

BIBLIOGRAPHY

- Alexopoulos, C.J., and C.W. Mims. Introductory mycology, 3rd edition, John Wiley & Sons, Inc., 147 - 150, 1979.
- Axtell, R.C., "Principles of integrated pest mangement (IPM) in relation to mosquito control," Mosq. News., 39, 709 - 718, 1979.
- Axtell, R.C., S.T. Jaronski, and T.L. Merriam, "Efficacy of the mosquito fungal pathogen, Legenidium giganteum (Oomycetes : Lagenidiales)," Proc. Calif. Mosq. and Vectors Contr. Assoc. Vol. 50 : 41 - 42, 1982.
- Bean, G.A., G.W. Patterson, and J.J. Motta, "Sterols and fatty acids of some aquatic phycomycetes," Comp. Biochem Physiol., B 43, 935 - 939, 1972
- Bland, C.E., J.N. Couch, nad S.Y. Newell, "Identification of Coelomomyces, Saprolegniales and Lagenidiales," in Microbial control of pests and plant diseases 1970 - 1980, H.D. Burges ed., p. 145 - 157, 1981.
- Boswell, J.S., "Zoosporogenesis in Legenidium giganteum, a fungal parasite of mosquito larvae, in response to nutritional supplements," Diss. Abstr. Int. B. Sci. Eng., 38, 4, 1528B - 1529B, 1977. (Abstr.).

- Bradford, M.M., "A rapid and sensitive method for quantitation of microgram quantities of protein utilizing the principle of protein-dye binding," Anal. Biochem, 72, 248 - 254, 1976.
- Brey, P.T., "Observations of in vitro gametangial copulation and oosporogenesis in Lagenidium giganteum," J. Invert. Pathol., 45(3), 276 - 281, 1985.
- Brown, J.K., E.G. Platzer, and D.S. Hugles, "Field trials with the mermithid nematode, Romanomermis culicivorax, in California," Mosq. News., 37, 603 - 608, 1977.
- Brown, J.K., and R.K. Washino, "Evaluating the fungus Lagenidium giganteum for the biological control of the clear lake gnat, Chaoborus astictopus, in an agricultural pond in a California Lake, County, California," Proc. Pap. Annu. Conf. Calif. Mosq. Vector Control Assoc., 47, 37, 1979. (Abstr.).
- Brunet, P.C.J., and D.W. Kent, "Observations on the mechanism of a tanning reaction in Periplaneta and Blatta," Proc. Roy. Soc., B144, 259 - 274, 1955. (Abstract).
- Chapman, H.C., "Biological control of mosquito larvae," Ann. Rev. Entomol., 19, 33 - 60, 1974.
- Chapman, H.C., "Basic concepts of biological control in an integrated program of mosquito abatement," Proc. Annu. Meet. Utah Mosq. Abatement Assoc., 27 : 8 - 9, 1974.

- Chappell, W.A., C.H. Calisher, R.F. Toole, K.C. Maness, D.R. Sasso, and B.E. Henderson, "Comparison of three methods used to isolate Dengue Virus Type 2. Appl. Microb., 22(6), 1100 - 1103, 1971.
- Couch, J.N., "A new saprophytic species of Lagenidium, with notes on other forms," Mycologia, 27 : 376 - 387, 1935.
- Couch, J.N., and S.V. Romney, "Sexual reproduction in Lagenidium giganteum," Mycologia, 65 : 250 - 252, 1973.
- Dean, D.D., and A.J. Domnas, "The extracellular proteolytic enzymes of the mosquito-parasitizing fungus Lagenidium giganteum," Exp. Mycol, 7(1), 31 - 39, 1983.
- Domnas, A., P.E. Giebel, and T.M. McInnis, Jr., "Biochemistry of mosquito infection : preliminary studies of biochemical change in Culex pipiens quinquefasciatus following infection with Lagenidium giganteum," J. Invert. Pathol., 24, 294 - 304, 1974.
- Domnas, A.J., R.M. Shipley, and B.F. Hicks, "Sterol requirement for zoospore production by the mosquito parasite Lagenidium giganteum," in Proc. 1st Int. Colloq. Invertebr. Pathol. & IX Annu. Meet. Soc. Invertebr. Pathol., Kingston, Canada, p. 427, 1976. (Abstr.).
- Domnas, A.J., "Biochemical aspects of mosquito infection by Lagenidium giganteum," Abstr. Pap. Xth Ann. Meet. Soc. Invertebr. Pathol. (Michigan), p. 1, 1977.

