

BIOGRAPHICAL SKETCH

NAME: William R Harvey

POSITION TITLE: Professor of Physiology and Functional Genomics

EDUCATION:

Year	Institution	Degree	Field
1947-1950	Tufts University	A.B.	Education
1951-1952	Edinburgh University	B.Ed.	Educational Psychology
1952-1957	Harvard University	M.A. Ph.D.	Biology

POSITIONS:

Year	Institution	Position title	Field
1945-1946	United States Navy	Yeoman 3 rd Class	Editing Daily Diary
1946-1947	Carlton School, Barre, VT	Element. Schl. Teacher	Reading, Writing, Math
1947-1948	Hyde Park High School	High School Teacher	General Science
1948-1950	Tufts University	Undergraduate Student	Education, Biology
1951-1952	University of Copenhagen	Spec. Research Fellow	Active K ⁺ transport
1952-1957	Harvard University	Laboratory Assistant	Biology, Physiology
1957-1960	Harvard University	Instructor	Biology
1961-1969	Univ. of Massachusetts	Asst., Assoc. Professor	Zoology
1969-1996	Temple University	Professor	Biology
1977-1978	Merck, Sharp & Dohme	Consultant	K ⁺ sparing diuretics
1983-1986	Rohm & Haas	Project Director	Insect peptides
1992-2004	J. Experimental Biology	Review Editor	Exptl. Biology
2005-2009	J. Experimental Biology	Co-Editor	Exptl. Biology
1997-2014	University of Florida	Visiting Professor	Physiol. Funct. Genomics
2014- prsnt	William R. Harvey, Ph.D.	Self Empld. Consultant	Loss of Arable Land

HONORS:

Year	Item	Location
1950	Summa cum laude, Phi Beta Kappa, Sigma Xi	Tufts University
1950	Graduated first in class	Tufts University
1950-51	Fulbright Scholar	Edinburgh University
1951-52	Special Research Fellow, NIH	University of Copenhagen
1952-57	Donner Fellow; Lalor Fellow	Harvard University
1967-68	Guggenheim Fellow	Cambridge University
1992	Organizer, editor, V-ATPase Symposium	Telluride, Colorado
1996	Organizer, editor, Molecular Homeostasis Symposium	Villefranche, France
1996	Convener, XX th International Congress of Entomology	Florence, Italy
1996	Speaker, V-ATPase Symposium	Shonan Village, Japan
1999	Organizer, editor, Protonmotive ATPase Symposium	Cambridge, UK

CONTRIBUTIONS TO SCIENCE:

Approximately 120 scientific publications; most significant contributions include:

Co-discovered K⁺ pump

Harvey, W.R. and Nedergaard, S. 1964 *Proceedings of the National Academy of Sciences USA* **51** Sodium-Independent Active Transport of Potassium in the Isolated Midgut of the Cecropia Silkworm, 757-765.

Co-discovered epithelial goblet cell

Anderson E. and Harvey W.R., 1966 *J. Cell Biology* **31** Active transport by the Cecropia midgut. II. Fine structure of the midgut epithelium, 107-134.

Co-discovered active K⁺ transport route

Harvey, W.R. and Zerahn, K. 1969 *J. Experimental Biology* **50** Kinetics and Route of Active K-Transport in the Isolated Midgut of *Hyalophora Cecropia* 297-306.

Co-discovered K⁺ ATPase

Harvey W.R., Cioffi M., Dow J.A. and Wolfersberger M.G., 1983 *J. Experimental Biology* **106** Potassium ion transport ATPase in insect epithelia, 91-117.

Co-isolated four K⁺ V-ATPase subunits

Merzendorfer H., Reineke S., Zhao X-F, Jacobmeier B., Harvey W.R. and Wieczorek H. , 2000 *Biochimica et Biophysica Acta (BBA) - Biomembranes* **1467** The multigene family of the tobacco hornworm V-ATPase: novel subunits a, C, D, H, and putative isoforms, 369-379.

Reviewed literature on coupling of V-ATPases to Na⁺ or K⁺ dependent ion transporters

Harvey, W.R. 2009 *J. Experimental Biology* **212** Voltage coupling of primary H⁺ V-ATPases to secondary Na⁺- or K⁺-dependent transporters, 1620-1629.

Developed methods to isolate transporters from whole larvae

Harvey, W.R., Okech, B.A., Linser, P.J., Becnel, J.J., Ahearn, G.A. and Sterling, M.M. 2010 *Journal of Insect Physiology* **56** H⁺ V-ATPase-Energized Transporters in Brush Border Membrane Vesicles from Whole Larvae of *Aedes aegypti*. 1377-1389.

