width deutomerite	.17	.18	.18	.17
Total length sporont	.55	.55	.54	.50

Ratio <u>length prot</u>				
total length	1:5.5	1:5.5	1:5.4	1:5.5
Ratio <u>width prot</u>				
width deut	1:1.3	1:1.4	1:1.7	1:1.5
Satellite:				
Length protomerite	.07	.13	.08	.07
Length deutomerite	.53	.43	.44	.48
Width protomerite	.13	.13	.13	.12
Width deutomerite	.19	.21	.17	.13
Total length sporont.	.56	.56	.52	.55
Ratio <u>length prot</u>				
total length	1:8	1:4.3	1:6.5	1:8
Ratio <u>width prot</u>				
width deut	1:1.5	1:1.6	1:1.3	1:1.5

This species and the old-world *Gregarina blattarum* Siebold, of *Blatta orientalis* are differentiated as follows:

	<i>G. blattarum</i>	<i>G. illinensis</i>
Shape	Irreg. cylindr.	Very regularly cylindr.
Posterior end of satellite	Not well rounded, often pointed	Well rounded always
Sarcocyte	Very thick	Thin except in prot.
Shape of prot. of sat.	Flattened, wider at base than elsewhere, 1.7 x as wide as at top. 2½ x as wide as high.	But slightly flattened, as wide at base as at top, 1½ x as wide as high.

In the following characteristics, the two species agree:

Ratio <u>length prot</u>		
total length primitive	1:5	1:5
Ratio <u>length prot</u>		
total length satellite	1:8	1:8
Shape prot. of primitive	Hemispherical	Hemispherical
Nucleus	Spherical	Spherical

Thus, on the strength of the shape of the posterior end of the body, shape of the satellite, and in the matter of regularity of shape of the body, there is basis for the creation of a new species, although in one important factor, proportions, the two species agree. There are no measurements stated for the

old-world species by any of the numerous workers. Schneider says

"- - elle devient très-volumineuse"

which indicates that the species may be as large as the one here described. The species described by Leidy (1853:239) from *Blatta orientalis* agrees in size with both species. His drawings indicate an irregularly shaped body and a more or less sharply pointed posterior extremity and the hosts he dissected were probably the introduced European cockroach and the gregarine the old-world *G. blattarum*.

Crawley records (1903:44) the species *G. blattarum* as

"Common in *Periplaneta orientalis*, *P. americana* and *Ectobia (Blatta) germanica*. A few specimens of *Ischnoptera pennsylvanica*, the field cockroach, were examined, but none contained gregarines."

These hosts undoubtedly yielded the same parasites which Leidy also had found at Philadelphia.

Ellis (1913a:83) says

"This gregarine was found in several specimens of the native roach *Ischnoptera pennsylvanica* from the woods near Douglas Lake. - - Although no introduced roaches have been collected in the vicinity ---, this gregarine from native roaches seems undoubted the typical *G. blattarum*, agreeing in spores, cysts and sporonts with that species. The biological question of interest is, of course, the source of infection of these native roaches: - - ; it is possible however, that *G. blattarum* is established in the native roaches in the new world. - - -both Frenzel and Magalhaes found the native roaches to be infected with gregarines other than *G. blattarum* - - -."

In his *Syllabus* (1913c:265) Ellis gives measurements which coincide fairly well with those recorded above in the table. The

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maximum length of a sporont he states is 520 μ , while that of the above species is 560 μ . Ellis says

"Cysts prolate spheroids, average 450 x 900 μ - - -, spore-ducts 10 or more, reaching the length of 200 μ ; sporocysts barrel-shaped, 4 x 8 μ ."

Ellis' drawing differs somewhat in shape from that of any specimen seen by the present writer (ratio length prot:total length primitive in the former 1:3.3; in the latter 1:5) but this is not sufficient to constitute a new species as it is the only difference in the two. It is highly probable that but one species is involved. Ellis' specimens were taken from *Ischnoptera pennsylvanica* (deGeer), at Douglas Lake, Mich.

Hall (1907) makes the simple statement that *Periplaneta americana* contains *Gregarina blattarum*. I have no reason to doubt its presence.

It is noted that the terms *Blatta orientalis* and *Periplaneta o.* are used interchangeably by various authors, the name now accepted being *Blatta orientalis* L.

Gregarina galliveri n.sp.

Fig. 205.

Host *Gryllus abbreviatus* Serv.

This species was taken at Oyster Bay, Long Island, N.Y. in August, 1914. The parasite lives in the intestine of the host. The species is rare, seen only twice in a hundred or more crickets opened, sixty-five associations and five cysts being found

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Fifth line of faint text, possibly a list item or a specific point.

Sixth line of faint text, continuing the narrative or list.

Seventh line of faint text, showing a transition or a new section.

Eighth line of faint text, possibly a concluding sentence for a section.

Ninth line of faint text, appearing to be a signature or a name.

Tenth line of faint text, possibly a date or a reference.

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in one host and a dozen associations in another. In the former ¹⁷⁵ instance, nearly all the associations were engaged in cyst-making.

The sporonts are biassociative, even to the smallest seen. The maximum length of an association seen was 590, the maximum width 180. The animals are quite polymorphic but certain generalizations can be made. The protomerite of the primate is always wider than the deutomerite. Measurements indicate that it is but little wider, but the difference seems much greater because the two places of greatest width, those used in measurements, are widely separated. The protomerite is low and broad, either flat or very slightly rounded at the anterior end and from two to four times as wide as high, the average being three. Its widest part is the middle portion where it is approximately one and one-half times as wide as the septum. The protomerite of the satellite is considerably narrower than that of the primate. It is greatly flattened and from two to four times as wide as high. The deutomerite of the primate is constricted a little just below the septum, widening out below the middle where it attains nearly the measured width of the protomerite. In some instances it is nearly cylindrical. The deutomerite of the satellite is irregularly subglobular to broadly ellipsoidal in shape and is of approximately the same width as the protomerite of the primate. The ratio of length prot: total length primate (for twelve asso-

The first part of the report deals with the general situation of the country and the progress of the work done during the year. It then goes on to discuss the various departments and the work done in each of them. The report concludes with a summary of the work done and a statement of the progress made.

The second part of the report deals with the financial statement of the year. It shows the income and expenditure of the various departments and the total income and expenditure of the country. It also shows the balance of the various departments and the total balance of the country.

The third part of the report deals with the work done in the various departments. It discusses the work done in the departments of Agriculture, Education, Health, and Social Welfare. It also discusses the work done in the departments of Finance, Home Affairs, and Foreign Affairs.

The fourth part of the report deals with the work done in the various departments. It discusses the work done in the departments of Agriculture, Education, Health, and Social Welfare. It also discusses the work done in the departments of Finance, Home Affairs, and Foreign Affairs.

The fifth part of the report deals with the work done in the various departments. It discusses the work done in the departments of Agriculture, Education, Health, and Social Welfare. It also discusses the work done in the departments of Finance, Home Affairs, and Foreign Affairs.

ciations) remains nearly constant and is approximately the same in the satellite as in the primitive, being 1:5. The ratio of width prot:width deut primitive is approximately 1.3 to 1; in the satellite it is 1:1.4.

The endocyte is very dense in both protomerite and deutomerite, and brown in color, not black as in so many species. The protomerite granules are much larger than those in the other species seen in the same host. The nucleus is small and spherical. It is not visible in vivo except in young individuals.

Upon carefully flattening out the association on the slide, by slight pressure, it was rendered translucent enough to make visible a large inflated papilla on the anterior end of the satellite which fits into a corresponding depression in the primitive and makes the union firmer. This was well demonstrated in some specimens from a starved host in which the protoplasm of the parasite was pale tan throughout and both the papilla and the nuclei were clearly visible.

The trophozoites possess a knob-shaped hyaline epimerite.

Cysts are 300-350¹ in diameter¹, very dense like the sporonts and deep brown in color. In one cricket, as stated above, almost all the associations were engaged in making cysts. Two such processes were watched from the incipiency to the complet-

1. The diameter, exclusive of the transparent layer is 50 less.

tion of the two cysts and took place in less than half an hour.

At 11 A.M., five cysts were present on another slide, and at 2 P.M. there were seven. Several of the cysts which when first observed were sporonts developed to completion with the exudation of ripe spores. The maximum number of sporeducts seen on a cyst was nine. The ducts are very long. The spores are barrel-shaped, 3 x 6 μ .

It was anticipated that this species was identical with Crawley's *Gregarina kingi* because of the peculiarly shaped protomerite of that species, but such was found not to be the case; they differ in many respects. The following table indicates the chief differences:

	<i>G. galliveri</i>	<i>G. kingi</i>
Max. length of ass'n	590 μ	350 μ
Ratio <u>length prot</u> total length primite	1:5	1:3
Ratio <u>width prot</u> width deut	1:0.8	1:1.1
Shape prot of primite	Broad and flat, irregular, 3 x as wide as high.	"Saddle-shaped, broad shape slightly and swollen in front, much narrower behind." Narrower than deut. Wider than deut.
Shape prot of satellite	Flattened, 4 x as wide as high	"Subspherical to compressed", twice as wide as high.
Shape deut of primite	Constricted below septum, dilated below and widest in posterior 2/3.	"Cylindr. generally broader in front. Outline often irregular."
Shape deut of satellite	Subspherical to broadly ovate	
Nucleus	Spher, small	Spher, small
Endocyte	Very dense, deep brown in both	"Not dense".

	prot and deut.	"Not dense."
Anterior surface of sat.	Provided with a very large, flattened papilla which fits into a corresponding depression in primite	Shows a slightly raised ring, primite fitting into a very shallow saucer on anterior end of satellite
Cysts, diam.	350 μ	90-110 μ
Dehiscence	Many sporeducts	Single long sporeduct
Frequency	Rare, not more than one cricket in 50 harboring it	85% of crickets opened contained these parasites in countless numbers

No other allied species has been described from crickets.

Measurements of a few associations are as follows:

Total length association	.590	.570	.540	.490	.440 mm.
Primite:					
Length protomerite	.06	.07	.06	.06	.04
Length deutomerite	.23	.20	.21	.21	.19
Width protomerite	.15	.14	.15	.15	.10
Total length sporont	.29	.27	.27	.27	.23
Ratio <u>length prot</u> total length	1:5	1:4	1:4.5	1:4.5	1:5.7
Ratio <u>width prot</u> width deut	1:1.1	1:1	1:1.1	1:1	1.4:1
Satellite:					
Length protomerite	.05	.05	.05	.04	.05
Length deutomerite	.25	.25	.22	.18	.17
Width protomerite	.11	.13	.14	.12	.09
Width deutomerite	.15	.18	.18	.17	.12
Total length sporont	.30	.30	.27	.22	.21
Ratio <u>length prot</u> total length	1:6	1:6	1:5.4	1:5.5	1:4.2
Ratio <u>width prot</u> width deut	1:1.3	1:1.4	1:1.3	1:1.4	1:1.3
Diameter cysts	.350	.300	.350		

Gregarina stygia n. sp.

Fig. 206

This new species was taken from *Ceuthophilus stygius* (Scudder) from hosts found in an unused cistern on Dr. Davenport's grounds, at Cold Spring Harbor, Long Island, N.Y.

The infection was heavy, as many as five hundred parasites being found in each of several hosts, and all of the twelve hosts examined contained each at least a few parasites. The region infected is the intestine.

The sporonts are biassociative as adults. The longest association measured 360μ . The sporonts are barrel-shaped, the maximum length recorded being 180μ and the maximum width 100μ . The protomerite is nearly hemispherical in the primitive and is flattened in the satellite. The deutomerite is widest at or in front of the middle portion. The satellite is somewhat more slender than the primitive and of the same length of a little shorter. The endocyte is dark tan in color, not being very dense in either deutomerite or protomerite, and the nucleus is easily visible in vivo. The sarcocyte is thicker at the septum and anterior ends of the protomerites than elsewhere, but it is fairly thick throughout. The nucleus is small and spherical and contains one or more large karyosomes.

Sections show that the cephalont possesses a simple knobbed epimerite, slightly stalked. The sporozoite is spindle-shaped and contains a large nucleus. Several sporozoites were

(8) The first part of the document is a list of names.

The names are listed in alphabetical order.

The list includes the following names:

- 1. Mr. John Doe
- 2. Mr. James Smith
- 3. Mr. Robert Brown
- 4. Mr. William Jones
- 5. Mr. Charles White
- 6. Mr. Thomas Green
- 7. Mr. Richard Black
- 8. Mr. Daniel Hill
- 9. Mr. Matthew King
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- 7. Mr. Richard Black
- 8. Mr. Daniel Hill
- 9. Mr. Matthew King
- 10. Mr. Christopher Lee

seen in the sectioned intestine free in the lumen or lying contiguous to the epithelial wall.

Movement is sluggish and of the ordinary two types, gliding and contortive.

Cysts average 150 in diameter. Dehiscence was not observed.

This species is not identical with Gregarina longiducta Ellis/ from Ceuthophilus latens and C. maculatus. Associations of the latter average 800-900 in length, the smallest observed being 465 long. Large associations of G. stygia are only 360 in length. Proportions vary as well as lengths.

The species differs from G. consobrina Ellis (1913a: 267) in size. Sporonts of the latter species attain a length of 600, those of C. stygia not becoming longer than 180.

No other species is recorded from the genus Ceuthophilus.

A table of measurements is appended herewith:

Total length association	.360	.330	.300 mm.
Primate:			
Length protomerite	.03	.02	.03
Length deutomerite	.15	.14	.12
Width protomerite	.06	.04	.055
Width deutomerite	.10	.10	.08
Total length sporont	.18	.16	.15
Ratio <u>length prot</u>			
total length	1:6	1:8	1:5
Ratio <u>width prot</u>			
width deut	1:1.6	.1:2.5	1:1.5
Satellite:			
Length protomerite	.02	.025	.03
Length deutomerite	.16	.145	.12

Width protomerite	.06	.05	.07
Width deutomerite	.08	.06	.08
Total length sporont	.18	.17	.15
Ratio <u>length prot</u> total length	1:9	1:7	1:5
Ratio <u>width prot</u> width deut	1:1.3	1:1.2	1:1.1

Gregarina nigra n. sp.

Fig. 210.

Hosts *Melanoplus femur-rubrum* (deGeer); *Encyrtoblophus sordidis* (Burm.).

This parasite seems to be present only as a secondary one. It never occurs in large numbers but is generally found in the same host with *Gregarina rigida*. During the season of 1913 I found the parasite comparatively frequently, but not over half a dozen Acrididae yielded the species in the collections made in the fall of 1914. It is easily differentiated from the more commonly found species in both color and shape especially of the protomerite. It was collected at Urbana, Illinois.

The maximum length of an association found was 1000 μ . The ratios of various parts of the body are about the same as those for *G. rigida*. The shape of the body is, however, quite different. The protomerite is shaped like a truncated cone; it is widest at the base, flattened on the top and square-cornared. It is approximately as high as wide at the base; there is no constriction or only a very slight one at the septum. A slight indentation persists at the apex of the pro-

10.	10.	10.	Ratio 10000000
10.	10.	10.	Ratio 10000000
10.	10.	10.	Ratio 10000000
10.	10.	10.	Ratio 10000000
10.	10.	10.	Ratio 10000000
10.	10.	10.	Ratio 10000000
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10.	10.	10.	Ratio 10000000
10.	10.	10.	Ratio 10000000
10.	10.	10.	Ratio 10000000

OPERATION OF THE
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(10000).

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one. It is very good in many respects but is
the way that the material is. The amount of
I found the material to be very good, but not
a large amount of material in the collection
the fall of 1911. It is really different from
commonly found species in both color and shape
the specimens. It was collected at Brown, Illinois.
The material is in the form of a
The entire material is in the form of a
those for 10000. The amount of the material is
different. The material is in the form of a
it is placed in the box. The material is in the
collected. It is approximately in the form of
there is no comparison to any other material of the
specimens. It is in the form of a

tomerite left by the detachment of the knob-like epimerite. The deutomerite is cylindrical, of the same width throughout and very little wider than the protomerite. It terminates in a broadly rounded extremity. The protomerite of the satellite is often not at all flattened but is a little shorter than that of the primite and of approximately the same shape.

The endocyte of the deutomerite is very opaque and dense, being black in transmitted light. The protomerite is somewhat less dense than the deutomerite. The nucleus is not visible in vivo. It is spherical, in diameter about one-third the width of the deutomerite and contains many karyosomes. The epicyte is thick at the anterior end of the protomerite, being thin elsewhere.

I have not been able to differentiate the cysts of this species (if present in my collections) from those of *G. rigida*. The size would be about the same, judging from the size of the associations. I have never seen an infection in which this species alone was present so have no way of knowing exactly which species yielded the cysts found when both species were present. In the instance of every cyst from Acrididae which I have watched develop, sporeducts grew from small orange-colored discs on the surface. The sporeducts were always short and the spores doliform.

A table of measurements follows:

Total length association	.990	.880	1.000	millimeters
Primate:				
Length protomerite	.14	.15	.15	.14
Length deutomerite	.39	.29	.38	.44
Width protomerite	.12	.13	.14	.13
Width deutomerite	.15	.17	.18	.15
Total length sporont	.53	.44	.53	.58
Ratio <u>length prot</u> total length	1:3.8	1:3	1:3.5	1:4
Ratio <u>width prot</u> width deut	1:1.2	1:1.4	1:1.3	1:1.1
Satellite:				
Length protomerite	.11	.10	.09	
Length deutomerite	.35	.34	.38	
Width protomerite	.11	.12	.13	
Width deutomerite	.17	.15	.16	
Total length sporont	.46	.44	.47	
Ratio <u>length prot</u> total length	1:4.2	1:4.4	1:5.2	
Ratio <u>width prot</u> width deut	1:1.5	1:1.2	1:1.2	

Leidyiana solitaria n.g., n.sp.

Fig. 208, 218-55.

Host *Gryllus abbreviatus* Serv. and *Gryllus pennsylvanica* Burm.

The parasites were taken at Cold Spring Harbor and Oyster Bay, Long Island, N.Y., Haverford, Pa., and at Urbana, Ill., during the summer and fall of 1914.

The intestine is the seat of infection, although the pyloric caeca is not infrequently found to contain parasites. The latter are generally present in small or moderate numbers, from 1 to 25 per host, and nearly every cricket examined at this season was parasitised. Sometimes the number per host runs up to 100 or more, but this is rare.

The parasites are solitary, never associative in the

Year	1951	1952	1953	1954	1955
White	1.0	1.1	1.2	1.3	1.4
Black	1.5	1.6	1.7	1.8	1.9
Other	1.2	1.3	1.4	1.5	1.6
Total	3.7	3.9	4.1	4.3	4.5
Ratio	1:1.1	1:1.2	1:1.3	1:1.4	1:1.5
White	1.0	1.1	1.2	1.3	1.4
Black	1.5	1.6	1.7	1.8	1.9
Other	1.2	1.3	1.4	1.5	1.6
Total	3.7	3.9	4.1	4.3	4.5
Ratio	1:1.1	1:1.2	1:1.3	1:1.4	1:1.5

Lithium sulfate
 100% pure

The following table shows the results of the analysis of the samples taken at the various points during the period from 1951 to 1955. The samples were taken at the following points: 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 8.0, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 10.0.

normal sporont life. The maximum recorded length is 500 μ , the maximum width 160 μ . The ratio of length prot:total length for fifteen specimens is 1:5 to 1:7. The ratio width prot:width deut is 1:1.3 to 1:1.7. The protomerite is slightly wider than high. It is broadly cone-shaped dilated in the middle and constricted at the septum. The constriction is very conspicuous in the young individuals and fairly deep in the adults. There is no papilla at the anterior end. The deutomerite is cylindrical to elongate-ellipsoidal, sometimes tapering but always rounded at the postdrior extremity. (Figs. 218, 21.)

The endocyte is very dense and black in the deutomerite (in transmitted light) and pale tan in the protomerite, the two parts being sharply contrasted. Longitudinal striations are easily discernible with the aid of an intra vitam stain or after crushing the body and releasing the dense endocyte. (Fig. 243) The nucleus is spherical and contains one or two small karyosomes. It is not visible in the dense adults, but is seen in vivo in the younger sporonts and in the trophozoites.

The epimerite is a large simple spherical hyaline knob set upon a short slender stalk. (Figs. 224-7). The sarcocyte is very distinctly visible in contrast to the contiguous black endocyte. It is thin and of even width throughout.

Trophozoites with epimerites are common, both free in the lumen and attached to the cells of the intestine. They are

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... ..

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The ... is ... and ... value ... and ...

The ... and ...

transparent or nearly so. Some individuals are surprisingly large. 185

Cysts average 350μ in over-all diameter, the transparent envelope being about 30μ in thickness when the cyst is new. Dehiscence is by sporeducts from one to twelve or more in number. Spores are extruded from the long ducts in chains. The spores are barrel-shaped and measure $3 \times 6\mu$.

This species was described by Crawley (1903a:45) as *Gregarina achetaeabbreviatae* Leidy and later as *Stenophora erratica*. Crawley first considered the species identical with Leidy's *Gregarina achetaeabbreviatae* from the same host but later created for it a new species because

"- - -at the anterior tip of the protomerite the ectosarc is often thickened to form a low papilla, within which are traces of a pore." (1907:221)

It is this character which led him to place the gregarine in the genus *Stenophora*. He adds

"The suggestion is permissible that this form is actually the common *Stenophora julipusilli* Leidy, somewhat altered from being in the wrong host - - -".

The suggestion that the species belongs to the family Stenophoridae is excluded when we consider the method of cyst-dehiscence, which is that characteristic of the family Gregarinidae rather than that of the Stenophoridae.

The sarcocyte at the anterior end of the protomerite is often thickened and papillate but I have not seen a trace of a pore.

1911.

These specimens are in some-what imperfect condition, but they are nevertheless of great value. The material is of considerable size and is well preserved. It is found in the same place as the other specimens. The same are found in the same place as the other specimens.

This species was described by Darwin (1845) as *...* Darwin first described the species in 1845. It is a very common species. It is a very common species. It is a very common species.

"... as the nature of the specimen is different. It is often followed by a few small, white, granular spots." (1845)

It is this species that I have seen in the same place as the other specimens. It is a very common species. It is a very common species.

"The specimen is very similar to the one I have seen in the same place as the other specimens. It is a very common species. It is a very common species."

The specimen that the species refers to the same place as the other specimens. It is a very common species. It is a very common species. It is a very common species.

The nature of the specimen and of the process of its development and growth. I have not seen a trace of it.

I wish to thank Mr. Elmer Shafer, of Haverford College, for so kindly sending me live crickets which contained this parasite and established the record in the region of Philadelphia.

A table of measurements follows:

Length sporont	.50	.49	.47	.42	.37	.29 mm.
Length protomerite	.08	.07	.08	.06	.06	.05 prot.with- out epim. .03 epimerite
Width protomerite	.11	.15	.08	.08	.08	.05
Width deutomerite	.15	.15	.16	.14	.13	.06
Ratio <u>length prot</u> total length	1:6.3	1:7	1:6	1:7	1:6.1	1:6
Ratio <u>width prot</u> width deut	1:1.3	1:1.7	1:2	1:1.7	1:1.6	1:1.2

Leidyiana gryllorum (Cuenot) Watson
Fig. 209.

1897 <i>Clepsidrina gryllorum</i>	Cuenot	1897:52-54
1899 <i>Gregarina macrocephala</i>	Labbe	1899:10
1901 <i>Gregarina Gryllorum</i>	Cuenot	1901:594-5
1915 <i>Leidyiana gryllorum</i>	Watson	

Leidyiana: Sporonts solitary, never associative, cylindrical. Length 420 μ . Ratio--length prot:total length :: 1:5; width prot:width deut :: 1:1.1. Protomerite subspherical, a deep constriction at septum. Deutomerite cylindrical, conical at end. Epimerite globular, nucleus small, spherical. Cysts spherical or ovoidal, 190-240 μ in diameter. Sporeducts 3-8. Spores barrel-shaped, 7 μ in longest axis.

Taken in the Departments of Ardennes and Meurthe-et-Moselle, France.

Host: *Gryllus domesticus* (L.).

Labbe' placed this species which had been mentioned but not described by Cuénot as a synonym of *Gregarina macrocephala* Schneider, which is only known from the cephalont.

Cuénot (1901) says regarding the disposition of the species

"Labbe' - - -l'a réunit de son propre chef à la *G. macrocephala* A. Schn.; or, cette dernière espèce est trop mal connue pour qu'il y ait quelque avantage à l'identifier à la mienne; le grand épimérite en forme de massue de '*macrocephala*' n'est certainement pas pareil à celui de '*gryllorum*.'

In a footnote he says

"Schneider ne décrit pas la forme adulte et ne parle pas du nombre de sporeductes des kystes."

Therefore the species has an individuality. It is very similar to the species described under a new genus, *Leidyiana solitaria*. Both are solitary, size of the two are very nearly the same, ratios of various parts not radically different and shape of the deutomerite quite similar. The cysts are slightly smaller than in the new species, but they dehisce by approximately the same number of sporeducts and the spores are similar. The epimerites of the two species are spherical and large. The nuclei are spherical. The only difference seems to be in the shape of the protomerite. In all the hundreds of specimens seen of *L. solitaria*, none has possessed a protomerite rounded at the anterior end; all have been decidedly conical at the apex. In the present species, the protomerite is broadly rounded--sub-spherical--in shape; the constriction at the septum is consider-

ably deeper than in the other species. I have separated the two on the basis of this character alone, deeming it of sufficient import to differentiate the species. Both species are parasites of the genus *Gryllus*, but of different species. The host of the former, *Gryllus domesticus*, flourishes in the old world and is rare in the United States, having formerly been found about old log houses--the former occupants of which undoubtedly introduced it from Europe. (Blatchley). The host of *Leidyana solitaria*, *Gryllus abbreviatus*, is the common field cricket in the United States. The infection is unlikely to have spread from the one host to the other.

Hyalospora roscoviana Schneider

For detailed synopsis and discussion of this species, see the chapter on Coleopteran parasites, under the same species name. The host is *Petrobius matitimus*, but as the genus *Petrobius* has been described for both Coleoptera and Orthoptera, it is impossible to state whether the host was a beetle or an orthopteran.

Hyalospora affinis Schneider

Fig. 201.

1882 <i>Hyalospora affinis</i>	Schneider	1882:445-6
1899 <i>Hyalospora affinis</i>	Labbé	1899:14

Hyalospora: Sporonts biassociative, slender and elongate. Length of cephalonts 300. Sporont measurements not

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given. Ratio length prot:total length primate :: 1:5 (without epimerite). Ratio width prot:width deut :: 1:1.8. Endocyte yellow. Epimerite a hyaline sessile knob, present on the primate of an association in the figure given (Fig. 201). Nucleus ellipsoidal, with one or two karyosomes.

Cysts spherical or subspherical, yellow in color, 60 in diam.

Spores 8.7 x 6 .

Taken at Rosfoc, France.

Host: *Machilus cylindrica* E. Geoff.

Habitat: Intestine.

Schneider's figure is a paradox. It shows an association, the primate of which is a cephalont, with an epimerite. This condition is almost unique in the history of gregarines, for it is an unwritten law that only sporonts couple themselves together.

Gamocystis tenax Schneider
Fig. 202.

1875 <i>Gamocystis tenax</i>	Schneider	1875:586-7
1899 <i>Gamocystis tenax</i>	Labbe	1899:12
1913 <i>Gamocystis tenax</i>	Ellis	1913e:271

Gamocystis: Sporonts biassociative, in apposition, head to head; obese. No protomerite in the sporonts. Body ovoidal to subconical, posterior extremity rounded, nucleus spherical with one karyosome. Endocyte with large irregular granules. Cysts spherical, sporulation partial, sporeducts 15 or more,

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Geographic names of the ...
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1875	Geographic name	1875	Geographic name
1880	Geographic name	1880	Geographic name
1885	Geographic name	1885	Geographic name

Geographic names of the ...
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short, extending only into the thick transparent layer of the cyst. Spores elongate-cylindrical, rounded at the ends.

Taken at Roscoff, France.

Host: *Blatella lapponica* (*Ectobia lapponica* (L.)); *Blatta lapponica*).

Habitat: Intestine.

Hirmocystis gryllotalpa (Léger) Labbé
Fig. 211.

1892 *Eirmocystis gryllotalpae* Léger 1892:112
1899 *Hirmocystis gryllotalpae* Labbé 1899:13

Hirmocystis: Sporonts in associations of two or three.

Length of sporonts 80-90 μ . Protomerite subspherical. Cysts spherical, 60 μ in diameter. Spores elongate-ovoidal, 5 x 2.1 μ .

Taken at Poitou, France.

Host: *Gryllotalpa gryllotalpa* (L.) (*G. vulgaris*).

Habitat: Intestine.

Léger and Labbé include here, as a synonym, *Gregarina sphaerulosa* Dufour (1837:12), probably on the strength of the fact that the latter was found in the same host-genus.

At the end of the chapter will be found a statement that Dufour's *G. sphaerulosa* was described from cysts instead of from sporonts. Dufour did not know the mode of reproduction of the little animals he had discovered a few years previous and looked upon the white spherules as a new species. It is interesting to note that he described cysts from two unallied hosts and he found enough differences between the cysts to designate them

1907. *Journal of the Royal Microscopical Society*, vol. 27, p. 100.
1908. *Journal of the Royal Microscopical Society*, vol. 28, p. 100.
1909. *Journal of the Royal Microscopical Society*, vol. 29, p. 100.

1910. *Journal of the Royal Microscopical Society*, vol. 30, p. 100.
1911. *Journal of the Royal Microscopical Society*, vol. 31, p. 100.

1912. *Journal of the Royal Microscopical Society*, vol. 32, p. 100.
1913. *Journal of the Royal Microscopical Society*, vol. 33, p. 100.

1914. *Journal of the Royal Microscopical Society*, vol. 34, p. 100.
1915. *Journal of the Royal Microscopical Society*, vol. 35, p. 100.

1916. *Journal of the Royal Microscopical Society*, vol. 36, p. 100.
1917. *Journal of the Royal Microscopical Society*, vol. 37, p. 100.

1918. *Journal of the Royal Microscopical Society*, vol. 38, p. 100.
1919. *Journal of the Royal Microscopical Society*, vol. 39, p. 100.
1920. *Journal of the Royal Microscopical Society*, vol. 40, p. 100.
1921. *Journal of the Royal Microscopical Society*, vol. 41, p. 100.
1922. *Journal of the Royal Microscopical Society*, vol. 42, p. 100.
1923. *Journal of the Royal Microscopical Society*, vol. 43, p. 100.
1924. *Journal of the Royal Microscopical Society*, vol. 44, p. 100.
1925. *Journal of the Royal Microscopical Society*, vol. 45, p. 100.
1926. *Journal of the Royal Microscopical Society*, vol. 46, p. 100.
1927. *Journal of the Royal Microscopical Society*, vol. 47, p. 100.
1928. *Journal of the Royal Microscopical Society*, vol. 48, p. 100.
1929. *Journal of the Royal Microscopical Society*, vol. 49, p. 100.
1930. *Journal of the Royal Microscopical Society*, vol. 50, p. 100.

as two separate species.

Pileocephalus blaberae Frenzel
Figs. 203 and 204.

1892 <i>Gregarina blaberae</i>	Frenzel	1892:300-14
1899 <i>Pileocephalus blaberae</i>	Labbé	1899:
1913 <i>Gregarina blaberae</i>	Ellis	1913c:266

Pileocephalus: Sporonts solitary, rather stout-bodied.

Length of sporonts 500 μ , width 150 μ . Ratio--length prot:total length :: 1:5; width prot:width deut :: 1:1.6. Protomerite hemispherical to subglobular, 1.4 times as wide as high, very deeply constricted at septum. Deutomerite ovoidal, widest through central portion or just in front thereof, rounded at posterior end. Nucleus spherical, with one karyosome. Epimerite long, cordiform, dilated at the base into a flattened sphere which is over half the width of the protomerite in its width. Epimerite equal in length to half the whole cephalont length (without the epimerite).

Cyst and spores not known.

Taken at Cordoba, Argentina.

Host: *Blabera claraziana* Sauss. and related species.

Ellis replaced this species in the genus *Gregarina* although the only known diagnostic character, the epimerite, does not coincide with that of the genus. This structure does, however, agree in shape with that of the genus *Pileocephalus* Schneider (1875:591) and Labbé (1899:19):

"Epimerite regulier simple conoide ou en fer de lance." L.

PLANTAS DE LA SIERRA DE GUANAJAY
(Las 21 y 22)

1882:100-1	Trinidad	1882 Guayana Francesa
1889:	Jamaica	1889 Guayana Francesa
1897:100	Trinidad	1897 Guayana Francesa

El presente trabajo tiene por objeto describir y clasificar las plantas de la Sierra de Guanajay, en las provincias de Cienfuegos y Matanzas, que se encuentran en las montañas de esta zona. El estudio se basó en las colecciones de las herbarios de la Universidad de la Habana y en las expediciones realizadas en el año 1900. Se describen 100 especies, algunas de ellas nuevas para la ciencia. Se acompañan fotografías de algunas de ellas.

Las plantas de la Sierra de Guanajay pertenecen a las provincias de Cienfuegos y Matanzas. Se describen 100 especies, algunas de ellas nuevas para la ciencia. Se acompañan fotografías de algunas de ellas.

Actinocephalus pachydermus (Crawley) Ellis
Figs. 189 and 190.

1853	<i>Gregarina Locusta Carolinae</i>	Leidy	1853:239
1856	Gregarina <i>Locustae Carolinae</i>	Leidy	1856:47
1859	<i>Gregarina fimbriata</i>	Diesing	1859:730
1903	<i>Stephanophora locustaecarolinae</i>	Crawley	1903a:54
1907	<i>Stephanophora pachyderma</i>	Crawley	1907:226
1913	<i>Actinocephalus pachydermus</i>	Ellis	1913c:278

Actinocephalus: Sporonts solitary, obovate. Maximum length of sporonts 500^u. Protomerite hemispherical, not constricted at septum but contour continuous with that of deutomerite. Latter tapers slightly, ending in a blunt point. Sarcocyte very thick especially over anterior end of protomerite. Endocyte black in deutomerite, less dense in protomerite. Nucleus spherical with 12 or more small karyosomes. Epimerite an inverted campanula, sessile, with 10 or more slender digitiform processes directed upwardly along the periphery.

Cyst and spores unknown.

Taken at Wyncote, Pa.

Host: *Dissosteria carolina* (L.).

Habitat: Intestine.

A cephalont of this species was first seen by Leidy in 1853. He described it and the sporonts of *Gregarina locustae-carolinae* together under the latter name.

In 1903, Crawley renamed the species *Stephanophora locustaecarolinae* from the character of the epimerite, as drawn by Leidy. Crawley did not see the species then. The error of

inclusion was discovered by Crawley from new material in 1907, and he then separated the two species, describing each in detail. The former he called *Stephanophora pachyderma*, the latter by the original name.

Ellis transferred the species in question to the genus *Actinocephalus*, where it belongs because of the character of the epimerite. The genus *Stephanophora* was distinguished by its flat cushion-like epimerite with stout broad digits rising from the periphery. The genus has now been merged with another and the name discontinued.

Indeterminate Species

Gregarina conica Dufour Fig.102.

1837	<i>Gregarina conica</i>	Dufour	1837:12
1851	<i>Gregarina conica</i>	Diesing	1851:8..
1863	<i>Gregarina conica</i>	Lankester	1863:94

Dufour's description is as follows:

"Oblongo-conica; cephalothorace subgloboso abdominis tertiam partem adaequante. Hab. Coleopterorum et Gryllorum."

In 1826, Dufour described an intestinal parasite from Coleoptera. In 1828 he named it *Conica*; in 1837 he gave as hosts the above animals and named the parasite *Gregarina conica*. The parasite is illustrated in his 1837 paper. That he had two species under consideration is obvious from his drawings, see figs. 101 and 102, one being labelled as from Coleoptera and the other from *Gryllus*. The former has a crenulate, stalked epimerite,

The former is called *Stenogramma* and the latter the original name.

