

# CURRICULUM VITAE

Louis Elwood Burnett, Jr.

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## Present Address:

Grice Marine Laboratory  
College of Charleston  
205 Fort Johnson  
Charleston, SC 29412

## Telephone:

Office 843-953-9170  
Fax 843-953-9199  
Home 843-762-6502

## Electronic Mail:

[BurnettL@cofc.edu](mailto:BurnettL@cofc.edu)

## Home Page:

<http://burnettl.people.cofc.edu>

## Personal:

Married, one daughter, one son

## Education:

College of William and Mary	B.S. 1973 with High Honors	Mentor: Charlotte P. Mangum
	Honors Thesis Title: Ventilation and Oxygen Uptake by the Clams <i>Mya arenaria</i> and <i>Rangia cuneata</i> in Declining Oxygen Tensions	
University of South Carolina	Ph.D. 1977	Mentor: Winona B. Vernberg
	The Function of Respiratory Mechanisms in the Spider Crab, <i>Libinia emarginata</i> and the Ghost Crab, <i>Ocypode quadrata</i>	
University of Aarhus, Denmark	Postdoctoral Fellow 1978	Mentor: Kjell Johansen

## Experience:

2002-present	Hollings Marine Laboratory Science Board (governing body - multi institutional facility)
1991-present	Director, Grice Marine Laboratory, College of Charleston
1994-present	Adjunct Faculty, Marine Biomedical & Environmental Sciences Program, Medical University of South Carolina
1991-present	Professor of Biology, College of Charleston
1996-1997	Director, Graduate Program in Environmental Studies, College of Charleston
1991-1996	Chair, Department of Biology, College of Charleston
1992-1993	Acting Director, Graduate Program in Marine Biology, College of Charleston
1990-1991	Acting Director, Marine and Environmental Studies Program, University of San Diego
1989-1991	Professor of Biology, University of San Diego
1988-1991	Chair, Department of Biology, University of San Diego
1982-1989	Associate Professor of Biology, University of San Diego
1985	Visiting Scientist, College of William and Mary
1985	Visiting Scientist, Physiological Research Laboratory, Scripps Institution of Oceanography
1984	Visiting Scientist, University of Calgary
1978-1982	Assistant Professor of Biology, University of San Diego
1978	Postdoctoral Fellow, Department of Zoophysiology, University of Aarhus, Aarhus, Denmark
1977	Research Biologist, EPA, Bears Bluff Field Station, Charleston, South Carolina

**Editorial Service:**

1996-present Associate Editor, *The Biological Bulletin*  
 1997-2005 Editorial Board, *Journal of Experimental Marine Biology and Ecology*  
 1998-1999 Associate Editor, *American Zoologist*  
 2002-present Editorial Board, *Comparative Biochemistry and Physiology*