- Domnas, A.J., B.F. Hicks, "Properties of mosquito infection with Lagenidium giganteum," Abstr. Pap. Xth Ann. Meet. Soc. Invertebr. Pathol. (Michigan), p. 4, 1977.
- Domnas, A.J., S.M. Fagan and S.T. Jaronski, "Factors influencing zoospore production in liquid cultures of Lagenidium giganteum (Oomycetes : Lagenidiales)," Mycologia, 74 (5), 820 - 825, 1982.
- Domnas, A.J., S.T. Jaronski, and W.K. Hanton, "An electron microscope study of zoospores of Lagenidium giganteum," in SIP XVII Annual Meeting program and abstracts, University of California, 5 - 9 August, 1984.
- Elliot, C.G., B.A. Knights, M.E. Hendric and W. Parker, "A steroid growth factor requirement in a fungus" Nature, 203, 427 - 428, 1964.
- Elliot, C.G., "Sterols in fungi : Their functions in growth and reproduction," Advan. Microbiol. Physiol., 15, 121 - 173, 1977.
- Elliot, C.G., and B.A. Knights, "Uptake and interconversion of cholesterol and cholesteryl esters by Phytophthora cactorum," Lipids, 16, 1 - 7, 1981.
- Federici, B.A., "Mosquito control by the fungus Culicinomyces, Lagenidium and Coelomomyces," in Microbial control of pests and plant diseases 1970 - 1980, H.D. Burges ed., Academic Press, London, p. 559 - 563, 1981.

- Fetter-Lasko, J., and R.K. Washino, "Patterns of experimental infection of mosquito larvae by Lagenidium giganteum," Proc., Pap. Annu. Calif. Mosq. Vector Contr. Assoc., 46 - 90, 1978. (Abstract).
- Fetter-Lasko, J.L., and R.K. Washino, "In situ studies on seasonality and recycling pattern in California of Lagenidium giganteum Couch, an aquatic fungal pathogen of mosquitoes," Environ. Entomol., 12, 635 - 640, 1983.
- Glenn, F.E., and H.C. Chapman, "A natural epizootic of the aquatic fungus Lagenidium giganteum in the mosquito Culex territans," Mosq. News., 38, 522 - 524, 1978.
- Haskins, R.H., A.P. Tullock, and R.G. Micetich, "Steroids and the stimulation of sexual reproduction of a species of Pythium," Canad. J. Microbiol., 10, 187 - 195, 1964.
- Hendrix, J.W., "Sterols in growth and reproduction of fungi," Annu. Rev. Phytopathol., 8, 111 - 130, 1970.
- Jaronski, S.T., "Oomycetes in mosquito control," The proceedings, IIIrd international colloquium on invertebrate pathology, University of Sussex, Brighton, UK., p. 421 - 424, 6 - 10 September, 1982.
- Jaronski, S.T., and R.C. Axtell, "Effects of organic water pollution on the infectivity of the fungus Lagenidium giganteum (Oomycetes : Lagenidiales) for larvae of Culex quinquefasciatus (Diptera : Culicidae) : Field and laboratory evaluation," J. Med. Entomol., 19 (3), 255 - 262, 1982.

Jaronski, S.T., and R.C. Axtell, "Effects of temperature on infection, growth and zoosporogenesis of Lagenidium giganteum, a fungal pathogen of mosquito larvae," Mosq. News., 43(1) : 42 - 45, 1983.

Jaronski, S.T., and R.C. Axtell, "Persistence of the mosquito fungal pathogen Lagenidium giganteum (Oomycetes : Lagenidiales), after introduction into natural habitats," Mosq. News., 43(3), 332 - 337, 1983.

Jaronski, S.T., S.M. Fagan, and A.J. Domnas, "Simple media for media for zoospore production by the mosquito pathogen Lagenidium giganteum (Oomycetes : Lagenidiales)," Report by National Institutes of Health under grant # NAID - RO - AJ - 17024, 13 pp., 1983.

Jaronski, S.T., R.C. Axtell, S.M. Fagan, and A.J. Domnas, "In vitro production of zoospores by the mosquito pathogen Lagenidium giganteum (Oomycetes : Lagenidiales) on solid media," J. Invert. Pathol., 41 : 305 - 309, 1983.

Jaronski, S.T., and R.C. Axtell, "Simplified production system for the fungus Lagenidium giganteum for operational mosquito control," Mosq. News., 44(3) : 377 - 381, 1984.

Kerwin, J.L., and R.K. Washino, "Sterol induction of sexual reproduction in Lagenidium giganteum," Experimental Mycology, 7, 109 - 115, 1983.