Ellis transferred the species in question to the genus *Stenogramma*, where it ranks among the members of the subgenus *Stenogramma*. The genus *Stenogramma* was distinguished by the characters-like species with short light brown legs and the body. The genus has not been mentioned in the name *Stenogramma*.

Stenogramma species

Stenogramma species
1907

1907	<i>Stenogramma</i> species	1907	<i>Stenogramma</i> species
1908	<i>Stenogramma</i> species	1908	<i>Stenogramma</i> species
1909	<i>Stenogramma</i> species	1909	<i>Stenogramma</i> species

Below's description is as follows:

Stenogramma species; *Stenogramma* species; *Stenogramma* species.

In 1907, below described the species *Stenogramma* species. In 1908 he named it *Stenogramma*; in 1909 he gave it the name *Stenogramma*.

The above species and named the species *Stenogramma* species.

The species is illustrated in his 1907 paper. That he had the species under consideration is evident from his drawings, see 1907.

1907 and 1908, one species named as *Stenogramma* species and the other *Stenogramma* species. The former was a *Stenogramma* species.

the latter a simple spherical stalked one. The former figure has been homologized with several drawings by subsequent writers and represented the parasite described in the chapter on Coleopteran parasites under the name of *Actinocephalus conicus* (Dufour) Stein.

Stein described a parasite, *Actinocephalus Lucani*, from a beetle, which is identical with Dufour's drawing 7. He did not know of Dufour's paper and the previous discovery of the species, but Frantzius (1848:195) did, and mentioned Stein's *Actinocephalus Lucani* from Lucanus, leaving the original *Gregarina conica* Dufour from *Gryllus* only.

Diesing (1851) listed both *G. conica* Dufour from Coleoptera and *Gryllus* and *G. Lucani* Stein from Lucanus parallelipedus).

Lankester did likewise. After his citation, *G. conica* dropped out of the literature. It is obvious that Dufour found a parasite in Orthoptera but what it was no one can say. He did not find associations and we do not know whether he saw only the isolated cephalonts with the epimerites (which he shows in his drawing) or whether he saw sporonts which were not associative.

So the generic position of the species is doubtful. The family determination is fairly definite, from the simple spherical epimerite, but the species must be relegated to the group of the Indeterminate.

The first of these is a simple rectangular prism. The second is a cube. The third is a cylinder. The fourth is a sphere. The fifth is a cone. The sixth is a pyramid. The seventh is a frustum. The eighth is a torus. The ninth is a paraboloid. The tenth is an ellipsoid. The eleventh is a hyperboloid. The twelfth is a surface of revolution. The thirteenth is a ruled surface. The fourteenth is a developable surface. The fifteenth is a minimal surface. The sixteenth is a space-filling curve. The seventeenth is a fractal. The eighteenth is a chaotic system. The nineteenth is a complex system. The twentieth is a network.

These are the basic shapes and forms that we encounter in the world around us. They are the building blocks of geometry and physics. They are the shapes that we use to describe the world around us. They are the shapes that we use to understand the world around us. They are the shapes that we use to create the world around us.

These shapes and forms are the foundation of geometry and physics. They are the building blocks of the universe. They are the shapes that we use to describe the world around us. They are the shapes that we use to understand the world around us. They are the shapes that we use to create the world around us.

These shapes and forms are the foundation of geometry and physics. They are the building blocks of the universe. They are the shapes that we use to describe the world around us. They are the shapes that we use to understand the world around us. They are the shapes that we use to create the world around us.

Gregarina davini Léger and Duboscq
Fig. 200.

1899 *Gregarina Davini* Léger and Duboscq 1899:
xxxviii-xl

Gregarina: Sporonts not described, cephalonts alone

known. Nucleus spherical, with a large irregularly shaped karyosome. Epimerite large and spherical, set upon a rather long stout collar formed by a projection of the anterior end of the protomerite.

Cysts spherical, with 12 or more long sporeducts from which spores are extruded in chains. Spores barrel-shaped, 8 μ long.

Taken at Marseilles, France.

Host: *Gryllomorpha dalmatina* Ocsk.

Habitat: Intestine and caecum.

Although sporonts have not been found, the species is undoubtedly a member of the genus *Gregarina* from the mode of dehiscence and the shape of the epimerite. It cannot be determined whether or not the species has been described elsewhere from the sporont in addition to these other factors under a different name. Until sporonts are found and correlated with the description herewith, the species must remain incomplete.

Miscellaneous

1837	<i>Gregarina sphaerulosa</i>	Dufour	1837:12	Fig. 179.
1851	<i>Gregarina sphaerulosa</i>	Diesing	1851:11	
1863	<i>Gregarina sphaerulosa</i>	Lankester	1863:94	
1899	<i>Hirmocystis gryllotalpae</i>	Labbé	1899:13	

Dufour described this form as follows:

THE UNIVERSITY OF CHICAGO

1911

Department of Geology

Chicago, Illinois

Dear Sir:

I have the honor to acknowledge the receipt of your letter of the 10th inst.

concerning

the matter of the

and in reply to inform you that the same has been forwarded to the

proper authorities for their consideration.

I am, Sir, very respectfully,

Yours very truly,

W. H. Diller

Assistant Professor of Geology

Department of Geology

University of Chicago

Chicago, Illinois

Very truly yours,

W. H. Diller

Enclosures

- 1000 University of Chicago
- 1001 University of Chicago
- 1002 University of Chicago
- 1003 University of Chicago
- 1004 University of Chicago

Very truly yours,

"Subspherica alba, cephalothorace abdomen adaequanta. Hab. in ventriculo Aedipodarum et Gryllotalpae.

Elle est - - - églant à peine la grosseur d'une tête de fine épingle à insectes; - - -. Les individus bien adultes semblent résulter de l'union de deux hémisphères. Des yeux peu rigoureux pourraient croire que ce sont deux individus accouplés bout à bout."

It is obvious from the description and from the figure that what Dufour saw and named were not sporonts but cysts formed by the union of two equal or sub-equal sporonts. None of his other descriptions of sporonts applies to the particular species of Orthoptera from which these cysts were taken, so no sporonts, but only cysts, must have been present in the host. Dufour did not, as might have been the case, describe the cysts and sporonts in the same host as separate species. These cysts were taken from *Oedipoda coerulea* and from *Gryllotalpa* sp.

Frantzius did not mention the 'species,' probably realizing the error. Diesing mentioned the 'species' and the host. Lankester did likewise. Labbé mentioned it as a synonym of *Hirmocystis gryllotalpae* (Léger) Labbé, probably from an identity of host genera and certainly not because of any similarity in appearance.

Fig. 180.

1837	<i>Gregarina soror</i>	Dufour	1837:12
1851	<i>Gregarina soror</i>	Diesing	1851:11
1863	<i>Gregarina soror</i>	Lankester	1863:94
1899	<i>Gregarina soror</i>	Labbé	1899:34

Just as in the instance above, Dufour has here described cysts instead of sporonts. His words are as follows:

"Subspherica alba, cephalothorace abdominis dimidiam partem adaequante."

"Celle-ci n'est peut-être qu'une variété de la précédente; mais le céphalothorace ne forme pas, comme dans cette dernière, la moitié de tout le corps."

The cyst in question consists of two unequal parts, making the "cephalothorax" less than half the sphere.

Diesing and Lankester mention the form and Labbé places it in his "Uncertain" Group under the original name.

List of Polycystid Gregarines in the
Coleoptera

The species are arranged in families, the families including genera in alphabetical order, and under each genus the species are placed in chronological sequence

Page	Names of parasites	Names of hosts
DIDYMOPHYIDAE		
204	<i>Didymophyes gigantea</i> Stein	<i>Oryctes</i> sp. larv. <i>Oryctes nasicornis</i> (L.) larv. <i>Phyllognathus</i> sp. larv.
205	<i>Didymophyes paradoxa</i> Stein	<i>Geotrupes stercorarius</i> (L.) SCARABAEI DAE
205-6	<i>Didymophyes leuckarti</i> Marshall	<i>Aphodius pradomus</i> (Brahm) <i>Aphodius nitidulus</i> F. "
206-7	<i>Didymophyes minuta</i> (Ishii) Watson	LUCANIDAE <i>Tribolium ferrugineus</i> F.
ACTINOCEPHALIDAE		
208-11	<i>Actinocephalus conicus</i> (Dufour) Stein	<i>Dorcus parallelipipedus</i> (L.) LUCANIDAE
211-12	<i>Actinocephalus dytiscorum</i> (Frantzius) Watson	<i>Dytiscus</i> sp. DYTISCIDAE
212-13	<i>Actinocephalus stelliformis</i> Schneider	<i>Ocyopus olens</i> Mull. larv. & ad. STAPHYLINIDAE <i>Carabus auratus</i> L. CARABIDAE <i>C. violaceus</i> L.
213-4	<i>Actinocephalus digitatus</i> Schneider	<i>Claenius vestitus</i> (Payk.)
214-5	<i>Actinocephalus acutispora</i> Leger	<i>Silpha laevigata</i> F. SILPHIDAE
215	<i>Actinocephalus americanus</i> Crawley	<i>Galerita bicolor</i> Drury CARABIDAE
216	<i>Actinocephalus harpali</i> (Crawley) Crawley	<i>Harpalus caliginosus</i> Fab. CARABIDAE
216-7	<i>Actinocephalus discoeli</i> (Crawley) Ellis	<i>Discoelus ovalis</i>

Actinocephalus crassus (Ellis)	Ellis	
217-8	Leptochirus edax Sharp	
Actinocephalus zophus (Ellis)	Ellis	TENEBRIONIDAE
218-20	Nyctobates barbata Knoch	
Actinocephalus gimbeli (Ellis)	Watson	
220-1	Harpalus pennsylvanicus Dej.	CARABIDAE
Asterophora philica (Leidy)	Crawley	
221-3	Nyctobates pennsylvanicus deGeer	TENEBRIONIDAE
Asterophora cratoparis	Crawley	Cratoparis lunatus
223-4		
Beloides firmus (Leger)	Labbe	Dermestes lardarius L. larv.
224-5		DERMESTIDAE
Beloides tenuis (Leger)	Labbe	Dermestes undulatus Brahm. larv.
225		
Bothriopsis histrio	Schneider	Hydaticus cinereus l. DYTISCIDAE
225-6		Colymbetes fuscus "
		Acilius sulcatus "
		Dytiscus sp. l. "
Bothriopsis terpischorella (Ellis)	Watson	
227-9	Hydrophilus sp.	HYDROPHILIDAE
Legeria agilis (Schneider)	Labbe	Colymbetes sp. l. DYTISCIDAE
229		
Phialoides ornata (Leger)	Labbe	Hydrophilus sp. l. HYDROPHILIDAE
230-1		H. piceus (L.) l. "
Pileocephalus bergi (Frenzel)	Labbe	
231	Necrobia ruficollis Fabr.	CLERIDAE
Pyxinia rubecula Hamm.		Dermestes lardarius L. lv.
232		D. vulpinus Fabr. DERMESTIDAE
Pyxinia crystalligera Frenzel		Dermestes vulpinus Fabr. l.
232-3		D. peruvianus Cateln. l. "
Pyxinia frenzeli Laveran & Mesnil	Attagenus pelli	DERMESTIDAE
233-4		
Pyxinia mobuszi Leger & Duboscq	Anthrenus verbasci	Oliv. l.
234-5		DERMESTIDAE
Stictospora provincialis Leger	Melolontha sp. l.	
235	Rhizotrogus sp. l.	

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- Steinina ovalis (Stein) Leger & Duboscq
236-7 Tenebrio molitor L. 1. TENEBRIONIDAE
- Steinina obconica Ishii
237-8 Tribolium ferrugineum F. "
- Steinina rotunda Watson
238-40 Amara angustata Say ?
- Stylocystis ensiferis (Ellis) Ellis
241 Leptochirus edax Sharp.

STYLOCEPHALIDAE

- Cystocephalus algerianus Schneider Pimelia sp.
241-2
- Lophocephalus insignis (Schneider) Labbe
242-3 Helops striatus TENEBRIONIDAE
- Oocephalus hispanus Schneider Morica sp.
243
- Stylocephalus oblongatus (Hammerschmidt) Schneider
244 Opatrum sabulosum (L.)
Asida grisea (F.)
- Stylocephalus longicollis Stein Blaps mortisaga
245
- Stylocephalus brevirostra (Kolliker) Frantzius
246-7 Hydrophilus sp. 1. HYDROPHILIDAE
- Stylocephalus gladiator Blanchard
248 Helenophorus collaris L.
- Stylocephalus gigantea (Ellis) Watson
248-9 Eleodes sp.
Asida sp.
Asida opaca Say
- Sphaerorhynchus ophioides (Schneider) Labbe
249 Acis sp.

ACANTHOSPORIDAE

- Acanthospora pileata Leger Omoplus sp. 1.
249-50
- Acanthospora polymorpha Leger Hydrous caraboides (L.) lv.
250
- Ancyrophora gracilis Leger Carabus sp. 1. & ad. CARABIDAE
251 Carabus auratus L. 1. & ad.
Carabus violaceus L. 1. & ad.

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Ancyrophora uncinata Leger 252	Dytiscus sp. Colymbetes sp.	DYTISCIIDAE "
Cometoides capitatus (Leger) Labbe 253	Hydrous sp. lv.	
Cometoides crinitus (Leger) Labbe 253-4	Hydrobius sp. lv.	HYDROPHILIDAE
Corycella armata Leger 254-5	Gyrinus natator (L.) lv.	GYRINIIDAE
GREGARINIDAE		
Euspora fallax Schneider 256-7	Rhizotrogus aestivus	
Gregarina cuneata Stein 258-61	Tenebrio molitor L. lv. & ad.	TENEBRIONIIDAE
Gregarina polymorpha (Hammerschmidt) Stein 261-3	Tenebrio molitor L. lv. & ad.	
Gregarina amara Frantzius 263-4	Poecilus cupreus (L.)	
Gregarina tenuis Hammerschmidt Allecula sp. 264		
Gregarina elongata Frantzius 264	Crypticus sp.	
Gregarina scarabeirelictus Leidy 264-5	Scarabeus relictus lv.	SCARABAEIDAE
Gregarina passalicurnuti Leidy 265-6	Passalus cornutus Fab.	LUCANIDAE
Gregarina melalonthaebrunneae Leidy 266	Melalontha brunnea	
Gregarina munieri (Schneider) Labbe 267-8	Timarcha tenebricosa (F.) Chrysomela violacea (Goeze) C. haemoptera L.	CHRYSOMELIIDAE
Gregarina laucornetensis (Schneider) Labbe 269	Parnus sp.	PARNIDAE
Gregarina statirae Frenzel 269	Statira unicolor Blanch.	LAGRIIDAE
Gregarina longirostris (Leger) Labbe 270	Thanasimus formicarius (L.)	CLERIDAE

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Gregarina acuta (Leger) Labbe 270	Trox perlatus Scriba SCARABAEIDAE
Gregarina steini Berndt 271	Tenebrio molitor L. lv. TENEBRIONIDAE
Gregarina parva Crawley 272-3	Harpalus pennsylvanicus Dej. Harpalus caliginosus Fab. CARABIDAE
Gregarina lucani (Crawley) Watson 273-4	Lucanus dama LUCANIDAE
Gregarina cavalieriana Blanchard 274	Dendarus tristis Rossi-coarcti- collis Mes.
Gregarina socialis Leger 275	Eryx ater Fabr. lv.
Gregarina guatemalensis Ellis 275-6	Ninus interstitialis Esch. LUCANIDAE
Gregarina grisea Ellis 276	Tenebrio castaneus Koch TENEBRIONIDAE
Gregarina minuta Ishii 277	Tribolium ferrugineum F. "
Gregarina barbarara Watson 280-2	Coccinella sp. COCCINELLIDAE
Gregarina katherina Watson 277-9	Coccinella sp. "
Gregarina tenebrionella Watson 284-6	Tenebrionidae sp. lv.
Gregarina gracilis Watson 286-8	Elateridae sp. lv.
Gregarina intestinalis Watson 288-9	Pterostichus stygicus (Say). CARABIDAE
Gregarina monarchia Watson 289-91	Pterostichus stygicus (Say). "
Gregarina fragilis Watson 282-4	Coccinella sp. COCCINELLIDAE
Gregarina globosa Watson 291-2	Coptotomus interrogatus (Fab.) DYTISCIDAE
Hyalospora roscoviana Schneider 255-6	Petrobius maratimus
Hirmocystis asidae Leger 257	Asida servillei Sol.
Sphaerocystis simplex Leger 256	Cyphon pallidulus Boh. DASYLLIDAE

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|---------------------------------------|-------------------------------|---------------|
| Gregarina elaterae Crawley | Elater sp. lv. | ELATERIDAE |
| 292 | | |
| Gregarina curvata Frantzius | Cetonia aurata lv. | |
| 293 | | |
| Gregarina (?) boletophagi (Crawley) | | |
| 294 | Boletophagus cornutus | TENEBRIONIDAE |
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| Gregarina (?) microcephala Leidy | Arrhenoplita bicornis Olivier | |
| 294-5 | | TENEBRIONIDAE |
| | | |
| Gregarina (?) ovalis (Crawley) Watson | | |
| 295 | Cucujidae larv. | |
| | | |
| Stylocephalus sp. | Xylopinus saperdoides | |
| 297 | | TENEBRIONIDAE |
| | | |
| Asterophora philica Leidy | Host not given | |
| 298 | | |
| sp. Watson | Coptotomus interrogatus Fab. | |
| 296 | | dytiscidae |

Didymophyes gigantea Stein
Figs 61 & 63.

1848	Didymophyes gigantea	Stein	1848:186
1863	Gregarina gigantea	Lankester	1863:95
1889	Didymophyes gigantea	Mingazzini	1889:234-9
1892	Didymophyes gigantea	Leger	1892:106

Didymophyes: Sporonts biassociative, slender, very much attenuated. Average length 1 cm., avg. width 80-100 μ . Ratio -- length prot:total length :: 1:30 to 1:40; width prot:width deut :: 1:0.66 to 1:1. Protomerite dome-shaped with a short wide neck just anterior to septum. Deutomerites two in number, cylindrical, widest at septum and tapering gradually, ending in a blunt, rounded extremity.¹ Septa convex upward. Deutomerites nearly equal in length. Nuclei not visible in vivo and not described. Endocyte dense, deeply staining. Epimerite a cylindrical conical papilla.

Cysts spherical, 600-700 μ in diameter. Spores ovoidal, bi-integumentary, 9 x 6.5 μ .

Taken at Berlin, Naples and Poitiers (France).

Hosts: Larvae of *Oryctes nasicornis* (L.); and of *Phyllognathus* sp; and of *Oryctes* sp.

Habitat: Intestine.

1. Stein's figure indicates that the first deutomerite in its anterior third is narrower than at the first septum, becoming as wide at the septum between the two deutomerites as it is at the septum between protomerite and the first deutomerite. This width is retained throughout the second deutomerite.

Didymophyes paradoxa Stein
Figs. 62 & 72.

1848	<i>Didymophyes paradoxa</i>	Stein	1848:223
1863	<i>Gregarina paradoxa</i>	Lankester	1863:95
1892	<i>Didymophyes rara</i>	Léger	1892:106
1899	<i>Didymophyes paradoxa</i>	Labbe	1899:8

Didymophyes: Sporonts biassociative, short. Length and width not given. Ratio--length prot:total length :: 1:7 to 1:9; width prot:width deut :: 1:1 to 1.1 : 1. Protomerite dome-shaped, considerably flattened, twice as wide as high, a little wider than deutomerite. First deut. cylindrical, of same length or $1\frac{1}{2}$ times longer than second; second tapering to a blunt point. Septa convex upward. Nuclei visible, spherical and large, one in each deutomerite. Cyst and spores unknown.

Taken in Berlin, Germany and Poitiers, France.

Hosts: *Geotrupes* sp. and *Geotrupes stercorarius* (L.).

Habitat: Intestine.

Didymophyes leuckarti Marshall
Figs. 59 and 60.

1893	<i>Didymophyes leuckarti</i>	Marshall	1893:41-2
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Didymophyes: Sporonts bi- or tri- associative. Length 280-1120 μ . Width not given. Ratio--length prot:total length :: 1:4 in the association of two; 1:11 in the triple association. Ratio width prot:width deut :: 1:1.3 to 1:5. Protomerite dome-shaped, broadly rounded, twice as wide as high, constriction at septum. Either 2 or 3 deutomerites, attached one behind the other,

1880	1880	1880
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The following is a list of the names of the persons who have been elected to the office of Justice of the Peace for the year 1880. The names are given in alphabetical order. The names of the persons who have been elected to the office of Justice of the Peace for the year 1880 are:

John A. Smith, James B. Jones, William C. Brown, Thomas D. White, Charles E. Green, Frederick F. Black, George G. Gray, Henry H. Hill, Isaac I. Iron, Jacob J. King, Lewis K. Lamb, Michael L. Lee, Nathan M. Moore, Oliver N. New, Philip O. Old, Quincy P. Peck, Samuel Q. Quinn, Theodore R. Reed, Uriah S. Stone, Walter T. Taylor, Vincent U. Underhill, William V. Vance, Xavier W. West, Yancy X. Xenon, Zachary Y. Young, and Zephaniah Z. Zimmerman.

District of Columbia, D.C.
 City of Washington, D.C.

The following is a list of the names of the persons who have been elected to the office of Justice of the Peace for the year 1880.

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John A. Smith, James B. Jones, William C. Brown, Thomas D. White, Charles E. Green, Frederick F. Black, George G. Gray, Henry H. Hill, Isaac I. Iron, Jacob J. King, Lewis K. Lamb, Michael L. Lee, Nathan M. Moore, Oliver N. New, Philip O. Old, Quincy P. Peck, Samuel Q. Quinn, Theodore R. Reed, Uriah S. Stone, Walter T. Taylor, Vincent U. Underhill, William V. Vance, Xavier W. West, Yancy X. Xenon, Zachary Y. Young, and Zephaniah Z. Zimmerman.

each nucleated and separated from others by a straight septum and a conspicuous constriction. Deutomerites barrel-shaped, but little wider than protomerite, last one tapering and ending in a more or less broadly rounded extremity. Endocyte dense in both protomerite and deutomerites. Nuclei spherical, containing many small chromatin bodies.

Cysts spherical, one long spore-duct. Spores not known.

Taken at Leipsic, Germany.

Hosts: *Aphodius pradomus* (Brahm.) and *A. nitidulus* F.

Habitat: Intestine.

The cyst-dehiscence as seen by Marshall does not coincide with that reported by Leger. The latter mentions simple rupture; the former dehiscence by one long sporeduct. If the methods described by both authors are to be accepted, various species in the same genus must have different modes of dehiscence.

Didymophyes minuta (Ishii) Watson
Fig. 71.

1914	<i>Gregarina minuta</i>	Ishii	1914:436-7
1915	<i>Didymophyes minuta</i>	Watson

Didymophyes: Sporonts elongate. Length 188 μ , width 26 μ . Ratio--length prot: total length :: 1:23; width prot: width deut :: 1:1.5. Protomerite flattened somewhat, twice as wide as high, deep constriction at septum. Deutomerites cylindrical, about equal in length, constriction between the two, posterior end broadly rounded. Nuclei spherical, one large karyosome

in each. Endoplasm not dense.

Cyst and spores unknown.

Taken in the Province of Izu, Japan.

Host: *Tribolium ferrugineum* F.

Habitat: Intestine.

Under the name *Gregarina minuta*, Ishii described and illustrated two species of gregarines, one proving to be the above member of the family Didymophyidae, the other a true *Gregarina*. The two forms were shown to be different by the absence of a protomerite in the satellite in the former and its presence in the latter. There was also a difference in the shape of the protomerite in the two forms and a difference in the size of the two kinds of associations. The smaller were those of a true *Gregarina*, having a protomerite in the satellite, and the name used by the author, *Gregarina minuta*, applies to them only; the larger associations were those of the other form, and I have called this species *Didymophyes minuta* (Ishii). For a more detailed argument concerning these species, see appendix at end of this chapter.

Actinocephalus conicus (Dufour) Stein
Figs. 75, 76, 101, 102
and 103.

1826 sp.	Dufour	1826:43
1828 --- Conica	Dufour	1828:367
1837 Gregarina conica	Dufour	1837:12
1848 Actinocephalus Lucani	Stein	1848:223
1848 Actinocephalus conicus	Frantzius	1848:195
1848 Actinocephalus Lucanus	Frantzius	1848:195
1851 Gregarina Lucani	Diesing	1851:14
1851 Gregarina conica	Diesing	1851:8
1863 Gregarina Lucani	Lankester	1863:95
1863 Gregarina conica	Lankester	1863:95
1892 Stephanophora radiosa	Léger	1892:127
1899 Stephanophora lucani	Labbé	1899:23
1913 Actinocephalus lucani	Ellis	1913c:277
1915 Actinocephalus conicus	Watson	

Actinocephalus: Sporonts solitary, length 300-

400 μ . Width not given. Ratio--length prot:total length :: 1:5

(without epimerite); width prot:width deut :: 1:1.3. Protomerite

nearly globular, carrying at the apex a persisting epimerite, situated upon a thick prominent neck. Epimerite larger than protomerite, consisting of a hemispherical plateau around the periphery of which is situated a corona of 12 or more large upwardly-directed digitiform processes. Deep constriction at septum. Deutomerite widest above middle, tapering but ending in a blunt, rounded extremity. Nucleus spherical, with several karyosomes or a band of chromidial bodies. E⁺cyte yellowish.

Cysts spherical, 250 μ in diam. Spores long, cylindrical, biconical at ends, 13.5 x 4.5 μ .

Taken at Berlin, Germany and Touraine, France.

Host: Dorcus parallelipedus (L.) (Lucanus p. Fabricus).

Habitat: Intestine.

There was considerable confusion regarding this species more than half a century ago. Dufour (1826:43) said

"Dans le tube alimentaire de divers Coléoptères, notamment du *Lucanus paralleilipedus*, de plusieurs *Mélasomes* et de la *Timarcha tenebricosa*, j'ai trouvé abondamment une espèce de Vers intestinaux, dont je joins ici le dessin."

It is interesting to note that he called the gregarine an intestinal worm. Two years later, he added:

"L'espece que j'ai dit habiter les entrailles de divers Coleopteres, merite, a cause de sa forme, le nom *Conica*."

By this time, Dufour was evidently including many species of gregarines under the same name, not differentiating them from one another.

In 1837, he described in detail, covering two pages, a new genus he established to include a half dozen species which he had discovered, and called the genus *Gregarina*. One of the species enumerated is *Gregarina conica* and its hosts are given as *Coleoptera* and *Gryllus*. That at least two species were concerned in this inclusion is indicated by his figures 7 and 7a, Pl. I, my figs. 101 and 102. The figures are similar in one respect, they are both conical at the posterior ends. The protomerites, however, are very unlike. Fig 101 compares favorably, despite its fanciful epimerite, with Stein's figure 33 Pl. IX, 1848, my fig. 75, from the intestine of the same beetle. These two species are quite probably the same and the name of the species should thus be *Actinocephalus conicus* (Dufour) Stein, Dufour having first

There are several things to be noted in this connection. First, it is clear that the Commission has not yet received all the information it needs to make a final decision on the matter. It is therefore necessary to continue the investigation and to request the necessary documents and information from the interested parties. It is also necessary to consult with the relevant authorities and to take into account the views of the public. The Commission will continue to work hard to resolve this matter as quickly as possible and to ensure that the interests of all parties are protected.

The Commission is aware of the importance of this matter and is committed to a fair and transparent process. It will continue to keep the public informed of its progress and will seek to resolve any outstanding issues as soon as possible. The Commission's decision will be based on the facts and the law and will be subject to appeal. It is the Commission's hope that all parties will cooperate fully in this process and that a satisfactory resolution can be reached.

The Commission is grateful for the information provided and will continue to work with the interested parties to resolve this matter. It is also grateful for the support and assistance of the relevant authorities and the public. The Commission will continue to work hard to ensure that the interests of all parties are protected and that a fair and transparent process is followed.

named the species and Stein having given the correct genus name.

Frantzius (1848) recorded both *Actinocephalus conicus* Dufour and *A. Lucanus* Stein and he mentioned as host of the former *Gryllus*, and of the latter *Lucanus*.

Diesing recorded *Gregarina conica* Dufour from "colopterorum et Gryllorum ventriculus (Dufour)" and *G. Lucani* Stein from "*Lucanus paralleilpipedus*".

Lankester listed both species. Léger (1892) described the species as a new one under the name *Stephanophora radiosa*. His description of the new genus *Stephanophora* does not differ from Stein's genus *Actinocephalus*. Léger's words are as follows:

"Appareil de fixation - - - constitué par un plateau épais borde d'une couronne de tentacules globuleux.
Gregarines toujours solitaires, fixées pendant la plus grande partie de leur existence; ---.
Kystes spheriques dehiscentes par simple rupture ---.
Spores cylindro-biconiques."

Stein's diagnosis of the genus is as follows:

"Die andere Form des Haftapparates entsteht dadurch, dass sich der Kopf nach vorn in einen kurzen Stiel verengert, der sich in eine flache, runde, am Rande gekerbte, auf dem Stiel senkrecht stehende Schiebe erweitert. (My fig. 75). Die vordere, zum Anheften dienende Fläche der Schiebe ist in der Mitte in einer, dem Durchmesser des Stiels gleichkommenden Ausdehnung glatt, von diesem glatten Centrum aus aber bis zur Peripherie sehr regelmässig strahlenförmig in Falten gelegt. Jede Einfaltungsfurche fällt mit einer Einkerbung des Scheibenrandes zusammen, Ich vereinige die mit einem solchen Haftapparat versehenen Formen zu der Gattung *Actinocephalus*."

The two descriptions are, thus, synonymous and but one species is involved, as well as but one genus. The epimerite 1. Dufour's Fig. 7a is placed in the Chapter on Orthopteran parasites, under the heading Indeterminate Species, *G. conica* Duf.

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being stalked, with digitiform processes radiating from a flat²¹¹ central plate. In Stein's drawing, the processes turn backwards, in Leger's they point directly forward, but this is of no import.

Labbe saw the error in considering the two species distinct. He united them under the ^{species} name given by Stein, leaving the species in the genus of Leger, calling the form *Stephanophora lucani* (Stein). Ellis replaced the species in the genus to which it was assigned by Stein. But, according to priority, and from the exhibition of all the evidence in the case, the species name given by Dufour should stand valid and the species be called *Actinocephalus conicus* (Dufour) Stein.

The removal of the species from the genus *Stephanophora* takes from the genus the type and only species and the genus thus drops out of usage.

Actinocephalus dytiscorum (Frantzius)
Watson
Fig. 148.

1848	<i>Sporadina Dytiscorum</i>	Frantzius	1848:195
1851	<i>Gregarina Dytiscorum</i>	Diesing	1851:12
1863	<i>Gregarina Dytiscorum</i>	Lankester	1863:94
1890	<i>Anchrophora uncinata</i>	Labbe'	1899:28-9
1915	<i>Actinocephalus dytiscorum</i>	Watson	

Actinocephalus: Sporonts robust. Ratio--length prot: total length :: 1:7; width prot:width deut :: 1:1. Protomerite broad and low, twice as wide as high, flattened in front. Very slight constriction at septum. Deutomerite at septum same width as protomerite in front of septum, retaining same width throughout

anterior half. Posterior half much narrower, tapering to a blunt point.

Cysts large, spherical, spores not known.

Taken at ----, Germany.

Host: *Dytiscus* sp.

Habitat: Intestine.

This species is known from the drawings of Frantzius, one being of an adult sporont (?) and the other of a cyst.

Diesing gives as host *Dytiscus marginalis*, larva.

Labbé regards the species as synonymous with *Ancyrophora uncinata* Leger, from a similarity of the host, *Dytiscus*.

The sporont, however, has no resemblance to that of Leger's species, and, although the epimerite of the species in question is not known, it seems to have an individuality.

Actinocephalus stelliformis Schneider

Figs. 67, 69 and 73.

1875 *Actinocephalus stelliformis* Schneider 1875:538-9

1893 *Actinocephalus stelliformis* Pfeiffer 1893:5-11

Actinocephalus: Dimensions not given. Ratio length prot:total length 1:4.5 to 1:8; width prot:width deut :: 1:1.4. Protomerite cylindrical, surmounted by a broadly rounded anterior extremity; same width throughout posterior half, width equal to length. Constriction at septum. Epimerite persisting, a small globular structure surmounted by a corona of recurved processes,

each slender at the base, dilated and bifid at the distal extremity. Deutomerite widest above the middle, tapering to a long, sharply pointed extremity. Endocyte very dense. Nucleus small, spherical.

Cyst and spores unknown.

Taken at Paris, France.

Hosts: *Ocypus olens* (Mull.) (*Staphylinus o.*) lv. and ad.;

Carabus auratus L.; *Carabus violaceus* L.; and *Rhizotrogus* sp. lv.

Habitat: Intestine.

Schneider mentions three varieties of this species, a) the body regularly lanceolate, epimerite persistent, b) body subspherical, c) body extremely elongate.

Pfeiffer found the species in *Carabus violaceus* L.

Actinocephalus digitatus Schneider
Fig. 66.

1875 *Actinocephalus digitatus* Schneider 1875:590

Actinocephalus: Sporonts solitary, short, obese. Measurements not given. Ratio--length prot:total length :: 1:4.5
Ratio--width prot:width deut :: 1:1.4. Protomerite dome-shaped, widest in posterior half, width equal to height. Constriction at septum. Deutomerite rather short, widest a short distance below septum and tapering gradually to a sharp point. Nucleus small, spherical. Epimerite persistent, a globular structure surmounted by a rosette of 8 to 10 recurved digitiform processes

rounded at their extremities.

Cyst and spores unknown.

Taken at Paris, France.

Host: *Claenius vestitus* (Payk.).

Habitat: Intestine.

Schneider says:

"L'Actinocephalus Lucani de Stein, provenant de la larve d'un *Lucanus paralleli* pipedus, est une espèce fort voisine de celle-ci."

Actinocephalus acutispora Léger
Figs. 212 and 213.

1892 *Actinocephalus acutispora* Léger, 1892:142
1899 *Actinocephalus acutispora* Labbe 1899:26

Actinocephalus: Sporonts solitary, length 1000-1500 μ .

Width not given. Ratio--length prot:total length :: 1:11; ratio width prot:width deut :: 1:1.4. Protomerite $1\frac{1}{2}$ times as long as wide, cylindrical, rounded at the top and slightly dilated in posterior fourth. Constriction at septum. Deutomerite very long and slender, slightly wider than protomerite at shoulder and tapering to a long acutely pointed posterior extremity. Epimerite a spherical button situated upon a short collar and consisting of 12 slender incurved processes terminating in obtuse points. Endocyte brownish-yellow. Nucleus spherical, containing 3 to 7 karyosomes. Cysts ovoidal, 550-600 μ x 280 μ . Dehiscence by simple rupture. Spores obese, acutely pointed, two sizes, 4.5 x 2.8 μ and 6.4 x 3.6 μ .

Taken at Poitiers, France.

Host: *Silpha laevigata* F.

Habitat: Intestine.

Actinocephalus americanus Crawley
Fig. 64.

1903 *Actinocephalus americanus* Crawley 1903b:636

Actinocephalus: The generic determination of this species is not absolute. Crawley's description is quoted below:

"This species is created for a single individual found in *Galerita bicolor* Drury. - - - It is placed in the genus *Actinocephalus* on account of the form of both protomerite and deutomerite, the presence of several karyosomes in the nucleus and the fact that the host was a carnivorous Arthropod.

The gregarine was 200 μ long, 35 μ of which represented the length of the protomerite. 45 μ broad. The epicyte - - - showed a little papilla at the anterior tip of the protomerite. - - -The endocyte was much denser in the deutomerite than in the protomerite. - - -."

It is probable that Crawley's determination is correct but the recovery of cysts and spores as well as the epimerite is needed to substantiate the determination.

Actinocephalus harpali (Crawley)
Crawley
Fig. 70.