**Grant Support (Research):**

2007-2010 National Science Foundation, \$573,851  
 Co-PI, Impaired Metabolism and Performance in Crustaceans Exposed to Bacteria  
 2004-2006 Oceans and Human Health, NOAA, \$300,135  
 Co-PI, "Marine Organisms as Disease Vectors"  
 2002-2005 National Science Foundation, \$417,412  
 Co-PI, "Hypercapnic hypoxia impacts shrimp immune defenses against bacterial pathogens"  
 2002-2005 Diamond V Mills, Inc., \$47,000  
 Co-PI, "Preliminary evaluation of a yeast product food supplement in protection against infection with a bacterial pathogen in the Pacific white shrimp, *Litopenaeus vannamei*"  
 2000-2002 United States Department of Agriculture, \$155,000  
 Co-PI, "Disease Resistance Lowered by Dissolved Oxygen and pH in Aquacultured Shrimp"  
 1999-2004 Oyster Disease Research Program, \$40,000  
 Co-PI, "Mortality of the Pacific Oyster, *Crassostrea gigas*: Identification and evaluation of multiple environmental stressors and methods to reduce associated mortalities"  
 1997-1999 South Carolina Sea Grant, \$118,000  
 PI, "Environmental Hypoxia and CO<sub>2</sub> Influence the Propagation, the Physiology, and the Biochemistry of Infections of *Perkinsus marinus* in Oysters"  
 1994-1995 Oyster Disease Research Program, NOAA, \$55,178  
 PI, "Physiological Responses of the Oyster *Crassostrea virginica* to Infections of *Perkinsus marinus*: Effects of Environmental Variables on Acid-base Status"  
 1993-1995 Charleston Harbor Project, NOAA, \$55,252  
 PI, "The Effects of Natural Variations of Carbon Dioxide on the Physiology of Juvenile Fish in Coastal Waters"  
 1989-1990 Hoechst Pharmaceutical, \$20,000  
 PI, "Synthesis of <sup>14</sup>C-labeled Chitin"  
 1988-1991 National Science Foundation, \$79,396  
 PI, "Mechanisms of CO<sub>2</sub> and Chloride Ion Translocation Across Isolated Perfused Crab Gills"  
 1988 National Science Foundation \$10,000  
 Co-PI, "Energetics, Cardiovascular, and Respiratory Aspects of Shark Swimming"  
 1987-1989 Research Corporation, \$12,000  
 PI, "Cl<sup>-</sup>/HCO<sub>3</sub><sup>-</sup> Exchange Across Isolated Perfused Crab Gills and the Function of Carbonic Anhydrase"  
 1984-1986 Research Corporation, \$20,000  
 PI, "Hemodynamics and Gas Exchange in Crabs"  
 1981-1982 National Science Foundation, \$29,996  
 PI, "The Initiation of the Salinity Adaptation Process in Crabs: Studies Using Organ Cultured Gills"

**Grant Support (Institutional/Programmatic):**

2007-2010	National Science Foundation, Field Stations and Marine Laboratories PI, "Renovation of Grice Marine Laboratory for Research and Teaching," \$341,285
2006-2008	National Science Foundation, Research Experiences for Undergraduates PI, "Research Experiences in Experimental Marine Biology," \$257,670
2003-2005	National Science Foundation, Research Experiences for Undergraduates PI, "Research Experiences in Physiology, Cell and Molecular Biology of Marine Organisms," \$194,000
1999-2002	National Science Foundation, Research Experiences for Undergraduates PI, "Research Experiences in Physiology, Cell and Molecular Biology of Marine Organisms," \$155,229
1991	National Science Foundation, Academic Research Facilities Modernization Program PI, "Renovation of Laboratories for Microscopy/Faculty Research," \$131,000
1990	Fletcher Jones Foundation "Establishment of an Electron Microscope Facility," \$148,500

**Awards:**

1975-1977	Belle W. Baruch Predoctoral Fellowship
1978	Lerner Fund for Marine Research (Travel Grant)
1978	George C. Marshall Memorial Fund in Denmark (Fellowship)
1987	Heinrich-Hertz Foundation (Germany)
2000	Baruch Scholar
2006	Distinguished Research Award, College of Charleston

**Professional Society Memberships:**

- American Physiological Society
- Council on Undergraduate Research
  - Councilor (1992-1994)
- Estuarine Research Federation
- National Shellfisheries Association
- Sigma Xi
- Society for Experimental Biology
- Society for Integrative and Comparative Biology (formerly American Society of Zoologists)
  - Program Officer, Division of Comparative Physiology and Biochemistry (1989-1990)
  - Chair, Division of Comparative Physiology and Biochemistry (1993-1995)
  - SICB Secretary (2006-2009)
- Southeastern Estuarine Research Society

