Nineteenth Annual Midwestern Conference of Parasitologists

Dear Member:

The Program Committee is presently planning for our next meeting, to be held at Iowa State University on June 9th and 10th, 1967. As in previous years, the program will be divided into two parts: a graduate student symposium for the presentation of relatively short (15 to 20 minutes) papers, and, a demonstration session to which all members are invited to make presentations.

As you may recall, it was decided during the 1966 business meeting to offer a prize of $200 for the most outstanding graduate student demonstration, through the generosity of the Eli Lilly and Company. We sincerely hope that you will offer maximum encouragement to your own graduate students to enter this stimulating competition. In the light of the outstanding success of last year's demonstration session, we should like again to concentrate on the applications of newer technical methods and approaches to the study of parasites and parasitism. The breadth of this topic will undoubtedly have the greatest range of interest of the membership, since it covers biochemical, histochemical, and immunological techniques employed in both in vivo and in vitro studies, which can be related to problems in parasite physiology, pathology, life history, phylogeny, host-parasite relationship, and morphology at the ultrastructural and gross levels. The only limitation to the design of these demonstrations is the imagination and ingenuity of the contributor.

Accordingly, will you please begin a campaign to encourage your graduate students to submit an entry to the demonstration or symposium section. To be complete, the following points should be covered: a title followed by an abstract (2-300 words), the author's name and business address, and a list of optical equipment necessary for the presentation. This information should be submitted to the Program Committee before 20 April 1967, after which a suitable program will be prepared.

Your active participation, and that of your graduate students is earnestly solicited.

Very sincerely,

Robert L. Calentine
Dept. of Biology
Wisconsin State College
River Falls, Wisconsin

Frank J. Etges, Chairman,
Program Committee
Dept. of Biological Sciences
University of Cincinnati
Cincinnati, Ohio 45221

P.S. The Secretary-Treasurer assumes responsibility for the lateness of this announcement. Let's get those titles in and have a good program!

NINETEENTH ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS

IOWA STATE UNIVERSITY, AMES, IOWA

9-10 June, 1967

Please fill out this blank and return it BEFORE JUNE 1, 1967 to:

Dr. Martin J. Ulmer
Department of Zoology
Iowa State University
Ames, Iowa 50010

Name _____

Address _____

Organization, College or University _____

REGISTRATION AND HOUSING RESERVATION

Arrival _____ (date) _____ (hour) Departure _____ (date) _____ (hour)

Please reserve:

_____ a single room in Maple Hall ($4 per night).

_____ twin-bed room ($2.50 per person per night).

To be shared with _____.

BANQUET (Friday, June 9, 1967) $3.00 per person.

Please indicate choice of: _____ Ham

_____ Roast Beef

_____ Trout

Registration Fee (50¢) and banquet and housing payments may be made at the time of registration at Maple Hall (see enclosed map). Please send no money now.

NINETEENTH ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS

IOWA STATE UNIVERSITY, AMES, IOWA

The Nineteenth Annual Midwestern Conference of Parasitologists will be held at Iowa State University, Ames, Iowa, on Friday and Saturday, 9-10 June, 1967. Housing will be available Thursday, Friday and Saturday nights, 8-10 June, in Maple Hall. Housing assignments and registration will be in Maple Hall (see enclosed campus map).

The tentative program follows:

Thursday, 8 June, 1967

3-11 p.m. Housing assignment and registration. Maple Hall.
Registration fee $0.50
Housing ($4.00 single; $2.50 double per night (See enclosed housing reservation form.)

Friday, 9 June, 1967

8:00 a.m. - 12:00 noon. Registration and housing assignments. Maple Hall.

(11:30 a. m. - 1:00 p.m. University of Iowa reunion luncheon,)
(Richards' Restaurant, 4010 West Lincoln Way)

1:00 - 4:00 p.m. Demonstration Session. Rooms 101 and 101A Veterinary Pathology.

4:00 p.m. First business session, Kildee Auditorium

6:30 p.m. Banquet. Red Barn Supper Club (2 miles west of campus on Highway 30) (Tickets sold at time of registration.)

8:00 p.m. Annual lecture. Dr. Norman D. Levine, College of Veterinary Medicine, University of Illinois, Urbana. "Parasitology: Problems and Promise". Kildee Auditorium.

Presentation of 1st annual Herrick Award for the best graduate student demonstration. (To be presented by Dr. Jean F. Downing, Director of Animal Science Research, Eli Lilly and Co.)

Saturday, 10 June, 1967

8:30 a.m. Second business session. Kildee Auditorium

9:00 a.m. Graduate student symposium. Kildee Auditorium

1:00 p.m. Tour of U.S.D.A. National Animal Desease Laboratory (limited to 50 - sign up at time of registration).

Meals other than the banquet can be obtained at the Memorial Union Cafeteria or elsewhere on an individual basis.

A map of the campus is enclosed for your information.

Please fill out the enclosed information blank and return it to Dr. Martin J. Ulmer, Department of Zoology, Iowa State University, Ames, Iowa, 50010, BEFORE JUNE 1, 1967.

19TH ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS

June 9-10, 1967

Iowa State University

Ames, Iowa

NINETEENTH ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS

IOWA STATE UNIVERSITY, AMES, IOWA

9-10 June, 1967

PROGRAM

Thursday, 8 June, 1967

3-11 p.m. Housing assignment and registration. Maple Hall
Registration fee, $0.50
Housing ($4.00 single; $2.50 double, per night)

Friday, 9 June, 1967

8:00 a.m. - 12:00 noon. Registration and housing assignments. Maple Hall

(11:30 a.m. - 1:00 p.m. University of Iowa Reunion Luncheon. Richards' Restaurant, 4010 West Lincoln Way)

1:00 p.m. - 4:00 p.m. DEMONSTRATION SESSION

ROOM 101 VETERINARY PATHOLOGY

1. Desser, Sherwin S., University of Toronto. ACID HYDROLYSIS AS AN AID IN THE HISTOLOGICAL STUDY OF HAEMOSPORIDIA.

2. Hoff, Richard L., University of Iowa. UPTAKE AND DISTRIBUTION OF LABELED COMPOUNDS BY TAPEWORM AND RAT IN ASSOCIATION.

3. Nollen, Paul M., Purdue University. THE UPTAKE AND INCORPORATION OF GLUCOSE, THYMIDINE AND TWO AMINO ACIDS BY ADULTS OF PHILOPHTHALMUS MEGALURUS.

4. Nollen, Paul M., Purdue University. A CASE OF OVOTESTIS IN PHILOPHTHALMUS MEGALURUS.

5. Cain, George D., Purdue University. ELECTROPHORETIC STUDIES ON PROTEINS OF LARVAL AND ADULT PHILOPHTHALMUS MEGALURUS AND FASCIOLOPSIS BUSKI.

6. Ellis, Charles J., Iowa State University. EXPERIMENTAL LIFE CYCLE OF MICROTETRAMERES STURNELLAE, N.SP. (NEMATODA: TETRAMERIDAE).

7. Bonner, Thomas P., University of Cincinnati. A TECHNIQUE FOR DEMONSTRATIN CHEMICALLY MEDIATED SEXUAL ATTRACTION IN PARASITIC HELMINTHS.

8. Bonner, Thomas P., University of Cincinnati. A HISTOCHEMICAL TECHNIQUE FOR DEMONSTRATING THE NERVOUS SYSTEM OF PARASITIC HELMINTHS.

9. Coil, William H., University of Kansas. STUDIES ON THE DEVELOPMENT OF THE CYCLOPHYLLIDEAN CESTODE DIPLOPHALLUS POLYMORPHUS (Rud., 1918) FUHRMANN, 1900 WITH EMPHASIS ON THE HISTOCHEMISTRY OF THE EGG MEMBRANES.

10. Coil, William H., University of Kansas. STUDIES ON THE DEVELOPMENT OF THE CYCLOPHYLLIDEAN CESTODE DIOECOCESTUS ACOTYLUS FUHRMANN, 1904 WITH EMPHASIS ON THE HISTOCHEMISTRY OF THE EGG MEMBRANES.