1903 *Gregarina harpali* Crawley 1903a:49
1903 *Actinocephalus harpali* Crawley 1903b:637-8

Actinocephalus: Sporonts solitary, obese. Length 225-1200 μ . Width not given. Ratio--length prot:total length ::1:6.5; width prot: width deut :: 1:1.2. Protomerite broadly dome-

shaped, twice as wide as high, flattened at the free end, deeply constricted at the septum. Deutomerite widest a short distance below septum where it is but little wider than the protomerite. Tapering from anterior fourth to a blunt posterior end. Endocyte very dense, blackish, of equal density in protomerite and deutomerite. Nucleus large, spherical, containing several karyosomes. Cysts spherical, 640μ in diameter, dehiscing by simple rupture. Spores $9 \times 7.5\mu$, diamond-shaped.

Taken at Wyncote, Pa.

Host: *Harpalus caliginosus* Fab.

Habitat: Intestine.

 "These gregarines were present in the intestine of the one beetle examined in hundreds."

Crawley, p. 50.

Actinocephalus discoeli (Crawley) Ellis
 Fig. 100.

1903 <i>Gregarina discoeli</i>	Crawley	1903a:47
1913 <i>Actinocephalus discoeli</i>	Ellis	1913c:279

Actinocephalus: Sporonts solitary, greatly elongate.

Length 1200μ . Ratio--length prot:total length :: 1:15; width prot:width deut :: 1:1.2. Protomerite pentagonal, seen in lateral optical section, widest through middle, flattened on top, width about equal to height. Slight constriction at septum. Deutomerite very elongate, cylindrical, slightly tapering to a blunt point. Epimerite not known. Endocyte dense, opaque in deutomerite, nearly transparent in protomerite. Nucleus spherical,

with several karyosomes.

Cyst and spores not known.

Host: Discoelus ovalis.

Habitat: Intestine.

Crawley placed this species in the genus Gregarina, with a question. In his 1903b paper he left it in the same genus but in a list of eight doubtful species.

Ellis says

"This gregarine is placed in the genus Actinocephalus because of the general shape of the sporont and the coleopteran host; it was removed from the genus Gregarina because the sporonts do not form associations."

Its generic position is still doubtful and from the data at hand might belong to any of these families: Actinocephalidae, Stylocephalidae or Acanthosporidae.

Actinocephalus crassus (Ellis) Ellis
Fig. 68.

1912 Stephanophora crassa	Ellis	1912c:688-9
1913 Actinocephalus crassus	Ellis	1913c:278

Actinocephalus: Sporonts solitary, obese. Length 50-60^u width not given. Ratio--length prot;total length :: 1:3.3, to 1:3.5. Width prot:width deut:: 1:1 to 1:5. Protomerite dome-shaped, a little wider than high, constricted at septum. Deutomerite widest in anterior third, where it is a little wider than the protomerite, narrowing abruptly to a rather sharply pointed posterior extremity. Nucleus small, spherical.

Cyst and spores not known.

Taken at Quirigua, Guatemala.

Host: *Leptochirus edax* Sharp.

Habitat: Intestine.

The determination of the species above is not absolute. Since generic diagnoses depend on the character of the epimerite and the spores as well as on other factors, the absence of these factors tends to make the determination indeterminate. By elimination of negative factors, however, the family determination is probably correct.

Actinocephalus zophus (Ellis) Ellis
Fig. 74.

1913 <i>Stephanophora zopha</i>	Ellis	1913b:201-2
1913 <i>Actinocephalus zophus</i>	Ellis	1913c:278

Actinocephalus: Sporonts elongate, length 1200-1600 μ .

Width not given. Ratio--length prot:total length :: 1:8 to 1:13; width prot:width deut :: 1:1.7.. Protomerite globose, rounded in front. Constriction at septum. Width same as length. Deutomerite slender, elongate. Widest at shoulder, cylindrical, tapering at posterior end to a sharp point. Epimerite persistent, constriction at base and terminating in a corona of 8 or more small regular, rounded, digitiform processes. Endocyte brown, nucleus not seen.

Cyst and spores not known.

Taken at New Orleans, La. and East Falls Church, Va.

Hosts: *Nyatobates barbata* Knoch (*N. barbarata* Kn.); *Alobates pennsylvanicus* deGeer.

Habitat: Intestine.

This species was described by Ellis as belonging to the genus *Stephanophora*, an error afterwards corrected by him and the species placed in the genus *Actinocephalus*.

Ellis mentions the fact that the record of a species found by Crawley among Leidy's manuscripts seems to indicate that the latter is the same species as that which he describes as *A. zophus*. His words are as follows:

"Figs. 29 and 30 (Crawley 1903a, Pl. III) as taken from Leidy's MMs. are of different gregarines, a fact recognized by Crawley. Fig. 30 represents a gregarine closely related to *G. grisea*, while Fig. 29 is apparently of a sporont of *S. zopha*."

A comparison of *S. zopha* (fig. 74 of this paper) and of Leidy's drawing (fig. 65 of this paper) will indicate that there is a difference in the shape of the sporonts. The protomerite of Leidy's species is wider than the deutomerite; in Ellis', narrower. In the former it is flattened, in the latter elongated. The deutomerite in the former tapers from the septum to a long, sharply pointed posterior extremity. In *S. zopha* the deutomerite is widest at the shoulder, a little below the septum and is cylindrical for two-thirds of its length, ending in a slightly tapering, bluntly pointed cone. From these facts and because the epimerite of Leidy's species was not seen, I am inclined to think the two

Department of
Geology

This country was described by Smith as follows:
The whole description, in many respects, was
and the same thing is the same and common.

Smith's account is given in the second
volume of his "Journal" under the heading of
"The Lake of the Indians" in the same manner as that given in
"Journal of A. Smith, 1793" and in "Smith's

Journal" of 1793 (London 1807, p. 111) in which
Smith's account of the "Lake of the Indians" is
given in detail. It is interesting to observe that
Smith's account of the "Lake of the Indians" is
given in "Smith's Journal" of 1793.

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"Journal of A. Smith, 1793" and in "Smith's

species are not identical and that the one in Leidy's drawing should be relegated to the list of indeterminate species. (See list of such species at end of the chapter.)

Actinocephalus gimbeli (Ellis) Watson
Figs. 126 and 127.

1913 *Stenophora gimbeli* Ellis 1913a:464
1915 *Actinocephalus gimbeli* Watson

Actinocephalus: Sporonts solitary, obese. Length 520 μ .

Width not given. Ratio--length prot:total length :: 1:5 to 1:6.

Ratio width prot:width deut :: 1:2. Protomerite broadly rounded in front, widest in middle portion, twice as wide as high.

Conspicuous constriction at septum. Deutomerite ovoidal, widest through middle, tapering and ending in a bluntly pointed posterior extremity. Endocyte very dense, black in deutomerite, lighter in protomerite, but dense in anterior end. Nucleus not seen.

Cyst and spores not known.

Taken at Vincennes, Indiana.

Host: *Harpalus pennsylvanicus* Dej.

Habitat: Intestine.

Ellis described this species as a *Stenophora* because of

"- - the papilla at the anterior end, which results from the expansion of the thin epicyte. Such a process has already been described by the writer (1912:681-6) in another species of this genus, *S. coekerellae* Ellis, from Guatemala."

The shape of the protomerite is very unlike that of the *Stenophoridae*, being twice as wide as high, while in this family

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it is globular or subglobular. The Stenophoridae are confined to the Diplopoda. Although no positive factors are present to indicate its position, yet from exclusion of factors, this species would fall under the family Actinocephalidae. The general shape is not unlike that of *Actinocephalus conicus* (Dufour) Stein, figs. 75 and 76. The two most important determinative factors, epimerite and spores, are unknown and so the determination cannot be absolute.

Asterophora philica (Leidy) Crawley
Figs. 78 & 113.

1889	<i>Gregarina philica</i>	Leidy	1889:9-10
1903	<i>Asterophora philica</i>	Crawley	1903a:53
1913	<i>Anthorhynchus philicus</i>	Ellis	1913c:280
1915	<i>Asterophora philica</i>	Watson	

Asterophora: Sporonts solitary, very elongate. Length 300-2000 μ . Maximum width 150 μ . Ratio length prot:total length :: 1:10 to 1:15; width prot:width deut :: 1:1.3. Protomerite conical, sharply pointed when deprived of epimerite, longer than wide. Constriction at septum not deep. Deutomerite widest at shoulder, tapering from thence to an attenuated, sharply pointed posterior extremity. Epimerite a circular, flattened cushion with a fluted periphery, situated upon a short neck at the apex of the protomerite. Endocyte and nucleus not described.

Cyst and spores unknown.

Taken at Philadelphia, Pa.

Host *Nyctobates pennsylvanica* deGeer (.N. pennsylvanicus).

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Habitat: Intestine.

The above description is taken from Leidy (1889). He remarks that

"- - the epimerite consists of a horizontal circular disc with a round milled border."

In a review of Leidy's MMs, Crawley found three more drawings from the same beetle. Crawley's words concerning his disposition of the same are as follows:

"*Asterophora philica* Leidy.

Gregarina philica Leidy (1889, p. 9, 1 fig.

It is impossible to give a description of this species. Figs. 31 and 32 are very plainly of the same gregarine, whereas fig. 33 seems almost certainly to belong to a different species. Further, the form figured by Leidy in 1889 is not so closely like that shown by figs. 31 and 32 as to render it certain that the two are the same.

I therefore include the three different forms under the same name, giving only the figures and reference, until such time as sufficient material is obtained to determine accurately what the actual facts may be.

The gregarines figured were about 300 microns long."
1889

It is quite evident that the form figured by Leidy, my fig. 113, and in his MMs, my fig. 78, are the same species. The proportions agree, the shapes of the protomerite are very similar, and the epimerites shown on fig. 78 coincides with Leidy's description of the epimerite.

Crawley's fig. 32, my fig. 104, may or may not be a cephalont of the same species, but the fig. 33, my fig. 105, is obviously unlike and must be placed among the uncertain species.

(See this group at end of chapter.)

The following is a list of the names of the persons who have been appointed to the various positions in the office of the Secretary of the Interior.

The names of the persons who have been appointed to the various positions in the office of the Secretary of the Interior are as follows:

In a letter to the Secretary of the Interior dated January 10, 1900, the following names were mentioned:

The names of the persons who have been appointed to the various positions in the office of the Secretary of the Interior are as follows:

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The names of the persons who have been appointed to the various positions in the office of the Secretary of the Interior are as follows:

Ellis placed the species in the genus *Anthorhynchus*, but the epimerite, as described by Leidy, coincides with Labbé's description of the genus *Asterophora* (1899:22):

"Epimerite en forme de bourrelet circulaire à côtes saillantes radiées en portant au centre un mamelon saillant. Sporadin - - - allongée,"

except that Leidy does not mention the central papilla. The description of the genus *Anthorhynchus* does not fit the case, Labbé (1899:19):

"Epim. en gros bouton cannelé."

Asterophora cratoparis Crawley
Fig. 77.

1903 <i>Asterophora cratoparis</i>	Crawley	1903a:54
1913 <i>Anthorhynchus cratoparis</i>	Ellis	1913c:279
1915 <i>Asterophora cratoparis</i>	Watson	

Asterophora: Length 540 μ . Width not given. Ratio--length prot:total length 1:5, width prot:width deut ::1:1.1. Protomerite nearly reniform with conical projection at apex upon which rests the epimerite. Protomerite 1.5 times as wide as high. Deep constriction at septum. Deutomerite widest at shoulder, tapering thence and terminating bluntly. Epimerite consisting of a number of "ribs projecting from a central knob". Endocyte not described. Nucleus spherical, with one karyosome. Cyst and spores unknown. Taken at Swarthmore, Pa. Host: *Cratoparis lunatus*.

1952
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Habitat: Intestine.

Ellis removed the species from the genus in which it was first placed, including it among the members of the genus *Anthorhynchus*. This genus and *Asterophora* are differentiated by the character of the epimerite and spores. In our present discussion, the latter factor may be omitted since spores are not known. The epimerite of *Anthorhynchus* is a large cannaliculated button; that of *Asterophora* consists of a circular cushion with a central knob and with a fluted, crenulate periphery. Crawley's species, therefore, coincides with the latter description and should be returned to that genus.

Beloides firmus (Léger) Labbé
Figs. 116 and 214.

1892 <i>Xiphorhynchus firmus</i>	Léger	1892:137-9
1899 <i>Beloides firmus</i>	Labbé	1899:26-7.

Beloides: Sporonts solitary, elongate. The adults 80 μ in length. Protomerite conical, dilated in center, constriction at septum. Deutomerite widest at shoulder, tapering to a sharp point. Ratio length prot:total length :: 1:3.8; width prot:width deut :: 1:1.2. Nucleus elongate ellipsoidal, with several karyosomes. Epimerite a stalked globose papilla with 12 large lateral curved spines and a long rigid central style (80 long in adults). Cysts spherical, 180-200 μ in diam., dehiscence by simple rupture, biconical, 14.5 x 6 μ .

Taken at Poitiers, France.

This account is based upon the work of the
 first class, including the work of the
 Assistant. This work has been done in
 the presence of the principal and others. In the
 course of the first year, the first class
 has been instructed in a large number of
 subjects, including the study of the
 principles of algebra, geometry, and
 trigonometry. The first class has also
 been instructed in the study of the
 principles of physics and chemistry.

Table of Contents

1900	1901	1902	1903
1904	1905	1906	1907

Table of Contents: The first class
 is instructed in the study of the
 principles of algebra, geometry, and
 trigonometry. The first class has
 also been instructed in the study of
 the principles of physics and chemistry.
 The first class has also been
 instructed in the study of the
 principles of history and literature.
 The first class has also been
 instructed in the study of the
 principles of art and music.

Host: Dermestes lardarius L. lv.

Habitat: Intestine.

Beloides tenuis (Léger) Labbé
Fig. 117.

1892 <i>Xiphorhynchus tenuis</i>	Léger, 1892:139
1899 <i>Beloides tenuis</i>	Labbe 1899:26-7

Beloides: Sporonts solitary, elongate. Epimerite a stalked globular papilla with 12 stiff lateral curved spines surmounted by a long slender sinuous style.

Cysts spherical; spores biconical, pointed.

Taken at Poitiers, France.

Host: Dermestes undulatus Brahm. larv.

Habitat: Intestine.

Labbé changed the genus name of this and the foregoing species because of priority.

Bothriopsis histrio Schneider
Figs. 79 and 81.

1875 <i>Bothriopsis histrio</i>	Schneider 1875:596
1892 <i>Bothriopsis histrio</i>	Léger 1892:136-7
1903 <i>Bothriopsis histrio</i>	Crawley 1903a:54-5

Bothriopsis: Sporonts solitary, max. length 425 μ . Width not given. Ratio--length prot:total length :: 1:1.6; width prot: width deut :: very variable. Length protomerite more than half that of the whole sporonts. Septum strongly convex upward into protomerite. Deutomerite stout, spindle-shaped, ending in a sharp point. Epimerite a small flattened disc from which project

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a half dozen long slender filaments. Nucleus ovoidal, generally placed diagonally, containing several karyosomes. Endocyte yellow in young, brownish black in adults.

Cysts spherical, 400-500 . Spores obese, biconical, 7.2 x 5 .

Taken at Paris and Touraine, France and Wyncote, Pa.

Hosts: Hydatiscus cinereus, larv; Colymbetes fuscus; and Acilius sulcatus; and Dytiscus sp. larv.

Habitat: Intestine.

Schneider stated that this species is highly polymorphic, and he described two varieties, the type form and a variety marginata, which is more active. He found no epimerite, but this was discovered later by Leger, who described it as consisting of six long slender filaments, 80-90 long. Leger also discovered the spores.

Crawley's observations on this species vary somewhat from those of Schneider; for instance, he says

"- - - the protomerite is a large rounded mass, but whereas Schneider's figures represent it to be solid, I find that it contains, at least in some cases, a large cavity. Within this cavity was a fluid in which floated a few granules.
- - - the septum dips backward. In a number of cases, however, the septum dipped forward, and such appears to have been the only condition seen by Schneider. - - -".

Crawley found that in the stained specimens, the protomerite is more densely granular than the deutomerite.

1. The first part of the report deals with the general situation of the country and the progress of the various branches of industry and commerce. It is found that the country has made considerable progress in the last few years, and that the various branches of industry and commerce are all flourishing.

2. The second part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

3. The third part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

4. The fourth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

5. The fifth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

6. The sixth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

7. The seventh part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

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9. The ninth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

10. The tenth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all flourishing, and that the country has made considerable progress in the last few years.

Bothriopsis terpischorella (Ellis) Watson

Fig. 80.

1913 Legeria terpischorella Ellis 1913b:276

1915 Bothriopsis terpischorella Watson

Bothriopsis: Sporonts solitary, average length 720 μ .Width 145 μ . Ratio--length prot:total length :: 1:1 to 1.8 :1.

Ratio width prot:width deut :: 1.3:1. Protomerite equal to or longer than deutomerite, the anterior fourth hemispherical to subglobose, below which is an elevated flange-like portion, remaining two-thirds cylindrical. No constriction at septum. Septum projecting forward into protomerite like the finger of a globe.

Deutomerite ovoidal, tapering, bluntly pointed posteriorly.

Endocyte dense, homogeneous, light brown.

Cyst and spores not known.

Taken at Douglas Lake, Mich.

Host: Hydrophilus sp.

Habitat: Iⁿtestine.

This species was described by Ellis as a member of the genus Legeria. His description is as follows:

"Epimerite not seen; sporonts extremely active, constantly changing the shape of the anterior three-fifths of the body and proceeding rather rapidly in a serpentine path as a result, the protomerite often being bent almost forty-five degrees from the main axis of the body; expanded individual with a protomerite equal to or longer than the deutomerite, the anterior $\frac{1}{4}$ of the protomerite hemispherical to subglobose, below which is an elevated flange-like portion, remaining $\frac{2}{3}$ cylindrical, the posterior portion with a cup-shaped depression some 60° deep into which the anterior conical portion of the deuto-

merite fits; deutomerite excepting the portion included by the protomerite ovoid, rather sharply rounded posteriorly; average sporonts 720 in length; - - -."

A comparison of fig. 82, a copy of *Legeria agilis* (Schn.) Labbe, with fig. 80, Ellis' species in question, reveals differences in the two. The genus *Legeria* is characterized by a) deutomerite spindle-shaped (same shape as in *Bothriopsis*); b) protomerite much less than half the total length; c) protomerite cylindrical, dilated in anterior third, terminating in a simple obtuse-angled cone; d) septum broadly convex upward into the protomerite in the shape of an hemisphere; e) nucleus spherical, f) agility of movement not confined to protomerite, but equally active in both segments. The species in question does not belong in this genus for the protomerite occupies more than half the total length, it does not terminate in a cone, the septum is not broadly dome-shaped and movement is not equally active throughout the whole sporont.

Bothriopsis is diagnosed by Schneider as having a) an unusually well-developed protomerite consisting of a large polymorphic mass convex or concave at its anterior end and nearly or equally as long as, or longer than, the deutomerite, cylindrical in posterior two-thirds; b) a septum invaginated into the protomerite like the finger of a glove; c) an ellipsoidal nucleus; d) endocyte yellow to dark brown; e) agility of movement chiefly confined to the protomerite.

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
530 SOUTH EAST ASIAN AVENUE
CHICAGO, ILLINOIS 60607

A copy of this report is being furnished to the following:
1. The Director of the Office of Naval Research
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The species in question coincides with the genus *Bothriopsis* in these characteristics: 1) polymorphism chiefly confined to anterior three-fifths of body; 2) protomerite equal to or longer than deutomerite; 3) protomerite largest in anterior third, posterior two-thirds cylindrical; 4) septum invaginated into protomerite for the posterior third of its length; 5) endocyte light brown.

I have therefore changed the name of the species to *Bothriopsis terpischorella*.

Legeria agilis (Schneider) Labbe
Fig. 82.

1875 <i>Duforia agilis</i>	Schneider	1875:595-6
1899 <i>Legeria agilis</i>	Labbe	1899:24

Legeria: Sporonts solitary; measurements not given. Ratio-- length prot:total length :: 1:2.5 to 1:3; width prot:width deut :: 1.1 : 1. Protomerite irregularly cylindrical, considerably dilated in anterior third, terminated by an obtuse angled cone as wide as high. No constriction at septum. Septum convex upward into protomerite. Deutomerite irregularly cylindrical, tapering from middle to a sharp point. Nucleus spherical, containing several karyosomes.

Cysts spherical, dehiscing by simple rupture. Spores cylindrobiconical.

Taken at Paris, France.

Host: *Colymbetes* sp. larv.

Habitat: Intestine.

The following is a list of the names of the persons who have been appointed to the various positions in the office of the Secretary of the State, for the term ending on the 31st day of December, 1900.

Secretary of the State: [Name]
Assistant Secretary: [Name]
Clerk: [Name]
Deputy Clerk: [Name]
Recorder: [Name]
Deputy Recorder: [Name]
Comptroller: [Name]
Deputy Comptroller: [Name]
Auditor: [Name]
Deputy Auditor: [Name]
Treasurer: [Name]
Deputy Treasurer: [Name]

LEGISLATIVE DEPARTMENT

Senate: [Name]
Speaker: [Name]
Deputy Speaker: [Name]
Clerk: [Name]
Deputy Clerk: [Name]
Recording Secretary: [Name]
Deputy Recording Secretary: [Name]
Comptroller: [Name]
Deputy Comptroller: [Name]
Auditor: [Name]
Deputy Auditor: [Name]
Treasurer: [Name]
Deputy Treasurer: [Name]
Clerk of the House: [Name]
Deputy Clerk of the House: [Name]
Recording Secretary of the House: [Name]
Deputy Recording Secretary of the House: [Name]
Comptroller of the House: [Name]
Deputy Comptroller of the House: [Name]
Auditor of the House: [Name]
Deputy Auditor of the House: [Name]
Treasurer of the House: [Name]
Deputy Treasurer of the House: [Name]

Phialoides ornata (Léger) Labbé
Figs. 87 and 88.

1892 *Phialis ornata* Léger 1892:135
1899 *Phialoides ornata* Labbé 1899:24

Phialoides: Sporonts solitary, rather obese. Average length 1200μ . Width not given. Ratio--length prot:total length:: 1:3.3; width protomerite:width deut :: 1:1.2. Protomerite subglobular, as wide as high, constriction at septum. Deutomerite broadly ellipsoidal, widest in middle, broadly rounded behind. Epimerite persistent, a long slender cylinder, nearly as long as the whole sporont (exclusive of the epimerite), terminating in a dome-shaped retractile structure surrounded by a thickened collar, above which is a ring of fine triangular chitinous teeth. Nucleus spherical, containing several karyosomes.

Cysts spherical, $300-400\mu$ in diameter, dehiscing by simple rupture.

Spores biconical, swollen in middle, $10.5 \times 6.75\mu$.

Taken at Poitiers, France.

Host: *Hydrophilus piceus* (L.) lv.

Habitat: Intestine.

Labbé included with this species, as a synonym, Kölliker's *Gregarina brevirostra* (1848:12), probably because of the similarity in hosts. Kölliker's species shows a 'proboscis' as does Léger's, but a much shorter and differently shaped one. The former is a short xiphoid cone, only half the length of the protomerite; the latter a long cylindrical process, three times the length of the protomerite. The latter is retractile, but

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Kölliker does not mention that this is true of his species. His drawing does not indicate the circular distal collar armed with teeth. I am inclined to think the species are quite distinct, and have therefore placed Kölliker's species in the genus *Stylocephalus*. For further description, see under the heading *Stylocephala brevirostra* (Kölliker).

Pileocephalus bergi (Frenzel) Labbé'
Fig. 83.

1892 <i>Gregarina bergi</i>	Frenzel 1892:286-98
1899 <i>Pileocephalus bergi</i>	Labbé' 1899:20

Pileocephalus: Sporonts solitary, barrel-shaped.

Length of largest 330 μ , width 90 μ . Ratio length prot:total length :: 1:5.2; width prot:width deut :: 1:1.6. Protomerite hemispherical, evenly rounded, 1.7 times wider than high, slight constriction at septum. Deutomerite broadly ellipsoidal, wider in middle, broadly rounded--nearly flattened--posteriorly. Epimerite a large hyaline centrally dilated and sharply pointed cone half the length of the whole cephalont without the epimerite.

Nucleus spherical with one large karyosome. Endocyte dense, gray to black.

Cyst and spores unknown.

Taken at Cordoba, Argentina.

Host: *Necrobia ruficollis* Fabr. (*Corymetes ruf.*).

Habitat: Intestine.

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Pyxinia rubecula Hammerschmidt
Figs. 119 & 159.

1838	<i>Pyxinia rubecula</i>	Hammerschmidt	1838:357
1848	<i>Actinocephalus rubecula</i>	Frantzius	1848:193, 195
1851	<i>Gregarina rubecula</i>	Diesing	1851:12
1863	<i>Gregarina rubecula</i>	Lankester	1863:95
1892	<i>Pyxinia rubecula</i>	Léger	1892:140
1899	<i>Pyxinia rubecula</i>	Labbé	1899:26

Pyxinia: Sporonts solitary, obese. Measurements not given. Ratio--length prot:total length :: 1:3.6; width prot:width deut :: 1:1.2. Protomerite large, regularly conoidal, a little longer than wide (1.2 : 1), constriction at septum. Deutomerite conical, widest at shoulder, tapering to a slender, pointed posterior extremity. Endocyte of deutomerite dense, of protomerite much less dense. Nucleus ellipsoidal.¹ Epimerite situated upon a short neck, urn-shaped, wide-mouthed, crenulate on the periphery, with a short, stout conical style projecting upward through the center.

Cysts spherical, 250-280 μ in diameter, spores bluntly biconical, 14 x 7 μ .

Taken at ? Germany and Poitiers, France.

Host: *Dermestes lardarius* L., lv. and *D. vulpinus* F.

Pyxinia crystalligera Frenzel
Figs. 84, 85 & 86.

1892	<i>Pyxinia crystalligera</i>	Frenzel	1892:314-29
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Pyxinia: Sporonts solitary, elongate. Max. length 750 μ ,

1. Frantzius' illustration shows a spherical nucleus.

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width not given. Ratio length prot:total length :: 1:5 to 1:10; width prot:width deut :: 1.1:1. Protomerite spherical in adults. Deutomerite of adults regularly cylindrical, tapering in posterior third to a long, slender, bluntly pointed extremity. Epimerite a short sharp rigid style resting upon a small crenulate corona, the whole superimposed upon the cone-shaped protomerite of the cephalont. Endocyte containing large, strongly refractile variously shaped crystals and granules of pyxinin. Nucleus irregularly ellipsoidal, containing several karyosomes.

Cyst and spores not known.

Taken at Cordoba, Argentina.

Hosts: *Dermestes vulpinus* Fabr.; *Dermestes peruvianus* Cateln; adults and larvae of both.

Habitat: Intestine.

Pyxinia frenzeli Laveran & Mesnil

1900 *Pyxinia frenzeli* Laveran & Mesnil 1900;554-7

Pyxinia: Sporonts solitary, obese. Length 200. Max. length of cephalonts 150 μ . Max. width 40 μ . Cephalonts, only, illustrated. Ratio--length prot:total length :: 1:4; width prot:width deut :: 1:2. Protomerite (of cephalonts) cylindrical to subglobose, constricted at septum. Deutomerite subglobose, nearly as wide as long. Epimerite in two parts, a slender cylindrical base equal in length to protomerite, and superimposed upon same, and a short, sharp apical style equal in length to the cylinder.

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Nucleus spherical, containing a large karyosome.

Cysts not seen; spores ovoidal, $14 \times 6 \mu$.

Taken at Paris, France.

Host: *Attagenus pellicio* (Dermestes).

Habitat: Intestine.

Pyxinia möbuszi Léger & Duboscq
Figs. 97 & 98.

1900 *Pyxinia Möbuszi* Léger & Duboscq 1900:1566
1902 *Pyxinia Möbuszi* Léger & Duboscq 1902:409-18

Pyxinia: Sporonts solitary. Length $100-140 \mu$. Width not given. Ratio length prot:total length :: 1:5 to 1:6; width prot:width deut :: 1:1. Protomerite hemispherical, lower margin straight, projecting beyond deutomerite at septum. Deutomerite regularly cylindrical, ending in a blunt point or in a well rounded extremity. Epimerite persistent, a long slender sinuous style attached to base of the epithelial cell, i.e. to mesothelial wall, of the host, and extending through this cell, longitudinally, to lumen, the cephalont body remaining in lumen, beyond cilia. Epimerite as long or longer than the whole cephalont itself. Endocyte containing paramylin granules and small yellow refractile bodies. Nucleus spherical, with one karyosome and several chromatic granules.

Cysts spherical, $60-70 \mu$ in diam. Spores elongate barrel-shaped, $6.5 \times 7 \mu$ long.

Taken at Grenoble (?), France.

Habitat: Intestine.

Stictospora provincialis Leger
Figs. 90 & 91.

1893 *Stictospora provincialis* Leger 1893:129-31
1896 *Stictospora provincialis* Leger 1896:32
1899 *Stictospora provincialis* Labbe 1899:21

Stictospora: Length 1000-2000 μ . Width not given.

Ratio--length prot:total length :: 1:6; width prot:width deut ::

1:1.2. Protomerite subglobular, terminating in a broadly conical anterior extremity. Width equal to height. Deep constriction at septum. Deutomerite widest at shoulder, tapering to a slender, sharply pointed distal portion. Nucleus ellipsoidal, with several karyosomes. Epimerite consists of a short-stalked, globular papilla depressed anteriorly, there proceeding from the depression a dozen long, backwardly directed, sharply pointed processes which fit closely around the papilla and completely cover it.

Cysts spherical, 800 μ in diam., dehiscence by simple rupture; spores biconical, slightly curved.

Taken at Marseilles, France.

Hosts: larvae of *Melolontha* sp. and *Rhizotrogus* sp.

Habitat: Intestine.

But one species is known in this genus and in the subfamily *Stictosporidae*.

Section of Pathology
April 20, 1919

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Steinina ovalis (Stein) Léger & Duboscq
Figs. 92, 93 & 94.

1838	Clepsidrina polymorpha	Hammerschmidt	1838:355
1848	Stylorhynchus ovalis	Stein	1848:132-223
1848	Stylorhynchus ovalis	Frantzius	1848:195
1851	Gregarina ovalis	Diesing	1851:9
1863	Gregarina polymorpha	Lankester	1863:95
1875	Clepsidrina polymorpha	Schneider	1875:580-2
1902	Gregarina polymorpha	Berndt	1902:405
1904	Steinina ovalis	Léger & Duboscq	1904:352-5
1910	Steinina ovalis	Pfeiffer	1910:108

Steinina: Sporonts solitary, obese. Length 100 μ . Width not given. Ratio--length prot:total length :: 1:2.5; width prot:width deut :: 1:1.4.. Protomerite cylindrical, terminating in a large cone, as broad as high, no constriction at septum. Deutomerite short, ovoidal, nearly as wide as long, terminating in an obtuse-angled cone. Nucleus spherical and containing one large karyosome. E^rimerite a short retractile digitiform process which later becomes a flattened button. Cysts spherical or ovoidal, 100 μ in diameter, dehiscing by simple rupture. Spores biconical, broad through middle, 9 x 7.5 μ .

Taken at ? , France.

Host Tenebrio molitor L. larv.

Habitat: Intestine.

This is a much discussed and confused species. Early writers grouped together all the polycystid gregarines found in the larva of Tenebrio molitor as one species. Hammerschmidt evidently found several species for he named the one species he described Clepsidrina polymorpha. Stein differentiated three

237

species and separated out this one, even assigning to it a different genus than the other two (*C. polymorpha* and *C. cuneata*.)

Schneider described under the name *Clepsidrina polymorpha* (Hamm.) three species, one of them being the *Stylorhynchus ovalis* of Stein. His words are as follows:

"L'espece *Clepsidrina polymorpha* a été instituée par Hammerschmidt, et plus tard démembrée par Stein, qui trouva moyen d'établir a ses dépens trois espèces, dont une fut reportée dans le genre *Stylorhynchus*. Ce prétendu *S. ovalis* est simplement le céphalin de l'une des variétés que nous allons décrire."

Berndt, in a long paper on the gregarines of *Tenebrio molitor* larva, still considered this species the cephalont of *G. polymorpha* in 1902.

It remained for Léger & Duboscq (1904) to clear up the discussion. They created a new genus for this species, and called it *Steinina*.

Steinina obconica Ishii
Fig. 95.

1914 *Steinina obconica* Ishii 1914:439-41

Steinina: Sporonts solitary, obese. Length 120-140 μ .

Width 68 - 80 μ . Ratio--length prot:total length :: 1:5 to 1:7; width prot:width deut :: 1:1. Protomerite dome-shaped, three times as wide as high, placed with septum at an angle of 45° from the longitudinal axis. Septum constricted slightly at periphery. Deutomerite widest just below septum, and tapering to a slender, bluntly pointed posterior extremity. Eimerite a short conical

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hyaline projection $\frac{1}{4}$ as long as the protomerite is high. Endocyte dense. Nucleus spherical.

Cysts spherical to slightly ovoidal, 120 x 108. Spores unknown. Taken in the Province of Izu, Japan.

Host: *Tribolium ferrugineum* F.

Habitat: Intestine.

The character of the epimerite is evidence that this species is rightly placed.

Steinina rotunda n. sp.
Fig. 173.

Host *Amara Angustata* Say.

Location St. Joseph, Illinois, November, 1914.

Region of infection, Intestine.

Degree of infection. A dozen individuals were found in one host.

Character of sporonts. Solitary. The body is stout, short and broad. The epimerite persists even on some of the largest individuals. It is a spherical, sessile or shortly stalked hyaline knob. The protomerite just below it is broadly conical in shape, widening rapidly downward to form a cylinder bulging in the middle portion. A deep constriction is present at the septum. The protomerite is widest $\frac{2}{3}$ of its length from the anterior end, and, without the epimerite, it is as high as wide. The deutomerite is practically spherical except in its anterior end, which, at the septum is more or less flattened, or sometimes concave downward. The deutomerite widens rapidly from the septum and is as wide as

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long.

In color, the body is light brown or tan, of equal density in both protomerite and deutomerite; the protoplasm is homogeneous and not very abundant. The anterior half of the protomerite and the epimerite are transparent. The nucleus is visible in vivo in specimens of all ages. In all the specimens attached to the epithelium, no matter how large, the nucleus contains but one large karyosome; in the free individuals, no matter how small, a large number of small deeply staining chromosomes are present. The epicyte is thin and of equal width throughout. Longitudinal striations are visible.

Most of the specimens seen possessed epimerites, whether free or attached. A goodly number of these, however, were free in the lumen. The epimerite disappears by being gradually constricted off. When the specimens are of a slide in a water medium for fifteen minutes, approximately, the epimerite breaks, the supposition being that it is highly porous and the sudden strain caused by media of unequal density outside and inside is reduced by the bursting of this fragile structure. When the trophozoite is attached, only the epimerite is embedded and the free ends of several cells are destroyed by the parasite.

Very slow movement of progression was noted. The power of contraction seems to be centered in the anterior part of the deutomerite, for the parasite is able to contract this portion of the body into a narrow neck.

This species is very probably a member of the genus Steinina, family Actinocephalidae, although the cysts and spores are not known. The globular hyaline epimerite corresponds to that of one stage of the epimerite of the type species, Steinina ovalis, as described by Léger and Duboscq (1904:352-4). The incipient stylous epimerite and the hat-shaped end-stage were not observed in this species. The adults are non-associative and in shape of the deutomerite, the protomerite, and the conoidal anterior projection of the protomerite, together with the nuclear shape and content, coincide with those of the type-species. Coupling of sporonts takes place probably just previous to cyst-formation and not, as in the genus Gregarina, near the beginning of sporont life.

Some of the important measurements are given below:

Total length sporont	.25	.22	.18 mm.
Length protomerite with epimerite	.13	.105	.07
Length epimerite	.02	.02	.015
Length prot. without epimerite	.11	.085	.055
Length deutomerite	.12	.115	.11
Width protomerite	.13	.09	.07
Width deutomerite	.15	.12	.085
Ratio <u>length prot</u> total length	1:2.3	1:2.5	1:3.3
Ratio <u>width prot</u> width deut	1:1.1	1:1.3	1:1.2
Diameter nucleus	.04	.032	.04

The following table shows the results of the analysis of variance for the different treatments. The values in parentheses are the standard errors of the means. The values in brackets are the standard errors of the differences between the means. The values in brackets are the standard errors of the differences between the means.