Received tribute for life's work

Edward M. Blumenthal and Peter M. Piermarini (Editors) 2012 *J. Insect Physiology* **58** Molecular Physiology of Epithelial Transport in Insects - a Tribute to William R. Harvey, 427-598.

RESEARCH SUPPORT

Harvey, W.R. 1948-1950 USPH Predoctoral Fellow, Active K⁺ Transport, Temple Univ.

Harvey, W.R. 1951-57 USPH Special Research Fellow, K⁺ Pump, Harvard University

Harvey, W.R. 1957-61 USPH Special Research Fellow, K⁺ Pump, Univ. Copenhagen,

Harvey, W.R. 1961-2010 Research Grants, Physiology of Active K⁺ Transport. National Institute of Allergy and Infectious Diseases. Forty nine years is among the longest periods of continual funding by the National Institutes of Health.

EXAMPLES OF SUPPORT

5 RO1 AI 52436 (Harvey, PI) 09/15/03 – 12/31/07 NIH/NIAID

Transport Physiology of Disease Vector Mosquitoes

The goal was to clone and characterize Na⁺/H⁺ antiporters from mosquito larval midgut, to localize them, and to examine the coupling between H⁺V-ATPases and cation exchangers.

RO1 AI 30464 (Boudko, PI; Harvey, Co-PI) 12/01/90 – 01/31/2009 NIH/NIAID

Physiology of Insect Amino Acid Transport

The goal was to clone, characterize and localize nutrient amino acid transporters from *Anopheles gambiae* and *Aedes aegypti* larval midgut, and to determine their role in uptake.

RO1 AI 45098-07 (Linser, PI; Harvey, Investigator) 02/01/99 – 01/31/10 NIH/NIAID

Anion Regulation in Larvae of Disease Vector Mosquitoes

The goal was to clone and characterize multiple carbonic anhydrases and anion-exchanging transporters in larvae of disease vector mosquitoes, to determine their cellular distribution during larval development, and to determine their role in midgut alkalization.

PERSONAL STATEMENT

Signe Nedergaard and I co-discovered the insect K⁺ pump. Helmut Wieczorek and I showed that it is a plasma membrane K⁺ V-ATPase. Minghui Xiang and I proposed that this K⁺ V-ATPase generates the receptor potential of the inner ear. We argued that the potential varies with high frequency sounds and enables the inner ear to transduce them to nerve impulses. Recently I have considered the role of global overpopulation in climate change and global warming. A human role in climate change has been denied by many people including President Trump and supporters of the coal and oil industries. Perhaps even more serious and less controversial is the role of global overpopulation in the loss of arable (farmable) land. There is a large literature on this topic by highly regarded scientists. I am trying to summarize highlights of this work in an article for Wikipedia entitled “Overpopulation and Arable Land Loss”.

PUBLICATIONS (Selected from ~135 peer-reviewed articles)

- Xiang M.A., Linser P.J. Price D.A. and 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**:570-579.
- Sterling K.M., Okech B.A., Xiang M.A., Linser P.J., Price D.A., Vanekeris L., Becnel J.J. and Harvey W. R. (2012) High affinity (3) H-phenylalanine uptake by brush border membrane vesicles from whole larvae of *Aedes aegypti* (AaBBMVw). *J Insect Physiol.* **58**:580-589.
- Harvey, W.R. and Xiang, M.A. (2012) K⁺ pump: from caterpillar midgut to human cochlea *J. Insect Physiol.* **58**: 590-598.
- 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.
- Harvey, W.R. (2009) Voltage coupling of primary H⁺ V-ATPases to secondary Na⁺- or K⁺-dependent transporters *J. Exp. Biol.* **212**:1620-1629.
- Okech, B. A., Meleshkevitch, E. A., Miller, M. M., Popova, L. B., Harvey, W. R. and Boudko, D. Y. 2008, Synergy and specificity of two Na⁺-aromatic amino acid symporters in the model alimentary canal of mosquito larvae. *J Exp Biol* **211**:1594-1602.