11. Khalil, Galila M., Purdue University. THE USE OF SUDAN BLACK STAINING AND AUTORADIOGRAPHY TO STUDY GERMINAL DEVELOPMENT OF PHILOPHTHALMUS MEGALURUS.

12. Greve, John H., College of Veterinary Medicine, Iowa State University. SOME PARASITES OF ZOO ANIMALS.

13. Coulter, Gary R. and W. H. Coil, University of Kansas. STUDIES ON THE HISTOCHEMISTRY OF LINTONIUM VIBEX (LINTON, 1905) STUNKARD AND NIGRELLI, 1930 (DIGENEA: FELLODISTOMIDAE).

14. Coulter, Gary R. and W. H. Coil, University of Kansas. STUDIES ON THE HISTOCHEMISTRY OF ONCOSPHERE AND EGG MEMBRANES OF SHIPLEYA INERMIS FUHRMANN, 1908.

15. Haloman, Verna L. and J. L. Crites, Ohio State University. DEMONSTRATION OF THE MALE NEMATODE PHARYNGODON BATRACHIENSIS WALTON, 1929.

16. Elwell, A. S., Iowa State University. TEMPERATURE EFFECTS ON DEVELOPMENT OF POSTHARMOSTOMUM HELICIS SPOROCYSTS IN ANGUISPIRA ALTERNATA.

17. Denner, Melvin W., Iowa State University. SOME LIFE CYCLE STAGES OF MERMIS SUBNIGRESCENS (NEMATODA: MERMITHIDAE)

18. Cable, R. M., Purdue University. DOES ECDYSIS OCCUR IN ACANTHOCEPHALA?

19. Gless, E. E., Bernice P. Bishop Museum, Honolulu and Iowa State University. ECTOPARASITES FROM ANTARCTIC ANIMALS COLLECTED DURING THE 1966-67 AUSTRAL SUMMER SEASON AT HALLETT STATION, ANTARCTICA.

ROOM 101A VETERINARY PATHOLOGY

20. Bird, Nancy T., West Virginia State College, and Wilbur M. Tidd, Ohio State University. TECHNIQUES USED IN HANDLING LIVING LERNAEA LARVAE.

21. Ulmer, Martin J., Iowa State University. THE IOWA LAKESIDE LABORATORY, LAKE OKOBOJI, IOWA.

22. Blankespoor, Harvey D., Iowa State University. HELMINTHS FROM SIX SPECIES OF IOWA BATS.

23. Page, Clayton R., III., University of Cincinnati. PARABIOSIS-RESEARCH TECHNIQUE FOR STUDYING PATHOGENESIS OF MANSONIAN SCHISTOSOMIASIS.

24. Keithly, Janet S., Iowa State University. EXPERIMENTAL DEVELOPMENT OF THE ACANTHOCEPHALAN, CORYNOSOMA CONSTRICTUM VAN CLEAVE, 1918 WITHIN THE INTERMEDIATE HOST HYALELLA AZTECA SAUSSURE, 1858.

25. Zapotosky, John E., Ohio State University. THE CUTICULAR ULTRASTRUCTURE OF AN ADULT NEMATOMORPHAN, PARAGORDIUS VARIUS LEIDY, 1851.

26. Zimmerman, William, Iowa State University Veterinary Medical Research Institute. THE TRICHINOSCOPE AS A RESEARCH TOOL.

4:00 p.m. - FIRST BUSINESS SESSION. Kildee Auditorium.

6:30 p.m. - BANQUET. Red Barn Supper Club (2 miles west of campus on Highway 30). $3.00 per person. (Tickets sold at time of registration.)

8:00 p.m. - PRESENTATION OF 1ST ANNUAL C. A. HERRICK AWARD. Presented by Milo C. Brandt, Eli Lilly and Co., Kildee Auditorium.

ANNUAL LECTURE. Dr. Norman D. Levine, College of Veterinar Medicine, University of Illinois, Urbana. "Parasitology: Problems and Promise". Kildee Auditorium.

Saturday, 10 June, 1967

8:30 a.m. - SECOND BUSINESS SESSION. Kildee Auditorium.

9:00 a.m. - GRADUATE STUDENT SYMPOSIUM. Kildee Auditorium. Dr. Frank Etges, presiding.

1. Nollen, Paul M., Purdue University, Lafayette, Indiana. APPLICATION OF AUTORADIOGRAPHY TO STUDIES ON REPRODUCTION IN ADULTS OF PHILOPHTHALMUS MEGALURUS.

2. Lehnert, James P., Department of Zoology, University of Illinois, Urbana Illinois. THE USE OF LUNG LESIONS IN THE MEASUREMENT OF PROTECTIVE ANTI BODY TO ASCARIS SUUM IN MICE.

3. Chaffin, Paulette, Department of Zoology, University of Illinois, Urbana Illinois. THE EFFECTS OF A SINGLE ARTIFICIAL INFECTION OF HAEMONCHUS CONTORTUS IN LAMBS.

4. Wagenbach, Gary, Department of Zoology, University of Wisconsin, Madison Wisconsin. POLAROGRAPHIC DETERMINATION OF OXYGEN CONSUMPTION DURING SPORULATION OF EIMERIA TENELLA AND EIMERIA STEIDAE OOCYSTS.

5. Overturf, Merrill, Department of Zoology, University of Iowa, Iowa City. LIPID METABOLISM OF HYMENOLEPIS DIMINUTA.

1:00 p.m. - TOUR OF U.S.D.A. NATIONAL ANIMAL DISEASE LABORATORY. (Limited to 50 participants. Please sign roster at the registration desk.)

AMCOP, 1967

ACID HYDROLYSIS AS AN AID IN THE HISTOLOGICAL STUDY OF HAEMOSPORIDIA

Sherwin S. Desser
Department of Parasitology
School of Hygiene
University of Toronto
Toronto 5, Canada

Hydrolysis with hydrochloric acid has been employed previously in the study of the nuclear morphology of bacteria. Nuclear and cytoplasmic RNA is hydrolyzed by the acid, and following staining, nuclear detail is clearly revealed.

Exo-erythrocytic stages of the Haemosporidia often contain abundant RNA and the application of even specialized staining techniques provides only limited details of nuclear structure. Tissue sections containing schizonts of Leucocytozoon simondi and Plasmodium berghei (in different stages of development), were treated with normal HCl at 60°C for approximately 10 minutes prior to staining with haematoxylin-phloxine or the Giemsa-colophonium method. Nuclear division in the developing schizonts was followed with ease in the hydrolyzed sections.

This technique may prove useful for the study of nuclear detail of several types of parasites.

Histological preparations stained by standard methods and by the hydrolysis technique are described and demonstrated.

AMCOP, 1967

UPTAKE AND DISTRIBUTION OF LABELED COMPOUNDS BY TAPEWORM AND RAT IN ASSOCIATION

Richard L. Hoff
Department of Zoology
University of Iowa
Iowa City, Iowa

A controlled flow rate of radioactive labeled compounds is maintained by a perfusion pump to enable measurement of absorption of the rat gut and tapeworm in association. The initial perfusion solution may contain labeled amino acids, fatty acids, carbohydrates, or drugs. An anesthetized rat is cannulated and the perfusion allowed to pass through the small intestine containing a tapeworm. The perfusion effluent is examined by liquid scintillation spectrometry and colorimetric determination. Worms removed from the gut are also subjected to similar analysis and possible radioautographic analysis. Metabolic conversion of compounds may be analyzed in the tapeworm by autoradiography.

AMCOP, 1967

THE UPTAKE AND INCORPORATION OF GLUCOSE, THYMIDINE AND TWO AMINO ACIDS BY ADULTS OF PHILOPHTHALMUS MEGALURUS

Paul M. Nollen, Purdue University

Adult worms pulsed in vitro with tritiated glucose, leucine, tyrosine and thymidine were later processed for autoradiography, using standard histological techniques for paraffin sections to detect incorporated compounds, and freeze-dried specimens embedded directly in epoxy resin for substances lost by the first method. No detectable leaching into the resin occurred. To investigate and time several functions and processes many worms were returned to the hosts (chicks) for various periods before processing for autoradiography. Histochemical techniques were used for glycogen and alkaline phosphatase.