Table 1. Analysis of variance for the different treatments.

Treatment	Mean	Standard Error	Standard Error of Difference
Total length (mm)	100.0	0.5	0.7
Length of head (mm)	15.0	0.2	0.3
Length of body (mm)	85.0	0.3	0.4
Length of tail (mm)	10.0	0.1	0.1
Weight (g)	1.5	0.05	0.07
Length of head (mm)	15.0	0.2	0.3
Length of body (mm)	85.0	0.3	0.4
Length of tail (mm)	10.0	0.1	0.1
Weight (g)	1.5	0.05	0.07

Stylocystis ensiferis (Ellis) Ellis
Figs. 96 and 99.

1912 *Stylocephalus ensiferis* Ellis 1912c:686-7
1913 *Stylocystis ensiferis* Ellis 1913c:274

Stylocystis: Sporonts solitary, short. Average length 40-65 μ . Ratio--length prot:total length :: 1:3; width prot:width deut :: 1:1 to 1:1.4. Protomerite cylindrical, conical to subglobose. Approximately as wide as high. Deep constriction at septum in adults. Deutomerite half as wide as long, widest at shoulder, tapering slightly and ending in a flattened or very broadly rounded posterior extremity. Epimerite a stout style, equal to protomerite in length.. Endocyte dark gray, opaque. Nucleus not seen.

Cost and spores not known.

Taken at Quirigua, Guatemala.

Host: *Leptochirus edax* Sharp.

Habitat: Intestine.

Ellis first described this species as a member of the family *Stylocephalidae*, later removing it to the family *Actinocephalidae* (1913c:274).

Cystocephalus algerianus Schneider
Figs. 115 and 160.

1886 *Cystocephalus algerianus* Schneider 1886:100
1899 *Cystocephalus algerianus* Labbé 1899:31

Cystocephalus: Sporonts solitary, ovoidal. Length 3-4 mm. Ratio--length prot:total length :: 1:6; width prot:width deut

:: 1:1.7. Protomerite dome-shaped, widest at base, twice as wide as high, no constriction at septum. Deutomerite ovoidal, widest through middle, length less than width, posterior end conical, sharply pointed. Epimerite placed upon a short collar, globose, with conical apex. Nucleus elongate, ellipsoidal, containing several karyosomes.

Cysts not known. Spores irregularly and peculiarly shaped, 10 x 10.5 μ.

Taken in Algeria.

Host: Pimelia sp.

Habitat: Intestine.

Lophocephalus insignis (Schneider) Labbe
Figs. 110, 114 and 161.

1882	Lophocephalus	insignis	Schneider	1882:435
1885	Lophocephalus	insignis	Schneider	1885:14
1899	Lophocephalus	insignis	Labbe	1889:31

Lophocephalus: Sporonts solitary, very elongate. Length 1000 μ. Width not given. Ratio--length prot:total length :: 1:15; width prot:width deut :: 1:1.3. Protomerite subglobose, flattened, twice as wide as high, constriction at septum. Deutomerite cylindrical, widest at end of anterior third, flattened at posterior extremity. Nucleus of sporont spherical with one karyosome. Epimerite a large flattened disc, depressed slightly in center, crenulate on periphery, longitudinally striated and carrying at base a circle of very many short upwardly directed digitiform processes. The cephalont which possesses the circular

disc-shaped epimerite is spherical , or nearly so. Its nucleus contains a single coiled chromatin band.

Cysts subspherical or subvoidal, 430 x 330 μ in diam., dehiscing by pseudocyst. Spores extruded in chains, irregularly hat-shaped, 10 μ long.

Taken at Tours, Indre-et-Loire, France.

Host: *Helops striatus*.

Habitat: Intestine.

Oocephalus hispanus Schneider

1886	<i>Oocephalus hispanus</i>	Schneider	1886:101
1899	<i>Oocephalus hispanus</i>	Labbé	1899:

Epimerite a sphere, carried on a short conical neck.

Host: *Morica* sp.

Habitat: Intestine.

Ellis (1913c:282) includes this genus with *Cystocephalus* under the name of the latter. The two genera are, however, distinct, having epimerites different in shape; the former being globular, set on a short conical neck, the latter spade-shaped (in side view), i.e. dilated in middle portion and conical at apical end, set on a short cylindrical slender collar.

1947-1948

1949-1950

1951-1952

1953-1954

1955-1956

1957-1958

1959-1960

1961-1962

1963-1964

1963-1964	1965-1966
1967-1968	1969-1970

1971-1972

1973-1974

1975-1976

1977-1978

1979-1980

1981-1982

1983-1984

1985-1986

1987-1988

Stylocephalus oblongatus (Hammerschmidt)

Watson

Figs. 106 and 120.

1838	<i>Rhizina oblongata</i>	Hammerschmidt	1838:357
1848	<i>Sporadina oblongata</i>	Frantzius	1848:195
1851	<i>Gregarina oblongata</i>	Diesing	1851:14
1875	<i>Stylorhynchus oblongatus</i>	Schneider	1875:569
1882	<i>Stylorhynchus oblongatus</i>	Schneider	1882:434
1915	<i>Stylocephalus oblongatus</i>	Watson	

Stylocephalus: Sporonts solitary, elongate. Max. length 3000 μ ; width not given. Ratio length prot:total length :: 1:6; to 1:8. Ratio width prot:width deut :: 1:2. Protomerite globular, constriction at septum. Deutomerite cylindrical, tapering slightly from middle, ending in a rather slender blunt posterior extremity. Epimerite a thick cylindrical neck with a terminal dilated portion with papilla on extremity. Whole epimerite equal to 1.5 to twice the length of protomerite alone. E¹¹docyte yellow in cephalont, becoming black in adult sporont. Nucleus ellipsoidal, with several karyosomes.

Cysts irregularly spherical, with slight depressions and protuberances. Spores brown, united in chains, 7 μ in long axis.

Taken at Paris and Poitiers, France.

Hosts: *Opatrum sabulosum* (L.) and *Asida grisea* (L.).

Habitat: Intestine.

Because of priority, Ellis renamed the genus *Stylorhynchus*, *Stylocephalus*. The species thus becomes *Stylocephalus oblongatus*.

1915	Stylosanthes trifoliate	1915
1916	Stylosanthes trifoliate	1916
1917	Stylosanthes trifoliate	1917
1918	Stylosanthes trifoliate	1918
1919	Stylosanthes trifoliate	1919
1920	Stylosanthes trifoliate	1920
1921	Stylosanthes trifoliate	1921
1922	Stylosanthes trifoliate	1922
1923	Stylosanthes trifoliate	1923
1924	Stylosanthes trifoliate	1924
1925	Stylosanthes trifoliate	1925

Stylosanthes trifoliate; Stylosanthes trifoliate, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925. The purpose of this paper is to report on the results of a series of experiments conducted during the past few years with this species. The results show that the species is highly resistant to certain diseases, and that the resistance is inherited. The inheritance of this resistance is controlled by a single gene, and the resistance is dominant. The results also show that the resistance is not affected by the environment, and that the resistance is stable. The results are discussed in relation to the inheritance of resistance to disease in other species.

Stylocephalus longicollis (Stein) Watson
Figs. 107 and 121.

1815	<i>Gregarina</i> sp.	Gaede	1815:17
1848	<i>Stylorhynchus longicollis</i>	Stein	1848:222
1848	<i>Stylorhynchus longicollis</i>	Frantzius	1848:195
1851	<i>Gregarina Mortisagae</i>	Diesing	1851:12
1863	<i>Gregarina longicollis</i>	Lankester	1863:95
1875	<i>Stylorhynchus longicollis</i>	Schneider	1875:572
1882	<i>Stylorhynchus longicollis</i>	Schneider	1882:422
1884	<i>Stylorhynchus longicollis</i>	Schneider	1884:1-36
1915	<i>Stylocephalus longicollis</i>	Watson	

Stylocephalus: Sporonts solitary, elongate. Measurements not given. Ratio--length prot:total length :: 1:10; width prot:width deut :: 1:1.1. Protomerite pentagonal in lateral optical view, truncate at apex, slight constriction at septum, width equal to length. Deutomerite elongate, cylindrical, tapering in posterior two-thirds and ending in a rather blunt point.

Nucleus ellipsoidal, with several karyosomes. Endocyte dense. Epimerite consisting of a long slender cylindrical neck, terminating in a slightly dilated papillate anterior end, the whole three or four times the length of the protomerite alone.

Cysts irregularly spherical, surface covered with small indentations and papillae. Spores like those of *S. oblongatus*.

Taken at Paris , France.

Host: *Blaps mortisaga*.

Habitat: Intestine.

Watson

Fig. 118.

1848	<i>Gregarina brevirostra</i>	Kölliker	1848:12
1848	<i>Stylorhynchus brevirostris</i>	Frantzius	1848:195
1851	<i>Gregarina brevirostrata</i>	Diesing	1851:9
1863	<i>Gregarina brevirostris</i>	Lankester	1863:95
1899	<i>Phialoides ornata</i>	Labbe	1899:24
1915	<i>Stylocephalus brevirostris</i>	Watson	

Stylocephalus: Sporonts solitary, stout-bodied. Ratio--
length prot:total length :: 1:4; width prot:width deut :: 1:1.2.
Protomerite cylindrical, of nearly equal width throughout, width
equal to length, no constriction at septum, corners rounded at
anterior end. Epimerite a small xiphoid-conoidal tongue projecting
upward from center of protomerite, length equal to half that of
protomerite. Deutomerite just below septum a little wider than
protomerite, tapering to a rather sharp point. Nucleus spherical,
with six to nine small karyosomes.

Cyst and spores unknown.

Taken at ? , Germany.

Host: *Hydrophilus* sp. larva.

Habitat: Intestine.

Kölliker illustrated another figure of this species
besides the one copied in Fig. 118, in which the whole body is
less angular in outline (1848, Pl. 2, Fig. 15); the epimerite is
a sphere, the protomerite nearly so also, and the deutomerite
ellipsoidal with a well-rounded posterior extremity. The animal
is drawn under abnormal conditions, however, a drop of egg-albumen

having been used as a medium and the animal left in it some time.

Frantzius placed this species where it evidently belongs, in the genus Stylocephalidae. His definition of the genus is as follows:

"Einzelu lebend mit russelartigem Kopfanhang."

Labbe regarded this species as identical with Phialoides ornata, probably because of an identity of hosts rather than a similarity of the parasites. A table of the important characteristics of the two species follows, and speaks for itself.

	St. brevirostris	Ph. ornata
Epimerite length	$\frac{1}{2}$ length of prot. $\frac{1}{8}$ l. of whole sporont	3 x l. of prot. = to whole sporont without epimerite
width	$\frac{1}{4}$ that of prot.	1/10 that of prot.
shape	Xipho-conical, i.e. elongate-conoidal, dilated in middle	Cylindrical
apex	Pointed	Flattened, a thickened collar, thickly set with 20 more or less small teeth
Protomerite shape	Widest at shoulder, tapering to post. end	Ellipsoidal
where widest?	Anterior 1/5	Center
post. extremity	Tapering and pointed	Broadly rounded
Nucleus, shape	Spher., several karyosomes	Spher., several karyosomes

Ellis (1912) changed the name of the genus from Stylo-rhynchus to Stylocephalus because of priority, hence the species-name changes.

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Stylocephalus gladiator (Blanchard) Watson

1905 *Stylorhynchus gladiator* Blanchard 1905:923-8
 1915 *Stylocephalus gladiator* Watson

Stylocephalus: Sporonts solitary, elongate, avg.

length 300-400 μ , max. length 720 μ ; width 30 μ , max. width 70 μ .

Protomerite short, globular. Deutomerite elongate cylindrical, with a slender attenuated posterior extremity, bluntly pointed.

Epimerite in two parts, a very long slender cylindrical neck and a dilated xiphoid-shaped apical portion, often longer than the whole gregarine. Nucleus ovoidal with one large karyosome.

Cysts not known.

Taken at Grenoble, France.

Host: *Helenophorus collaris* L.

Habitat: Intestine.

Stylocephalus giganteus Ellis
 Figs. 108 & 109.

1912 *Stylocephalus giganteus* Ellis 1912a:25-7

Stylocephalus: Sporonts solitary, elongate. Length 1200-1800 μ . Width not given. Ratio--length prot:total length :: 1:9 to 1:18; width prot:width deut :: 1:1 to 1:1.5. Protomerite dome-shaped, widest at base, or dome-shaped dilated above base, flattened anteriorly. Constriction at septum. Deutomerite widest at shoulder. Cylindrical, terminating in an abrupt but sharply pointed cone. Epimerite a long pointed cone, situated upon a conoidal projection of the protomerite of the cephalont.

Department of Chemistry
5700 South University Avenue
Chicago, Illinois 60637

Dear Mr. [Name]:

I have your letter of [Date] regarding [Subject].
I am sorry that I cannot give you a more definite answer at this time.
The matter is still under consideration and I will contact you again as soon as a final decision has been reached.

Sincerely,
[Name]
[Title]

Enclosure: [List of items]

I am sure that you will understand the need for a thorough review of the situation.
If you have any further questions, please do not hesitate to contact me.
Thank you very much for your interest in [Subject].

Endocyte dense. Nucleus not described.

Cysts spherical, 450 μ in diam., entire surface papillated and indented, dehiscence by pseudocyst, spores extruded in chains.

Spores irregularly subspherical, black, 7 x 11 μ .

Taken at Boulder, Colo. and at Denver, Colo.

Hosts: Eleodes sp.; Asida sp.; Asida opaca Say; and Eusattus sp.

Habitat: Intestine.

Sphaerochynchus ophioides (Schneider) Labbe'

1886	<i>Sphaerocephalus ophioides</i>	Schneider	1886:100
1899	<i>Sphaerorhynchus ophioides</i>	Labbe'	1899:32

Sporonts solitary, elongate. Length 3-4 mm. Epimerite

1/6 the total length of cephalont, consisting of a small spherical or ovoidal body carried on a long cylindrical stalk, broadest at base and gradually narrowing toward apical end. Cephalonts 1.3 mm long, 220 μ of which is length of the epimerite and 8.5 μ for the terminal sphere.

Taken at ?

Host: Acis sp.

Habitat: Intestine.

Acanthospora pileata Leger

Figs. 162 & 215.

1892	<i>Acanthospora pileata</i>	Léger	1892:145-6
1899	<i>Acanthospora pileata</i>	Labbe'	1899:28

Acanthospora: Sporonts solitary, elongate. Length 300-400 μ . Ratio--length prot:total length :: 1:6; width prot:width

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deut :: 1:1.5. Protomerite nearly hemispherical, little higher than wide, constricted at septum. Deutomerite elongate-ellipsoidal, widest just anterior to middle. Endocyte brown. Epimerite a broadly conical papilla. Nucleus ellipsoidal, with several karyosomes. Cysts spherical, 150-180 μ in diam. Spores biconical, ends truncate, with 6 equatorial spines in a circle. Dimensions 7.5 x 10.5 μ .

Taken in the Department of Poitou, France.

Hosts: Cistelides sp.; Omoplus sp. lv (Scudder gives a genus Omoplus, not Omoplus).

Habitat: Intestine.

Acanthospora polymorpha Léger
Fig. 163.

1896 *Acanthospora polymorpha* Léger 1896:44

1899 *Acanthospora polymorpha* Labbé 1899:28

Acanthospora: Sporonts solitary, elongate, polymorphic.

Protomerite irregularly cylindro-conical. Deutomerite ovoidal, widest through middle. Endocyte yellowish-brown.

Cysts 500-700 μ in diam. Spores bipyramidal, each face hexagonal, each pole armed with 6 sharp spines and with a circle of 6 equatorial spines, 8 x 4.4 μ .

Taken at ?

Host: Hydrous caraboides (L.) lv.

Habitat: Intestine.

Ancyrophora gracilis Léger
Figs. 122 & 164.

18--	<i>Gregarina acus</i>	Stein	18--:--
1848	<i>Actinocephalus Acus</i>	Frantzius	1848:195
1863	<i>Gregarina acus</i>	Lankester	1863:95
1892	<i>Ancyrophora gracilis</i>	Léger	1892:146-7

Ancyrophora: Sporonts solitary, elongate. Max. length 2000 μ ; max. width 400 μ . Protomerite conical, dilated in central region. Constriction at septum. Deutomerite widest at shoulder, tapering to a long acuminate posterior extremity. Nucleus spherical, with several karyosomes. Epimerite a globular papilla with 8 long, backwardly-directed, flexible 'tentacles'.

Cysts spherical, 200 μ in diameter. Spores biconical, truncate, with four spines at each pole and six equatorial spines, 8.5 x 5.1 μ .

Taken at ? , Germany and Poitiers, France.

Hosts: *Carabus* sp.; *Carabus auratus* L.; *C. violaceus* L., larvae and adults; and *Silpha thoracica* L. larva.

This species was first described by Stein under the name *Gregarina acus*, according to Léger, but no mention is made of this species in Stein's 1848 article, however.

Frantzius and Lankester refer the species to Stein; Diesing does not mention it.

If the originally described species is the same as the species described by Léger in 1892 under the name *Ancyrophora gracilis*, then the name of the latter should be changed to *A. aca* (Stein) Léger. In the absence, however, of complete data, it stands as given by Léger.

Ancyrophora uncinata Léger
Fig. 216.

1892 *Ancyrophora uncinata* Léger 1892:147-8

Ancyrophora: Sporonts solitary, length 150-200 μ .

Width not given. Epimerite garnished with twelve rigid hooks in two alternating rows.

Cysts spherical. Spores spined, both polar and equatorial, 7.5 x 4.5 μ .

Taken at Poitiers, France.

Hosts: *Dytiscus* sp.; *Colymbetes* sp.; *Sericostoma* sp.; and *Limnophilus rhombicus* (L.) (*Phryganea rhomb.*).

Habitat: Intestine.

Labbe placed *Gregarina dytiscorum* Frantz. with this species under the name of the latter, evidently from a similarity in the first host given above. The species are, however, unlike and I have separated them, calling the former an Uncertain Species, under the Actinocephalidae.

The last three hosts given by Léger are not Coleoptera but Neuroptera and the circumstance of finding the same species of gregarine in such widely separated hosts is unusual, and almost unique yet the record is authentic.

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Cometoides capitatus (Léger) Labbé
Figs. 123, 124 & 165.

1892 *Pogonites capitatus* Léger, 1892:150-1
1899 *Cometoides capitatus* Labbé 1899:29

Cometoides: Sporonts solitary, elongate. Length 1500 μ .

Width not given. Ratio--length prot:total length :: 1:13; width prot:width deut :: 1:1.5. Protomerite subspherical, width equal to eheight. Constriction at septum. Deutomerite widest at shoulder, tapering from thence to a very long slender bluntly-pointed posterior extremity. Epimerite globose, stalked, armed with a sub-equatorial band of 12 - 15 long slender flexible filaments 32-35 long. Nucleus spherical, with several karyosomes.

Cysts spherical, 300 μ in diameter, dehiscence by simple rupture, spores cylindro-biconical, apices truncate, each face octagonal. Poles armed with four spines each, two equatorial rows of spines.

2.5 x 5.1 μ .

Taken at Poitou and Avanton, France.

Host: Hydrous sp. larv.

Habitat: Intestine.

Cometoides crinitus (Léger) Labbé
Fig. 125.

1892 *Pogonites crinitus* Léger, 1892:149-50
1899 *Cometoides crinitus* Labbé 1899:29

Cometoides: Sporonts solitary, very elongate. Max.

length 2000 μ . Ratio length prot:total length :: 1:20; ratio width prot:width deut :: 1:1.3. Body shaped very similar to *C. capitatus*.

1957-58
1958-59

Department of Physics
Chicago, Illinois

Dr. J. R. Schrieffer
Department of Physics
University of Chicago
Chicago, Illinois

Dear Dr. Schrieffer:

I have just received your letter of the 11th and am pleased to hear that you are interested in the work of the Chicago group.

The Chicago group is currently working on the theory of superconductivity and the properties of the electron gas.

I would be glad to discuss this work with you if you are interested.

Sincerely,
John Bardeen

John Bardeen
Department of Physics
University of Chicago
Chicago, Illinois

1957-58
1958-59

except that it is longer. Epimerite hemi-spherical, flattened surface upward, armed with an equatorial ring of 7 or 8 long slender flexible filaments 100 long. Endoplasm brown. Nucleus ellipsoidal, with several karyosomes.

Cysts spherical, 200-300 μ in diam. Spores cylindro-biconical, spines at the poles and in two equatorial bands.

Taken at Poitou and Vendee, France.

Host: Hydrobius sp. larv.

Habitat: Intestine.

Corycella armata Leger
Figs. 111, 112, & 166.

1892 *Corycella armata* Leger 1892:144-5

Corycella: Sporonts solitary, 280-300 μ long. Ratio-- length prot:total length :: 1:4; width prot:width deut :: 1:0.9. Protomerite subglobular, constriction at septum, wider in middle than deutomerite. Deutomerite widest at shoulder, tapering thence to a sharp point. Endoplasm gray-brown. Epimerite a large globular papilla set upon a stout cylindrical collar which is two-thirds as long as the protomerite itself, and armed with 8 strong, short, sharply-pointed, recurved, and backwardly-directed hooks. Nucleus spherical, containing several karyosomes.

Cysts spherical, 250 μ in diam. Spores biconical, truncate, 4 small spines at each pole, no equatorial spines. 13 x 6.5 μ .

Taken at Poitou, France.

1977

1978

1979

1980

1981

1982

1983

1984

1985

1986

Host: *Gyrinus natator* (L.) larv.

Habitat: Intestine.

Hyalospora roscoviana Schneider
Fig. 129.

1875 *Hyalospora roscoviana* Schneider 1875:584

Hyalospora: Sporonts biassociative, cylindrical, very elongate. Length and width not given. Ratio--length prot:total length (primita) :: 1:9; width prot:width deut :: 1:1.6. Protomerite of primita cylindrical, conical, rounded at anterior extremity, twice as high as wide, a constriction at septum. Deutomerite elongate-cylindrical, tapering but slightly at posterior end and terminating in a rounded extremity. Nucleus elongate-ellipsoidal, with one large karyosome. Epimerite not known.

Endocyte yellow to yellow-orange.

Cysts spherical (?), dehiscing by simple rupture. Spores broadly ellipsoidal but sharply pointed.

Taken at Roscoff, France.

Host: *Petrobius maratimus*.

The name *Petrobius* has been applied to genera of both Orthoptera (*Thysanura*) (1817) and Coleoptera (1836) and, not knowing which one Schneider found as host, I have included this species among the Coleopteran as well as in the Thysanuran list and the Orthopteran chapter. He says of its habitat:

PHYSICS DEPARTMENT
CHICAGO, ILL.

TO THE PHYSICS DEPARTMENT

Dear Sirs:

I have the honor to acknowledge the receipt of your letter of the 15th inst. in relation to the matter mentioned therein. I am sorry that I cannot give you a more definite answer at this time, but I am sure that you will understand the reasons therefor. I am sure that you will understand the reasons therefor.

I am, Sir, very respectfully,
Your obedient servant,
[Signature]

"Les Petrobius se recontrent, en effet, sur le mur même qui sépare le laboratoire de la mer, tapis dans les interstices des pierres. La même espèce est commune sur une grande partie du littoral - - -".

Form its habitat, the host might be either an Orthopteran or a Coleopteran.

This is the only species in the genus Hyalospora.

Sphaerocystis simplex Léger
Fig. 137.

1892 *Sphaerocystis simplex* Léger 1892:115-16

Sphaerocystis: Sporonts solitary, subspherical, length 100-140 μ . Width not given. Dicytid, having protomerite only when young. Shape spherical, with a large papillate extension at each end. Nucleus spherical, with a large karyosome.

Cysts spherical, 100 μ in diam., without spore-ducts. Encystment solitary. Spores ovoidal, 10.5 x 7.5 μ .

Taken at Iteuil (Poutou), France.

Host: *Cyphon pallidulus* Boh. (*C. spallidus*).

Habitat: Intestine.

Euspora fallax Schneider
Fig. 131.

1875 *Euspora fallax* Schneider 1875:583

Euspora: Sporonts biassociative, ellipsoidal. Measurements not given. Ratio--length prot:total length (primita) :: 1:6; width prot:width deut :: 1:2.5. Protomerite of primita spherical, deep constriction at septum; deutomerite ellipsoidal,

widest through middle or just posterior to middle, posterior end flattened. Nucleus spherical with one karyosome. Endocyte dense except in anterior third of protomerite, where there is a distinct conoidal area of less dense endocyte.

Cysts spherical, dehiscing by simple rupture. Spores prismatic, square-cornered, pentagonal in optical view.

Taken at Roscoff, France.

Host: A Melolonthid (*Rhizotrogus aestivus* ?).

Habitat: Intestine.

Hirmocystis asidae Leger

1896 <i>Eirmocystis asidae</i>	Léger 1896:30
1899 <i>Hirmocystis asidae</i>	Labbé 1899:12

Hirmocystis: Sporonts very small, bi- or tri- associative. Cylindrical. Length 20 μ . Width not given. Ratio--length prot:total length (primita) :: 1:10 to 1:12; width prot:width deut :: 1:2. Protomerite subglobular, depressed. Deutomerite elongate. Epimerite a small, simple papilla.

Cysts spherical, dehiscence by simple rupture. Spores cylindro-ovoidal, 6 x 3.5 μ .

Taken at ? , France.

Host: *Asida servillei* Sol.

Habitat: Intestine.

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Gregarina cuneata Stein

Figs. 132, 133, 134, 135, 136 and 152.

1838	<i>Clepsidrina polymorpha</i>	Hammerschmidt	1838:35-7 ?
1848	<i>Gregarina cuneata</i>	Stein	1848:209-10, 222
1848	<i>Gregarina cuneata</i>	Frantzius	1848:196
1851	<i>Gregarina cuneata</i>	Diesing	1851:13
1863	<i>Gregarina polymorpha</i>	Lankester	1863:95
1875	<i>Clepsidrina polymorpha</i> var. <i>cuneata</i>	Schneider	1875:581
1899	<i>Gregarina polymorpha</i> var. <i>cuneata</i>	Labbé	1899:11
1902	<i>Gregarina cuneata</i>	Berndt	1902:393-404
1903	<i>Gregarina xylopi</i>	Crawley	1903a:47
1904	<i>Gregarina cuneata</i>	Léger & Duboscq	1904:354-5
1910	<i>Clepsidrina cuneata</i>	Pfeiffer	1910:108
1911	<i>Gregarina cuneata</i>	Ishii	1911:279
1914	<i>Gregarina cuneata</i>	Ishii	1914:435

Gregarina: Sporonts biassociative, elongate cylindrical. Length 380μ ; width 170μ . Ratio--length prot:total length (primita) :: 1:3; width prot:width deut (primita) :: 1:1.5. Protomerite elongate cylindrical, $2\frac{1}{2}$ times as wide as posterior portion, dilated at anterior end, widest part acutely angled, apex broadly rounded. Slight constriction at septum. Deutomerite elongate, width gradually increasing from septum to posterior portion, terminating in a very broadly rounded extremity. Nucleus spherical, small, with one karyosome.

Cysts spherical. 240μ in diam. long sporeducts. Spores extruded in chains, doliform, $5.7 \times 4\mu$.

Taken at Berlin, Germany; Roscoff, Caen, France; Philadelphia, Pa., and in the Province of Izu, Japan.

Host: *Tenebrio molitor* L. larv. and ad.

Habitat: Intestine.

Hammerschmidt described two gregarines from *Tenebrio molitor* under one name, *Clepsidrina polymorpha*. He regarded them as different shapes assumed by the same parasite.

Stein said, concerning his discoveries:

"Ich fand drei verschiedend Formen, von denen zwei zur Gattung *Gregarina* in engern Sinne, eine zur Gattung *Stylorhynchus* gehört. Hammerschmidt kannte wahrscheinlich bereits zwei dieser Formen, doch geht dies selbst aus seinen Abbildungen die gar zu roh sind, nicht mit völliger Bestimmtheit hervor; er hielt sie aber für eine Art und nannte sie *Clepsidrina polymorpha*."

Stein's figure is reproduced in Fig. 133.

Frantzius enumerated among his species both *G. polymorpha* and *G. cuneata* Stein, not recognizing that the former included the latter. He did not illustrate the genus *Gregarina cuneata*, but included under the name *G. polymorpha* one excellent figure of *G. cuneata* (Fig. 135). Stein said that Frantzius knew all three gregarines in this *Tenebrio*, but

"wirst sie eben falls zu einer Art unter dem Namen *Gregarina polymorpha* zusammen blos aus dem Grunde, weil sie in einem und demselben Thiere leben."

He named one of the species *Stylorhynchus ovalis*. The other two

"sind einander sehr ähnlich und fast gleich gross. Die eine ist durch den nach vorn erweiterten, flach gedrückten, keilähnlichen Kopf, der fast $1/3$ der Länge des Leibes gleichkommt, und durch den nach hintern erweiterten Leib ausgezeichnet; ich nenne sie *Gregarina cuneata*."

Lankester placed this species and Schneider's *St. ovalis* together as synonyms under the name *Gregarina polymorpha* Hamm.

Schneider grouped together under the name *Clepsidrina*

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Section header or title text, centered on the page.

First main paragraph of text, containing several lines of faint, illegible characters.

Second line of text, possibly a sub-section or continuation of the first paragraph.

Third main paragraph of text, consisting of multiple lines of faint, illegible characters.

Fourth main paragraph of text, continuing the faint, illegible content.

Fifth line of text, possibly a transition or a new section marker.

Sixth main paragraph of text, containing faint, illegible characters.

Seventh line of text, possibly a sub-section or continuation.

Eighth main paragraph of text, containing faint, illegible characters.

Ninth line of text, possibly a final line or a signature area.

polymorpha (Hamm.) the three species from Tenebrio molitor, which Stein had separated some twenty-five years before. He designated the species which is under discussion as Clepsidrina polymorpha variety cuneata (Stein). He considered adult associations of G. cuneata as young immature associations of G. polymorpha.

"Les jeunes individus sont nombreux et remarquables par le volume relatif de leur protomérite (fig. 16 et 17)."

The figure 16 referred to is a typical association of G. cuneata.

He says further

"- - Ressemble beaucoup à la précédente; est arrondie en arrière au deutomérite et plus massive dans son ensemble (fig. 11, le primitive)."

His fig 11, my fig. 132, coincides with Stein's figure of his G. cuneata (my fig. 133).

Berndt studied the gregarines of the larva of Tenebrio molitor and isolated G. cuneata from the others.

Léger and Duboscq (1904) confirmed his work. (Their drawing is reproduced in my fig. 152).

In Leidy's unpublished manuscript, Crawley (1903a) found two drawings of gregarines taken from the Tenebrionid, Xylopinus saperdoides. One has been otherwise disposed of, but one drawing is of a species identical with or very similar to G. cuneata. No description or measurements accompanied the drawings. From a similarity of the figures of the type G. cuneata and the figure given by Crawley (my fig. 134), the species is the same.

Ishii (1911:279 and 1914:435) found the species in Japan (my fig. 136) in *Tribolium ferrugineum*, one of the Tenebrionidae, and very similar to *Tenebrio molitor*. It is quite possible that the parasite is not identical with or a variety of the classical *G. cuneata* for the figure does not exactly coincide with the others, but no data whatever accompanies the figures and it seems best to leave the species in the present position.

Gregarina polymorpha (Hammerschmidt)

Stein

Figs. 140, 141, 142, and 153.

1838	<i>Clepsidrina polymorpha</i>	Hammerschmidt	1838:357 ?
1848	<i>Gregarina polymorpha</i>	Stein	1848:210, 222
1848	<i>Gregarina polymorpha</i>	Frantzius	1848:193, 195
1851	<i>Gregarina polymorpha</i>	Diesing	1851:13
1875	<i>Clepsidrina polymorpha</i>	Schneider	1875:580
1899	<i>Gregarina polymorpha</i>	Labbé	1899:10
1902	<i>Gregarina polymorpha</i>	Berndt	1902:404-8
1904	<i>Gregarinapolymorpha</i>	Léger & Duboscq	1904:354-7
1910	<i>Clepsidrina polymorpha</i>	Pfeiffer	1910:108
1911	<i>Gregarina polymorpha</i>	Ishii	1911:279

Gregarina: Sporonts biassociative, elongate, cylindrical, maximum length 350μ , max. width 100μ . Ratio--length prot: total length :: 1:5 to 1:7; width prot:width deut :: 1:1.2 to 1:2. Protomerite dome-shaped, as wide as high, no constriction at septum. Deutomerite elongate-cylindrical, rounded at posterior extremity. Nucleus small, spherical, one karyosome. Cyst and spores unknown.

Taken at Berlin, Germany, Roscoff, and Grenoble, France.

Host: *Tenebrio molitor* L. larva and adult.

Habitat: Intestine.

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PROGRAMME OF STUDIES
1910-1911

1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911
1910-1911	1910-1911	1910-1911

Main body of faint, illegible text, likely containing the details of the program of studies.

Hammerschmidt knew two of the forms of gregarines parasitic in the larva of *Tenebrio molitor*. He called them, however, by one name. In the words of Stein,

"Hammerschmidt kannte wahrscheinlich bereits zwei dieser Formen, - - ; er hielt sie aber für eine Art und nannte sie *Clepsidrina polymorpha*."

Stein differentiated the two species, calling one *G. cuneata*, my fig. 133, the other *G. polymorpha*, my fig. 142. Since the latter species agrees best with the figures of Hammerschmidt

"da auf sie die meisten, Figuren Hammerschmidt's am besten passen."

Frantzius gave, side by side, figures of Stein's *G. cuneata* and *G. polymorpha*, and called them both *G. polymorpha*. (Pl. VII, group V, figs. 1 & 2; my figs. 135 and 140).

Lankester mentioned *G. polymorpha* Hamm., and under this name gave as synonyms *Stylorhynchus ovalis* Stein and *G. cuneata* Stein.

Schneider brought together, again, in coincidence with Hammerschmidt's original determination, the three species which Stein had differentiated, and added another variety. He described

1) *Clepsidrina polymorpha* var. *cuneata*, 2) *C. polymorpha* *typica*, 3) *C. mimosa*, 4) and disposes of *Stylorhynchus ovalis* Stein as

"simplement le céphalin de l'une des variétés que nous allons décrire."

Of these forms, the first has since been designated *Gregarina cuneata* Stein; the second remains *Gregarina polymorpha*; the third

has been dropped as an authentic species for it is obviously immature and probably, from the shape, a young individual of *G. cuneata*; the fourth is now *Steinina ovalis* (Stein) Leger & Duboscq.

Berndt separated the species *G. polymorpha* from *G. cuneata*, describing each in detail. Leger & Duboscq corroborated his work and created the genus *Steinina* for the species previously known as *Stylorhynchus ovalis* Stein.

Ishii found the species in Japan, from one of the Tenebrionidae. No description of adults is given.

Gregarina amarae Frantzius

1838	<i>Clepsidrina ovata</i>	Hammerschmidt	1838:356
1848	<i>Gregarina Amarae</i>	Frantzius	1848:195
1851	<i>Gregarina Amarae</i>	Diesing	1851:12
1863	<i>Gregarina Amarae</i>	Lankester	1863:95
1899	<i>Gregarina amarae</i>	Labbé	1899:36

This parasite has not been found since the original discovery by Hammerschmidt. Frantzius mentioned it by name only; Diesing gave this description:

"*Gregarina Amarae* Frantzius.

Proboscis--- Receptaculum ovatum breve. Corpus subglobosum. Longit. 9/40''', crassit ---

Clepsidrina ovata Hamm. (Individua bina postice juncta." - - -. Habitaclum Amara cuprea, in intestinus tenuibus (Hamm.)"

Labbé says that the host is probably the beetle known now as *Poecilus cupreus* (L.).