- Lord, J.C., and D.W. Roberts, "The effects of host passage and maintenance on sterol - free and sterol - containing media on zoosporogenesis, oosporogenesis and infectivity of Lagenidium giganteum," in Society for invertebrate pathology-program and abstracts SIP XVII Annual meeting, University of California, Davis, California, 5 - 9 August, 1984.
- Lord, J.C., and D.W. Roberts, "Effect of salinity, pH, organic solutes, anaerobic conditions, and the presence of other microbes on production and survival of Lagenidium giganteum (Oomycetes : Lagenidiales) zoospores," J. Invert. Pathol, 45, 1984.
- Mattingly, P.F., "Mosquito eggs XX : Egg parasitism in Anopheles with a further note on Armigeres," Mosq.Syst., 4, 84 - 86, 1972.
- Mattingly, P.E., Lagenidium sp. : a fungal parasite of mosquito eggs," Trans. Roy. Soc. Trop. Med. Hyg., 71 (5), 383, 1977.
- McCray, E.M., Jr., C.J. Umphlett, and R.W. Fay, "Laboratory studies on a new fungal pathogen of mosquitoes," Mosq. News., 33, 54 - 60, 1973.
- McCray, E.M., "Laboratory observatory observations and field tests with Lagenidium against California mosquitoes," Proc. Pap. Ann. Conf. Calif. Mosq. Contr. Assoc., p. 123 - 128, 1973.
- McCray, Jr., E.M., "Lagenidium giganteum (fungi)," in Biological control of mosquitoes - bull. No. 6, American Mosquito Control Association, H.C. Chapman ed., 1985.

- McInnis, Jr., T.M., and A.J. Domnas, "An aryl β -D-glucosidase of the aquatic fungus Lagenidium giganteum, a parasite of mosquito larvae," Arch. Microbiol., 101 : 343 - 350, 1974.
- Merriam, T.L., and R.C. Axtell, "Salinity tolerance of two isolates of Lagenidium giganteum (Oomycetes : Lagenidiales), a fungal pathogen of mosquito larvae," J. Med. Entomol., 19(4) : 388 - 393, 1982.
- Peabody, D.C., "Effects of pH and buffering compounds on the infective capacity of the Oomycete, Lagenidium giganteum, as a parasite of mosquito larvae," M.S. Thesis, Clemson University, 1974. (Abstr.).
- Race, M.W., M.C. Williams, and C.F.M. Agostini, "Dengue in the Caribbean virus isolation in a mosquito (Aedes pseudoscutellaris) cell line., Trans. R. Soc. Trop. Med. Hyg., 73, 18 - 32, 1979.
- Ramoska, W.A., S. Watts, and H.A. Watts, "Effects of sand formulated Metarrizium anisopliae spores on larvae of three mosquito species," Mosq. News., 41(4), 725 - 728, 1981.
- Rutz, D.A., R.C. Axtell, and T.D. Edwards, "Effect of organic pollution levels on aquatic insect abundance in field pilot-scale anaerobic animal waste lagoons," Mosq. News., 40 : 403 - 409, 1980.
- Singh, K.R.P., and S.D. Paul, "Isolation of Dengue Viruses in Aedes albopictus cell cultures," Bull. W.H.O., 40, 982 - 983, 1969.

- Umphlett C.J., and C.S. Huang, "Lagenidium culicidum as an agent of biological control of mosquitoes," Bull. Assoc. of Southeastern Biol., 17, 68, 1970, (Abstract).
- Umphlett, C.J., and Huang, C.S., "Experimental infection of mosquito larvae by a species of the aquatic fungus Lagenidium," J. Invert. Pathol., 20 : 326 - 331, 1972.
- Umphlett, C.J., C. S. Huang, "Experimental infection of mosquito larvae by a species of the aquatic fungus Lagenidium," J. Invert. Pathol., 20, 326 - 331, 1972.
- Varma, M.G.R., M. Pudney, and C.J. Leake, "Cell lines from larvae of Aedes (Stegomyia) malayensis Colless and Aedes (S) pseudoscutellaris (Theobald) and their infection with some arboviruses," Transac. Roy. Soc. Trop. Med. Hyg., 68, 5, 374 - 382, 1974.
- Warner, S.A., and A.J. Domnas, "Evidence for a cycloartenol-based sterol synthetic pathway in Lagenidium spp.," Exp. Mycol., 5, 184 - 188, 1987.
- Warner, S.A., M.S. Graham, G.W. Sovocool, and A.J. Domnas, "Alkane contamination of lipids extracted from Lagenidium giganteum and Lagenidium callinectes," Lipids, 16 : 628 - 630, 1981.
- Warner, S.A., G.W. Sovocool, and A.J. Domnas, "Comparative utilization of sterols by the Oomycetes Lagenidium giganteum and Lagenidium callinectes," Experimental Mycology, 7 : 227 - 232, 1983.

Warner, S.A., G.W. Sovocool, A.J. Domnas, and S.T. Jaronski, "The composition of sterols in mosquito larvae is optimal for zoosporogenesis in Lagenidium giganteum (Oomycetes : Lagenidiales)," J. Invert. Pathol., 43, 293 - 296, 1984.