Glucose was absorbed largely through the tegument and became generally distributed in 1 minute. In 15 minutes, tissues positive for glycogen showed intense radioactivity, indicating conversion of glucose to glycogen within that time. Limitation of alkaline phosphatase to the excretory system implied unimportance of that enzyme to glucose absorption.

Within 2 minutes, tyrosine and leucine entered the worms, mostly through the gut, and became generally distributed. Fixation occurred throughout the body in 15 minutes, and in less time by certain tissues notably the vitellaria which fixed tyrosine in 10 minutes. Studies with inhibitors of protein synthesis indicated that vitelline cells as well as the other tissues sampled incorporated tyrosine and leucine in protein. In worms returned to the host for 2 days, activity of the tyrosine was concentrated in the egg shell but no detectable tanning occurred. From labeling of vitelline cells until eggs were laid required 10 days. Injection of infected birds with H^3-tyrosine showed its fixation in the vitelline cells within 8 hours.

In 5 minutes, thymidine became generally distributed, apparently entering somewhat more through the tegument than the gut. In 30 minutes, fixation in

nuclei was observed throughout young worms but almost entirely in the reproductive system of ovigerous specimens. Activity was greatest in the testes and developing eggs. Entry and fixation of glucose, leucine, tyrosine and thymidine in developing miracidia demonstrated that the uterus is more than a passive conduit for eggs in Philophthalmus megalurus.

Incorporation of H^3-thymidine in gonial cells but not thereafter permitted timing of certain aspects of gametogenesis and studies on self- and cross-insemination. From the oogonia until primary oocytes are enclosed in the egg required 7 days in 6 day-old worms to 13 days when 68 days of age. From labeled vitelline cells until their nuclei were detected in eggs required 96 hours. Tertiary spermatogonia became primary spermatocytes within 48 hours; 12 hours later, secondary spermatocytes were present. In 36 hours more, the testes contained labeled spermatids and, 24 hours later, bundles of radioactive sperms, which reached the seminal vesicle within 12 hours. Timing of the above events was not affected by the age of the worms after sexual maturity was attained.

When 37 pulsed worms 6 to 90 days of age were returned singly to the host for 6 to 16 days, 28 inseminated themselves as demonstrated by radioactive sperms in the female system. When each of 33 such worms was in the company of 1 to 3 non-pulsed worms of the same age, only one inseminated itself whereas the 33 inseminated 47 of 61 non-pulsed worms available. The extent of cross-insemination was less when only old worms were present but not when young and old worms were together even though there was about a threefold size difference. Disappearance of labeled sperms from the uterine seminal receptacl within 14 to 16 days of copulation demonstrated a rate of turnover requiring repeated insemination during the life of the worms for continued production of viable eggs.

AMCOP, 1967

A CASE OF OVOTESTIS IN PHILOPHTHALMUS MEGALURUS

Paul M. Nollen, Purdue University

In the course of autoradiographic studies on Philophthalmus megalurus a worm with ovarian tissue embedded in the anterior testis was found. This specimen had been pulsed with H^3-thymidine for 5 1/2 hours when 6 days old and then returned to the eye of an uninfected chick for 17 days. The piece of ovarian tissue is roughly cone-shaped and no connection could be found between it and the ovary of the worm. The primary oocytes formed in that tissue appear normal and were metabolically active in that they incorporated the H^3-thymidine into their nuclei.

AMCOP, 1967

ELECTROPHORETIC STUDIES ON PROTEINS OF LARVAL AND ADULT *FASCIOLOPSIS BUSKI* AND *PHILOPHTHALMUS MEGALURUS*

George D. Cain, Purdue University

Soluble proteins in homogenates of adult and larval *F. buski* and *P. megalurus* were separated by electrophoresis in 7.5% acrylamide gels at pH 8.3. Staining of gels for protein revealed 16-18 distinct bands in adults of both species, 11-12 bands in rediae of *F. buski* and 9-10 bands in excysted metacercariae of *P. megalurus*. Adults of both species possess large amounts of hemoglobin (or a similar heme protein) migrating as a single band in *F. buski* and two bands in *P. megalurus*. Neither of the larval stages investigated contained hemoglobin in detectable amounts, and protein patterns bore little resemblance to those of the corresponding adult.

Malic and lactic dehydrogenase (MDH and LDH) activities were detected in gels by coupling the reaction with the appropriate substrate to nitro blue tetrazolium. A single band of MDH activity was present in all stages investigated. The position of the MDH band was approximately the same in different generations of each species, but differed from one species to the other. LDH showed less distinct banding patterns than MDH. Although the presence of multiple molecular forms of LDH could not be ascertained, activity was demonstrated in all material studied. For each species, the electrophoretic mobility of larval LDH differed from that of the adult.

Alpha-naphthyl acetate, propionate and butyrate were used to demonstrate esterase activity in adults of both species and excysted metacercariae of *P. megalurus*. Two metacercarial esterases which acted only on α-naphthyl acetate and propionate were present, while at least four additional enzymes acted on naphthyl acetate in the adult. One esterase from adult *P. megalurus* hydrolyzed all three substrates, three were specific for α-naphthyl propionate and three acted on propionate as well as acetate. In adults of *F. buski*, three non-specific esterases were observed. Each of these enzymes hydrolyzed α-naphthyl acetate and propionate readily, but showed only slight activity with α-naphthyl butyrate.

AMCOP, 1967

EXPERIMENTAL LIFE CYCLE OF *MICROTETRAMERES STURNELLAE* N. SP.

(NEMATODA : TETRAMERIDAE)

Charles J. Ellis
Department of Zoology and Entomology
Iowa State University

The experimental life cycle of *Microtetrameres sturnellae* n. sp. involves domestic canaries (*Serinus canarius*) and grasshoppers (*Melanoplus* spp.) Natural definitive hosts number about 115 species including the meadowlark (*Sturnella neglecta* and *S. magna*).

Eggs containing first-stage juveniles are deposited with the bird's feces. Juveniles hatch when grasshoppers ingest eggs. They undergo further development to second-stage juveniles and migrate within the grasshopper. Eventually, juveniles reach the perivisceral sinus of the intermediate host's hemocoel where they encyst as third-stage juveniles. This stage is infective and develops about 25 days post-ingestion of an egg. Fourth-stage juveniles presumably develop within the proventricular gland of the avian host. Adult females develop within the proventricular glands. The three males recovered in the laboratory were found within the mucus of the bird's proventricular lumen.

First-stage juveniles are characterized by dontoidal projections and discontinuous striae anteriorly. They resemble microfilariae. Second-stage juveniles are larger than first-stage juveniles and possess a complete digestive tract. Older second-stage juveniles have a characteristic "bent-tail" configuration. Third-stage juveniles are much longer, are encysted and possess a genital primordium. Juveniles of all stages recovered possess aspinose tails Fourth-stage juveniles have not been recovered.

Pathology of adult males is unknown but that of adult females involves mild proventriculitis but not connective tissue encapsulation.

Laboratory-reared males possess no gubernacula.

Constancy of egg size, and to a lesser degree of the buccal capsule, suggests a stable criterion for species differentiation.

AMCOP, 1967

A TECHNIQUE FOR DEMONSTRATING CHEMICALLY MEDIATED SEXUAL ATTRACTION IN PARASITIC HELMINTHS*

Thomas P. Bonner
Department of Biological Sciences
University of Cincinnati

An experimental migration channel has been devised for the *in vitro* study of chemical attraction in parasitic helminths. The polyvinyl channel was grooved for the insertion of transverse permeable barriers 1 cm from an end. The permeable barrier thus divided the channel into two regions. Starting at the barrier, reference markers were located at 1 cm intervals. The test channel was thus divided into zones 1 cm long. The entire channel was filled with Tyrode's solution to a depth of 1 cm. Under these conditions only soluble chemicals or fine suspended material could pass through the barrier and diffuse into the test channel. Sexed worms were placed in chamber A (the short 1 cm chamber) and allowed to incubate for a period (6 hours for *Trichinella*). Worms of the opposite sex were then placed in the test channel at zone 0. At the termination of each experiment the number of worms in each zone was recorded. Controls consisted of homosexual and untreated (no worms in chamber A) experiments. It must be cautioned that results of a single test are not reliable and a number of experiments must be carried out and evaluated statistically (Chi-square test) for valid interpretation.