That this species is a member of the genus *Gregarina* is attested by Diesing's words

The first part of the report is devoted to a general
 description of the system, and to a statement of the
 objects to be attained. It is then divided into
 three parts, the first of which is devoted to a
 description of the system, the second to a
 statement of the objects to be attained, and the
 third to a description of the system.

Description of the System

1. The first part of the report is devoted to a general description of the system, and to a statement of the objects to be attained.	2. It is then divided into three parts, the first of which is devoted to a description of the system, the second to a statement of the objects to be attained, and the third to a description of the system.	3. The first part of the report is devoted to a general description of the system, and to a statement of the objects to be attained.
4. It is then divided into three parts, the first of which is devoted to a description of the system, the second to a statement of the objects to be attained, and the third to a description of the system.	5. The first part of the report is devoted to a general description of the system, and to a statement of the objects to be attained.	6. It is then divided into three parts, the first of which is devoted to a description of the system, the second to a statement of the objects to be attained, and the third to a description of the system.

The second part of the report is devoted to a
 description of the system, and to a statement of the
 objects to be attained. It is then divided into
 three parts, the first of which is devoted to a
 description of the system, the second to a
 statement of the objects to be attained, and the
 third to a description of the system.

The third part of the report is devoted to a
 description of the system, and to a statement of the
 objects to be attained. It is then divided into
 three parts, the first of which is devoted to a
 description of the system, the second to a
 statement of the objects to be attained, and the
 third to a description of the system.

which indicates the biassociative nature of the sporonts. No drawing accompanies any available mention of the species.

Gregarina tenuis Hammerschmidt

1848	<i>Gregarina tenuis</i>	Frantzius	1848:195
1851	<i>Gregarina tenuis</i>	Diesing	1851:13
1863	<i>Gregarina tenuis</i>	Lankester	1863:94

Host *Allecula* sp.

No mention is made of this species among those in Labbe's *Sporozoa* or in the list of *Sporozoa* in Lankester's *Treatise on Zoology* (Pt. 1, Protozoa). The species is probably a true *Gregarina*, for Frantzius included in this genus only gregarines

"-- stets zu zweien aneinandergeheftet."

Gregarina elongata Frantzius

Fig. 154

1848	<i>Gregarina elongata</i>	Frantzius	1848:193, 195
1851	<i>Gregarina elongata</i>	Diesing	1851:13
1863	<i>Gregarina elongata</i>	Lankester	1863:94

Host *Crypticus* sp.

This species is well illustrated by Frantzius but does not appear in Labbe's classification of the *Sporozoa*.

Gregarina scarabeirelictii Leidy

1851	<i>Gregarina scarabei relictii</i>	Leidy	1851:208, 287
1863	<i>Gregarina Scarabei</i>	Lankester	1863:94

This species is known only from the original descript-

The first part of the report deals with the general situation of the country and the progress of the work done during the year.

General remarks on the work done during the year.

The work done during the year has been very satisfactory and has resulted in a number of important discoveries.

The following are the results of the work done during the year.

The first result is the discovery of a new species of plant which has been found in the mountains of the country. This plant is very rare and is of great value for medicinal purposes.

The second result is the discovery of a new species of animal which has been found in the forests of the country.

General remarks on the work done during the year.

The work done during the year has been very satisfactory and has resulted in a number of important discoveries.

The following are the results of the work done during the year.

The first result is the discovery of a new species of plant which has been found in the mountains of the country.

General remarks on the work done during the year.

The work done during the year has been very satisfactory and has resulted in a number of important discoveries.

The following are the results of the work done during the year.

ion, which is as follows:

"Body cylindro-fusiform. Superior division presenting four sides of a hexahedron, subacute. Nuclear body of inferior division transparent, globular or elliptical, containing several coarse granules. Length from $1/66$ to $1\frac{1}{2}$ lines; head $1/400$ in to $1/133$ in. long, by $1/285$ in to $1/111$ broad. Anterior portion of inferior division $1/200$ in to $1/86$ in. broad, posterior division $1/666$ in to $1/250$ in broad. Longitudinal lines of inferior division more distinct than those of upper division, $1/8000$ in apart."

No drawing accompanies the description.

Host: *Scarabeus relictus* larv.

Gregarina passalicornuti Leidy
Fig. 139.

1853	<i>Gregarina passali cornuti</i>	Leidy	1863:238
1903	<i>Gregarina passalicornuti</i>	Crawley	1903a:45
1913	<i>Gregarina passalicornuti</i>	Ellis	1913b:201

Gregarina: Sporonts biassociative, cylindrical. Length of associations 350-400 μ . Width not given. Ratio--length prot: total length (primate) :: 1:5; width prot:width deut :: 1:1. Protomerite dome-shaped, flattened, times as wide as high. Slight constriction at septum. Deutomerite cylindrical, sometimes constricted a little in middle. Posterior extremity broadly rounded or flattened. Endocyte opaque; nucleus spherical, content not mentioned.

Taken at Philadelphia, Pa. and New Orleans, La.

Host: *Passalus cornutus* Fab.

Habitat: Intestine.

Leidy's figure represents sporonts with the deuto-

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The following information is for your information.

For more information, please contact us.

The following information is for your information.

Item	Description	Amount
1	Item 1	\$100.00
2	Item 2	\$200.00
3	Item 3	\$300.00

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The following information is for your information.

merite much wider than long. Crawley's figure is normal. Leidy probably left the animals on the slide in a water medium until they had become greatly distended before drawing them.

Ellis recovered the same species from the same Lucanid, from Louisiana.

The beetles of this species at Urbana, Illinois seem not to be infected. Twenty-five or more have been examined without finding an instance of parasitism.

Gregarina melalonthaebrunneae Leidy

1856	<i>Gregarina Melalonthae brunneae</i>	Leidy	1856:47
1863	<i>Gregarina Melalonthae</i>	Lankester	1863:94
1913	<i>Gregarina melalonthaebrunneae</i>	Ellis	1913c:269

Gregarina: Sporonts biassociative, ellipsoidal. Length of primite 400 μ , width 250 μ . Ratio--length prot:total length :: 1:4; width prot:width deut :: 1:1.7. Protomerite oblate-spheroidal, slightly elevated at summit. Deutomerite oblong-ovoidal. Taken at Philadelphia, Pa.

Host: *Melalontha brunnea*.

Habitat: Intestine.

This species has not been redescribed. No drawings accompany Leidy's brief record. Lankester left out part of the name which Leidy used, probably because of its cumbersomeness. Ellis merely mentions the species.

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217

Gregarina munieri (Schneider) Labbe
Figs. 128 and 147.

1875 Clepsidrina Munieri	Schneider 1875:574-8
1899 Gregarina munieri	Labbe 1899:9-10.

Gregarina: Sporonts biassociative, elongate-ellipsoidal.

Length and width not given. Ratio--length prot:total length :: 1:6 to 1:7 (in primate); width prot:width deut :: 1:1.7. Protomerite cylindrical, flattened anteriorly, a little wider than high, less than 1.5 times, slight constriction at septum. Deutomerite cylindrical, ending bluntly or tapering slightly from middle and ending in a broad but rather pointed extremity.

Epimerite a small spherical papilla situated upon the apex of a short conical projection of the protomerite of the cephalont.

Endocyte reddish-orange. Nucleus spherical, with one karyosome.

Cysts ovoidal. Sporeducts 3 to 6, reddish, very short, less than the radius of the cyst in length. Spores extruded in chains.

Spores barrel-shape, cylindrical, dilated through middle portion, terminating bluntly.

Taken at Roscoff, France.

Hosts: Tiamrcha tenebricosa (F.); --- Chrysomela violacea (Goeze) and C. haemoptera L.

Habitat: Intestine.

Schneider's argument concerning the species in question speaks for itself and is quoted here:

Dr. J. H. ...
Chicago, Ill., June 1, 1917

Dear Sir: ...
I have the honor to acknowledge the receipt of your letter of the 28th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration. ...
Very respectfully,
J. H. ...

Very truly yours,
J. H. ...

Schneider's argument concerning the species in question speaks for itself and is quoted here (1875:575):

"Dans le tube alimentaire de divers Coléoptères, notamment du *Lucanus parallelipedus*, de plusieurs *Mélasomes* et de la *Timarcha tenebricosa*, j'ai trouvé abondamment une espèce de Vers intestinaux, dont je joins ici le dessin. L'espèce que j'ai dit habiter les entrailles de divers Coléoptères, mérite, a cause de sa forme, le nom *Conica*. Si maintenant on se reporte à la figure individuelle par L. Dufour, on n'y trouve pas la désignation de l'hôte de l'individu représenté, la légende portant simplement cette mention: "Vers intestinaux trouvés dans le tube alimentaire de divers Coleoptères." Il n'y a donc aucun indice que l'auteur ait plus particulièrement visé l'espèce qui nous occupe, et comme il cite d'abord le *Lucanus parallelipedus*, c'est à la Grégarine de ce *Mélolonthide* qu'il conviendra de réserver l'épithète de *Conica*. Quant à l'espèce actuelle, je l'ai dédiée à mon excellent ami M. Munier Chalmas - - -."

The species which Dufour found in *Lucanus parallelipedus* is the species now named *Actinocephalus conicus* (Dufour) Stein.

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Gregarina laucournetensis (Schneider) Labbé

1885 *Clepsidrina Laucournetensis* Schneider 1885:28
 1899 *Gregarina laucournetensis* Labbé 1899:11

Gregarina: Sporonts biassociative, obese. Length 60-70 μ ;
 width 50-60 μ . Cysts spherical, one sporeduct.
 Spores elongate-ovoidal, extruded in chains.

Taken at ?

Host *Parnus* sp.

Habitat : Intestine.

Gregarina statirae Frenzel

Fig. 138.

1892 *Gregarina statirae* Frenzel 1892:234-82

Sporonts biassociative, spheroidal. Length 300-350 μ ;
 width 200 μ . Ratio--length prot:total length primitive :: 1:5;
 width prot:width deut :: 1:3.5. Protomerite hemispherical,
 widest at base, 1.7 times as wide as high. Deutomerite spherical,
 as wide as high. Nucleus spherical, with one karyosome. Endo-
 cyte dense except in anterior third of protomerite, where it is
 sparse. Epimerite a simple short cylindrical papilla, rounded
 at apex.

Spores and cysts unknown.

Taken at Cordoba, Argentina.

Host: *Statira unicolor* Blanch.

Habitat: Intestine.

1. The first part of the paper discusses the general theory of the subject.

2. The second part of the paper discusses the general theory of the subject.

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12. The twelfth part of the paper discusses the general theory of the subject.

13. The thirteenth part of the paper discusses the general theory of the subject.

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15. The fifteenth part of the paper discusses the general theory of the subject.

16. The sixteenth part of the paper discusses the general theory of the subject.

17. The seventeenth part of the paper discusses the general theory of the subject.

18. The eighteenth part of the paper discusses the general theory of the subject.

19. The nineteenth part of the paper discusses the general theory of the subject.

Gregarina longirostris (Léger) Labbé
Fig. 155.

1892 *Clepsidrina longirostris* Léger, 1892:122-4
1899 *Gregarina longirostris* Labbé 1899:12

Gregarina: Sporonts biassociative, obese. 100 μ long. Ratio length prot:total length :: 1:4; width prot:width deut :: 1:1.1. Protomerite conical, dilated in posterior half. No constriction at septum. Protomerite obovoidal. Nucleus spherical with one karyosome. Epimerite an elongate simple cylinder, 50-60 μ long, one-half or more than half as long as whole cephalont. Endoplasm greenish-yellow.

Cysts ovoidal, 60-70 μ in diam. One sporeduct. Spores barrel-shaped, 7.4 μ x 3.8 μ .

Taken in the Vallee de la Loire, France.

Host: *Thanasimus formicarius* (L.).

Habitat: Intestine.

Gregarina acuta (Léger) Labbé
Fig. 217.

1892 *Clepsidrina acuta* Léger, 1892:121-2
1899 *Gregarina acuta* Labbé 1899:11

Gregarina: Sporonts biassociative. Protomerite short, cylindrical, rounded in front. Deutomerite cylindrical, rounded behind. Nucleus spherical, with one karyosome. Epimerite a sharp point. Cyst and spores unknown.

Taken at Poitou, France.

Host: *Trox perlatus* Scriba.

Habitat: Intestine.

271

Gregarina steini Berndt
Fig. 146.

1902 *Gregarina steini*

Berndt 1902:408-13

Gregarina: Sporonts biassociative, 42-150 in length; width 16-30. Protomerite hemispherical. Constriction at septum. Deutomerite widest at shoulder, tapering to a more or less slender but well-rounded posterior extremity. Epimerite a simple globular papilla.

Cysts ovoidal, 70-100 x 85-160. Cysts smaller than those of *G. cuneata* or *G. polymorpha*.

Taken in Berlin, Germany.

Host: *Tenebrio molitor* L. larv.

Habitat: Intestine.

The work on this species needs confirmation before it can be accepted absolutely. Leger and Duboscq (1904:351-60) described the gregarines of the larva of this beetle but made no mention of this species. No one of the numerous previous workers on the same beetle has mentioned it. Not knowing how polymorphic *G. polymorpha* may be, the present writer does not wish to comment on this species.

1914

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Gregarina parva Crawley
Fig. 130.

1903 <i>Gigaductus parvus</i>	Crawley	1903b:633-4
1913 <i>Gigaductus parvus</i>	Ellis	1913b:271
1915 <i>Gregarina parva</i>	Watson	

Gregarina: Sporonts biassociative, length 150 μ ; width 90 μ . Ratio--length prot:total length primitive :: 1:5; width prot:width deut :: 1:1.1. Protomerite subglobular, somewhat flattened anteriorly. Widest through middle portion. Width $1\frac{1}{2}$ times height. Deep constriction at septum. Deutomerite elongate-ellipsoidal, widest about or a little above the middle, terminating bluntly. Nucleus large, spherical, content not noted. Endocyte coarsely granular, not dense.

Cysts 170-200 μ in diam., spherical, dehiscence by "one enormous sporeduct". Spores cylindrical, 25 μ x 10 μ , square-cornered.

Taken at Wyncote, Pa. and Vincennes, Ind.

Hosts: *Harpalus caliginosus* Fab. and *Harpalus pennsylvanicus* Dej.

Habitat: Intestine.

Crawley created a genus *Gigaductus* for this species.

The genus is described thus:

"Cysts spherical, with a thin gelatinous envelope. Dehiscence by one enormous sporeduct. Maturation period short. Spores cylindrical, very large. Wall single, thick. Spores marked with diagonal lines, those on one side opposed in direction to those on the other, giving the spore a latticed appearance. These lines are apparently due to the sporozoites, which make up a hollow cylinder lying in contact with the inner surface of the spore wall. The residuum an ellipsoidal mass liberally provided with granules, occupies the cavity of this hollow cylinder."

1. The first part of the report is devoted to a general survey of the situation in the country.

The second part of the report is devoted to a detailed study of the various aspects of the problem. It is divided into three main sections: (a) the economic situation, (b) the social situation, and (c) the political situation. Each of these sections is further subdivided into smaller units, and each unit is treated in a separate chapter. The chapters are: (1) The general situation, (2) The economic situation, (3) The social situation, (4) The political situation, (5) The conclusion.

The third part of the report is devoted to a study of the various aspects of the problem. It is divided into three main sections: (a) the economic situation, (b) the social situation, and (c) the political situation. Each of these sections is further subdivided into smaller units, and each unit is treated in a separate chapter. The chapters are: (1) The general situation, (2) The economic situation, (3) The social situation, (4) The political situation, (5) The conclusion.

I have placed the species in question under the genus Gregarina. Several hitherto described species of the genus Gregarina have been recorded to dehisce by one sporeduct (e.g. *G. laucournetensis*; *G. longirostris*). It is to be noted that sometimes cysts of the genus Gregarina develop only one sporeduct and others in the same fecal mass several. There is apparently no maximum-minimum limit to the number of ducts which may be present within the same species.

Gregarina lucani (Crawley) Watson
Fig. 150.

1903	<i>Euspora lucani</i>	Crawley	1903a:50-1
1915	<i>Gregarina lucani</i>	Watson	

Gregarina: Sporonts biassociative, elongate-ellipsoidal.

Length of associations 880. Primate 520 long, 128 wide.

Ratio--length prot:total length primate :: 1:10; width prot:

width deut :: 1: 1.7. Protomerite flattened, widest through

middle, twice as wide as high, deep constriction at septum.

Deutomerite elongate-cylindrical, slightly constricted in middle portion, flattened or broadly rounded behind.

Cyst and spores unknown.

Taken at Swarthmore, Pa.

Host: *Lucanus dama*.

Habitat: Intestine.

Ellis (1913c:264) says:

"This species is referred to the genus *Euspora* because of the shape of the sporont and the coleopteran host, making

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THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY

1-10-1941
CHICAGO, ILL.

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the generic determination very uncertain."

The original description gives no evidence that the species is a member of the genus *Euspora*. The protomerite is not spherical and does not contain the conoidal, less-dense area in its anterior third, and the spores are not known and cannot be verified with those of the genus *Euspora*. The fact that the host is a beetle is of no significance since the *Eusporae* and the *Gregarinae* are both found in beetles.

I have placed the species in the genus *Gregarina* because it is associative and does not have characteristics of the other associative genera.

Gregarina cavalieriana Blanchard

1905 *Gregarina cavalieriana* Blanchard 1905:926-8

Gregarina: Sporonts biassociative, the couple attaining a total length of 1500-2000 μ . Length primate 500-1000 μ , width 80-100 μ . Ratio length prot:total length primate :: 1:15; width prot:width deut :: ? Protomerite flattened, ellipsoidal, longitudinal axis perpendicular to that of deutomerite. Deutomerite cylindrical, rounded hemispherically at posterior end. Endocyte yellow in protomerite, darker in deutomerite. Nucleus spherical, 27 μ in diam., one karyosome. Cysts spherical, 400 μ in diam., dehiscing by sporeducts, 200 μ long, 40 μ wide at base and 15 μ wide at end. Spores extruded in chains. Spores ellipsoidal, 8 μ x 6 μ .

The University of Chicago is pleased to announce the appointment of Dr. [Name] as the new [Title]. Dr. [Name] has a B.S. in [Field] from [University] and a Ph.D. in [Field] from [University]. He has been an Assistant Professor at [University] and a Lecturer at [University]. He has published several papers in [Field] and is currently working on a book on [Field]. He will be joining the faculty of the Department of [Field] at the University of Chicago in [Month].

Dr. [Name] is a member of the [Organization] and the [Organization]. He is also a member of the [Organization] and the [Organization]. He is currently a member of the [Organization] and the [Organization]. He is also a member of the [Organization] and the [Organization].

For more information, please contact [Name] at [Phone Number] or [Email Address].

Dr. [Name] is a member of the [Organization] and the [Organization]. He is also a member of the [Organization] and the [Organization].

He has a B.S. in [Field] from [University] and a Ph.D. in [Field] from [University]. He has been an Assistant Professor at [University] and a Lecturer at [University].

He has published several papers in [Field] and is currently working on a book on [Field]. He will be joining the faculty of the Department of [Field] at the University of Chicago in [Month].

Dr. [Name] is a member of the [Organization] and the [Organization]. He is also a member of the [Organization] and the [Organization].

He has a B.S. in [Field] from [University] and a Ph.D. in [Field] from [University]. He has been an Assistant Professor at [University] and a Lecturer at [University].

He has published several papers in [Field] and is currently working on a book on [Field]. He will be joining the faculty of the Department of [Field] at the University of Chicago in [Month].

For more information, please contact [Name] at [Phone Number] or [Email Address].

Taken in the mountains of Maure, France.

Host: Dendarus (Pandarus) tristis Rossi-coarcticollis Mls.

Habitat: Intestine.

Gregarina socialis Léger

1906 <i>Gregarina socialis</i>	Léger 1906:106-30
1911 <i>Gregarina socialis</i>	Sokolow 1911:79

Sokolow gives the reference to the original paper by Leger as Arch. Prot. 7:106-30, but this reference is incorrect. The writer has perused every possible reference in order to locate the species, but in vain. It does not appear in the Zurich cards, in the files of the Archiv fur Protistenkunde or in those of the Archives de Parasitologie.

Host *Eryx ater* Fabr. larv.

Ellis refers to this paper (1913d:79) as it is given above, but, it is obvious, did not see the paper in question.

Gregarina guatemalensis Ellis
Fig. 144.

1912 *Gregarina guatemalensis* Ellis:1912c:687-8

Gregarina: Sporonts biassociative, the couple attaining 400-500 in length. Width not given. Ratio--length prot: total length primite :: 1:3 to 1:3.5; width prot:width deut :: 1:2.4 to 1:7.5. Protomerite subglobose, slightly flattened and pointed at apex, faint constriction at septum. Deutomerite irregularly cylindrical, narrowest at septum, widening very

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gradually and greatly dilate in posterior fourth, terminating in a very broad flattened extremity, the base nearly twice as wide as the deutomerite at the septum. The whole sporont is shaped like a salt-cellar. Sarcocyte very thick, especially in posterior portion of deutomerite. Endocyte of protomerite denser than that of deutomerite. Nucleus spherical, small.

Taken at Quirigua, Guatemala.

Host: *Ninus interstitialis* Esch.

Habitat: Intestine.

In Ellis' 1913c paper, the host genus is given as *Nelus* instead of *Ninus* as in the original description.

Gregarina grisea Ellis
Fig. 151.

1913 *Gregarina grisea*

Ellis:1913b:200-1

Gregarina: Sporonts biassociative, cylindrical. Length of association 500-1050. Length of primate 200-500. Ratio--length prot:total length primate :: 1:4.5 to 1:6.5. Ratio width prot: width deut :: 1:1 to 1:5. Protomerite hemispherical, widest at posterior margin, no constriction at septum. Deutomerite cylindrical, tapering slightly to a broadly rounded posterior extremity. Endocyte dense, dark gray. Nucleus spherical.

Cyst and spores not known.

Taken at New Orleans, La.

Host: *Tenebrio castaneus* Koch.

Habitat: Intestine.

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Gregarina minuta Ishii

Fig. 143.

1914 *Gregarina minuta* Ishii 1914:436-7

Gregarina: Sporonts biassociative, length of associations 118μ ; length primitive 58μ . Ratio--length prot:total length :: 1:9; width prot:width deut :: 1:1.7. Protomerite somewhat flattened, rounded anteriorly, twice as wide as high. NO constriction at septum. Deutomerite cylindrical, broadly rounded at posterior end. Endocyte not dense. Nucleus large, spherical, with one karyosome.

Cysts spherical, 36μ x 48μ .

Taken in the Province of Izu, Japan.

Host: *Tribolium ferrugineum* F.

Habitat: Intestine.

Under the name *Gregarina minuta*, the author described two gregarines belonging to widely different families, one, the larger, being a *Didymophyes* (*D. minuta*), from the absence of a protomerite in the satellite, and the other the gregarine described above. For a detailed statement of these facts, see article in appendix of this chapter.

Gregarina katherina n. sp.

Fig. 171.

Host *Coccinella novumnotata* Herbst.

Location, Oyster Bay, Long Island, N.Y., August, 1914.

Percent of Infection. Fourteen lady-beetles of various species

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were examined and only two found to be parasitised, one with this species, the other with *G. barbarara*. The infection with this gregarine was very heavy, the whole alimentary tract being filled with parasites which numbered into hundreds. The gregarines were practically transparent and it was impossible to count them.

The sporonts are biassociative when adult. The shape is that of a typical gregarine of this genus. The protomerite of the primitive is widest at the base, rounded on its free ends and more or less flattened at the apex. It is $1\frac{1}{2}$ to $1\frac{3}{4}$ times as wide as high, and constricted slightly at the septum. The protomerite of the satellite is flattened top and bottom and three to four times as wide as high. Its upper and lower surfaces are about equal in width. The deutomerite is cylindrical to ellipsoidal from $1\frac{1}{2}$ to two times as wide as is the protomerite; it terminates in a broadly rounded posterior extremity.

Color is practically absent from the animals for the body is almost transparent and contains very little protoplasm in either protomerite or deutomerite. The sporonts were stained with iodine or an anilin dye (safranin in water) before they could be studied.

The nucleus is small and spherical, in diameter attaining only $\frac{1}{3}$ to $\frac{1}{4}$ the width of the deutomerite. It contains one large karyosome.

Young individuals were seen attached to epithelial cells of the intestine by large smooth sessile transparent epi-

merites. NO cysts were seen.

Movement consists of very slow progression and a still slower contortion of the body.

The character of the epimerite and the biassociative sporonts leave no doubt that this species belongs to the genus Gregarina. It is differentiated from the other species found in the Coccinellidae by the shape and proportion of the sporonts, especially of the protomerite of the satellite, and by size.

A table of dimensions of a few associations is given here:

Total length association	.096	.108	.134	.141	.148
Primate: in mm.					
Length protomerite	.009	.011	.01	.01	.011
Length deutomerite	.035	.059	.052	.059	.059
Width protomerite	.011	.017	.019	.02	.014
Width deutomerite	.021	.03	.03	.034	.034
Total length sporont	.044	.07	.062	.069	.07
Ratio <u>length prot</u> total length	1:5	1:16.3	1:6.2	1:6.9	1:6.8
Ratio <u>width prot</u> width deut	1:1.9	1:1.8	1:1.6	1:1.7	1:2.1
Satellite:					
Length protomerite	.008	.007	.008	.008	.006
Length deutomerite	.044	.071	.064	.064	.072
Width protomerite	.014	.026	.02	.02	.021
Width deutomerite	.022	.035	.027	.03	.023
Total length sporont	.052	.078	.072	.072	.078
Ratio <u>length prot</u> total length	1:6.5	1:11	1:9	1:9	1:13
Ratio <u>width prot</u> width deut	1:1.6	1:1.4	1:1.3	1:1.5	1:1.1
Diameter nucleus			.009		.008

The general character of the work is to determine the relative importance of the various factors in the production of the total output.

The character of the work is to determine the relative importance of the various factors in the production of the total output. It is a statistical study of the various factors in the production of the total output.

A table of the results of the various factors in the production of the total output is given below.

Factor	1911	1912	1913	1914
Total output	1000	1100	1200	1300
Factor A	200	220	240	260
Factor B	300	330	360	390
Factor C	400	440	480	520
Factor D	100	110	120	130
Factor E	50	55	60	65
Factor F	50	55	60	65
Factor G	50	55	60	65
Factor H	50	55	60	65
Factor I	50	55	60	65
Factor J	50	55	60	65
Factor K	50	55	60	65
Factor L	50	55	60	65
Factor M	50	55	60	65
Factor N	50	55	60	65
Factor O	50	55	60	65
Factor P	50	55	60	65
Factor Q	50	55	60	65
Factor R	50	55	60	65
Factor S	50	55	60	65
Factor T	50	55	60	65
Factor U	50	55	60	65
Factor V	50	55	60	65
Factor W	50	55	60	65
Factor X	50	55	60	65
Factor Y	50	55	60	65
Factor Z	50	55	60	65

Gregarina barabara n. sp.

Fig. 169.

Host *Coccinella* sp.

Location Oyster Bay, Long Island, N.Y., August, 1914.

Fourteen lady-beetles were examined and only two were parasitised, one with this species and the other with *G. katherina*. Sixteen associations of this species were found in the one host. The region of infection is the intestine.

The adult sporonts are biassociative. In shape they are similar to other members of this genus. The primate is not essentially different in shape from that of *G. katherina*. The protomerites of the primate in the two species are identical, viz. $1\frac{1}{4}$ to $1\frac{1}{2}$ times as broad as high, cylindrical at the base and terminating in a broadly rounded, often apically flattened anterior extremity. The deutomerite of the primate of this species is more nearly globular, broadening appreciably backwards from the septum and attaining its greatest width in the middle or at the beginning of the posterior two-thirds of the body. From here the deutomerite rapidly contracts, ending in a very broadly rounded and not flattened posterior end. The shape of the satellite is quite different from that of the primate. It has the form of an elongated egg smaller at the posterior end. The satellite is generally longer than but is never as wide as the primate. The protomerite is very different from that of *G. katherina*. It is approximately five times as wide as high, and

1914

London: The British Medical Association, 1914.

The following is a list of the papers read at the
 meeting of the Society on the 15th of the month.
 The first paper was read by Mr. [Name], and
 dealt with the subject of [Topic]. The paper
 was well received, and the author was
 complimented on the interest and value of
 his contribution. The second paper was
 read by Mr. [Name], and dealt with the
 subject of [Topic]. This paper was also
 well received, and the author was
 complimented on the interest and value of
 his contribution. The third paper was
 read by Mr. [Name], and dealt with the
 subject of [Topic]. This paper was also
 well received, and the author was
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 his contribution. The fourth paper was
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 subject of [Topic]. This paper was also
 well received, and the author was
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 his contribution. The fifth paper was
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 well received, and the author was
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 his contribution. The sixth paper was
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 subject of [Topic]. This paper was also
 well received, and the author was
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 his contribution. The eighth paper was
 read by Mr. [Name], and dealt with the
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 his contribution. The ninth paper was
 read by Mr. [Name], and dealt with the
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 his contribution. The tenth paper was
 read by Mr. [Name], and dealt with the
 subject of [Topic]. This paper was also
 well received, and the author was
 complimented on the interest and value of
 his contribution.

twice as wide as the protomerite of the primitive. It is broadly rounded in front and but imperfectly interlocked with the primitive. The septum is straight or slightly concave upward, with no constriction whatever at its periphery, the protomerite and deutomerite forming a perfectly smooth contour at the edges of the septum. The deutomerite of the satellite is widest a little behind the septum and anterior to the center of the egg-shaped mass. The body gradually tapers from the region of greatest width, ending in a blunt, well-rounded extremity.

This parasite is practically transparent with a few large scattered darkly colored protoplasmic granules accumulated in the central regions of the deutomerite of the primitive; the satellite is generally free from these dark-colored inclusions. The nucleus is rarely obscured by protoplasm; it is small and spherical.

The epicyte is very thin and fragile and the animals quickly break up when exposed to the diluted digestive juices of the host.

Trophozoites were not observed, possibly because of their transparency. No cysts were present.

A list of the essential measurements is appended:

Total length association	.283	.275	.220	.192 mm.
Primitive:				
Length protomerite	.017	.022	.025	.02
Length deutomerite	.103	.113	.12	.105
Width protomerite	.028	.04	.04	.04
Width deutomerite	.08	.09	.09	.075
Total length sporont	.12	.135	.145	.125

The first part of the report is devoted to a description of the general conditions of the country, and to a statement of the progress of the various branches of industry and commerce. The second part contains a detailed account of the principal manufactures, and of the means of improving them. The third part is a description of the principal towns, and of the means of improving them. The fourth part is a description of the principal rivers, and of the means of improving them. The fifth part is a description of the principal ports, and of the means of improving them. The sixth part is a description of the principal roads, and of the means of improving them. The seventh part is a description of the principal canals, and of the means of improving them. The eighth part is a description of the principal bridges, and of the means of improving them. The ninth part is a description of the principal harbours, and of the means of improving them. The tenth part is a description of the principal fortifications, and of the means of improving them. The eleventh part is a description of the principal arsenals, and of the means of improving them. The twelfth part is a description of the principal hospitals, and of the means of improving them. The thirteenth part is a description of the principal schools, and of the means of improving them. The fourteenth part is a description of the principal churches, and of the means of improving them. The fifteenth part is a description of the principal public buildings, and of the means of improving them. The sixteenth part is a description of the principal public works, and of the means of improving them. The seventeenth part is a description of the principal public institutions, and of the means of improving them. The eighteenth part is a description of the principal public offices, and of the means of improving them. The nineteenth part is a description of the principal public departments, and of the means of improving them. The twentieth part is a description of the principal public services, and of the means of improving them.

A list of the principal manufactures in England.

Year	Woolen	Iron	Other	Total
1700	100	100	100	300
1750	150	150	150	450
1800	200	200	200	600
1850	300	300	300	900
1900	400	400	400	1200

Ratio <u>length prot</u>				
total length	1:7	1:6	1:5.8	1:6.2
Ratio <u>width prot</u>				
width deut	1:2.5	1:2.2	1:2.2	1:1.9
Satellite:				
Length protomerite	.017	.01	.018	.015
Length deutomerite	.046	.13	.057	.052
Width protomerite	.065	.055	.06	.04
Width deutomerite	.08	.08	.08	.068
Ratio <u>length prot</u>				
total length	1:9.2	1:14	1:4.2	1:4.5
Ratio <u>width prot</u>				
width deut	1:1.2	1:1.4	1:1.3	1:1.7
Diameter nucleus	.01			

This species is considerably larger than *Gregarina katherina*.

Gregarina fragilis n. sp.

Fig. 175.

Host *Coccinella* sp.

Location, Urbana, Illinois, November, 1914.

The intestine of the host is the seat of infection. Out of thirty or more lady-beetles of many species which were examined, only two yielded parasites. About twenty-five associations were found in the two hosts.

The sporonts are biassociative. The protomerite of the primitive is cylindrical, rounded at the corners and nearly flattened anteriorly; it is about $1 \frac{2}{3}$ times as wide as high. A shallow constriction or none at all is present at the septum. In the satellite, the protomerite is altered slightly in shape, being both flattened and broadened. The deutomerite is subglobular, widest in the middle portion or slightly posterior

to the middle and terminates in a broadly rounded extremity²⁸³.

The satellite is smaller than the primite and less nearly globular in shape.

This parasite is often practically transparent and can only be seen after staining with iodine or a dye in water. The largest specimens contain endocyte tinged with tan color in the deutomerite, while the protomerite is invariably colorless.

The nucleus is spherical and small, $1/3$ to $1/4$ the width of the deutomerite in its diameter; it is visible in vivo and contains one large transparent karyosome.

Trophozoites were seen but the epimerite was not visible because of the transparency when embedded. Cysts are unknown.

Measurements of a few associations are as follows:

Total length association	.185	.208	mm.
Primite:			
Length protomerite	.02	.021	
Length deutomerite	.08	.09	
Width protomerite	.033	.031	
Width deutomerite	.061	.06	
Total length sporont	.10	.111	
Ratio <u>length prot</u>			
total length	1:5	1:5	
Ratio <u>width prot</u>			
width deut	1:2	1:2	
Satellite:			
Length protomerite	.02	.02	
Length deutomerite	.065	.077	
Width protomerite	.033	.031	
Width deutomerite	.043	.048	
Total length sporont	.085	.097	
Ratio <u>length prot</u>			
total length	1:4.2	1:4.8	
Ratio <u>width prot</u>			
width deut	1:1.3	1:1.5	

The results of the analysis are shown in the following table. The total amount of the sample is 1000 g.

This analysis is a preliminary one. It is intended to show the general character of the results. The following table shows the results of the analysis of the sample. The results are given in the following table. The results are given in the following table. The results are given in the following table. The results are given in the following table. The results are given in the following table.

Element	Amount (g)	Percentage (%)
Carbon	1000	100.0
Hydrogen	1000	100.0
Oxygen	1000	100.0
Nitrogen	1000	100.0
Sulfur	1000	100.0
Phosphorus	1000	100.0
Chlorine	1000	100.0
Fluorine	1000	100.0
Iron	1000	100.0
Copper	1000	100.0
Zinc	1000	100.0
Lead	1000	100.0
Aluminum	1000	100.0
Magnesium	1000	100.0
Silicon	1000	100.0
Potassium	1000	100.0
Sodium	1000	100.0
Calcium	1000	100.0
Strontium	1000	100.0
Barium	1000	100.0
Mercury	1000	100.0
Vanadium	1000	100.0
Chromium	1000	100.0
Manganese	1000	100.0
Cobalt	1000	100.0
Nickel	1000	100.0
Molybdenum	1000	100.0
Rhodium	1000	100.0
Palladium	1000	100.0
Silver	1000	100.0
Gold	1000	100.0
Platinum	1000	100.0
Mercury	1000	100.0
Vanadium	1000	100.0
Chromium	1000	100.0
Manganese	1000	100.0
Cobalt	1000	100.0
Nickel	1000	100.0
Molybdenum	1000	100.0
Rhodium	1000	100.0
Palladium	1000	100.0
Silver	1000	100.0
Gold	1000	100.0
Platinum	1000	100.0

Diameter nucleus .01 .011

284

This species differs from the other two species described from Coccinellidae in size, shape of the protomerite of the satellite and in color.

