

PAUL J. LINSER, Ph.D.

Professor of Anatomy and Cell Biology, Neuroscience, Microbiology and Cell Science, Entomology and Biology



My research has branched several times from an early interest in the role that cell communication plays in regulating neural development. In that early context, I developed expertise in many technical approaches as well as credentials in specific elements of gene regulation and molecular physiology. Today there are three main directions in the lab: The Molecular Physiology of the mosquito alimentary canal and respiratory systems; the neurological pathologies that lead to hearing loss with aging in mammals; the evolution of functional compartmentalization in basal metazoans. The mosquito molecular physiology project was fairly quiet in 2019 with a summer REU intern (l'frica Norman) working on the larval respiratory system epithelial cells. There is the possibility that his results along with others generated by myself and previous students may be submitted in 2020.

The project which involves the age-related loss of hearing focuses on the primary neurological and ion-regulatory tissues of the cochlea and is a collaboration with Shinichi Someya of the University of Florida Aging Institute. 2019 saw the graduation of a PhD student from the group as well as the publication of 3 research papers. My involvement in this project is slowly running down as I approach retirement in May of 2020.

The research aimed at detailing physiological compartmentalization in basal metazoans (in this case *Nematostella vectensis*) has carbonic anhydrase and the metabolically interactive bicarbonate ion transporter family at its center. This project is a very active collaboration between myself and Joseph Ryan and Leslie Babonis. We have an interesting set of observations implicating a number of carbonic anhydrases in early development in *Nematostella*. A manuscript is in preparation but there are a few additional experiments in progress that could expand the focus of this research paper. The current goal is to get a paper submitted prior to my retirement in May of 2020.

Education:

1977 Ph.D. (Developmental Biology), University of Cincinnati
1974 B.S. (Biology), University of Cincinnati

Professional Experience:

2017 Awarded Term Professorship recognition University of Florida
2015 Special Editor *Int J Environ Res Public Health*
2012 Appointed to Editorial Board of *Psyche*
2010-Present Appointed to the Florida Coordinating Council for Mosquito Control
2006 Organized the 7th International Conference on the Carbonic Anhydrases
2005-Present Affiliate Professor of Entomology and Nematology, University of Florida
2001-Present Affiliate Professor of Fisheries and Aquatic Sciences, University of Florida
2000-Present Professor of Anatomy and Cell Biology, University of Florida, Whitney Laboratory for Marine Bioscience

1994-1997 Coordinator, Whitney Laboratory Undergraduate Intern Program
1994-Present Affiliate Professor of Neuroscience, University of Florida
1992-Present Affiliate Professor of Zoology, University of Florida
1989-1990 National Eye Institute (NIH) Visiting Professor
1987-2000 Associate Professor of Anatomy and Cell Biology, University of Florida, Whitney Laboratory for Marine Bioscience

1982-1987 Assistant Professor, University of Florida, Whitney Laboratory for Marine Bioscience

1982-1987 Assistant Professor of Anatomy, University of Florida
1980-1982 Assistant Professor, University of Chicago, Department of Biology

Paul J. Linser, Ph.D.

1977-1980 Postdoctoral Fellow (NIH), University of Chicago
1974-1976 Graduate Teaching Assistant, University of Cincinnati
1974 Research Associate, Cincinnati Children's Hospital Clinical Research Center
1973 Undergraduate Research Fellow, University of Cincinnati

Membership in Professional Societies:

American Society for Tropical Medicine and Hygiene
The International Society for Developmental Biologists
International Brain Research Organization
The Society for Developmental Biology

Recent Publications (2010-Present):

Park, H.J., Kim, M.J., Rothenberger, C., Kumar, A., Sampson, E.M., Ding, D., Han, C., White, K., Boyd, K., Manohar, S., Kim, Y.H., Ticsa, M.S., Gomez, A.S., Caicedo, I., Bose, U., **Linser, P.J.**, Miyakawa, T., Tanokura, M., Foster, T.C., Salvi, R., Someya, S. 2019. GSTA4 mediates reduction of cisplatin ototoxicity in female mice. *Nature Communications* 10(1):4150. doi: 10.1038/s41467-019-12073-0.