*This work was supported by a U.S.P.H.S., N.I.H. Fellowship (1-F1-GM-32,750-01)

AMCOP, 1967

STUDIES ON THE DEVELOPMENT OF THE CYCLOPHYLLIDEAN CESTODE *DIPLOPHALLUS POLYMORPHUS* (RUD., 1819) FUHRMANN, 1900 WITH EMPHASIS ON THE HISTOCHEMISTRY OF THE EGG MEMBRANES

William H. Coil
Department of Zoology
University of Kansas

These studies were based on serial sections of whole worms, smears, and thin-sections. Fixatives used were Bakers formol, Carnoy's (at -70°C. and at room temperature and glutaraldehyde-osmic acid at room temperature. Histochemical evidence is based on some 22 tests or reactions. Hatching was studied by standard techniques. Evidence from electron micrographs is presented. Color photomicrographs (Kodachrome X and electronic flash) are presented for most of the histochemical tests.

AMCOP, 1967

STUDIES ON THE DEVELOPMENT OF THE CYCLOPHYLLIDEAN CESTODE *DIOECOCESTUS ACOTYLUS* FUHRMANN, 1904 WITH EMPHASIS ON THE HISTOCHEMISTRY OF THE EGG MEMBRANES

William H. Coil
Department of Zoology
University of Kansas

These studies were based on serial sections of whole worms, smears, and thin-sections. Fixatives used were Bakers formal, Carnoys (at -70°C. and at room temperature and glutaraldehyde-osmic acid at room temperature. Histochemical evidence is based on some 22 tests or reactions. Hatching was studied by standard techniques. Evidence from electron micrographs is presented. Color photomicrographs (Kodachrome X and electronic flash) are presented for most of the histochemical tests.

AMCOP, 1967

THE USE OF SUDAN BLACK STAINING AND AUTORADIOGRAPHY TO STUDY GERMINAL DEVELOPMENT IN PHILOPHTHALMUS MEGALURUS

Galila M. Khalil, Purdue University

Sudan Black B as formulated by Griffen (1955) and modified by O. G. Ward (personal communication) has proved useful in studies on the germinal cells of P. megalurus. Entire larvae and testes and smears of testicular cells were fixed in Carnoy's fluid for 24 hours. Washing in 70% ethanol was followed by staining in a mixture of equal parts of 1% Sudan Black B (certified; Matheson, Coleman and Bell) in 85% lactic acid, 100% propionic acid, 20% formic acid, and distilled water. Staining time varied from 5 minutes for smears to 9 hours for entire germinal sacs and testes which were opened to permit entry of the stain and later squashed. Because of the lactic acid, covered preparations did not dry out for two days and could be examined directly during that period. Permanent mounts were prepared by dehydration in increasing strengths of ethanol through 95% and containing decreasing amounts of acetic acid, followed by absolute ethanol. Preparations were cleared in methyl salicylate and mounted in Permount. With this technique, chromosomes appear much larger and better defined than when hematoxylin stains are employed.

Germinal sacs were pulsed with H^3-thymidine in Hedon-Fleig's solution for six hours, fixed in Schaudinn's fluid and processed for paraffin sections used in autoradiography. Within that time, the thymidine was incorporated mostly in nuclei of the germinal cells and embryos in young sporocysts and rediae. Apparently, the complement of nuclei in somatic tissue is attained early in the life of those generations and little replacement occurs thereafter.

AMCOP, 1967

SOME INTERESTING PARASITES FROM ZOO ANIMALS

J. H. Greve, D.V.M.
Veterinary Pathology
Iowa State University

Over the past several months we have had the unusual opportunity to receive for identification several parasites from necropsied zoo animals. This has been in cooperation with the pathologists at the Des Moines, St. Louis, and Chicago zoos. Hosts that have been represented in this project have been diverse, including carnivores, elephants, snakes, sea lions, anurids, and simians, among others.

The demonstration includes the following specimens:

1. Protofasciola robusta from the small intestine of an African elephant. The pathologist stated, "The flukes were present throughout the small intestine. They have been present in tremendous numbers in every elephant recently imported that we've posted." This is a paramphistomatid fluke.
2. Kalicephalus appendiculatus from the proximal small intestine of an indigo snake (colubrid). Diaphanocephalid strongyles are common in zoo snakes. Our collection includes K. subulatus, K. colubri, and K. viperae obliquus from various snakes.
3. Pterolichid hypopial nymphs, unidentified, from the serosal surface of the esophagus of a scarlet ibis. The adults probably occur on the skin or in the feather follicles. A related form is Falculifer rostratus, which infests pigeons in a similar way.
4. Cyclocoelum (Haematotrephus) brasilianum from the abdominal air sacs of a greater yellow-leg sandpiper. These cyclocoelid specimens are not in good condition. All members of this family are found in birds, which become infected by ingesting cercaria-harboring snails.
5. Prosthenorchis elegans, an acanthocephalid from an uakari (a New

of monkeys and can be a serious pathogen in monkey houses. Commonly, the inflammatory reaction around the attachment sites in the ileum extends into the peritonitis,resulting in fatal periotonitis.

AMCOP, 1967

STUDIES ON THE HISTOCHEMISTRY OF LINTONIUM VIBEX (LINTON, 1905) STUNKARD AND HIGRELLI, 1930 (DIGENEA: FELLODISTOMIDAE)

Gary R. Coulter and William H. Coil
Department of Zoology
University of Kansas

Lintonium vibex was collected from the pharynx of the smooth puffer, Spheroides maculatus off Beaufort, N.C. Fixation was in Carnoy's (-70°C), vacuum embedding was in a Piccolyte-Tissuemat mixture. Sections were cut 5 microns thick. A series of histological and histochemical tests were run in order to characterize various parts of the worm with special emphasis being given to the anatomy and mechanism of egg shell formation. Staining procedures used included: PAS, for polysaccharides, counterstained with malachite green and celestin blue, aqueous bromphenol blue for basic proteins, Gomori's alkaline phosphatase technique and Harris' hematoxylin counterstained with eosin.

AMCOP, 1967

STUDIES ON THE HISTOCHEMISTRY OF ONCOSPHERE AND EGG MEMBRANES OF SHIPLEYA INERMIS FUHRMANN, 1900

Gary R. Coulter and William H. Coil
Department of Zoology
University of Kansas

Specimens of Shipleya inermis Fuhr., 1900 were taken from the Dowitcher, Limnodromus griseus and fixed in Carnoys or acetone at -70° C. Gravid segments were vacuum embedded in a Piccolyte-Tissuemat mixture and cross-sections cut at 5 microns. A total of 22 histological and histochemical procedures were used: Gomori's and azocoupled acid and alkaline phosphatase, toluidine blue and azure B, PAS with celestin blue and malachite green, ninhydrin-Schiff, aqueous and mercuric bromphenol blue, alcian blue, Millon's reaction, Hale's dialyzed iron, xanthoproteic, Holt's 5-bromoindoxyl, the alpha napthyl acetate method and the tween 80 method for esterases and the acetylithiocholine iodide method for cholinesterase, and fast red B for tyrosine. 2" X 2" color slide photomicrographs were taken using Kodacolor X with electronic flash.

AMCOP, 1967

DEMONSTRATION OF THE MALE NEMATODE

PHARYNGODON BATRACHIENSIS WALTON, 1929

Verna L. Haloman and J. L. Crites
Department of Zoology and Entomology
The Ohio State University

In the United States the majority of the nematodes of the genus Pharyngodon have been described in reptiles. Of the few species described in amphibians (frogs, tadpoles, toads), usually, the data is limited to the female specimens only.