Gregarina tenebrionella n. sp.

Fig. 174.

Host larva of an unidentified member of the Tenebrionidae.

Location, Urbana, Illinois, October, 1914.

The intestine of the host was heavily infected, with a hundred or more associations.

The sporonts are biassociative and the shape is that characteristic for this genus. The animals are very small and subglobular. The protomerite of the primitive is as wide at the base as throughout the posterior third of the body. Its anterior end is well rounded, without a papilla at the apex. In the satellite, the width of the protomerite is about equal to the height, although it is more or less flattened top and bottom. The length of the protomerite of the primitive is one-fourth the total length. The deutomerite of the primitive is short, broad, globose, widest through the median portion and broadly rounded behind. In the satellite it tapers slightly and is less globular in shape, being $1/3$ to $4/5$ as wide as the deutomerite of the primitive. The primitive is larger in every instance recorded than the satellite, often longer by one-third.

The color of this species is pale gray. The proto-

The first part of the paper is devoted to a general

discussion of the theoretical aspects of the problem.

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The first part of the paper is devoted to a general

discussion of the theoretical aspects of the problem.

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The fifth part of the paper is devoted to a general

discussion of the theoretical aspects of the problem.

plasm is not dense in any part of the body and the protomerite is almost devoid of protoplasm. The granules of the body are not homogeneous, smaller being interspersed with larger. The satellite is more nearly transparent than the primitive. The nucleus is spherical, $\frac{1}{4}$ to $\frac{1}{3}$ the width of the deutomerite in its diameter; it is not visible in vivo in the primitive but generally so in the satellite. The interlocking device between the sporonts is weakly developed and the individuals often barely touching are easily displaced.

Trophozoites and cysts were not seen. Movement consists of a slow uniform progression; contortion was not noted.

A table of measurements follows:

Total length association	.14	.137	.129	.109 mm.
Primitive:				
Length protomerite	.017	.018	.015	.016
Length deutomerite	.053	.052	.046	.046
Width protomerite	.023	.020	.025	.02
Width deutomerite	.042	.037	.038	.035
Total length sporont	.07	.07	.061	.062
Ratio <u>length prot</u> total length	1:4.1	1:3.9	1:4	1:3.9
Ratio <u>width prot</u> width deut	1:1.8	1:1.8	1:1.5	1:1.7
Satellite:				
Length protomerite	.013	.017	.018	.01
Length deutomerite	.057	.05	.05	.037
Width protomerite	.028	.02	.028	.016
Width deutomerite	.032	.03	.05	.018
Total length sporont	.07	.067	.068	.047
Ratio <u>length prot</u> total length	1:5.4	1:4	1:3.8	1:4.7
Ratio <u>width prot</u> width deut	1:1.2	1:1.5	1:1.8	1:1.1
Diameter nucleus	.01	.008	.009	

The following table shows the results of the analysis of variance for the different treatments. The results are given in terms of the mean square and the standard error of the mean. The results are given in terms of the mean square and the standard error of the mean. The results are given in terms of the mean square and the standard error of the mean.

Table 1. Analysis of variance results.

Treatment	Mean Square	Standard Error	D.F.	Total Variance
Control	1.00	0.10	10	10.00
Treatment A	2.00	0.15	10	20.00
Treatment B	3.00	0.20	10	30.00
Treatment C	4.00	0.25	10	40.00
Treatment D	5.00	0.30	10	50.00
Treatment E	6.00	0.35	10	60.00
Treatment F	7.00	0.40	10	70.00
Treatment G	8.00	0.45	10	80.00
Treatment H	9.00	0.50	10	90.00
Treatment I	10.00	0.55	10	100.00
Treatment J	11.00	0.60	10	110.00
Treatment K	12.00	0.65	10	120.00
Treatment L	13.00	0.70	10	130.00
Treatment M	14.00	0.75	10	140.00
Treatment N	15.00	0.80	10	150.00
Treatment O	16.00	0.85	10	160.00
Treatment P	17.00	0.90	10	170.00
Treatment Q	18.00	0.95	10	180.00
Treatment R	19.00	1.00	10	190.00
Treatment S	20.00	1.05	10	200.00
Treatment T	21.00	1.10	10	210.00
Treatment U	22.00	1.15	10	220.00
Treatment V	23.00	1.20	10	230.00
Treatment W	24.00	1.25	10	240.00
Treatment X	25.00	1.30	10	250.00
Treatment Y	26.00	1.35	10	260.00
Treatment Z	27.00	1.40	10	270.00
Treatment AA	28.00	1.45	10	280.00
Treatment AB	29.00	1.50	10	290.00
Treatment AC	30.00	1.55	10	300.00
Treatment AD	31.00	1.60	10	310.00
Treatment AE	32.00	1.65	10	320.00
Treatment AF	33.00	1.70	10	330.00
Treatment AG	34.00	1.75	10	340.00
Treatment AH	35.00	1.80	10	350.00
Treatment AI	36.00	1.85	10	360.00
Treatment AJ	37.00	1.90	10	370.00
Treatment AK	38.00	1.95	10	380.00
Treatment AL	39.00	2.00	10	390.00
Treatment AM	40.00	2.05	10	400.00
Treatment AN	41.00	2.10	10	410.00
Treatment AO	42.00	2.15	10	420.00
Treatment AP	43.00	2.20	10	430.00
Treatment AQ	44.00	2.25	10	440.00
Treatment AR	45.00	2.30	10	450.00
Treatment AS	46.00	2.35	10	460.00
Treatment AT	47.00	2.40	10	470.00
Treatment AU	48.00	2.45	10	480.00
Treatment AV	49.00	2.50	10	490.00
Treatment AW	50.00	2.55	10	500.00
Treatment AX	51.00	2.60	10	510.00
Treatment AY	52.00	2.65	10	520.00
Treatment AZ	53.00	2.70	10	530.00
Treatment BA	54.00	2.75	10	540.00
Treatment BB	55.00	2.80	10	550.00
Treatment BC	56.00	2.85	10	560.00
Treatment BD	57.00	2.90	10	570.00
Treatment BE	58.00	2.95	10	580.00
Treatment BF	59.00	3.00	10	590.00
Treatment BG	60.00	3.05	10	600.00
Treatment BH	61.00	3.10	10	610.00
Treatment BI	62.00	3.15	10	620.00
Treatment BJ	63.00	3.20	10	630.00
Treatment BK	64.00	3.25	10	640.00
Treatment BL	65.00	3.30	10	650.00
Treatment BM	66.00	3.35	10	660.00
Treatment BN	67.00	3.40	10	670.00
Treatment BO	68.00	3.45	10	680.00
Treatment BP	69.00	3.50	10	690.00
Treatment BQ	70.00	3.55	10	700.00
Treatment BR	71.00	3.60	10	710.00
Treatment BS	72.00	3.65	10	720.00
Treatment BT	73.00	3.70	10	730.00
Treatment BU	74.00	3.75	10	740.00
Treatment BV	75.00	3.80	10	750.00
Treatment BW	76.00	3.85	10	760.00
Treatment BX	77.00	3.90	10	770.00
Treatment BY	78.00	3.95	10	780.00
Treatment BZ	79.00	4.00	10	790.00
Treatment CA	80.00	4.05	10	800.00
Treatment CB	81.00	4.10	10	810.00
Treatment CC	82.00	4.15	10	820.00
Treatment CD	83.00	4.20	10	830.00
Treatment CE	84.00	4.25	10	840.00
Treatment CF	85.00	4.30	10	850.00
Treatment CG	86.00	4.35	10	860.00
Treatment CH	87.00	4.40	10	870.00
Treatment CI	88.00	4.45	10	880.00
Treatment CJ	89.00	4.50	10	890.00
Treatment CK	90.00	4.55	10	900.00
Treatment CL	91.00	4.60	10	910.00
Treatment CM	92.00	4.65	10	920.00
Treatment CN	93.00	4.70	10	930.00
Treatment CO	94.00	4.75	10	940.00
Treatment CP	95.00	4.80	10	950.00
Treatment CQ	96.00	4.85	10	960.00
Treatment CR	97.00	4.90	10	970.00
Treatment CS	98.00	4.95	10	980.00
Treatment CT	99.00	5.00	10	990.00
Treatment CU	100.00	5.05	10	1000.00

Shape and size differentiate this species from all the other species found in the Tenebrionidae. For list of these gregarines, see Index of this chapter on Coleopteran parasites.

Gregarina gracilis n. sp.

Fig. 170.

Host larva of an unidentified member of the family Elateridae.

Location, Urbana, Illinois, October, 1914.

The parasites infest the intestine of the host.

The sporonts are biassociative. The satellite is generally the larger, contrary to the general rule that either the primate is slightly the larger or the two sporonts differ but little in size. The body is elongate-ellipsoidal, rather longer in proportion than is true of most biassociative members of the genus. The protomerite of the primate is hemispherical with no papilla or indentation at the anterior end. The constriction at the septum is shallow; the protomerite is $1 \frac{1}{3}$ times as broad as high and averages $\frac{1}{6}$ the total length of the sporont. The protomerite of the satellite is of practically the same width as that of the primate, but is slightly flattened. The deutomerite is elongate-cylindrical, a little wider in the middle portion and tapering slightly, ending in a broadly rounded extremity. The interlocking device is not well constructed, sporonts of an association being barely contiguous and easily dissociated by slight pressure.

Organon proclis n. 29.
Fig. 107.

The organon proclis is a small, simple, and elegant instrument, which is used for the purpose of measuring the length of the vocal tract. It is made of brass, and is divided into two parts, the upper and the lower. The upper part is a small, cylindrical tube, which is inserted into the mouth. The lower part is a small, cylindrical tube, which is inserted into the nostrils. The two parts are connected by a small, cylindrical tube, which is inserted into the throat. The organon proclis is used in the following manner: The upper part is inserted into the mouth, and the lower part is inserted into the nostrils. The small tube is then inserted into the throat, and the length of the vocal tract is measured. The organon proclis is a very useful instrument, and is used by many physicians and surgeons.

The body is pearl gray, and the protoplasm is not homogeneous but consists of large and small granules sparsely scattered throughout. The anterior end of the protomerite is devoid of granules. The nucleus is not visible in adults not because of the density of the protoplasm but because of the fact that the large granules seem to cling to or lie in the region of the nucleus in a cluster. The region occupied by the nucleus can, therefore, be easily detected although its outline is obscured. The nucleus is small and spherical, containing one small karyosome. In one instance, the chromatin was arranged outside the karyosome as in the spokes of a wheel, the karyosome forming the eccentric hub. The epicyte is very thin and of even width throughout.

Cysts were seen to be spherical and of approximately .08 mm. in diameter.

A table of measurements of sporonts follows:

Total length of association	.368	.355	.31	.237 mm.
Primitive:				
Length protomerite	.02	.02	.021	.02
Length deutomerite	.158	.105	.129	.097
Width protomerite	.035	.03	.03	.023
Width deutomerite	.075	.05	.057	.041
Total length sporont	.178	.125	.15	.117
Ratio <u>length prot</u>				
total length	1:8.9	1:6.2	1:7.1	1:5.8
Ratio <u>width prot</u>				
width deut	1:2.1	1:1.7	1:1.9	1:1.9
Satellite:				
Length protomerite	.021	.02	.02	.02
Length deutomerite	.169	.16	.14	.10
Width protomerite	.041	.035	.035	.032
W Width deutomerite	.08	.075	.065	.045

Total length sporont	.19	.18	.16	.12
Ratio $\frac{\text{length prot}}{\text{total length}}$	1:9	1:9	1:8	1:6
Ratio $\frac{\text{width prot}}{\text{width deut}}$	1:2	1:2.1	1:1.9	1:1.4

Gregarina intestinalis n. sp.

Fig. 168.

Host: *Pterostichus stygicus* Say. (Carabidae).

Location, Urbana, Illinois, November, 1914.

A dozen associations were found in the intestine of one beetle. The beetle was also infected with *Gregarina monarchia*.

The sporonts are biasociative. The body is ellipsoidal to subglobose. The protomerite of the primate is subspherical, well rounded in front, widest along the center, equal in width to $\frac{1}{4}$ to $\frac{1}{6}$ the width of the deutomerite, and one/fifth the total length. There is a fairly deep constriction at the septum. The deutomerite is egg-shaped, widest about the middle portion or slightly posterior to the middle. The posterior end is broadly rounded in the primate and slightly more tapering in the satellite. The individuals of an association are easily detached by slight pressure.

In color, this species is dark gray, especially in the deutomerite; the protomerite is less dense. The nucleus is not visible in the life animal.

Trophozoites and cysts were not seen.

A table of measurements follows:

1875
1876
1877
1878

1875
1876
1877
1878

THE UNIVERSITY OF CHICAGO
1875

1875: President's Report
Chicago, Illinois, 1875

A more extensive view than is given in the preceding
pages. The table is also revised with reference to
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as a center for the study of the sciences and
the arts.

The University of Chicago was founded in 1875
as a center for the study of the sciences and
the arts.

Total length association	.32	.304		
Primate:				
Length protomerite	.04	.033	.03	.035
Length deutomerite	.12	.137	.13	.135
Width protomerite	.045	.042	.042	.055
Width deutomerite	.08	.08	.07	.082
Total length sporont	.16	.17	.15	.17
Ratio <u>length prot</u>				
total length	1:4	1:5	1:5	1:5
Ratio <u>width prot</u>				
width deut	1:2	1:2	1:1.6	1:1.5
Satellite:				
Length protomerite	.03	.02		
Length deutomerite	.13	.114		
Width protomerite	.05	.032		
Width deutomerite	.07	.075		
Total length sporont	.16	.134		
Ratio <u>length prot</u>				
total length	1:5.3	1:6.7		
Ratio <u>width prot</u>				
width deut	1:1.4	1:2.3		

Gregarina monarchia n. sp.

Fig. 167.

Host *Pterostichus stygicus* Say. (Carabidae).

Location, Urbana, Illinois, November, 1914.

Only one parasite was seen in the intestine of the host.

The same beetle was infected with *Gregarina fragilis*.

The sporonts are biassociative. The body is very long and sausage-shaped, easily visible to the eye. The protomerite of the primate is dome-shaped, widest just below the middle portion, is but little wider than high, and in length equal to 1/7 the total length of the sporont. There is a deep constriction at the septum. The deutomerite is cylindrical, of even width throughout and but little wider than the protomerite. It is

broadly rounded at the free extremity. The protomerite of the satellite is flattened top and bottom, twice as wide as high, and in length averages 1/16 the total length of the satellite. The interlocking device between primate and satellite is deep and well-developed.

The body is black, the protoplasm being very dense in all parts except the protomerite of the primate. This portion is nearly transparent except for its lower portion in which the protoplasm is dense and darkly colored. A deep groove runs crosswise just anterior to the middle portion of the protomerite and in front of it is a clear vesicular area rather indistinct in outline. The epicyte is rather thick and of the same width throughout except in the protomerite of the satellite. It is considerably thicker at the place of interlocking and a little thicker on the sides of this protomerite than elsewhere in the association.

Trophozoites and cysts were not recovered.

Movement of progression was not noted, but a slow contortion was evinced by slightly curving of the body.

Measurements of the one association seen are as follows:

Total length of association	1.07 mm.	
	Primate	Satellite
Length protomerite	.08	.032
Length deutomerite	.49	.468
Width protomerite	.11	.115
Width deutomerite	.13	.162
Total length sporont	.57	.50
Ratio <u>length prot</u>		
total length	1:7	1:16

The first part of the report deals with the general situation of the country and the progress of the work done during the year. It also contains a list of the names of the members of the committee and of the persons who have assisted them in their work.

The second part of the report deals with the results of the work done during the year. It contains a list of the names of the persons who have been appointed to various positions and of the persons who have been promoted to higher positions. It also contains a list of the names of the persons who have been dismissed from their positions and of the persons who have been reappointed to their positions.

The third part of the report deals with the financial statement of the committee for the year. It contains a list of the names of the persons who have been appointed to various positions and of the persons who have been promoted to higher positions. It also contains a list of the names of the persons who have been dismissed from their positions and of the persons who have been reappointed to their positions.

Total Budget of Association		Total Budget of Association	
1911	1910	1911	1910
100.00	100.00	100.00	100.00
20.00	20.00	20.00	20.00
30.00	30.00	30.00	30.00
40.00	40.00	40.00	40.00
50.00	50.00	50.00	50.00
60.00	60.00	60.00	60.00
70.00	70.00	70.00	70.00
80.00	80.00	80.00	80.00
90.00	90.00	90.00	90.00
100.00	100.00	100.00	100.00

Ratio <u>width prot</u>		
width deut	1:1.2	1:1.4

Gregarina globosa n. sp.
Fig. 176.

Host *Coptotomus interrogatus* (Fab.) (Dytiscidae)

Location: Urbana, Illinois, November, 1914.

The intestine of the host was infected; two beetles out of six containing two parasites each.

The sporonts are biassociative. The body is subspherical, the protomerite of the primate twice as wide as high and hemispherical but rather flattened at the top. There is a constriction at the septum but it is shallow and scarcely noticeable in the satellite. The deutomerite is stout, $3/4$ as wide as long; it increases gradually in width up to the beginning of the posterior third of the body, when it becomes rapidly narrower, ending in a very broadly rounded extremity. The protomerite of the satellite is larger than that of the primate, which possibly indicates sexual dimorphism. The primate and satellite are not well interlocked.

The endocyte of the primate is dense and is not visible in vivo. The endocyte of the satellite is paler, revealing the presence of a spherical nucleus. Trophozoite and cysts were not found.

A table of measurements follows:

1887

1887

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1887

1887

1887

1887

Total length association .455 mm.

292

	Primitie	Satellite
Length protomerite	.03	.045
Length deutomerite	.23	.165
Width protomerite	.075	.11
Width deutomerite	.18	.155
Total length sporont	.26	.21
Ratio <u>length prot</u>	"	"
total length	1:8.6	1:4.7
Ratio <u>width prot</u>		
width deut	1:2.4	1:1.4

Uncertain Species in the Genus
Gregarina

Gregarina sp. Fig. 158.

1903 Gregarina elaterae Crawley 1903a:46

Sporonts not seen. Crawley's description is based evidently on the cephalonts and a species can hardly be assigned to material containing no mature specimens for the cephalonts of many of the Gregarinidae are identical. Crawley's description is in part as follows:

"Epimerite spherical, protomerite elliptical, long axis perpendicular to that of deutomerite, sharp constriction at septum. Deutomerite oval to subspherical. Endocyte characteristic of cephalonts, sparse and granular. M^{ax}. length 62 μ . Host Elater sp. larva. Taken at Wyncote, Pa."

The species is probably a member of the genus Gregarina from the epimerite, but it cannot stand as absolute. Subsequent discovery of the sporonts probably cannot be correlated with the cephalonts here described owing to a similarity of the cephalonts of so many species.

1000	1000	1000
2000	2000	2000
3000	3000	3000
4000	4000	4000
5000	5000	5000
6000	6000	6000
7000	7000	7000
8000	8000	8000
9000	9000	9000
10000	10000	10000

THE UNIVERSITY OF CHICAGO

1900

1900

The University of Chicago is a private research university in Chicago, Illinois. It was founded in 1837 as the first American university to be organized as a corporation. The university is known for its research and academic excellence, and is ranked among the top universities in the world. It has a long history of producing leaders in various fields of study, and is a major center of research and scholarship. The university's motto is "The love of knowledge," and it is committed to the pursuit of truth and the advancement of human knowledge.

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1900

Gregarina curvata

1838 Rhizina sp.	Hammerschmidt	1838:356
1848 Sporadina curvata	Frantzius	1848:195
1851 Gregarina curvata	Diesing	1851:14
1863 Gregarina curvata	Lankester	1863:94

The following and only description of the species available is quoted from Diesing:

"Proboscis ? Receptaculum rotundatum. Corpus elongatum retrorsum attenuatum curvatum, receptaculo sexies longius. Lobgit. $\frac{1}{4}$ - $\frac{3}{4}$ ''."

Host: Cetonia aurata larv.

Habitat: Intestine.

Frantzius merely names the species, giving neither drawing nor description. Diesing gives no clue as to whether the species is biassociative or not. Lankester places it in the genus Gregarina, which he characterises by the phrase

"two animals frequently hanging together"

giving no description.

The species has not since been mentioned in the literature, and in lieu of complete data, it is placed in the group of doubtful species under the genus Gregarina.

1887	1886	1885	1884	1883	1882	1881	1880
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100

The following are the names of the persons who were present at the meeting held on the 10th of the month.

Mr. J. H. ...
 Mr. ...
 Mr. ...

...

The ... of the ...
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 ...

...

The ... of the ...
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 ...

(?) *Gregarina boletophagi* Fig. 145.

1903 *Gregarina boletophagi* Crawley 1903a:47-8

Sporonts not associative, cylindrical, 320 in length.

"Protomerite large, variable in shape. Separated from deutomerite by a sharp constriction. Deutomerite cylindrical, with - - - conical end. - - -Endocyte dense, --nucleus oval to spherical, with one karyosome. Epimerite not seen. Host *Boletophagus cornutus*. Locality Swarthmore, Pa."

Ellis (1913c:280) says

"This species has been transferred to this genus (*Anthorhynchus*) from *Gregarina* although neither cysts nor epimerite are known, because it is not found in association and because the anterior portion of the protomerite is suggestive of the slightly produced protomerite of other species of the genus *Anthorhynchus* which bear epimerites. It is to be regarded as a provisional determination only."

No characteristics of the genus *Anthorhynchus* are evident. The epimerite, not being seen, cannot be compared with the very large globular canaliculated epimerite of the latter genus and the spores cannot be compared, not being seen. Size of the species in question is only one-seventh that of the type species of the genus *Anthorhynchus* (*A. sophiae* Schn.).

It seems that the only solution of the problem is the relegation of the species to an Uncertain Group.

(?) *Gregarina microcephala* Leidy Fig. 149.

1889 *Gregarina microcephala* Leidy 1889:10-1

"Body clavate, the head like a watch crystal with a little bump at the summit! Length 350 μ , width 100 μ , head 12 long x 40 wide.

(1) The first part of the document is a list of names and addresses of the members of the committee.

The committee has the honor to acknowledge the receipt of your letter of the 15th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

Very respectfully,
Your obedient servant,

The undersigned has the honor to acknowledge the receipt of your letter of the 15th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

The undersigned has the honor to acknowledge the receipt of your letter of the 15th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

Very respectfully,
Your obedient servant,

The undersigned has the honor to acknowledge the receipt of your letter of the 15th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

(2) The second part of the document is a list of names and addresses of the members of the committee.

The committee has the honor to acknowledge the receipt of your letter of the 15th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

Taken at Philadelphia, Pa.

Host: *Arrhenoplita bicornis* Olivier (*Hoplocephalus bi*).

Habitat: Intestine.

Ellis (1913c) corrected the host name. He left the species in the genus *Gregarina*.

Leidy said of the species:

"It bears a close resemblance to *Echinocephalus hispidis* Schneider - - but in the one described I at no time found digitiform appendages on the head."

That the species belongs in the genus *Gregarina* seems doubtful; its position is left undetermined.

(?) *Gregarina ovalis* (Crawley) Figs. 156 & 157.

Watson

1903 <i>Hirmocystis ovalis</i>	Crawley 1903a:50
1913 <i>Gregarina elaterae</i>	Ellis 1913c:270
1915 ? <i>Gregarina ovalis</i>	Watson

Sporonts cylindrical, 70 μ long; width not given.

Ratio--length prot:total length :: 1:4; width prot:width deut::

1:1.1. Protomerite hemispherical, widest at base. Slight

constriction at septum. Deutomerite dilated at shoulder, cylindrical,

ending very bluntly. Endocyte dark brown. Anterior third

of protomerite usually free from granules. Nucleus not seen.

Cyst and spores unknown.

Taken at Wyncote, Pa.

Host: Cucujidae larva ("doubtful det.").

Habitat: Intestine.

1. The first part of the report is devoted to a general survey of the situation in the country.

2. The second part contains a detailed analysis of the economic situation.

3. The third part deals with the social and cultural aspects of the situation.

4. The fourth part discusses the foreign relations of the country.

5. The fifth part contains the conclusions and recommendations of the commission.

6. The sixth part is a summary of the main findings of the report.

7. The seventh part is a list of the members of the commission.

8. The eighth part is a list of the documents and materials used in the preparation of the report.

1. General survey of the situation in the country.	2. Detailed analysis of the economic situation.
3. Social and cultural aspects of the situation.	4. Foreign relations of the country.
5. Conclusions and recommendations of the commission.	6. Summary of the main findings of the report.

9. The ninth part is a list of the names of the members of the commission.

10. The tenth part is a list of the names of the members of the commission.

11. The eleventh part is a list of the names of the members of the commission.

12. The twelfth part is a list of the names of the members of the commission.

13. The thirteenth part is a list of the names of the members of the commission.

14. The fourteenth part is a list of the names of the members of the commission.

15. The fifteenth part is a list of the names of the members of the commission.

16. The sixteenth part is a list of the names of the members of the commission.

17. The seventeenth part is a list of the names of the members of the commission.

18. The eighteenth part is a list of the names of the members of the commission.

This species is probably associative but adult sporonts have not yet been found. The specimens illustrated are probably immature. The length is less than that in most adult gregarines.

Ellis placed the species and Crawley's *Gregarina elaterae* together under the name of the latter. I have rather regarded the latter species as a doubtful one and have left this gregarine under its original name but questioning the correctness of the genus name. The species cannot be assigned to the genus *Gregarina* without a question of doubt arising. It is therefore placed with the Uncertain Species.

(?) *Gregarina* sp. Fig. 172.
Watson

Host: *Coptotomus interrogatus* Fab. Dytiscidae.

Location: Urbana, Ill., November, 1914.

Two hosts each contained one parasite in the intestine.

The sporonts are solitary. In shape the body is elongate-ellipsoidal. The protomerite is cylindrical at the base with a broadly rounded conical apex; it is as wide as high and the widest part is just anterior to the septum. There is no constriction at the septum. The deutomerite is elongate-ellipsoidal broadening rapidly from the septum and soon attaining its maximum width. It remains of the same width throughout most of the length terminating in a very broadly rounded blunt extremity. The endocyte is gray and not dense, for the nucleus is clearly

visible invivo as an ellipsoidal body twice as long as wide and containing one large spherical karyosome.

Trophozoites and cysts have not been observed.

Measurements are as follows:

Total length sporont	.21	.125	mm.
Length protomerite	.03	.018	
Length deutomerite	.18	.107	
Width protomerite	.035	.028	
Width deutomerite	.08	.038	
Ratio <u>length prot</u> total length	1:7	1:7	
Ratio <u>width prot</u> width deut	1:2.3	1:1.3	
Nucleus	.041 x .02	.023 x .01	mm.

It is very probable that these specimens are not members of the genus Gregarina. The ellipsoidal nucleus is like that of some of the Actinocephalidae. No attempt is made to place the specimens, and they are mentioned for completeness of the record only.

(?) Stylocephalus sp. Fig. 65.

The following description is copied from C¹awley (1903a:47):

"GREGARINA xylopinii Crawley.

The two gregarines shown in figs. 29 and 30 are stated by Leidy to be parasites of the beetle *Xylopinus saperdoides*. Of the six beetles examined, five contained gregarines of the form shown in fig. 29, one of the form shown in fig. 30. These two forms are so dissimilar that it appears better, at present, to give only the figures, reserving the description until additional information is at hand."

Fig. 29 is reproduced in my fig. 65; fig. 30 in fig. 134.

The first gregarine, fig. 65, agrees in appearance

THE
 REPORT OF THE
 COMMISSIONERS OF THE
 LAND OFFICE
 FOR THE YEAR 1881

STATEMENT OF THE REVENUE

Item	1880-81	1881-82
Land Revenue	1,115,000	1,115,000
Income Tax	1,115,000	1,115,000
Excise	1,115,000	1,115,000
Stamps	1,115,000	1,115,000
Post Office	1,115,000	1,115,000
Telegraphs	1,115,000	1,115,000
Other	1,115,000	1,115,000
Total	11,115,000	11,115,000

It is a very fortunate thing that the Government has been able to maintain the same level of expenditure as last year, and that the revenue has increased. The revenue has increased in every branch, and the Government has been able to meet its obligations. The revenue has increased in every branch, and the Government has been able to meet its obligations.

(1) THE REVENUE

THE REVENUE OF THE
 LAND OFFICE

(1881-82)

The revenue of the Land Office has increased in every branch, and the Government has been able to meet its obligations. The revenue has increased in every branch, and the Government has been able to meet its obligations.

THE
 REPORT OF THE
 COMMISSIONERS OF THE
 LAND OFFICE
 FOR THE YEAR 1881

THE
 REPORT OF THE
 COMMISSIONERS OF THE
 LAND OFFICE
 FOR THE YEAR 1881

with sporonts of Schneider's *Stylocephalus longirostris* (1875: Pl. XIX, fig. 2).

Ellis considers it as synonymous with his *Actinocephalus zolhus*. I do not, however, regard them as so, but as separate species. See discussion under *A. zophus*.

The second gregarine, fig. 134, is evidently a specimen of *Gregarina cuneata*. The host is one of the *Tenebrionidae* and the drawing compares very favorably with the others listed under *G. cuneata* Stein.

Gregarina sp. Crawley Fig. 105.

"*Asterophora philica* Leidy. *Gregarina philica* Leidy (1889). It is impossible to give a description of this species. Figs. 31 and 32 are very plainly of the same gregarine, whereas fig. 33 seems almost certainly to belong to a different species. Further, the form figured by Leidy in 1889 is not so closely like that shown in figs. 31 and 32 as to render it certain that the two are the same. I therefore include the three different forms under the same name, giving only the figures and reference, until such time as sufficient material is obtained to determine accurately what the actual facts may be. The gregarines figured were about 300 microns long." (Crawley, 1903a:53).

The first two gregarines have been described under the name *Asteophora philica* (Leidy) Crawley. The third is certainly very different from the others and merits isolation. Its generic position is undetermined from lack of data and it is mentioned here simply for completeness of the record.

1917

The first two paragraphs have been printed under the name of the author. The third paragraph is printed under the name of the author. The fourth paragraph is printed under the name of the author. The fifth paragraph is printed under the name of the author. The sixth paragraph is printed under the name of the author. The seventh paragraph is printed under the name of the author. The eighth paragraph is printed under the name of the author. The ninth paragraph is printed under the name of the author. The tenth paragraph is printed under the name of the author.

1917

The first two paragraphs have been printed under the name of the author. The third paragraph is printed under the name of the author. The fourth paragraph is printed under the name of the author. The fifth paragraph is printed under the name of the author. The sixth paragraph is printed under the name of the author. The seventh paragraph is printed under the name of the author. The eighth paragraph is printed under the name of the author. The ninth paragraph is printed under the name of the author. The tenth paragraph is printed under the name of the author.

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Appendix

An Hitherto Unnamed Species of Didymophyes from
a Japanese Beetle

In a recent article on the parasites in the intestine of a Japanese beetle, *Tribolium ferrugineum* F., (Tenebrionidae), S. Ishii (1914) has evidently confused two species of Polycystid Gregarines and designated them by the same name. He described two kinds of associations, large and small, as *Gregarina minuta*, but from his drawings and measurements the specimens are unlike. The protomerite of the primitive in the first (Fig. 71) is large, subglobose, nearly flattened on the anterior surface, $\frac{5}{8}$ as wide as the deutomerite at its widest portion, and $\frac{3}{5}$ as high as wide. Its widest portion is some little distance anterior to the septum. At the septum, there is a deep constriction, the protomerite just anterior to it being wider than the deutomerite just posterior to it. In Fig. 143, the protomerite of the primitive is smaller in proportion than in Fig. 71, hemispherical in shape, widest on its posterior margin, $\frac{2}{3}$ as wide as the deutomerite at its widest part, and half as high as it is broad. It is narrower at the septum than is the deutomerite just posterior to the septum. Thus there is a smooth, rounded contour along the edge of the septum. The length given for the larger associations is 188μ ; for the smaller 118μ .

In his general description, Ishii says "the protomerite

A HISTORY OF THE UNITED STATES OF AMERICA
BY CHARLES A. BEAMAN

In a recent article in the American Historical Review, the author has endeavored to show that the United States was not a new creation, but a continuation of the old world. He traces the roots of the American people to the ancient civilizations of the East, and shows how the ideas and institutions of those civilizations have been adapted to the new world. He argues that the American people are not a new race, but a new synthesis of the old races of the world. He shows how the American people have inherited the best of the old world, and how they have adapted it to the new world. He concludes that the American people are the most advanced and most civilized people in the world, and that they are the most worthy of the name of Americans.

The author's argument is based on a number of facts. First, he shows that the American people are descended from the same stock as the people of the old world. He traces the lineage of the American people to the ancient civilizations of the East, and shows how the ideas and institutions of those civilizations have been adapted to the new world. He argues that the American people are not a new race, but a new synthesis of the old races of the world. He shows how the American people have inherited the best of the old world, and how they have adapted it to the new world. He concludes that the American people are the most advanced and most civilized people in the world, and that they are the most worthy of the name of Americans.

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Third, the author shows that the American people have adapted the best of the old world to the new world. He traces the lineage of the American people to the ancient civilizations of the East, and shows how the ideas and institutions of those civilizations have been adapted to the new world. He argues that the American people are not a new race, but a new synthesis of the old races of the world. He shows how the American people have inherited the best of the old world, and how they have adapted it to the new world. He concludes that the American people are the most advanced and most civilized people in the world, and that they are the most worthy of the name of Americans.

Finally, the author concludes that the American people are the most advanced and most civilized people in the world, and that they are the most worthy of the name of Americans. He shows how the American people have inherited the best of the old world, and how they have adapted it to the new world. He argues that the American people are not a new race, but a new synthesis of the old races of the world. He shows how the American people have inherited the best of the old world, and how they have adapted it to the new world. He concludes that the American people are the most advanced and most civilized people in the world, and that they are the most worthy of the name of Americans.

in the satellite is not infrequently hidden from view, being entirely embedded in the deutomerite of the primite.¹ In his table of measurements, he says of the satellite "protomerite absent." Later he mentions "the frequent absence of protomerite in the satellite." The figure of the larger association, fig. 71, lacks a protomerite in the satellite; the figure of the smaller, fig. 143, shows a protomerite and the table of measurements corroborates its presence.

Absence of protomerite in the satellite is not one of the diagnostic features of the genus *Gregarina*. If the protomerite had been absent in rare instances, the sporont might have been a sport, but its frequent absence is, clearly enough, reason for removing the specimens from the genus *Gregarina*.

Absence of the protomerite of the satellite is the chief diagnostic character of the family *Didymophyidae* (in which there is but one genus, *Didymophyes*), and of this family only. Therefore this polycystid gregarine which lacks a protomerite in the satellite belongs to the latter genus and I wish to designate it *Didymophyes minuta* (Ishii). Of course, the determination cannot be absolute without the spores and epimerite, but if the specimens belong to any known genus, they must belong to the genus *Didymophyes*.

1. This statement is construed to mean that the author did not see the protomerite of the satellite and inferred that it was embedded in the deutomerite of the primite.

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Main body of faint, illegible text, appearing to be several paragraphs of a document.

Faint text at the bottom right of the page, possibly a signature or date.

Faint text at the very bottom of the page, possibly a footer or a reference note.

Of the four hitherto described species in this genus, two have been recovered from Coleoptera. The present species is the smallest to be recorded by 67 (*D. longissima* Sieb.).

The smaller associations which Ishii described and in which the protomerite of the satellite is present, belong, without doubt, to the genus *Gregarina*, and the name *G. minuta* refers to them only.

There is also either a confusion of species or an error in observation in regard to the species *Gregarina crassa* (Ishii, p. 438). He illustrates but one specimen and, in this one indistinct figure, it is impossible to determine whether or not there is a protomerite in the satellite. Since only one specimen is measured and but one drawn, no comparisons can be made between the specimens with and those without protomerites in the satellites and I am unable to determine the number of species under consideration and the systematic position of the specimen described.