Washino, R.K., "Recent development of Lagenidium giganteum for vector control," Seventh scientific working group on biological control of vectors, Geneva, 5 - 9 March, 1984.

WHO, "The role of biological agents in integrated vector control and the formulation of protocols for field testing of biological agents," in Report of the sixth meeting of the scientific working group on biological control of vectors, TDR/VEC - SWG (6)/82.3, Geneva, 13 - 16 September, 1982.

APPENDIX

Media Formulations

Peptone - Yeast extract - Glucose (PYG)

Peptone	1.25	g/l
Yeast extract	1.25	g/l
Glucose	3.0	g/l
Distilled water up to	1.0	liter

For preparing PYG agar, added agar 20 g/l.

Wheat germ - Yeast extract - Glucose (WGYG)

Wheat germ	3.2	g/l
Yeast extract	1.4	g/l
Glucose	1.2	g/l
Distilled water up to	1.0	liter

For preparing WGYG agar, added agar 20 g/l.

Z medium

HSYG	1	part
WGYG	1	part

For preparing Z agar, added agar 20 g/l

Hemp seed - Yeast extract - Glucose (HSYG)

Hemp seed	0.25	mg/ml
		protein of HS
Yeast extract	1.4	g/l
Glucose	1.2	g/l
Distilled water up to	1	liter



Dye preparations for Histopathological method

Harris Hematoxylin

Hematoxylin crystals	5.0	gm
Alcohol, 100%	50.0	gm
Ammonium or potassium alum	100.0	gm
Mercuric oxide (red)	2.5	gm
Distilled water	1000.0	ml

Dissolve the hematoxylin in the alcohol, the alum in the water by the aid of heat. Remove from heat and mix the two solutions. Bring to a boil as rapidly as possible. (Limit this heat to less than 1 minute and stir often). Remove from heat and add the mercuric oxide slowly. Reheat to a simmer until it becomes dark purple, remove from heat immediately and plunge the vessel into a basin of cold water until cool. The stain is ready for use as soon as it cools. Addition of 2 - 4 ml of glacial acetic acid per 100 ml of solution increases the precision of the nuclear stain. Filter before use.

Eosin

1% Stock Alcoholic Eosin

Eosin Y, water soluble	1.0	gm
Distilled water	20.0	ml

Dissolve and add:

Alcohol, 95%	80.0	ml
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Working Eosin Solution

Eosin stock solution	1	part
Alcohol, 80%	3	parts

Just before use and add 0.5 ml of glacial acetic acid to each 100 ml of stain and stir.

Protein Measurement

The protein content in media for this studies was assayed by the "Bio-Rad Protein Assay" (Bio - Rad Laboratories, 1986). The Bio-Rad Protein Assay is a dye - binding assay based on the differential color change of a dye in response to various concentrations of protein.

A. Components

1. Dye Reagent : Containing solution of dye, phosphoric acid and methanol.
2. Protein Standard : Lyophilized preparations of bovine plasma gamma globulin and bovine plasma albumin (BSA) are available for use as standards.

B. Assay Procedure

1. Reagent preparation

The dye reagent is provided as a five - fold concentrate. It must be diluted and filtered prior to use in the standard assay procedure. Dilute 1 volume of Dye Reagent Concentrate with 4 volumes of high quality distilled or deionized water. Filter through Whatman No. 1 paper or equivalent and store dilute reagent in a glass container at room temperature.

2. Protein standard

The Bio-Red Protein Standard consists of lyophilized bovine gamma globulin or bovine albumin sealed under nitrogen. To reconstitute, add 20.0 ml of distilled water which will yield a concentration of approximately 1.4 mg/ml. Store rehydrated protein up to 60 days at 4 °C.

3. Sample preparation

Each medium, i.e., PYG, WGYG, HS, Z, and SFE were diluted before testing to reduce the concentration of protein in the sample. Particulate matter in the sample was removed by centrifugation or filtration.

C. Standard Assay Procedure

Prepare several dilutions of protein standard containing from 0.2 to about 1.4 mg/ml. Prepare a standard curve each time the assay is performed by placing 0.1 ml of standards and appropriately diluted samples in clean, dry test tubes. Place 0.1 ml sample buffer in "blank" test tube. Then, added 5.0 ml of diluted dye reagent. Mixed several times by gentle inversion of test tube. After a period of from 5 minutes to one hour, measured OD_{595} versus reagent blank. Then, plotted OD_{595} versus concentration of standards. Read unknowns from the standard curve.

BIOGRAPHY

Miss Siripat Limchitti was born on the 18th of February, 1961 in Bangkok, Thailand. She obtained the Bachelors Degree of Science (B.Sc.) (Biology) from Faculty of Science, Kasetsart University in March, 1982. She worked as Medical Technician at AFRIMS, Bangkok for 1 year.