Walton (1929) reported large numbers of female P. batrachiensis from Rana pipiens tadpoles. Until the present time no males of the species have been reported. Male specimens as well as female specimens which closely resemble the species mentioned above were taken from the intestine of Rana clamitans tadpoles which were collected from Pond #26, the Delaware Game Preserve, Delaware, Ohio. Walton (1933) reported female specimens of P. armatus from Rana clamitans adults. However, measurements and certain characteristics of the specimens collected fit more closely to those given by Walton (1929) of P. batrachiensis with certain variations.

Some of the distinct characteristics of the male are:

(1) caudal alae

(2) spicule (s)

(3) caudal papillae

(4) excretory pore posterior to the oesophageal bulb.

AMCOP, 1967

TEMPERATURE EFFECTS ON DEVELOPMENT OF *POSTHARMOSTOMUM HELICIS* SPOROCYSTS IN *ANGUISPIRA ALTERNATA*

A. S. Elwell
Iowa State University

A. alternata (Gastropoda: Endodontidae) exposed to *P. helicis* eggs were maintained at temperatures averaging 10°C, 22°C, and 30°C for periods up to one year. After 38 days, mother sporocyst development was more advanced in 30°C snails than in 22°C snails as determined by size of mother sporocysts and contained germinal masses. No sporocyst development was discernible by standard histological procedures in snails maintained at 10°C for the same period. Cercarial emergence began from 30°C snails 10 weeks after exposure and from 22°C snails 12 1/2 weeks after exposure. At 10°C cercarial emergence did not occur over a 12 month period, but began after subsequent maintenance at 22°C for 7 weeks. Unusually large numbers of cercariae ultimately emerged from snails of this latter group. Daughter sporocysts produce larger numbers of active *P. helicis* cercariae in snails maintained at 22°C than in snails maintained at 30°C.

(Supported in part by NSF Grants GB-2384 and GB-5465X.)

AMCOP, 1967

DOES ECDYSIS OCCUR IN ACANTHOCEPHALA?

R. M. Cable, Purdue University

If molting comparable to that characteristic of nematodes occurred in immature acanthocephala, it probably would have been revealed by life history studies. The situation in adults is less certain. Cable and Linderoth (1963) reported a membranous covering on the trunks of an immature female and two males of Illiosentis heteracanthus from a Caribbean flounder; a few other species have been so described or figured. In the first case, it was suggested that cyst membranes of recently ingested cystacanths may have been retained. Another possibility is an artifact due to blistering during fixation. Neither would explain, however, the specimen demonstrated, a gravid female of Paulisentis fractus from the creek chub, Somotilus atromaculatus. The sheath partially covering the trunk and obviously slipping off the posterior end contains eggs and was seen in the living worm still attached to the host's intestine and moving actively. The sheath is the same thickness as the body wall external to the radially fibrillar layer and seems to have the same structure. Because that portion of the worm is in good condition, the sheath cannot be attributed to a degenerative process with aging; instead, it seems attributable only to molting, possibly associated with cyclical reproductive activity of the adult. That possibility is being investigated in further studies.

AMCOP, 1967

ECTOPARASITES FROM ANTARCTIC ANIMALS COLLECTED DURING THE 1966-1967 AUSTRAL SUMMER SEASON AT HALLETT STATION, ANTARCTICA

Elmer E. Gless
Bernice P. Bishop Museum, Honolulu
and
Iowa State University, Ames

When seals and birds indigenous to Hallett Station were located or otherwise made available, they were examined for ectoparasites. Seals were shrouded with a tarpaulin and secured or wrapped with a rope. While they were then effectively immobilized, an examination of their posterior flippers was made.

Sucking lice of the family Echinophtheridae were found in abundance on the crabeater seal (Lobodon carcinophagus). No parasites were found on the leopard seal (Hydrurga leptonyx) and the Ross seal (Ommatophoca rossi). The Weddell seal, (Leptonychotes weddelli) was found to have fewer lice than previously suspected: an average of 1.25 per animal.

The south polar skua (Catharacta skua maccormacki) was snared with a loop string when baited into it or caught in a trap-type cage when lured with garbage from the U. S. Navy galley. A Wilson's storm petrel (Oceanites oceanicus) was found dead in camp during high winds. It apparently had hit a power transmission or antenna wire. It was found to be heavily infested with ectoparasites.

Mallophaga comprising two suborders (Amblycera and Ishnocera) were collected in abundance from the skua and the Wilson's storm petrel. Feather mites of families Proctophyllodidae and Analgesidae were also collected in abundance from these birds.

Definite identification of the parasites is pending. More collections will be made and submitted to specialists at the U. S. National Museum and Bernice P. Bishop Museum.

AMCOP, 1967

TECHNIQUES USED IN HANDLING LIVING LERNAEA LARVAE

Nancy Thorton Bird* and Wilbur M. Tidd
Department of Zoology and Entomology
The Ohio State University

We are interested in mating behavior of Lernaea cyprinacea, also the mating of individuals from different populations. This kind of work requires techniques for quieting larvae so they may be sexed and handled without injury; also some way of distinguishing mated from virgin females. The methods outlined below apply to the 5th copepodid larvae reared at a temperature of 22° to 23°C. The hosts were comet goldfish 5 to 7 centimeters long. Age of the larvae was 11 days from hatching. By the 11th day they were very active. The sexes at this stage were morphologically differentiated, but it was almost impossible to sex them with a certainty unless they were quieted.

Quieting Larvae

The method of quieting larvae demonstrated here consists in:

(1) dislodging larvae from the surface of the host;
(2) cooling the water medium below 10°C and not below 4°C by immersing the bowl containing the larvae in mixture of ice and salt;
(3) placing the bowl with larvae upon the stage of a microscope and gently transferring them with a medicine dropper to a second container of water approximately the same temperature;
(4) the validity of the method is based upon transfers of over 100 females without injury;
(5) since the publication of this method (Bird 1966) it has been used successfully in the sexing, transfer and mating of pairs of larvae (males x virgin females).

Use of a Vital Dye to Distinguish Mated Females from Virgin Females

Mating of the sexes usually starts upon the 11th day from hatching and continues over the next few days. The following method permits one to distinguish between virgin females and those which have been mated.

1. A goldfish with its attached larvae may be immersed in a solution of trypan blue for one hour (concentration-one drop of a 1% solution trypan blue to 10 cc H_2O). The fish is then transferred to a clean bowl with a small amount of water. Under the dissecting microscope one can easily observe the blue spermatopore of a mated female. Only the spermatopores stain.

2. A variation of this method has been to first dislodge the larvae and pour the stain over them.
3. Once stained the larvae can easily be handled by the method of quieting outlined above.
4. Repeated trials indicate little or no effects from staining upon fertilization of the eggs or development of the zygotes.

*Present address: West Virginia State College, Institute, West Virginia

AMCOP, 1967

THE IOWA LAKESIDE LABORATORY, LAKE OKOBOJI, IOWA

Martin J. Ulmer
Iowa State University

This biological field station, located in northwest Iowa, includes approximately a hundred acres adjacent to Miller's Bay on the west shore of West Lake Okoboji. It functions through the cooperative efforts of the University of Iowa, Iowa State University and State College of Iowa. Established in 1909, the station has attracted numerous students and investigators throughout its history. Parasitologically, it provides a large number of habitats for a diverse and abundant protozoan and helminth fauna. Such habitats include numerous marshes, sloughs, kettleholes, small streams and larger rivers, as well as several glacial lakes.

Intensive helminthological investigations have been underway at the Laboratory since 1953. A survey of more than 3000 vertebrate hosts has been carried on during the past decade and an overall rate of more than 73% infection is present. Included among the genera of helminths studied during the past decade are: Archigetes, Biacetabulum, Corynosoma, Cotylurus, Dendritobilharzia, Fibricola, Gigantobilharzia, Heronimus, Mesocestoides, Microtetrameres, Protechinostoma, Posthodiplostomum, Phyllodistomum, Spirorchis, Splendidofilaria, and Telorchis.

Kodachromes of the Laboratory and of representative helminths from the area will be on demonstration.