Pusey, M.A., Pace, K., Fascelli, M., **Linser, P.J.**, Steindler, D.A., Galileo, D.S. 2019. Ectopic expression of L1CAM ectodomain alters differentiation and motility, but not proliferation, of human neural progenitor cells. *Int J Dev Neurosci.* 78:49-64. doi: 10.1016/j.ijdevneu.2019.08.001. Epub 2019 Aug 14.

Kim, M.J., Haroon, S., Chen, G.D., Ding, D., Wanagat, J., Liu, L., Zhang, Y., White, K., Park, H.J., Han, C., Boyd, K., Caicedo, I., Evans, K., **Linser, P.J.**, Tanokura, M., Prolla, T., Salvi, R., Vermulst, M., Someya, S. 2019. Increased burden of mitochondrial DNA deletions and point mutations in early-onset age-related hearing loss in mitochondrial mutator mice. *Exp Gerontol.* 125:110675. doi: 10.1016/j.exger.2019.110675. Epub 2019 Jul 22.

White, K., Kim, M.J., Han, C., Park, H.J., Ding, D., Boyd, K., Walker, L., **Linser, P.**, Meneses, Z., Slade, C., Hirst, J., Santostefano, K., Terada, N., Miyakawa, T., Tanokura, M., Salvi, R., Someya, S. 2018. Loss of IDH2 Accelerates Age-related Hearing Loss in Male Mice. *Sci Rep.* Mar 22;8(1):5039. doi: 10.1038/s41598-018-23436-w.

Han, C., Kim, M.J., Ding, D., Park, H.J., White, K., Walker, L., Gu, T., Tanokura, M., Yamasoba, T., **Linser, P.**, Salvi, R., Someya, S. 2017. GSR is not essential for the maintenance of antioxidant defenses in mouse cochlea: Possible role of the thioredoxin system as a functional backup for GSR. *Plos One* July 7:12(7): e0180817.

White, K., Kim, M.J., Ding, D., Han, C., Park, H.J., Meneses, Z., Tanokura, M., **Linser, P.**, Salvi, R., Someya, S. 2017. G6pd deficiency does not affect the cytosolic glutathione or thioredoxin antioxidant defense in mouse cochlea. *J. Neurosci.* 37: 5770-5781.

Dixon, D.P., VanEkeris, L., **Linser, P.J.** 2017. Characterization of Carbionic Anhydrase 9 in the alimentary canal of *Aedes aegypti* and its relationship to homologous mosquito carbonic anhydrases. *Int J Environ Res Public Health* 14(2); pii: E213

Tokar, D., van Ekeris, L., **Linser, P.J.**, Ochrietor, J.D. 2017. Characterization of the expression of Basigin gene products within the Pineal Gland of mice. *Cell Mol Neurobiol*; Aug; 37(6): 1141-1145. doi:10.1007/s10571-016-0441-5

Han, C., Ding, D., Lopez, M-C., Manohar, S., Zhang, Y., Kim, M-J., Park, H-J., White, K., **Linser, P.**, Tanokura, M., Leeuwenburgh, C., Baker, H.V., Salvi, R., Someya, S. Effects of long-term exercise on age-related hearing loss in mice. 2016. *J Neuroscience* JN-RM-2493-16R1

Han, C., **Linser, P.**, Park, H-J., Kim, M-J., White, K., Vann, J.M., Ding, D., Prolla, T.A., Someya, S. 2016. Sirt1 deficiency protects cochlear cells and delays the early onset of age-related hearing loss in C57BL/6 mice. *Neurology of Aging* 43 58-71.

Linser, P.J. and Dinglasan, R.R. 2014. Insect gut structure, function, development and target of biological toxins. *Advances Insect Physiol* 47: 1-37.