Part Four

A LIST OF THE CEPHALINE GREGARINES OF THE WORLD
TOGETHER WITH THEIR HOSTS

1918

THE NATIONAL BUREAU OF INVESTIGATION

WASHINGTON, D. C.

A List of the Cephaline Gregarines of
the World with Their Hosts

DIDYMOPHYIDAE

Didymophyes gigantea	Oryctes nasicornis (L.)	
	Oryctes sp.	
	Phyllognathus sp.	COLEOPTERA
leuckarti	Aphodius pradomus (Brahm.)	
	nitidulus F.	COLEOPTERA
longissima	Gammarus pules (L.)	
	Orchestia littorea Leach.	CRUSTACEA
minuta	Tribolium ferrugineum F.	COLEOPTERA
paradoxa	Geotrupes stercorarius L.	COLEOPTERA

GREGARINIDAE

Gregarina achetaeabbreviatae

	Gryllus abbreviatus Serv.	ORTHOPTERA
acridiorum	Pamphagus sp.	
	Tryxalis sp.	
	Sphingonotus sp.	ORTHOPTERA
acuta	Trox perlatus Scriba	COLEOPTERA
amarae	Poecilus cupreus (L.)	COLEOPTERA
Barbarara	Coccinella sp.	COLEOPTERA
blattarum	Periplaneta americana (L.)	
	Periplaneta orientalis (L.)	
	Blatella germanica (L.)	ORTHOPTERA
boletophagi	Boletophagus cornutus	COLEOPTERA
cavaleriana	Dendarus tristis	COLEOPTERA
clausi	Phronima sp.	CRUSTACEA
conica	Coleoptera and Orthoptera	
consobrina	Ceuthophilus valgas Scud.	ORTHOPTERA
cuneata	Tenebrio molitor L.	COLEOPTERA

GENERAL INFORMATION		RESEARCHER'S NAME
1. Name of the institution	2. Address	3. City
4. State	5. Country	6. Telephone
7. Date of birth	8. Sex	9. Marital status
10. Education	11. Occupation	12. Present address
13. Present occupation	14. Present address	15. Present telephone
16. Present address	17. Present telephone	18. Present address
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100. Present address	101. Present telephone	102. Present address

<i>Gregarina curvata</i>	<i>Cetonia aurata</i>	COLEOPTERA
<i>davini</i>	<i>Grylломорpha dalmatina</i> Ocsk.	ORTHOPTERA
<i>elaterae</i>	<i>Elater</i> sp.	COLEOPTERA
<i>elongata</i>	<i>Crypticus</i> sp.	COLEOPTERA
<i>ensiformis</i>	<i>Salpa aeruginosa</i>	TUNICATA
<i>flava</i>	<i>Salpa conforderata</i> <i>vagina</i>	TUNICATA
<i>fragilis</i>	<i>Coccinella</i> sp.	COLEOPTERA
<i>galliveri</i>	<i>Gryllus abbreviatus</i> Serv.	ORTHOPTERA
<i>gammari</i>	<i>Gammarus</i> sp.	CRUSTACEA
<i>globosa</i>	<i>Coptotomus interrogatus</i> (Fab.)	COLEOPTERA
<i>gracilis</i>	<i>Elater</i> sp.	COLEOPTERA
<i>granulosa</i>	<i>Ephemera</i> sp.	NEUROPTERA
<i>grisea</i>	<i>Tenebrio castaneua</i> Koch	COLEOPTERA
<i>guatemalensis</i>	<i>Ninus interstitialis</i> Esch.	COLEOPTERA
<i>hyalocaphala</i>	<i>Tridactylus variegatus</i>	ORTHOPTERA
<i>illinensis</i>	<i>Ischnoptera pennsylvanica</i> (deGeer)	ORTHOPTERA
<i>intestinalis</i>	<i>Pterostichus stygicus</i> (Say)	COLEOPTERA
<i>katherina</i>	<i>Coccinella</i> sp.	COLEOPTERA
<i>kingi</i>	<i>Gryllus abbreviatus</i> Serv.	ORTHOPTERA
<i>lagenoides</i>	<i>Lepisma saccharina</i>	THYSANURA
<i>laucournetensis</i>	<i>Parnus</i> sp.	COLEOPTERA
<i>locustaecarolinae</i>	<i>Dissosteria carolina</i> L.	ORTHOPTERA

Gregarina longiducta	Ceuthophilus maculatus (Say) latens Scud.	ORTHOPTERA
longirostris	Statira unicolor Blanch.	COLEOPTERA
longa	Tipula sp.	DIPTERA
lucani	Lucanus dama	COLEOPTERA
macrocephala	Nemobius sylvestris (F.) Gryllus domesticus L.	ORTHOPTERA
marteli	Embia sp.	NEUROPTERA
melalonthaebrunneae	Melalontha brunnea	COLEOPTERA
microcephala	Arrhenoplita bicornis Ol.	COLEOPTERA
millaria	Gammarus sp. Astacus sp.	COLEOPTERA
minuta	Tribolium ferrugineum F.	COLEOPTERA
monarchia	Pterostichus stygicus (Say)	COLEOPTERA
munieri	Timarcha tenebricosa (F.) Chrysomela violacea (Goëze) haemoptera L.	COLEOPTERA
mystacidorum	Mystacida sp.	NEUROPTERA
nereidis denticulata ?		ANNELIDA
nigra	Acrididae	ORTHOPTERA
oblonga	Oedipodae migratoriae Grylli campestris	ORTHOPTERA
ovalis	Cucujidae	COLEOPTERA
ovata	Forficula auricularia	ORTHOPTERA
panchlorae	Panchlora exoleta Klug	ORTHOPTERA
paranensis	Schistocerca paranensis	ORTHOPTERA
passalicornuti	Passalus cornutus Fab.	COLEOPTERA

<i>Gregarina podurae</i>	<i>Orchesella villosa</i>	THYSANURA
<i>polymorpha</i>	<i>Tenebrio molitor</i> L.	COLEOPTERA
<i>praemorsa</i>	<i>Platycarcinus</i>	CRUSTACEA
<i>psocorum</i>	<i>Psocus</i> sp.	NEUROPTERA
<i>ptero-tracheae</i>	<i>Pterotrachea</i> sp.	MOLLUSCA
<i>rigida</i>	Acrididae	ORTHOPTERA
<i>salpae</i>	<i>Salpa maxima</i>	TUNICATA
<i>scarabeirelictus</i>	<i>Scarabeus relictus</i>	COLEOPTERA
<i>serpentula</i>	<i>Periplaneta orientalis</i> (J.)	ORTHOPTERA
<i>socialis</i>	<i>Eryx ater</i> Fab.	COLEOPTERA
<i>statirae</i>	<i>Statira unicolor</i> Blanch.	COLEOPTERA
<i>steini</i>	<i>Tenebrio molitor</i> L.	COLEOPTERA
<i>stygia</i>	<i>Ceuthophilus stygius</i> (Scud.)	ORTHOPTERA
<i>tenebrionella</i>	Tenebrionidae	COLEOPTERA
<i>tenuis</i>	<i>Allecula</i> sp.	COLEOPTERA
<i>termitis</i>	<i>Termes</i> sp.	NEUROPTERA
<i>tipula</i>	<i>Tipula</i> sp.	DIPTERA
<i>valettei</i>	<i>Pollicipes</i>	CRUSTACEA
sp. (Pfeiffer)	<i>Gammarus pulex</i>	CRUSTACEA
sp. (Ritter)	<i>Perophora annectena</i>	MOLLUSCA
sp. (Moseley)	<i>Peripatus</i> sp.	ONYCOPHORA
sp. (Porter)	<i>Rhyncobolus americanus</i>	ANNELIDA
sp. (Hallez)	<i>Dendrocoelum lacteum</i>	PLATYHELMINTHES
sp. Kolliker)	<i>Balanus</i> sp.	CRUSTACEA
sp. (Mawrodiadi)	<i>Balanus</i> sp.	CRUSTACEA

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Gregarina sp. (Solger)	Balanus improvisus	CRUSTACEA
sp. (Bolsius)	Glossophonia sp. Herpobdella sp.	ANNELIDA
sp. (Watson)	Coptotomus interrogatus	Fab. COLEOPTERA
Hirmocystis asidae	Asida servillei Sol.	COLEOPTERA
gryllotalpae	Gryllotalpa gryllotalpa (L.)	ORTHOPTERA
polymorpha	Lemnobia sp.	DIPTERA
ventricosa	Tipula sp. Pachyrhina sp.	DIPTERA
Hyalospora affinis	Machilus cylindrica Geoff.	ORTHOPTERA
reduvii	Reduvius personatus	HEMIPTERA
roscoviana	Pterobius maratimus	ORTHOPTERA or COLEOPTERA
Cnemidospora lutea	Glomeris sp.	MYRIAPODA
Euspora fallax	Rhizotrogus aestivus	COLEOPTERA
Gamocystis ephemerae	Ephemera sp.	NEUROPTERA
tenax	Blatella laponica	ORTHOPTERA
Frenzelina chtamali	Chtamalus stellatus	CRUSTACEA
conformis	Pachygraspus marmoratus	CRUSTACEA
dromiae	Dromia dromia	CRUSTACEA
fossor	Pinnotheres pisum	CRUSTACEA
ocellata	Eupagurus prideauxi	CRUSTACEA
portunidarum	Portunus arcuatus	CRUSTACEA
praemorsa	Cancer pagurus	CRUSTACEA
Uradiophora communis	Balanus sp.	CRUSTACEA
cuenoti	Atyaephyra desmaresti	CRUSTACEA

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<i>Leidyana gryllorum</i>	<i>Gryllus domesticus</i> (L.)	ORTHOPTERA
<i>solitaria</i>	<i>Gryllus abbreviatus</i> Serv.	ORTHOPTERA
DACTYLOPHORIDAE		
<i>Dactylophorus robustus</i>	<i>Cryptops hortensis</i> Leach.	MYRIAPODA
<i>Nina giardi</i>	<i>Scolopendra oraniensis</i>	MYRIAPODA
<i>giardi corsicum</i>	<i>Scolopendra oraniensis lusitanica</i> Verh.	MYRIAPODA
<i>gracilis</i>	<i>Cryptops anomalons lusitanus</i> Verh. <i>Scolopendra cingulata</i> (Latr.)	MYRIAPODA
<i>indicia</i>	<i>Scolopendra subspinipes</i> Leach	MYRIAPODA
<i>Trichorhynchus pulcher</i>	<i>Scutigera</i> sp. <i>Scutigera forceps</i> (Raf.)	MYRIAPODA
<i>Echinomera hispida</i>	<i>Lithobius forficatus</i> Linn. <i>coloradensis</i> Cock.	MYRIAPODA
<i>horrida</i>	<i>Lithobius calcaratus</i> Lock	MYRIAPODA
<i>Rhopalonia geophili</i>	<i>Himantarium gabrielis</i> Linn. <i>Stigmatogaster gracilis</i> Mein.	MYRIAPODA
<i>stella</i>	<i>Himantarium gabrielis</i> Linn.	MYRIAPODA
<i>Acutispora macrocephala</i>	<i>Lithobius forficatus</i> Linn.	MYRIAPODA
<i>Metamera schubergi</i>	<i>Hirudinea</i> sp.	ANNELIDA
ACTINOCEPHALIDAE		
<i>Actinocephalus acutispora</i>	<i>Silpha laevigata</i> F.	COLEOPTERA
<i>americanus</i>	<i>Galerita bicolor</i> Drury	COLEOPTERA
<i>brachydactylus</i>	<i>Aeshna</i> sp.	NEUROPTERA
<i>caudatus</i>	<i>Sciara</i> sp.	DIPTERA

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Actinocephalus conicus	Dorcus parallelipedus (L.)	COLEOPTERA
crassus	Leptochirus edax Sharp	COLEOPTERA
digitatus	Claenius vestitus (Payk.)	COLEOPTERA
discoeli	Discoelus ovalis	COLEOPTERA
dujardini	Lithobius forficatus L.	MYRIAPODA
dytiscorum	Dytiscus sp.	COLEOPTERA
gimbeli	Harpalus pennsylvanicus Dej.	COLEOPTERA
harpalus	Harpalus caliginosus Fab.	COLEOPTERA
octacanthus	Phryganea sp.	NEUROPTERA
pachydermus	Dissosteria carolina (L.)	ORTHOPTERA
repelini	Phalangium sp.	ARACHNIDA
sieboldi	Agrion sp.	NEUROPTERA
stelliformis	Ocypus olens Mull.	
	Carabus auratus L.	COLEOPTERA
striatus	Scolopendra cingulata Latr.	MYRIAPODA
tipulae	Tipula sp.	DIPTERA
zophus	Nyctobates barbata Knoch	
	Alobates pennsylvanicus deGeer	COLEOPTERA
sp.	Ctenophora sp.	DIPTERA
Geneiorhynchus aeshnae	Aeshna constricta Say	NEUROPTERA
monnieri	Libellules sp.	NEUROPTERA
Pyxinia crystalligera	Dermestes vulpinus Fabr.	COLEOPTERA
frenzeli	Attagenus pelli	COLEOPTERA

<i>Pyxinia mobüszi</i>	<i>Anthrenus verbasci</i> Oliv.	COLEOPTERA
<i>rubecula</i>	<i>Dermestes lardarius</i> L. <i>vulpinus</i> Fabr.	COLEOPTERA
<i>Beloides firmus</i>	<i>Dermestes lardarius</i> L.	COLEOPTERA
<i>tenuis</i>	<i>Dermestes undulatus</i> Brahn.	COLEOPTERA
<i>Legeria agilis</i>	<i>Colymbetes</i> sp.	COLEOPTERA
<i>Coleorhynchus heros</i>	<i>Nepa</i> sp.	HEMIPTERA
<i>Bothriopsis histrio</i>	<i>Dytiscus</i> sp. <i>Hydaticus cinereus</i> <i>Colymbetes fuscus</i> <i>Acilius sulcatus</i>	COLEOPTERA
<i>terpischorella</i>	<i>Hydrophilus</i> sp.	COLEOPTERA
<i>Asterophora elegans</i>	<i>Phryganea</i> sp.	NeUROPTERA
<i>mucronata</i>	<i>Rhyacophila</i> sp.	NEUROPTERA
<i>philica</i>	<i>Cratoparis lunatus</i>	COLEOPTERA
<i>Schneideria mucronata</i>	<i>Bibio</i> sp.	DIPTERA
<i>Stictospora provincialis</i>	<i>Melolontha</i> sp. <i>Rhizotrogus</i> sp.	COLEOPTERA
<i>Stylocystis ensiferis</i>	<i>Leptochirus edax</i> Sh.	COLEOPTERA
<i>praecox</i>	<i>Tanypus</i> sp.	DIPTERA
<i>Steinina obconica</i>	<i>Tribolium ferrugineum</i> F.	COLEOPTERA
<i>ovalis</i>	<i>Tenebrio molitor</i> L.	COLEOPTERA
<i>rotunda</i>	<i>Amara angustata</i> Say	COLEOPTERA
<i>Taeniocystis truncatus</i>	<i>Sericostoma</i>	NEUROPTERA
<i>Amphoroides calverti</i>	<i>Callipus lactarius</i> (Say)	MYRIAPODA
<i>polydesmi</i>	<i>Polydesmus complanatus</i> (L.) <i>dispar</i> Silvestri	MYRIAPODA

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<i>Pileocephalus bergi</i>	<i>Necrobis ruficollis</i> Fabr.	COLEOPTERA
<i>blaberae</i>	<i>Blabera claraziana</i> Sauss.	ORTHOPTERA
<i>chinensis</i>	<i>Mystacides</i> sp.	NEUROPTERA
<i>Anthorhynchus sophiae</i>	<i>Phalangida</i> sp.	ARACHNIDA
<i>fissidens</i>	<i>Phalangides</i> sp.	ARACHNIDA
<i>goronowitschi</i>	<i>Phalangium</i> sp.	ARACHNIDA
<i>Sciadophora phalangii</i>	<i>Phalangium</i> sp.	ARACHNIDA
<i>Hoplorhynchus actinotus</i>	<i>Scolopocryptops cingulata</i> Latr.	MYRIAPODA
<i>scolopendras</i>	<i>SColopendra woodi</i> Mein.	MYRIAPODA
<i>Amphorocephalus amphorellus</i>	<i>Scolopendra heros</i> Giard	MYRIAPODA
ACANTHOSPORIDAE		
<i>Acanthospora pileata</i>	<i>Omoplys</i> sp.	COLEOPTERA
<i>polymorpha</i>	<i>Hydrous caraboides</i> (L.)	COLEOPTERA
<i>Corycella armata</i>	<i>Gyrinus natator</i> (L.)	COLEOPTERA
<i>Ancyrophora gracilis</i>	<i>Carabus</i> sp.	
	<i>Carabus auratus</i> L.	
	<i>Carabus violaceus</i> L.	COLEOPTERA
<i>uncinata</i>	<i>Dytiscus</i> sp.	
	<i>Colymbetes</i> sp.	
	<i>Sericostoma</i> sp.	COLEOPTERA
<i>Cometoides capitatus</i>	<i>Hydrorus</i> sp.	COLEOPTERA
<i>crinitus</i>	<i>Hydrobius</i> sp.	COLEOPTERA
MENOSPORIDAE		
<i>Menospora polyacantha</i>	<i>Agrion</i> sp.	NEUROPTERA
STYLOCEPHALIDAE		
<i>Stylocephalus balani</i>	<i>Balanus</i> sp.	CRUSTACEA
<i>brevirostra</i>	<i>Hydrophilus</i> sp.	COLEOPTERA

1. Introduction
 2. Methodology
 3. Results
 4. Discussion
 5. Conclusion
 6. References
 7. Appendix
 8. Glossary
 9. Index
 10. Bibliography

APPENDIX A

1. Appendix A
 2. Appendix B
 3. Appendix C
 4. Appendix D
 5. Appendix E
 6. Appendix F
 7. Appendix G
 8. Appendix H
 9. Appendix I
 10. Appendix J

APPENDIX B

1. Appendix B
 2. Appendix C
 3. Appendix D
 4. Appendix E
 5. Appendix F
 6. Appendix G
 7. Appendix H
 8. Appendix I
 9. Appendix J

caudatus	Phalangides sp.	ARACHNIDA
giganteus	Eleodes sp. Asida opaca Say Asida sp.	COLEOPTERA
gladiator	Helenophorus collaris L.	COLEOPTERA
heeri	Phryganea sp.	NEUROPTERA
longicollis	Blaps mortisaga	COLEOPTERA
oligacanthus	Agrion sp.	NEUROPTERA
oblongatus	Opatrum sabulosum (L.) Asida grisea F.	COLEOPTERA
phallusiae	Phallusia sp.	MOLLUSCA
sp.	Xylopinus saperdoides	COLEOPTERA
Sphaerorhynchus ophoiides	Acis sp.	COLEOPTERA
Lophocephalus insignis	Helops striatus	COLEOPTERA
Cystocephalus algerianus	Pimelia sp.	COLEOPTERA
Oocephalus hispanus	Morica sp.	COLEOPTERA
STENOPHORIDAE		
Stenophora aculeata	Craspedosoma rawlinsii	MYRIAPODA
brolemanni	Blaniulus hirsutus Brol. Brachydesmus superus Latzel Brachyiulus pusillus lusitanus Verh.	MYRIAPODA
chordeume	Chordeuma silvestre Koch	MYRIAPODA
cockerellae	Parajulus sp.	MYRIAPODA
corsica	Craspedosoma legeri	MYRIAPODA
dauphinia	Julus mediterraneus Latzel boleti C. Koch fallax Meinert	MYRIAPODA
diplocorpa	Euryurus erythropygus (Brandt)	MYRIAPODA

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elongata	Orthomorpha coarctata (Sauss.)	313 MYRIAPODA
fontaria	Polydesmus sp. Fontaria sp.	MYRIAPODA
impressa	Parajulus impressus (Say)	MYRIAPODA
juli	Julus sabulosus (L.) boleti C.Koch	MYRIAPODA
julipusilli	Julus and Parajulus	MYRIAPODA
lactaria	Callipus lactarius (Say)	MYRIAPODA
larvata	Spirobolus spinigerus Wood	MYRIAPODA
nematoides	Strongylosoma italicum Latz.	MYRIAPODA
polydesmivirginiensis	Fontaria virginiensis (Drury)	MYRIAPODA
polyxeni	Polyxenus lagurus (L.)	MYRIAPODA
producta	Julus varius Fabricus	MYRIAPODA
robusta	Parajulus venustus Wood Orthomorpha gracilis (C.Koch) Orthomorpha sp.	MYRIAPODA
silene	Lysiopetalum foetisissum Savi	MYRIAPODA
spiroboli	Spirobolus sp.	MYRIAPODA
varians	Schizophyllum corsicum Broil.	MYRIAPODA

Genera of Uncertain Position

Ulivina elliptica	Audouinia sp.	ANNELIDA
Nematoides fusiformis	Balanus sp.	CRUSTACEA
Ganymedes anaspides	Anaspides sp.	CRUSTACEA
Agrippina bona	Ceratophyllum fasciatus Bosk.	ARACHNIDA

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1901. The first year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1902. The second year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1903. The third year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1904. The fourth year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1905. The fifth year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1906. The sixth year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1907. The seventh year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1908. The eighth year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1909. The ninth year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

1910. The tenth year of the century was marked by a general depression in the United States, which was due to a variety of causes, including a drought in the West and a panic in the East.

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1. The first part of the book is devoted to a general introduction to the subject of the history of the world.

2. The second part of the book is devoted to a detailed account of the history of the world from the beginning of the world to the present time.

3. The third part of the book is devoted to a detailed account of the history of the world from the beginning of the world to the present time.

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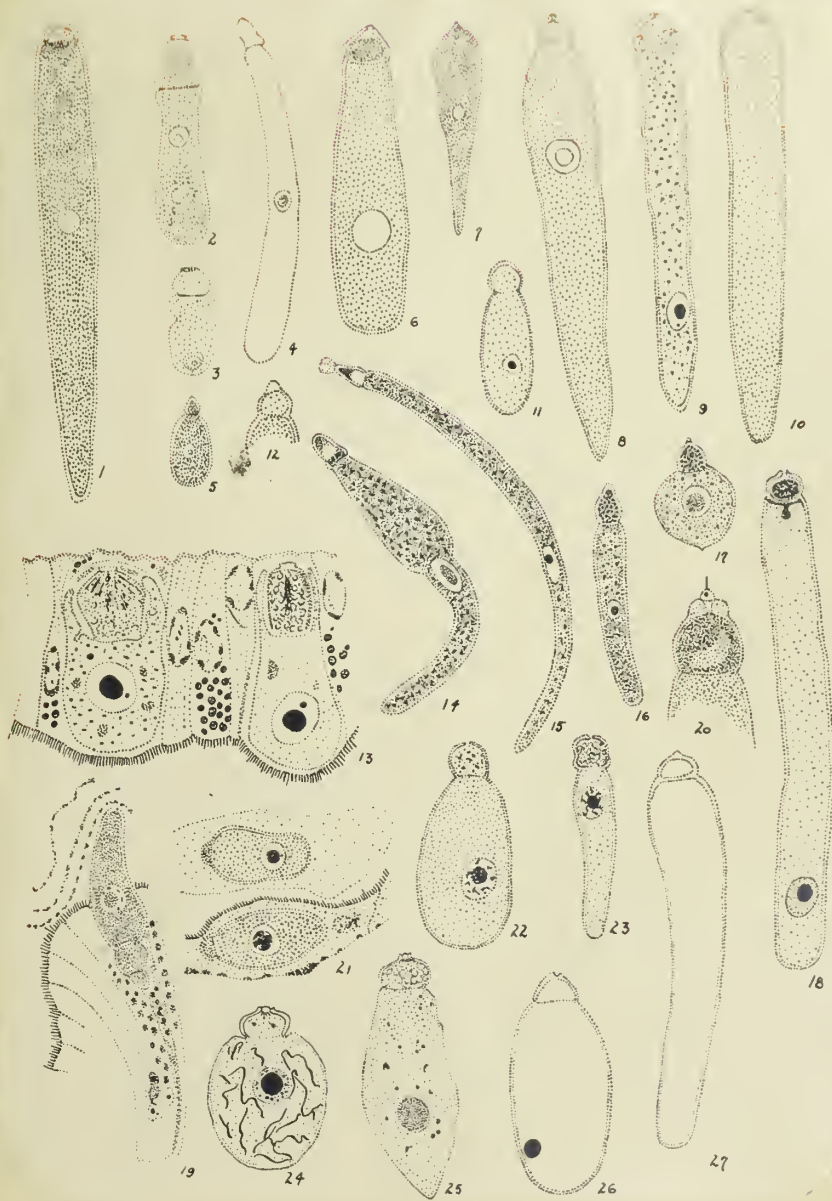
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List of Drawings

The drawings are copied from the originals by means of a camera lucida

1. *Stenophora larvata* (Leidy) Ellis. Leidy 1853 Pl. X, fig. 1.
- 2 & 3. Young individuals of *Stenophora polydesmivirginiensis* (Leidy) Watson. Leidy 1853 Pl. XI, figs. 23 & 25.
4. Adult sporont, *Stenophora polydesmivirginiensis* (Leidy) Watson Ibid, fig. 27.
5. *Stenophora julipusilli* (Leidy) Crawley. Ibid Pl. X, fig. 21.
6. *Stenophora julipusilli* (Leidy) Crawley. Crawley 1903b Pl. XXX, fig. 17.
7. *Stenophora juli* (Frantzius) Schneider. Frantzius 1848 Pl. VII, X, fig. 1.
8. *Stenophora juli* (Frantzius) Schneider. Schneider 1875, Pl. XX, fig. 29.
9. *Stenophora dauphinia* Watson. Léger & Duboscq 1904 Pl. 14, fig. 13.
10. *Stenophora spirobóli* (Crawley) Ellis. Crawley 1903a, Pl. II, fig. 22.
11. *Stenophora fontaria* (Crawley) Watson. Ibid, Pl. I, fig. 12.
12. *Stenophora fontaria* (Crawley) Watson, protomerite. Ibid, fig. 14.
13. *Stenophora brolemanni* Léger & Duboscq. L & D 1903b, fig. 21.
14. *Stenophora nematoides* Léger & Duboscq. Ibid, fig. 17 (2).
15. *Stenophora nematoides* Léger & Duboscq. Ibid, fig. 17 (1).
16. *Stenophora varians* Léger & Duboscq, elongate form. Ibid, fig. 18.
17. *Stenophora varians* Léger & Duboscq, globose form. Ibid, fig. 20.
18. *Stenophora producta* Léger & Duboscq. L & D 1904 Pl. 14, fig. 10.
19. *Stenophora aculeata* Léger & Duboscq. Ibid, fig. 5.
20. *Stenophora aculeata* Léger & Duboscq, protomerite. Ibid, fig. 14.
21. *Stenophora polyxeni* Léger & Duboscq. Ibid, fig. 6.
22. *Stenophora silene* Léger & Duboscq, elongate form. Ibid, fig. 12b.
23. *Stenophora silene* Léger & Duboscq, globose form. Ibid, fig. 12a.
24. *Stenophora chordeume* Léger & Duboscq, globose form. Ibid, fig. 11.
25. *Stenophora chordeume*, Léger & Duboscq, elongate form. Ibid, fig. 15.
26. *Stenophora robusta* Ellis. Ellis 1912b, fig. 1b.
27. *Stenophora coekerellae* Ellis. Ellis 1912a:1c.
28. *Stenophora elongata* Ellis. Ellis 1912a, fig. 4n.
29. *Dactylophorus robustus* Léger. Labbé 1899 fig. 27.
30. *Nina gracilis* Grebnecki. Labbé 1899, fig. 24.
31. *Nina giardi corsicum* (Léger & Duboscq) Sokolow. L & D 1903b, fig. 15.
32. *Echinomera hispida* (Schneider) Labbé. Schneider 1875 Pl. XVI, fig. 36.

Plate I

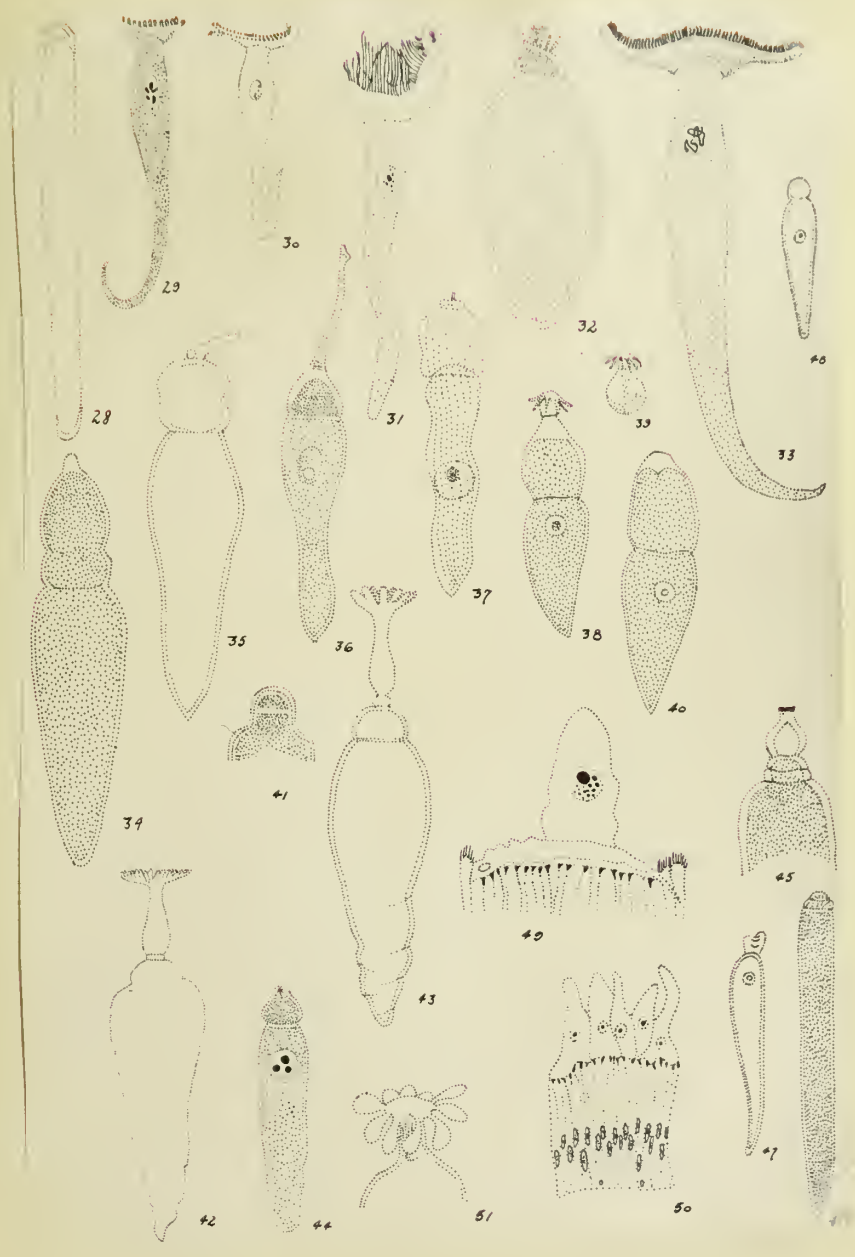


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33. *Nina indicia* Merton. Merton 1911 Pl. III, fig. 1.
34. *Acutispora macrocephala* Crawley. Crawley 1903b, Pl. XXX, fig. 1.
35. *Trichorhynchus pulcher* Schneider. Leidy 1889, fig. 3.
36. *Trichorhynchus pulcher* Schneider. Schneider 1882 Pl. XIII, fig. 14.
37. *Actinocephalus striatus* Leger & Duboscq. L & D 1903b, fig. 16.
38. *Actinocephalus dujardini* Schneider. Schneider 1875 Pl. XVI, fig. 9.
39. *Actinocephalus dujardini* Schneider. Schneider Ibid, fig. 10.
40. *Actinocephalus dujardini* Schneider. Schneider Ibid, fig. 12.
41. *Hoplorhynchus scolopendra* Crawley. Crawley 1903b Pl. XXX, fig. 19.
42. *Hoplorhynchus actinotus* (Leidy) Crawley. Crawley 1903a Pl. III, fig. 37.
43. *Hoplorhynchus actinotus* (Leidy) Crawley. Leidy 1889, fig. 2.
44. *Trichorhynchus lithobi*. Crawley. Crawley 1903b Pl. XXX, fig. 18.
45. *Amphorocephalus amphorellus* Ellis. Ellis 1913a, fig. 1.
46. *Amphorocephalus amphorellus* Ellis. Ellis Ibid, fig. 2.
47. Species of uncertain genus, Balbiani 1889, Pl. II, fig. 34.
48. Species of uncertain genus, Kölliker 1848, Pl. III, fig. 30.
49. *Nina gracilis* Grebnecki in section. Léger & Duboscq 1902, Pl. VI, fig. 93.
50. *Nina gracilis* Grebnecki, in section. Léger & Duboscq Ibid, fig. 96.
51. *Rhopalonia geophilii* Léger. Labbé 1899, fig. 21.
52. *Amphoroides calverti* (Crawley) Watson.
53. *Stenophora impressa* Watson.
54. *Stenophora diplocorpa* Watson.
55. *Stenophora lactaria* Watson.
56. *Cnemidospora lutea* Schneider. Schneider 1882 Pl. XIII, fig. 44.
57. *Cnemidospora lutea* Schneider, protomerite. Ibid, fig. 44.
58. *Amphoroides polydesmi* (Leger) Labbé. Léger 1892 Pl. X, fig. 10.
59. *Didymophyes leuckarti* Marshall. Marshall 1893 Pl. II, fig. 24.
60. *Didymophyes leuckarti* Marshall. Ibid, fig. 26.
61. *Didymophyes gigantea* Stein. Stein 1848 Pl. XI, fig. 40.
62. *Didymophyes paradoxa* Stein. Léger 1892 Pl. VI, fig. 14.
- Didymophyes gigantea* Stein. Labbé 1899, fig. 4.
64. *Actinocephalus americanus* Crawley. Crawley 1903b Pl. XXX, fig. 22.
65. *Stylocephalus* sp. Crawley, 1903a Pl. III, fig. 29.
66. *Actinocephalus digitatus* Schneider. Schneider 1875 Pl. XVI, fig. 35.
67. *Actinocephalus stelliformis* Schneider. Schneider 1875 Pl. XVI fig. 32.
68. *Actinocephalus crassus* (Ellis) Ellis. Ellis 1912c fig. 7.