AMCOP, 1967

HELMINTHS FROM SIX SPECIES OF IOWA BATS

Harvey D. Blankespoor
Iowa State University

Sixty-three bats representing six species were collected and examined in Iowa from October, 1965 to September, 1966. The following helminths were recovered:

Trematodes

Allassogonoporus marginalis Olivier, 1938
*Acanthatrium eptesici Alicata, 1932
*Acanthatrium lunatum Williams, 1960
*Prosthodendrium (Paralecithodendrium) nokomis Macy, 1937
*Prosthodendrium (Prosthodendrium) swansoni Macy, 1936
Prosthodendrium (Prosthodendrium) volaticum n. sp.
Limatulum gastroides Macy, 1935
*Urotrema scabridum Braun, 1900
*Dicrocoelium rileyi Macy, 1933
*Plagiorchis vespertilionis (Müller, 1784) Braun, 1900

Cestodes

Cycloskrjabinia taborensis (Loewen, 1934) Spassky, 1951
*Hymenolepis roudabushi Macy and Rausch, 1946

Nematodes

*Capillaria palmata Chandler, 1938
*Allintoshius travassosi Chandler, 1938
Rictularia lucifugus Douvres, 1956
Unidentified, immature spirurideans

*New host records

Host distribution of six species of Iowa bats included eleven counties in Iowa. Hosts included the following: Eptesicus fuscus (Big Brown Bat), Lasionycteris noctivagans (Silver-haired Bat), Lasiurus borealis (Red Bat), Lasiurus cinereus (Hoary Bat), Myotis lucifugus (Little Brown Bat) and Pipistrellus subflavus (Eeastern Pipistrel Bat).

A new species, Prosthodendrium (Prosthodendrium) volaticum was recovered from the big brown bat, Eptesicus fuscus and from the red bat, Lasiurus borealis captured in Ames, Iowa.

AMCOP, 1967

PARABIOSIS- RESEARCH TECHNIQUE FOR STUDYING PATHOGENESIS OF MANSONIAN SCHISTOSOMIASIS

Clayton R. Page, III
Department of Biological Sciences
University of Cincinnati

Parabiosis, the union of two living individuals, can occur spontaneously as in the case of joined twins, or may be produced by surgical operation in experimental animals. The surgical technique for parabiosis by Bunster and Meyer (1933) was used with several modifications. A lateral longitudinal incision was made from the iliac bone to a point just posterior of the ear. Abdominal walls and thoracic cavities were joined by 3-0 catgut. The scapular union was achieved by 4-0 surgical silk and the skin margins were joined by either 3-0 catgut or placement of stainless steel 11-mm wound clips. At the end of the procedure penicillin was administered intraperitoneally. Introduced into parasitological research by Chandler (1935), this method has in recent years been used by Zaiman (1953-1961) in the study of trichinosis and by Raslavicius (1965) with schistosomiasis. At present this technique is being used to investigate the pathogenesis of hyperinfections with Schistosoma mansoni.

AMCOP, 1967

EXPERIMENTAL DEVELOPMENT OF THE ACANTHOCEPHALAN, *CORYNOSOMA CONSTRICTUM* VAN CLEAVE, 1918 WITHIN THE INTERMEDIATE HOST *HYALLELA AZTECA* SAUSSURE, 1858

Janet S. Keithly
Department of Zoology and Entomology
Iowa State University

The life cycle of *Corynosoma constrictum* Van Cleave has been experimentally determined. *Hyallela azteca* Saussure serves as intermediate host. Acanthor penetration of the gut wall may occur within two hours after ingestion. Characteristic acanthellae are clearly visible eight days following penetration; infective cystacanths result forty-eight to fifty-five days after exposure. Mallards (*Anas platyrhynchos*) served as experimental definitive hosts.

Gravid female *Corynosoma* recovered from the gut of blue-winged teal (*Anas discors*) were individually placed in Stender dishes of distilled water. Eggs obtained from the females were then checked under oil immersion for acanthor movement, a sign of maturity. Little movement was observed prior to application of a droplet of crushed amphipod juice at the coverslip edge.

Groups of ten *Hyallela* were allowed to feed upon mature eggs for two hours according to the method of Hynes and Nicholas (1957, Annals. Trop. Med. and Parasitology 51:380-391). After exposure, amphipods were rinsed in three changes of artificial spring water, transferred to plastic containers, and kept at 65°F. Crustaceans were removed periodically, fixed in Bouin's, 10% formalin, or AFA, and serially sectioned.

AMCOP, 1967

THE CUTICULAR ULTRASTRUCTURE OF AN ADULT NEMATOMORPHAN, PARAGORDIUS VARIUS LEIDY, 1851

John E. Zapotosky
Botany and Zoology Building
Ohio State University

The light microscopy of the adult cuticle of Paragordius varius was originally done by Montgomery, 1904 and was reworked by May, 1919. May described the adult cuticle as consisting of an outer homogenous layer with protoplasmic connections to the hypodermis and with hyaline-like bodies over a fibrous layer. Present studies with the electron microscope reveal several more distinct layers and bodies. The layers from outside in are: ependyma layer, external cortical layer, internal cortical layer, fibrous layer, basal lamella and a hypodermis.

The outer edge of the hypodermis appears serrated. At the apecies the basal lamella gives rise to thin, hollow strands that weave through the fibrous layer and connect into the internal cortical layer. The fibrous layer is a multi-fibered area that wraps around the body in a helical manner. The internal cortical layer appears lightly granular and receives many projections from the more osmophilic external cortical layer. The projections of the external cortical layer in some areas appear to pass through the entire thickness of the internal cortical layer. Enclosing the external cortical layer is the ependyma layer which in turn consists of two areas: a coarse outer osmophilic region of varying thickness and an inner non-staining area.

Within the internal cortical layer are several types of bodies. Granular amembranous bodies, found scattered throughout the internal cortical layer, are very osmophilic and lack an enclosing membrane. These bodies are always found at the termination of large, walled canals that are located between two of the bodies described below. The remaining bodies are all enclosed in multi-layered membranes and contain none, thin fibers, or thick hollow fibers. Thin fibered bodies are always found in association with a colliculus or small bump in the cuticle, while the afibrous and thick fibered bodies are found scattered throughout the layer.

AMCOP, 1967

THE TRICHINOSCOPE AS A RESEARCH TOOL

W. J. Zimmermann
Veterinary Medical Research Institute
College of Veterinary Medicine
Iowa State University

The trichinoscope is widely used in many countries of the world for examination of pork. It has rarely been used in the United States, however, since routine examination of pork is not carried out.

The trichinoscope has been used extensively at the Veterinary Medical Research Institute for examination of human diaphragms for trichinosis. Because the trichinoscope generally utilizes a 1 gram tissue sample, routine examination of swine diaphragms has not been carried out, since 80% of the infected diaphragms contain less than 1 larvae per gram.

Other uses of the trichinoscope at the Veterinary Medical Research Institute have included:

(1) Examination of tissue sections.

(2) Drawings of parasitological specimens.

(3) Examination of fecal specimens.

(4) Measurement of parasites, bacterial and mycoplasma colonies, and virus plaque size.

AMCOP, 1967

SYMPOSIUM

THE USE OF LUNG LESIONS IN THE MEASUREMENT OF PROTECTIVE ANTIBODY TO *ASCARIS SUUM* IN MICE

James P. Lehnert
Department of Zoology
University of Illinois

A description of a scoring system based on that of Brown and Chan (1955) will be given. Data showing comparisons between this and other method (s) of assessing protective immunity will be presented and discussed. Correlations between serological data and lung lesion data will be considered, as will limitations of the system and its inherent variance.

SYMPOSIUM

THE EFFECTS OF A SINGLE ARTIFICIAL INFECTION OF *HAEMONCHUS CONTORTUS* IN LAMBS

Mrs. Paulette Chaffin
Department of Zoology
University of Illimois

A study was made to determine at what level of larval dosage resistance could be induced in two month old lambs infected with the parasitic nematode, *Haemonchus contortus*.