Tsujimoto, H., Liu, K., **Linser, P.J.**, Agre, P., Rasgon, J.L. 2013. Organ-specific splice variants of Aquaporin water channel AgAQP1 in the malaria mosquito *Anopheles gambiae*. *Plos One* 8(9):e75888, 2013.

White, B.J., Kundert, P.N., Turissini, DA., VanEkeris, L., **Linser, P.J.**, Besansky, N.J. 2013. *J. Exp Biol* 216:3433-41.

Corena-McLeod M., Walss-Bass C., Oliveros, A., Gordillo Villegas, A., Ceballos C., Charlesworth, C.M., Madden, B., **Linser, P.J.**, VanEkeris, L., Smith, K., Richelson E. *Plos One*. 2013 May 14;8(5):e52147.doi:10.1371/journal.pone.0052147. Print 2013.

Hua, G., Zhang, Q., Zhang, R., Abdullah, A.M., **Linser, P.J.**, Adang, M.J. 2013. AgCAD2 cadherin in *Anopheles gambiae* larvae is a putative receptor of Cry11Ba toxin of *Bacillus thuringiensis* subsp. *jegathesan*. *Insect Biochem. Mol. Biol.* 43:551-62.

Linser, P.J., Neira Oviedo, M., Hirata, T., Seron, T.J., Smith, K.E., Piermarini, P.M., Romero, M.F. 2012. Slc4-like anion transporters of the larval mosquito alimentary canal. *J. Insect Physiol.* 58:551-62.

Xiang, M.A., **Linser, P.J.**, Price, D.A., Harvey, W.R. 2012. Localization of two Na⁺- or K⁺- H⁺ antiporters, AgNHA1 and AgNHA2, in *Anopheles gambiae* larval Malpighian tubules and the functional expression of AgNHA2 in yeast. *J. Insect Physiol.* 58:570-79.

Hirata, T., Czapar, A., Brin, L.R., Haritonova, A., Bondeson, D.P., **Linser, P.J.**, Cabrero, P., Dow, J.A.T., Romero, M.F. 2012. Ion and solute transport by prestin in *Drosophila* and *Anopheles*. *J. Insect Physiol.* 58:563-69.

Sterling, K.M., Okech, B.A., Xiang, M.A., **Linser, P.J.**, Price, D.A., VanEkeris, L., Becnel, J.J., Harvey, W.R. 2012. High affinity 3H-phenylalanine uptake by brush border membrane vesicles from whole larvae of *Aedes aegypti* (AaBBMVw). *J. Insect Physiol.* 58: 580-89.

Harvey, W.R., Okech, B.A., **Linser, P.J.**, Becnel, J.J., Ahearn, G.A., and Sterling, K.M. 2010. H⁺ V-ATPase-energized transporters in brush border membrane vesicles from whole larvae of *Aedes aegypti*. *J. Insect Physiol.* 56: 1377-1389.

Ochrietor, J.D., Moroz, T.P., and **Linser, P.J.** 2010. The 2M6 antigen is a Muller cell-specific intracellular membrane-associated protein of the sarcolemmal-membrane-associated protein family and is also TopAP. *Mol. Vis.* 16; 961-969.

Vo, M., Brown, D.T., **Linser, P.J.** and Bowers, D.F. 2010. Organ Assoc. Muscles in *Aedes albopictus* (Diptera; Culicidae) respond differentially to Sinbis virus. *J. Med. Entomol.* 47: 215-225.

Smith, K.E., VanEkeris, L., Valenti, M., Raymond, S., Smith, P., and **Linser, P.J.** 2010. Physiological and pharmacological characterization of the anopheline rectum shows redistribution in function in response to varying salinity. *Comp. Biochem. Physiol. C*, 157: 55-62.

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Research Support:

Linser is co-investigator on two funded NIH R01 (NIDCD) grants with Shinichi Someya (of the Aging Institute at UF) as the PI. Start date on one was 07/01/13 and end date is 06/30/18. The project ID is 00109789. The second started on 04/01/15 and ends on 03/31/21. The project ID is 00116053.