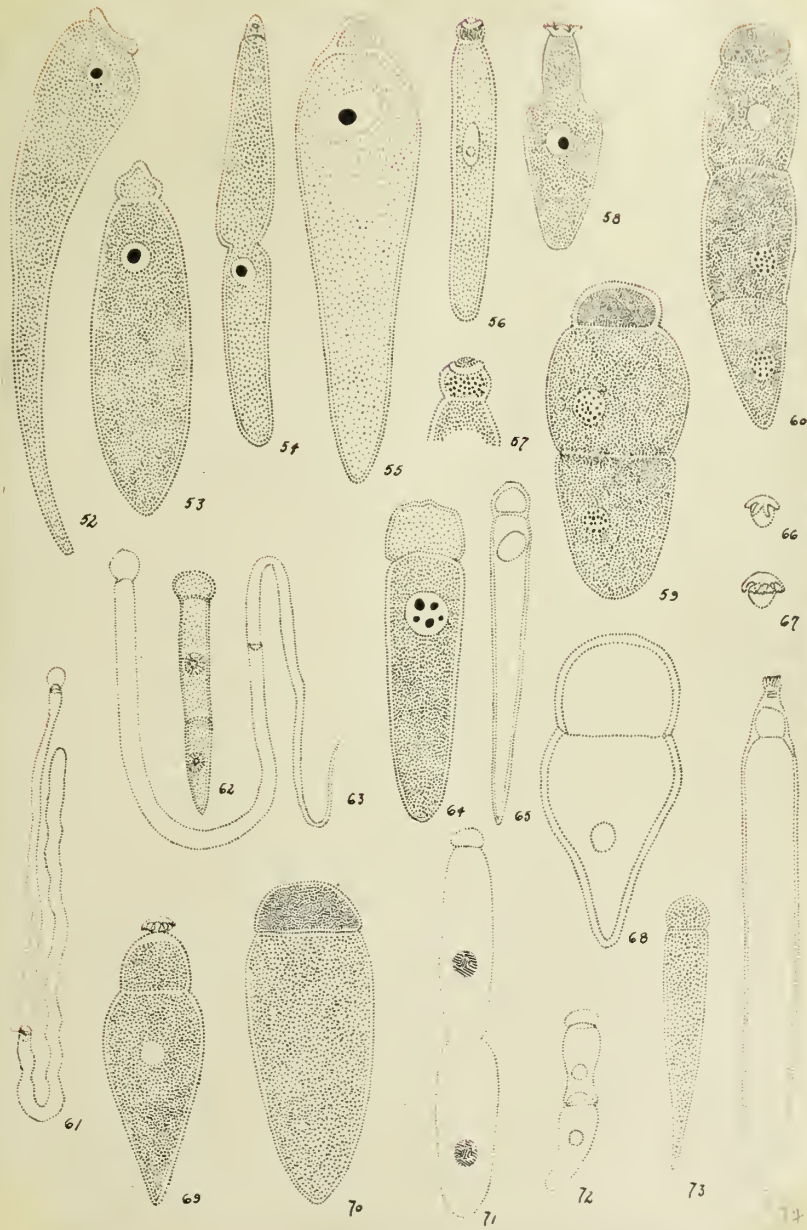
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Plate 2



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Plate 3



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69. *Actinocephalus stelliformis* Schneider. Schneider 1875 Pl. XVI, fig. 32.
70. *Actinocephalus harpali* (Crawley) Crawley. Crawley 1903a Pl. I, fig. 1.
71. *Didymophyes minuta* (Ishii) Watson. Ishii 1914, fig. 2a.
72. *Didymophyes paradoxa* Stein. Stein Pl IX, fig. 34.
73. *Actinocephalus stelliformis* Schneider. Schneider 1875 Pl. XX, fig. 20.
74. *Actinocephalus zophus* (Ellis) Ellis. Ellis 1913a, fig. 2.
75. *Actinocephalus conicus* (Dufour) Stein. Stein 1848 Pl. IX, fig. 33.
76. *Actinocephalus conicus* (Dufour) Stein. Leger 1892 Pl. XII, fig. 3.
77. *Asterophora cratoparis* Crawley. Crawley 1903a Pl. II, fig. 23.
78. *Asterophora philica* (Leidy) Crawley. Crawley 1903a Pl. III, fig. 31.
79. *Bothriopsis histrio* Schneider. Schneider 1875 Pl. XXI, fig. 13.
80. *Bothriopsis terpischorella* (Ellis) Watson. Ellis 1913b Pl. XVIII, fig. 30.
81. *Bothriopsis histrio* Schneider. Leger 1892 Pl. XIII, fig. 1.
82. *Legeria agilis* (Schneider) Labbe. Schneider 1875 Pl. XXII, fig. 1.
83. *Pileocephalus bergi* (Frenzel) Labbe. Frenzel 1892 Pl. VIII, fig. 16.
84. *Pyxinia crystalligera* Frenzel. Ibid, fig. 40.
85. *Pyxinia crystalligera* Frenzel. Ibid, fig. 36.
86. *Pyxinia crystalligera* Frenzel. Ibid, fig. 37.
87. *Phialoides ornata* (Leger) Labbe. Leger 1892 Pl. XIII, fig. 8.
88. *Phialoides ornata* (Leger) Labbe. Ibid Pl. XIII, fig. 7.
89. *Pyxinia frenzeli* Laveran & Mesnil. L & M 1900 fig. 5,
90. *Stictospora provincialis* Leger. Labbe 1899, fig. 43.
91. *Stictospora provincialis* Leger. Ibid, fig. 42.
92. *Steinina ovalis* (Stein) Leger & Duboscq. L & D 1904, fig. 3c.
93. *Steinina ovalis* (Stein) Leger & Duboscq. Ibid, fig. 4a.
94. *Steinina ovalis* (Stein) Leger & Duboscq. Ibid, fig. 4d.
95. *Steinina obconica* Ishii. Ishii 1914, fig. 4.
96. *Stylocystis ensiferis* (Ellis) Ellis. Ellis 1912, fig. 5.
97. *Pyxinia mobuszi* Leger & Duboscq. L & D 1902 Pl. VI, fig. 60.
98. *Pyxinia mobuszi* Leger & Duboscq. L & D 1902 Pl. VI, fig. 58.
99. *Stylocystis ensiferis* (Ellis) Ellis. Ellis 1912, fig. 5s.
100. *Actinocephalus discoeli* (Crawley) Ellis. Crawley 1903a Pl. I, fig. 7.
101. *Actinocephalus conicus* (Dufour) Stein. Dufour 1837 Pl. I, fig. 7.
102. *Gregarina conica* Dufour. Dufour 1837 Pl. I, fig. 7a.
103. *Actinocephalus conicus* (Dufour) Stein. Leger 1892 Pl. XII, fig. 4.

Plate 4



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104. Indeterminate species called by Crawley *Asterophora philica*.
Crawley 1903a Pl. III, fig. 32.
105. Indeterminate species called by Crawley *Asterophora philica*.
Crawley 1903a Pl. III, fig. 33.
106. *Stylocephalus oblongatus* (Hamm.) Watson. Schneider 1875
Pl. XVIII, fig. 3.
107. *Stylocephalus longicollis* (Stein) Watson. Schneider 1875
Pl. XIX, fig. 1.
108. *Stylocephalus giganteus* Ellis. Ellis 1912c, fig. 2.
109. *Stylocephalus giganteus* Ellis. Ellis Ibid, fig. 1d.
110. *Lophocephalus insignis* (Schneider) Labbé. Schneider 1882
Pl. XIII, fig. 1.
111. *Corycella armata* Leger. Leger 1892 Pl. XVI, fig. 7.
112. *Corycella armata* Leger. Leger 1892 Pl. XVI, fig. 8.
113. *Asterophora philica* (Leidy) Crawley. Leidy 1889, fig. 7.
114. *Lophocephalus insignis* (Schneider) Labbé. Wasielewski 1896,
fig. 5, after Leger.
115. *Cystocephalus algerianus* Schneider, cephalont. Labbé 1899,
fig. 82.
116. *Beloides firmus* (Leger) Labbé. Labbé 1899, fig. 65, after
Leger.
117. *Beloides tenuis* (Leger) Labbé. Labbé Ibid, fig. 65.
118. *Stylocephalus brevirostra* (Kölliker) Watson. Kölliker 1848
Pl. II, fig. 14.
119. *Pyxinia rubecula* Hamm. Frantzius 1848 Pl. VII, group II,
fig. 1.
120. *Stylocephalus oblongatus* (Hamm.) Watson. Schneider 1875 Pl.
XVIII, fig. 5.
121. *Stylocephalus longicollis* (Stein) Watson. Schneider Ibid
Pl. XIX, fig. 2.
122. *Ancyrophora gracilis* Leger. Leger 1892 Pl. XIX, fig. 11.
123. *Cometoides capitatus* (Leger) Labbé. Leger 1892 Pl. XVI,
fig. 3.
124. *Cometoides capitatus* (Leger) Labbé. Leger 1892 Pl. XVI, fig. 4.
125. *Cometoides crinitus* (Leger) Labbé. Leger 1892 Pl. XVIII, fig. 3.
126. *Actinocephalus gimbeli* (Ellis) Watson. Ellis 1913, fig. 4.
127. *Actinocephalus gimbeli* (Ellis) Watson. Ellis Ibid fig. 3.
128. Eimerite of *Gregarina munieri* (Schneider) Labbé. Schneider
1875 Pl. XVII, fig. 2.
129. *Hyalospora roscoviana* Schneider. Schneider 1875 Pl. XVI, fig. 41.
130. *Gregarina parva* Crawley. Crawley 1903b Pl. XXX, fig. 10.
131. *Euspora fallax* Schneider. Schneider 1875 Pl. XVIII, fig. 14.
132. *Gregarina cuneata* Stein. Schneider 1875 Pl. XX, fig. 11.
133. *Gregarina cuneata* Stein. Stein 1848 Pl. IX, fig. 23.
134. *Gregarina cuneata* Stein. Crawley 1903a Pl. III, fig. 30.
135. *Gregarina cuneata* Stein. Frantzius 1848 Pl. VII, group V,
fig. 1.
136. *Gregarina cuneata* Stein. Ishii 1914, fig. 1.

Plate 5

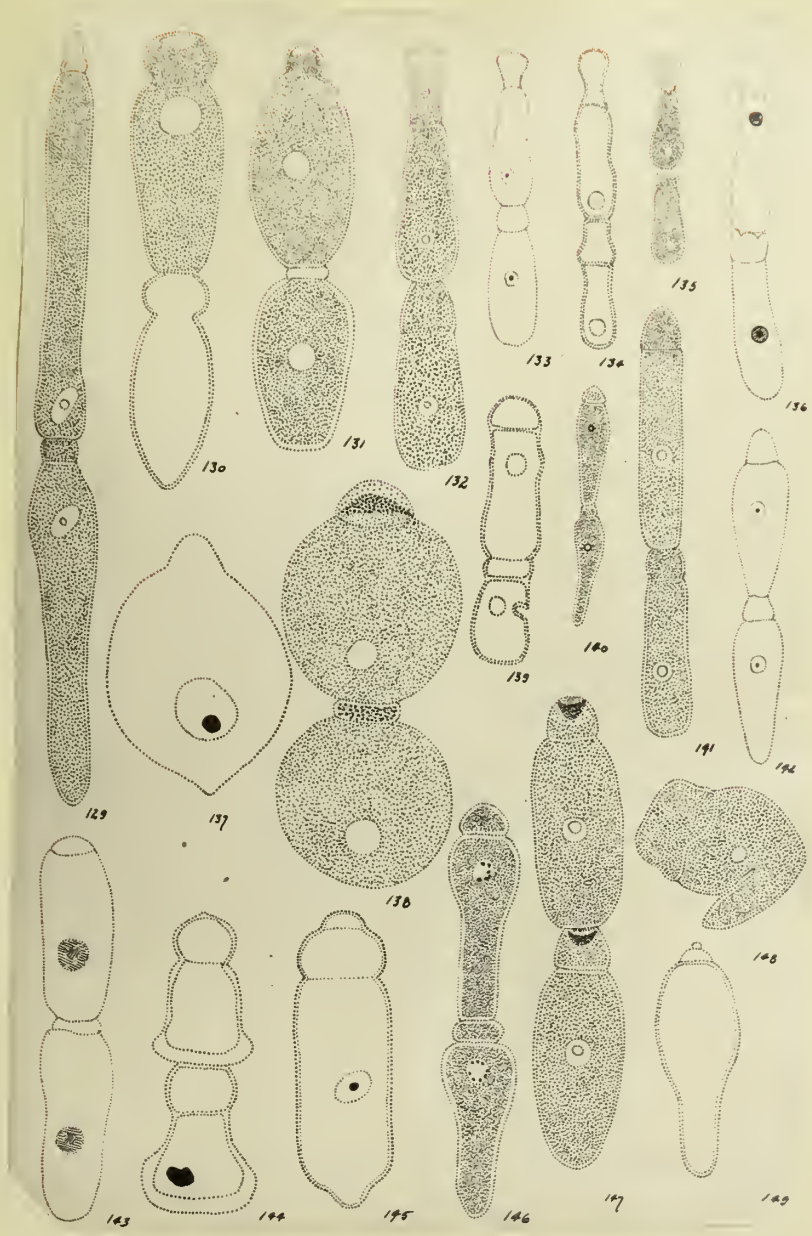


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137. *Sphaerocystis simplex* Léger. Léger 1892 Pl. VI, fig. 11.
138. *Gregarina statirae* Frenzel. Frenzel 1892 Pl. VIII, fig. 1.
139. *Gregarina passacornuti* Leidy. Crawley 1903a Pl. II, fig. 24.
140. *Gregarina polymorpha* (Hamm.) Stein. Frantzius 1848 Pl. VII, group V, fig. 2.
141. *Gregarina polymorpha* (Hamm.) Stein. Schneider 1875 Pl. XX, fig. 0.
142. *Gregarina polymorpha* (Hamm.) Stein. Stein 1848 Pl. IX, fig. 24.
143. *Gregarina minuta* Ishii. Ishii 1914 fig. 2b.
144. *Gregarina guatemalensis* Ellis. Ellis 1912 fig. 6t.
145. Uncertain species (Genus ? boletophagi Crawley) . Crawley 1903a Pl. II, fig. 26.
146. *Gregarina steini* Berndt. Berndt 1902 Pl. XIII, fig. 69.
147. *Gregarina munieri* (Schneider) Labbé. Schneider 1875 Pl. XVII, fig. 1.
148. *Actinocephalus dytiscorum* (Frantzius) Watson. Frantzius 1848 Pl. VII, group VII, fig. 1.
149. Uncertain species (*Gregarina microcephala* Leidy) . Leidy 1889, fig. 4.
150. *Gregarina lucani* (Crawley) Watson. Crawley 1903a Pl. III, fig. 38.
151. *Gregarina grisea* Ellis. Ellis 1913, fig. 1.
152. *Gregarina cuneata* Stein. Léger & Duboscq 1904, fig. 5.
153. *Gregarina polymorpha* (Hamm.) Stein. Léger & Duboscq 1904 fig. 6.
154. *Gregarina elongata* Frantzius. Frantzius 1848 Pl. VII, group IV, fig. 2.
155. *Gregarina longirostris* (Léger) Labbé. Léger 1892 Pl. XI, fig. 5.
156. Uncertain species (*Gregarina ovalis* (Crawley) Watson) . Crawley 1903a Pl. I, fig. 5.
157. Uncertain species Ibid. Crawley Ibid, fig. 6.
158. Uncertain species (*Gregarina elaterae* Crawley). Crawley 1903a Pl. I, fig. 11.
159. *Pyxinia rubecula* Hammerschmidt. Léger 1892 Pl. XIV, fig. 2.
160. Spore of *Cystocephalus algerianus* Schneider. Labbé 1899, fig. 8.
161. Spores of *Lophocephalus insignis* (Schneider) Labbé. Schneider 1882 Pl. XIII, figs. 48 & 50.
162. Spore of *Acanthospora pileata* Léger. Léger 1892 Pl. XV, fig. 5a.
163. Spore of *Acanthospora polymorpha* Léger. Labbé 1899, fig. 68.
164. Spore of *Ancyrophora gracilis* Léger. Léger 1892 Pl. XIX, fig. 12b.
165. Spore of *Cometoides capitatus* (Léger) Labbé. Léger 1892 Pl. XVI, fig. 5.
166. Spore of *Corycella armata* Léger. Léger 1892 Pl. XVI, fig. 10.

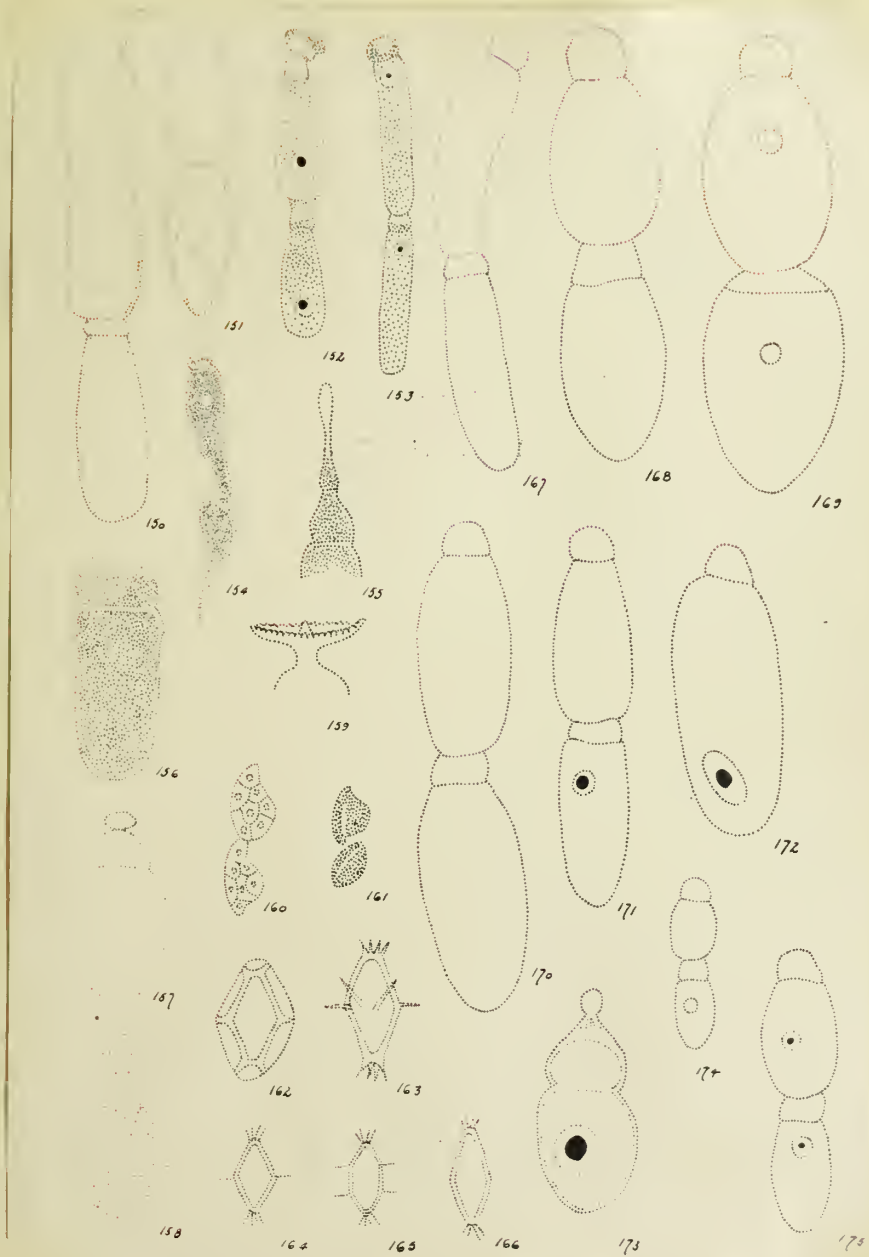
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Plate 6



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Plate 7

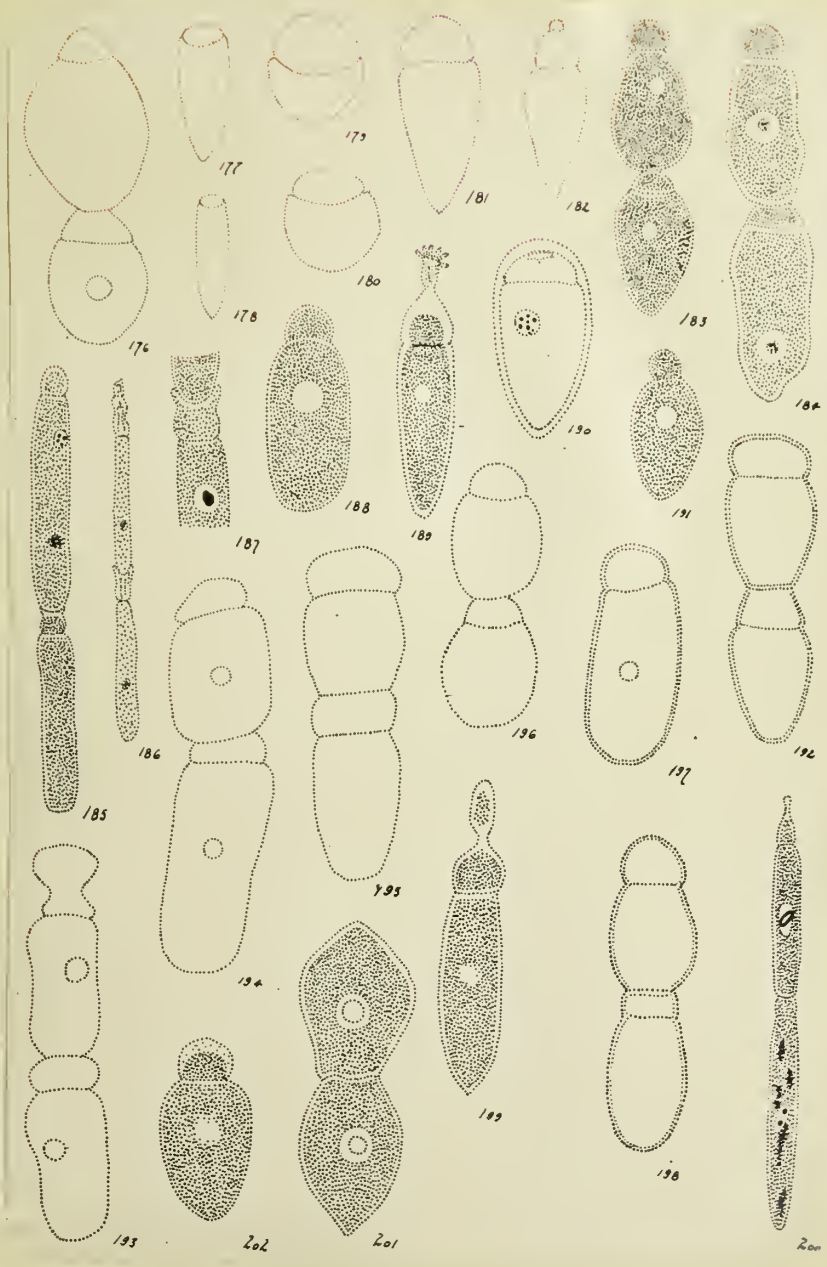


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167. *Gregarina monarchia* Watson.
168. *Gregarina intestinalis* Watson.
169. *Gregarina barbarara* Watson.
170. *Gregarina gracilis* Watson.
171. *Gregarina katherina* Watson.
172. *Gregarina* sp. Watson.
173. *Steinina rotunda* Watson.
174. *Gregarina tenebrionella* Watson.
175. *Gregarina fragilis* Watson.
176. *Gregarina globosa* Watson.
177. *Gregarina oblonga* Dufour. Dufour 1837 Pl. I, fig. 9.
178. *Gregarina oblonga* Dufour. Dufour 1837 Pl. I, fig. 9a.
179. Cysts of species called by Dufour *G. sphaerulosa*. Dufour 1837 Pl. I, fig. 4.
180. Cysts of species called by Dufour *G. soror*. Dufour 1837, Pl. I, fig. 5.
181. *Gregarina hyalocephala* Dufour. Dufour Ibid, fig. 8.
182. *Gregarina hyalocephala* Dufour. Dufour Ibid, fig. 8a.
183. *Gregarina ovata* Dufour. Frantzius 1848 Pl. VII, group IX, fig. 1.
184. *Gregarina blattarum* Siebold. Schneider 1875 Pl. XVII, fig. 11.
185. *Gregarina serpentula* deMagalhaes. deMagalhaes 1900, fig. 4.
186. *Gregarina serpentula* deMagalhaes. Magalhaes Ibid, fig. 4.
187. *Gregarina panchlorae* Frenzel. Frenzel 1892 Pl. VIII, fig. 20.
188. *Gregarina locustacarolina* Leidy. Leidy 1853 Pl. XI, fig. 35.
189. *Actinocephalus pachydermus* (Crawley) Ellis. Leidy 1853 Pl. XI, fig. 37.
190. *Actinocephalus pachydermus* (Crawley) Ellis. Crawley 1907 Pl. XVIII, fig. 3.
191. *Gregarina achetaeabbreviatae* Leidy. Leidy 1853 Pl. XI, fig. 32.
192. *Gregarina achetaeabbreviatae* Leidy. Crawley 1903a Pl. III, fig. 35.
193. *Gregarina kingi* Crawley. Crawley 1907 Pl. XVIII, fig. 10.
194. *Gregarina rigida* (Hall) Ellis. Crawley 1907 Pl. XVIII, fig. 8.
195. *Gregarina longiducta* Ellis. Ellis 1913d, fig. 8.
196. *Gregarina consobrina* Ellis. Ellis 1913c Pl. XVIII, fig. 24.
197. *Gregarina rigida* (Hall) Ellis. Hall 1907 Pl. I, fig. 8.
198. *Gregarina rigida* (Hall) Ellis. Watson
199. *Gregarina macrocephala* Schneider. Schneider 1882 Pl. XIII, fig. 42.
200. *Hyalocephala affinis* Schneider. Schneider 1882 Pl. XIII, fig. 33.
201. *Gamocystis tenax* Schneider. Schneider 1875 Pl. XIX, fig. 10.
202. *Pileocephalus blaberae* Frenzel. Frenzel 1892 Pl. VIII, fig. 24.
203. *Pileocephalus blaberae* Frenzel. Frenzel Ibid, fig. 23.
204. *Gregarina davini* Léger & Duboscq. L & D 1899, fig. 3.

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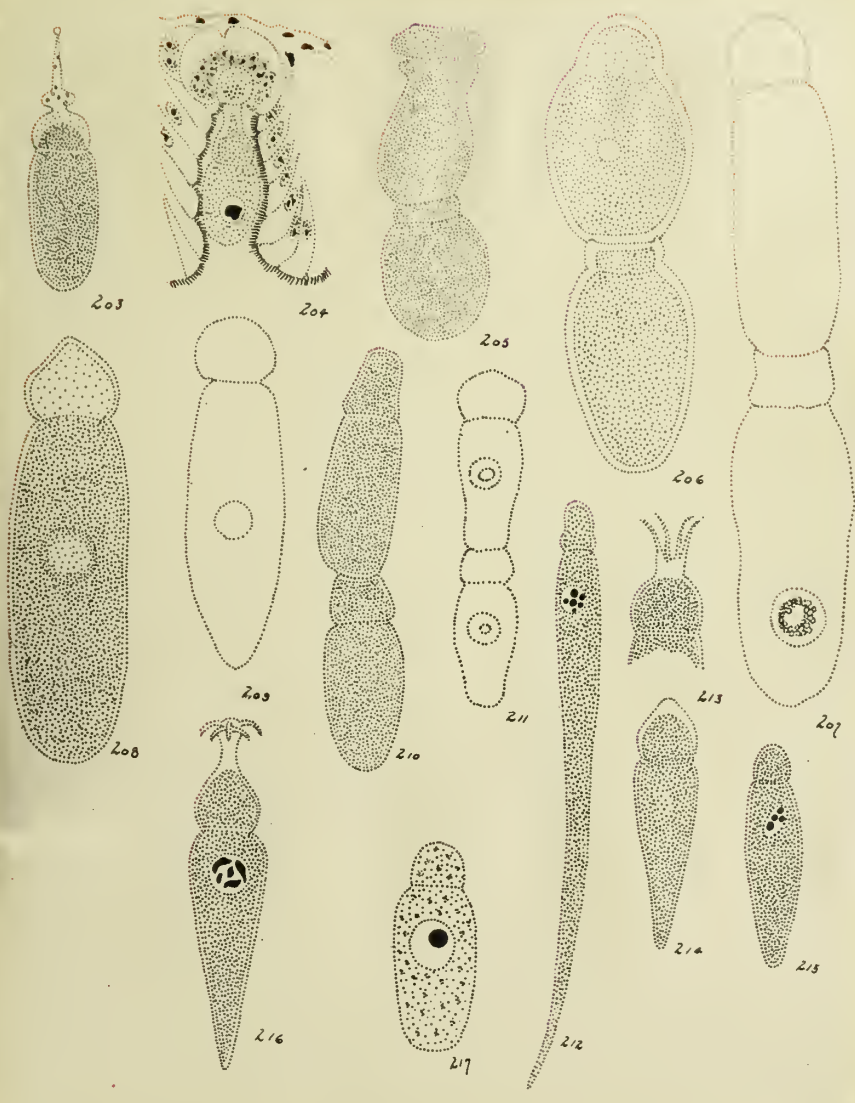
Plate 8



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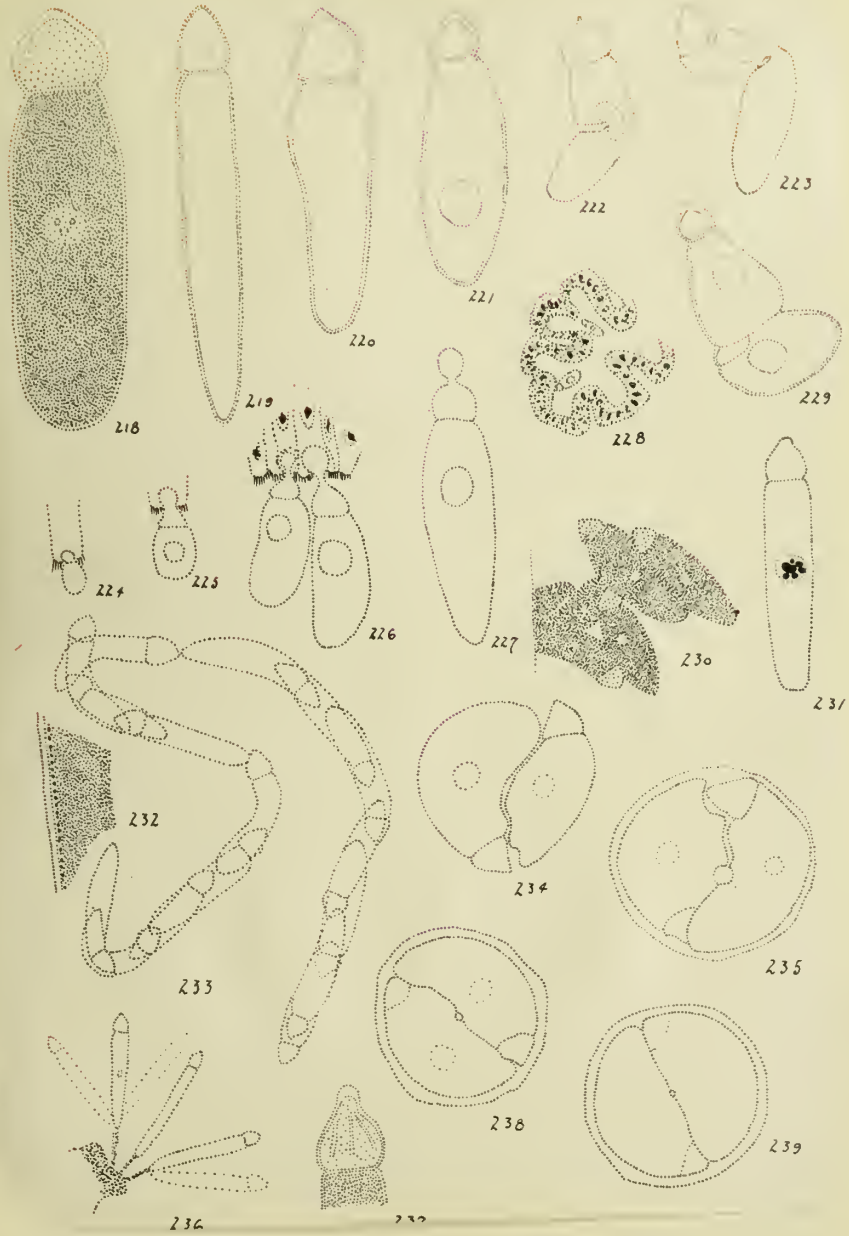
205. *Gregarina galliveri* Watson.
206. *Gregarina stygia* Watson.
207. *Gregarina illinensis* Watson.
208. *Leidyiana solitaria* Watson.
209. *Leidyiana gryllorum* (Cuénot) Watson. Cuénot 1901 Pl. XX, fig. 27.
210. *Gregarina nigra* Watson.
211. *Hirmocystis gryllotalpae* (Leger) Labbé. Leger 1892 Pl. VI, fig. 5.
212. *Actinocephalus acutispora* Leger. Leger 1892 Pl. XIV, fig. 6.
213. *Actinocephalus acutispora* Leger. Leger Ibid, fig. 7.
214. *Beloides firmus* (Leger) Labbé. Leger 1892 Pl. XVII, fig. 5.
215. *Acanthospora pileata* Leger. Leger 1892 Pl. XV, fig. 4.
216. *Ancyrophora uncinata* Leger. Leger 1892 Pl. XIX, fig. 8.
217. *Gregarina acuta* (Leger) Labbé. Leger 1892 Pl. VI, fig. 10.
- 218-263. *Leidyiana solitaria* n. sp.
218. An adult sporont.
219. A younger slender sporont, nearly transparent.
220. Another adult sporont.
221. Aⁿ old sporont, dense, compact and sluggish, just preparatory to cyst-formation.
- 222 & 223. Drawings to illustrate the bending of the body.
224. The trophozoite attached to a host-cell.
225. A larger trophozoite with an incipient protomerite.
226. Fully developed but still attached trophozoites.
227. An individual with epimerite, free in the intestine and nearly as large as the adults.
228. A section of the caeca indicating that this organ is frequently the seat of infection.
229. The sluggish sporonts attached by the sticky secretion from their bodies. They are not attached antero-posteriorly by means of a socket, as in the genus *Gregarina* but haphazard and barely contiguous.
230. A cluster of sluggish, fully matured sporonts, several of which formed cysts of the slide.
231. An adult sporont from the original of Crawley and called by him *Stenophora erratica*. Crawley 1903a Pl. III, fig. 34.
232. Longitudinal section of a portion of the deutomerite, indicating the deeply staining myonemes cut cross-wise, just within the epicyte wall.
233. A sporont in the process of contortive and progressive movement. The series was made at intervals of fifteen seconds.
234. Two sporonts in the process of rotation previous to cyst-formation. The sporonts are not attached.
235. A cyst still in rotation with a thin transparent wall.
236. A cluster of sporonts after half an hour on a slide, en-

Plate 9



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Plate 10



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deavoring to free themselves from threads at the posterior end which hold them to the debris. The sporonts are greatly stretched owing to their efforts to move forward.

237. A protomerite with an apical papilla. The animal is collapsing from evaporation of the medium.
238. A cyst still in rotation, the nuclei faintly visible, the protomerites still distinct and the transparent layer thick.
239. The nuclei have now disappeared and the protomerites are still visible as lighter areas.
240. The protomerites are visible as slightly less dense areas; the transparent layer has become still wider.
241. The outside layer is much wider than before and the inner mass smaller because of the exudation of liquids. The line of separation between the two sporonts is now obliterated and the cyst is a homogeneous mass.
242. The protoplasm is collected in small spherical masses.
243. Section of a sporont stained on the slide, showing the longitudinal striations and the myonemes which form a horizontal network of fibrillae.
244. A segment of the cyst in the stage shown in fig. 242. The gametes are being formed from the outer parts of these protoplasmic masses.
245. Six sporeducts are indicated by orange-colored condensation discs on the surface of the cyst-mass.
246. The sporeducts have grown from the periphery inward to the central part of the mass.
- 247, 248. The ducts extending outward from the periphery into the transparent cyst-wall.
249. A mature cyst from which the spores are being extruded in chains.
250. Cross-section of an intestine heavily infected with parasites; the gregarines remain in the epithelial region of the intestine rather than among the food masses where they would easily be swept along by peristaltic movement.
251. A gamete taken from a cyst which was crushed at the end of about thirty hours.
252. Two isogametes which have just fused, from a cyst of about thirty-five hours.
253. A later stage in the fusion of the isogametes.
254. A zygote formed by the fusion of the two gametes.
255. Ripe spores from a fully-developed cyst of about forty-eight hours.



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Vita

The writer of this dissertation was born Dec. 8, 1886 at Fostoria, Michigan. She attended the graded and high school of this village and also the high school at Flint, Michigan, graduating from the latter institution in 1903. She entered Olivet College in 1906 and graduated in 1909, and taught in the high schools of Rockville Centre and Oyster Bay, Long Island, N.Y. for three years. In 1912-3 she was Assistant in Zoology in the University of Illinois, taking the M.S. degree in 1913. The summer of 1910 was spent in graduate work at Middlebury College (Vermont) and the summers of 1911, 12, 13, and 14 in course work and research at the Biological Laboratory of the Brooklyn Institute at Cold Spring Harbor, Long Island. During the years of 1913-14 and 1914-15 she has been a Fellow in Zoology in the University of Illinois.