Thirty parasite-free lambs were divided into six groups consisting of five animals and each group was orally infected with 1,000, 5,000, 10,000, 25,000 and 50,000 larvae respectively, Group 6 being the control group. All lambs were maintained on elevated platforms to insure that no reinfection could occur. Fecal samples were taken twice weekly and serum samples were taken each week. Twenty-three weeks after the initiation of the experiment all lambs were given the anthelminthic thiabendazole to terminate all parasitic forms; the lambs were challenged with 25,000 infective *H. contortus* on the twenty-fourth week. At the termination of the experiment, 11 of 15 surviving lambs were determined resistant on challenge. The criteria used for measuring resistance were fecal egg counts of less than 1,500 eggs per gram of feces and a corresponding antibody titer as indicated by haemagglutination. It was found that a larval dosage administered to two month old lambs of from 1,000 to 10,000 larvae definitely induced resistance.

AMCOP, 1967

SYMPOSIUM

POLAROGRAPHIC DETERMINATION OF OXYGEN CONSUMPTION DURING SPORULATION OF EIMERIA TENELLA AND EIMERIA STIEDAE OOCYSTS

Gary Wagenbach
Department of Zoology
University of Wisconsin

Oxygen consumption of sporulating E. tenella and E. stiedae oocysts was determined with a polarographic oxygen electrode system. Oxygen uptake was correlated with time and morphological events of sporulating oocysts incubated at 29° C. Sporulation time for E. tenella and E. stiedae was 25 and 35 hours, respectively, as measured by the appearance of mature sporocysts. The time interval of each morphological category chosen to characterize the process of sporulation was of similar duration in both species. The longer sporulation time for E. stiedae was due to the greater duration of the initial phase of sporulation preceding the first nuclear division. E. stiedae oocysts utilized oxygen at a maximum rate of about 9.2 ul/hr./10^6 oocysts between 8 and 9 hours of incubation. This was followed by a decrease in rate of 4.2 u'/hr. at about 14 hours and another increase to 8.9 ul/hr. at 17 hours followed by a nearly linear approach to a rate of 2.5 ul/hr. at 73 hours. A similar curve was observed for E. tenella except that the rate/ 10^6 oocysts was lower with a high of 7.1 ul/hr. at 6 hours and a low rate of 0.5 ul/hr. at 71 hours with a decrease in rate occurring at about 4 hours. The time of maximum consumption and appearance of a rate depression was different in the two species. The depression in oxygen consumption correlated at 4 hours in E. tenella with the appearance of the "fertilization spindle", which event probably precedes the first nuclear division. A similar correlation was suggested for E. stiedae at about 14 hours incubation. In both species no consistent rate changes were observed that correlated with the probable time of the 2nd and 3rd nuclear divisions. These observations will be discussed in relation to previous work on coccidia and the physiology of nuclear division.

SYMPOSIUM

LIPID METABOLISM OF HYMENOLEPIS DIMINUTA

Merrill Overturf
125 Zoology
University of Iowa

The major lipids isolated from mature cestodes by column and thin layer chromatography were triglyceride, phosphatidylcholine, and phosphatidylethanolamine. Total lipid extracts and these three lipid classes were transesterified and the long-chain fatty acids of each were determined by gas-liquid chromatography (GLC). The predominant acids were; palmitic (16:0), palmitoleic (16:1), stearic (18:0), oleic (18:1), linoleic (18:2), and linolenic (18:3).

Lipid turnover was studied by determining the fatty acid composition of the total extract and the three classes by GLC during periods of starvation of the host up to five days. The total lipid extract showed a decrease in 18:2 from 55 to 40 percent-composition and the 18:2 of the triglyceride fraction decreased from 61 to 25%. The 18:2 of the phospholipids decreased slightly. In these fractions the 18:1 decreased significantly. The total triglyceride, phospholipid, and protein content increased, while dry weight decreased slightly. Glycogen content dropped for 96 hours and then held moderately constant through 166 hours of starvation.

To determine the influence of dietary lipids upon the lipid composition of H. diminuta, the fatty acid composition of Purina Lab Blox, a high fat diet, and a low fat diet was compared to that of cestodes from rats fed these diets. After 30 days the percent-composition of the fatty acids of the diets were closely reflected in the worms. High fat diet worms had nearly a four-fold increase in triglyceride content. The low fat diet gave a reduced worm triglyceride content. Neither diet had any influence on the glycogen content.

In vivo and in vitro experiments utilizing C^{14}-precursors were performed. Glucose was incorporated into the glycerol moiety of various

lipid but not the fatty acid portion. Acetate was rapidly oxidized but served only slightly as a fatty acid precursor. Palmitate was not oxidized, but did contribute to various lipids. Cholesterol was not oxidized and was found only in the cholesterol fraction.

PREVIOUS AMCOP MEETINGS

1949 - 1st Annual Midwestern Association of Parasitologists
University of Wisconsin, June 20-21, 1949

1950 - 2nd Annual Conference of Midwestern Parasitologists
University of Michigan, June 19-20, 1950
R. V. Bangham, presiding officer

1951 - 3rd Annual Midwestern Conference of Parasitologists (AMCOP)
Purdue University, June 18-19, 1951
L. O. Nolf, presiding officer

1952 - 4th AMCOP - University of Illinois, June 16-17, 1952
R. Porter, presiding officer

1953 - 5th AMCOP - Iowa State College, June 15-16, 1953
C. A. Herrick, presiding officer

1954 - 6th AMCOP - Michigan State College, June 21-22, 1954
A. C. Walton, presiding officer

1955 - 7th AMCOP - University of Notre Dame, June 13-14, 1955
R. M. Cable, presiding officer

1956 - 8th AMCOP - State University of Iowa, June 11-12, 1956
W. D. Lindquist, presiding officer

1957 - 9th AMCOP - University of Michigan, June 17-18, 1957
J. E. Ackert, presiding officer

1958 - 10th AMCOP - Kansas State College, June 16-17, 1958
G. R. LaRue, presiding officer

1959 - 11th AMCOP - Northwestern University, June 15-16, 1959
G. F. Otto, presiding officer

1960 - 12th AMCOP - Purdue University, June 15-16, 1960
F. J. Kruidenier, presiding officer

1961 - 13th AMCOP - Ohio State University, June 12-13, 1961
N. D. Levine, presiding officer

1962 - 14th AMCOP - University of Nebraska, May 25-26, 1962
G. Kelley, presiding officer

1963 - 15th AMCOP - University of Minnesota, June 24-25, 1963
M. F. Hansen, presiding officer

1964 - 16th AMCOP - University of Chicago, May 22-23, 1964
D. T. Clark, presiding officer

1965 - 17th AMCOP - Kellogg Gull Lake Biological Station, May 28-29, 1965
P. E. Thompson, presiding officer

1966 - 18th AMCOP - University of Illinois, June 10-11, 1966
M. J. Ulmer, presiding officer

1967 - 19th AMCOP - Iowa State University, June 9-10, 1967

(Corrected copy)

Minutes: Nineteenth Annual Midwestern Conference of Parasitologists
Iowa State University
Ames, Iowa
June 9-10, 1967

First Business Meeting: June 9, 1967

Presiding Officer Dr. Paul Silverman called the meeting to order at 4:00 P.M. in the auditorium of Kildee Hall.

Dr. Martin Ulmer, chairman of the local committee on arrangements, made some announcements concerning the annual banquet and field trip for Saturday.

Ad hoc committees were appointed by the Presiding Officer:

Nominating Committee:
Raymond M. Cable, Chairman
Norman D. Levine

Meeting Place Committee:
B. J. Jaskoski, Chairman
Frank Etges

Program Committee:
F. G. Wallace, Chairman
William J. Bemrick

Resolutions Committee:
Harold W. Manter, Chr.
Francis J. Kruidenier

Mimeographed copies of the Secretary-Treasurer's report for 196(were distributed and approved as printed.

An announcement was made of the deaths of Dr. Arthur C. Walton and Dr. Donald McMullen.

Dr. Silverman recognized Dr. B. J. Jaskoski, who told of a plan proposed by the American Institute of Biological Sciences. According to this plan, the American Society of Parasitologists would meet with four other societies interested in ecology. These five societies would hold two days of joint symposia. It was suggested that AMCOP also meet with these societies at some meeting place in the Midwest in June, 1968. This would constitute a joint meeting of the Annual Midwestern Conference of Parasitologists and the American Society of Parasitologists. Dr. Jaskoski made a formal motion that AMCOP accept the plan. The motion was discussed, and Dr. Cable pointed out that any change in the meeting place of the ASP would depend upon actions of the Meeting Place Committee of the American Society of Parasitologists at the forthcoming meeting in August, 1967, at Tucson, Arizona. Dr. John Greve moved that the motion be tabled until the business meeting of June 10. Seconded by Dr. Crites. Carried.