- Okech, B.A., Boudko, D. Y. and Harvey, W. R. 2008 Cationic Pathway of pH regulation in larvae of *Anopheles gambiae* *J. Exp. Biol.* 211:967-968.
- Rheault, M. R., Okech, B.A., Keen, S. B. W., Miller, M. M., Meleshkevitch, E.A., Linser, P. J., Boudko, D. Y. and Harvey, W.R. (2007) Molecular cloning, phylogeny and localization of AgNHA1: the first Na⁺/H⁺ antiporter (NHA) from a metazoan, *Anopheles gambiae* *J. Exp. Biol.* **210**:3848-3861.
- Meleshkevitch, E.A., Assis-Nascimento, P., Popova, L.B., Miller, M.M., Kohn, A.B., Phuong, L., Mandal, A., Harvey, W.R. and Boudko, D.Y. (2006) Molecular Characterization of the First Aromatic Nutrient Transporter from the Sodium Neurotransmitter Symporter Family, *J. Exp. Biol.* **209**, 3183-3198.
- Boudko D.Y., Kohn A.B., Meleshkevitch E.A., Dasher M.K., Stevens B.R. and Harvey W.R. (2005) Ancestry and Progeny of Nutrient Transporters, *Proc. Natl. Acad. Sci. U.S.A.* **102**, 1360-1365.
- Boudko, D.Y., Stevens, B.R., Donly, B. C. and Harvey, W.R. (2005) Amino acid and Neurotransmitter transporters, In *Comprehensive Insect Science*, Vol. 5, Pharmacology, Editors: Lawrence I. Gilbert, Kostas Iatrou, and Sarjeet Gill. Elsevier Pergamon, Amsterdam pp 2555-309.
- Liu, Z., Stevens, B.R., Feldman, D.H., Hediger, M.A. and Harvey, W.R. (2002). K⁺ amino acid transporter KAAT1 Mutant Y147F has increased transport activity and altered substrate selectivity. *J. Exp. Biol.* **206**, 245-254.
- Boudko, D.Y., Cooper, B.Y., Harvey, W.R. and Moroz, L.L. (2002). High-resolution microanalysis of nitrite and nitrate in neuronal tissues by capillary electrophoresis with conductivity detection. *J. Chromatogr. B.* **774**: 97-104.
- Stevens, B. R., Feldman, D.H., Liu, Z., and Harvey, W.R. (2002) Conserved tyrosine-147 plays a critical role in the ligand-gated current of the epithelial cation/amino acid transporter/channel CAATCH1. *J. Exp. Biol.* **205**:2545-2553.
- Boudko, D.Y., Moroz, L.L., Harvey, W.R. and Linser, P.J. (2001), Alkalinization by chloride/bicarbonate pathway in larval mosquito midgut. *Proc. Natl. Acad. Sci. U.S.A.* **98** 15354-15359.
- Boudko, D.Y., Moroz, L.L., Linser, P.J. Trimarchi, J.R., Smith, P.J.S. and Harvey, W.R.(2001), *In situ* analysis of pH gradients in mosquito larvae using non-invasive, self-referencing, pH-sensitive microelectrodes. *J. Exp. Biol.* **204**, 691-699.
- Stevens, B.R., Tellier, M., Harvey, W., Feldman, D.H., and Bosworth, J. 2000. Interleukin-2 and concanavalin A upregulate a CAT2 isoform encoding a high affinity L-arginine transporter in feline lymphocytes. *Can. J. Vet. Res.* **64**:187-191.
- Merzendorfer, H., Reineke, S., Zhao, X-F, Jacobmeier, B. Harvey, W.R. and Wiczorek, H. (2000). The multigene family of the tobacco hornworm V-ATPase: novel subunits a, C, D, H, and putative isoforms. *Biophys. Biochim. Acta* **1467**, 369-379.
- Grüber, G., Svergun, D.I., Godovac-Zimmermann, J. Harvey, W.R., Wiczorek, H. and Koch, M.H.J. (2000), Evidence for major structural changes in the *Manduca sexta* midgut V₁ ATPase due to redox modulation A small angle X-ray scattering study. *J. Biol. Chem.* **275**, 30082-30087.
- Grüber, G., Radermacher, M., Ruiz, T., Godovac-Zimmermann, J., Canas, B., Kleine-Kohlbrecher, D., Harvey, W.R. and Wiczorek, H. (2000). Three-dimensional structure and subunit topology of the V₁ ATPase from *Manduca sexta*. *Biochemistry* **39**, 8609-8616.
- Wiczorek, H., Grüber, G., Harvey, W.R., Huss, M., Merzendorfer, H. and Zeiske, W. (2000), Structure and regulation of insect plasma membrane H⁺ V-ATPase. *J. Exp. Biol.* **203**, 127-135.