The annual banquet was held at 6:30 P.M. at the Red Barn. After dinner, the Conference reconvened in Kildee Hall auditorium, where Dr. Norman D. Levine, University of Illinois, presented the annual lecture, "Parasitology -- Problems and Promise."

Dr. James E. Ackert, reviewing the life and contributions of Dr. C. A. Herrick, introduced the awarding of the first annual C. A. Herrick Award. This award was made possible by Eli Lilly and Company and consisted of a certificate and $200.00 to that graduate student who best presented his research at the demonstration session. A committee comprised of Drs. B. J. Jaskoski, Harold Manter, and F. G. Wallace, Chairman, gave the following report:

"The committee is impressed by the unusually high quality of the demonstrations and of the work that they represent. It wishes to compliment all of the participants and to state that it is not easy to choose between them. We wish to recommend as recipient of the award Paul M. Nollen of Purdue University for his demonstration entitled 'The Uptake and Incorporation of Glucose, Thymidine and Two Amino Acids by Adults of Philophthalmus megalurus.'

"We further wish to recommend for honorable mention Miss Aleda S. Elwell of Iowa State University for her demonstration entitled 'Temperature Effects on Development of Postharmostomum helicis Sporocysts in Anguispira alternata.'"

The award was presented by Milo C. Brandt, Assistant Senior ~~Pathologist~~ Parasitologist, Eli Lilly and Company.

Second Business Meeting: June 10, 1967

Dr. Paul H. Silverman, Presiding Officer, called the meeting to order at 8:30 A.M. in the auditorium of Kildee Hall.

Discussion on the tabeled motion was reopened. Dr. Jaskoski again presented the proposal of joint symposia with other ecology-oriented groups. It was moved that we join this meeting. Carried.

Dr. Silverman called for reports of the ad hoc committees.

Nominating Committee, Dr. Raymond Cable, chairman: The name of Dr. F. G. Wallace was placed in nomination for the next Presiding Officer. The name of Dr. John Greve was placed in nomination for Secretary-Treasurer. It was moved that nominations cease, and a unanimous ballot be cast for the candidates. Carried.

Meeting Place Committee, Dr. Jaskoski, chairman: Since we agreed to join with other ecology-oriented organizations in the 1968 symposium, the next open date is for 1969. A verbal invitation was tendered by Dr. Tom Dunagan, University of Southern Illinois, Carbondale.

Resolutions Committee, Dr. Harold Manter, chairman: The following resolutions were presented:

I. The Resolutions Committee notes the sincere appreciation of the Annual Midwestern Conference of Parasitologists to Iowa State University for the excellent personal and physical accomodations afforded the members of the Conference during its 19th annual meeting in Ames. Particular thanks are due Dr. Martin J. Ulmer, in charge of local arrangements, his students, and his assistant, Dr. John Greve, and to Dr. O. E. Tauber, Head of the Department of Zoology and Entomology, for the facilities extended to us.

The Committee moves that the Secretary-Treasurer be directed to express these sentiments of the Conference to the proper officials of Iowa State University.

II. The Committee notes with regret the recent demise of several well-known American parasitologists. These include:

1. Dr. Richard Kudo (on June 4, 1967), an internationally known protozoologist, Professor Emeritus of the University of Illinois, past president of the Society of Protozoologists and a member of this Conference before his retirement;

2. Dr. Donald B. McMullen (on May 27, 1967), president of the American Society of Parasitologists, a teacher in the Midwest before the formation of this Conference, and lately a prominent investigator with W.H.O. and the Walter Reed Institute of Research;

3. Dr. A. C. Walton, Professor Emeritus of Knox College, past secretary and president of the American Society of Parasitologists, an active member of this Conference, and its presiding officer in 1954;

4. Dr. A. E. Woodhead, Professor Emeritus of the University of Michigan and a member of this Conference.

The Committee moves a minute of standing silence in memory of these former colleagues, and that the Secretary express the condolences of this Conference to their widows.

The resolutions were adopted.

The second business meeting then adjourned.

Dr. Frank Etges, chairman of the Program Committee, then introduced the graduate student symposium. Fine presentations were given by the following slate of speakers: Paul M. Nollen (Purdue University), James P. Lehnert (University of Illinois), Paulette Chaffin (University of Illinois), Gary Wagenbach (University of Wisconsin), and Merrill Overturf (University of Iowa).

At 1:00 P.M., a guided tour of the U.S.D.A. National Animal Disease Laboratory was enjoyed by all who participated.

Financial Statement

Balance on hand, June 1, 1967	$161.10
Income since June 1, 1967:	
Registration fees for 113 persons @50¢	56.50
Dividends from savings account	3.47
Meal tickets	348.00
Eli Lilly (C. A. Herrick Award)	200.00
Expenses since June 1, 1967:	
Red Barn Supper Club (banquet)	348.00
Paul M. Nollen (C. A. Herrick Award)	200.00
Expenses for Ames meeting	12.50
Postage (Madison mtg)	21.24
Stationery and copy service	12.74
Balance on hand, April 15, 1968	$174.59

Respectfully submitted,
John H. Greve

ABSTRACT

The Annual Midwestern Conference of Parasitologists held its annual meeting on June 9-10, 1967, at Iowa State University, Ames. An annual award, the C. A. Herrick Award was given for the first time. The recipient is that graduate student who best presents his research at the demonstration session. The 1968 meeting will be held in conjunction with the AIBS ecology-oriented multidisciplinary symposium. The new Presiding Officer is F. G. Wallace, and the new Secretary-Treasurer is John H. Greve.

ANNUAL MIDWESTERN CONFERENCE OF PARASITOLOGISTS

Annual Report to the American Society of Parasitologists
Tucson, Arizona

The Annual Midwestern Conference of Parasitologists held its meeting at Iowa State University, Ames, on June 9-10, 1967. Dr. Martin J. Ulmer was in charge of local arrangements. There were 115 registrants.

The format of the conference followed the traditional pattern: an afternoon demonstration session in which mostly graduate students participated, a business meeting, a banquet, and an after-dinner lecture entitled "Parasitology -- Problems and Promise" given by Dr. N. D. Levine (University of Illinois). The next morning a second business meeting was held and there was a graduate student symposium, in which extensive presentations of the students' works were reported. Participating in this symposium were Paul M. Nollen (Purdue University), James P. Lehnert (University of Illinois), Paulette Chaffin (University of Illinois), Gary Wagenbach (University of Wisconsin), and Merrill Overturf (University of Iowa).

In addition to the traditional format, presentation of the first annual C. A. Herrick Award was made. This award consists of a certificate and $200.00 to the graduate student who best presents his research during the demonstration session. The award is underwritten by Eli Lilly and Company. It is planned that the C. A. Herrick Award will become an annual feature of the conference. The recipient in 1967 was Paul M. Nollen, Purdue University (the uptake and incorporation of glucose, thymidine and two amino acids by adults of Philophthalmus megalurus). Honorable mention went to Mrs. Aleda S. Elwell, Iowa State University (temperature effects on development of Postharmostomum helicis sporocysts in Anguispira alternata). Comprising the judging committee for this award were Drs. B. J. Jaskoski, H. W. Manter, and F. G. Wallace, committee chairman.

It was decided that next year's meeting would be held in conjunction with certain other ecology-oriented associations. This meeting will be held somewhere in the Midwest, and would be a "trial balloon" for similar meetings in the future.

Officers for 1967-68 were elected and are as follows:

1. Presiding Officer: Dr. Franklin G. Wallace
   Department of Zoology
   University of Minnesota
   Minneapolis, Minnesota

2. Secretary-Treasurer: Dr. John H. Greve
   Department of Veterinary Pathology
   Iowa State University
   Ames, Iowa 50010

Respectfully submitted,
John H. Greve
Secretary-Treasurer