**Significant & Current Professional Responsibilities:**

- Member of the National Organizing Committee for the congress of the International Union of Physiological Sciences (IUPS) in 2005 in San Diego, California
- International Union of Biological Sciences, Section of Comparative Physiology and Biochemistry, representative for the Division of Comparative Physiology and Biochemistry of SICB
- Member of the Science Board governing a five institutional (federal and state) research partnership in the Hollings Marine Laboratory, Charleston, SC

**Teaching:**

- College of Charleston (1991-present); Introductory Biology; Environmental Physiology; Physiology and Cell Biology of Marine Organisms (Graduate)
- University of San Diego (1978-1991); Comparative Animal Physiology; Invertebrate Zoology; Principles of Biology (Introductory)

**Research Interests:**

The environmental physiology of animals; the influence of environmental variables on the physiology and biochemistry of animals. The evolution of the transition from water breathing to air breathing in animals. The effects of environmental variables, especially hypoxia, hypercapnia, and temperature on disease resistance in animals.

**Publications (students indicated by \*):**

1. Mangum, C. P. and L. E. Burnett. 1975. The extraction of oxygen by estuarine invertebrates. In *Physiological Ecology of Estuarine Organisms*. Edited by F. John Vernberg, University of South Carolina Press, Columbia, S. C.
2. Burnett, L. E. 1979. The effects of environmental oxygen levels on the respiratory function of hemocyanin in the crabs, *Libinia emarginata* and *Ocypode quadrata*. *J. Exp. Zool.* 210:289-300.
3. Middaugh, D. P., L. E. Burnett and J. A. Couch. 1980. Toxicological and physiological responses of the fish, *Leiostomus xanthurus*, exposed to chlorine produced oxidants. *Estuaries* 3:132-141.
4. Burnett, L. E., G. K. Chambers\* and G. M. Coster\*. 1980. Gill tissue O<sub>2</sub> uptake in crustaceans: Application to the Fick principle for estimating blood flow. *Comp. Biochem. Physiol.* 67A:195-197.
5. Burnett, L. E., P. B. J. Woodson, M. G. Rietow\* and V. C. Vilicich\*. 1981. Crab gill intra-epithelial carbonic anhydrase plays a major role in haemolymph CO<sub>2</sub> and chloride ion regulation. *J. Exp. Biol.* 92:243-254.
6. Burnett, L. E. and K. Johansen. 1981. The role of branchial ventilation in hemolymph acid-base changes in the shore crab, *Carcinus maenas*, during hypoxia. *J. Comp. Physiol.* 141:489-494.
7. Burnett, L. E., P. L. deFur and D. D. Jorgensen. 1981. Application of the thermodilution technique for measuring cardiac output and assessing cardiac stroke volume in crabs. *J. Exp. Zool.* 218:165-173.
8. Burnett, L. E. and C. R. Bridges. 1981. The physiological properties and function of ventilatory pauses in the crab *Cancer pagurus*. *J. Comp. Physiol.* 145:81-88.
9. Middaugh, D. P., H. W. Kohl\* and L. E. Burnett. 1983. Concurrent measurement of intertidal environmental variables and embryo survival for the California grunion, *Leuresthes tenuis* and Atlantic silverside *Menidia menidia* (Pisces: Atherinidae). *Calif. Fish and Game* 69:89-96.
10. Burnett, L. E. 1984. CO<sub>2</sub> excretion across isolated perfused crab gills: Facilitation by carbonic anhydrase. *Amer. Zool.* 24:253-264.
11. McMahon, B. R., L. E. Burnett and P. L. deFur. 1984. Carbon dioxide excretion and carbonic anhydrase function in the red rock crab, *Cancer productus*. *J. Comp. Physiol. B* 154:371-383.
12. Burnett, L. E. and R. L. Infantino, Jr.\* 1984. The CO<sub>2</sub> specific sensitivity of hemocyanin oxygen affinity in the decapod crustaceans. *J. Exp. Zool.* 232:59-66.
13. Burnett, L. E., T. N. Dunn\* and R. L. Infantino, Jr.\* 1985. The function of carbonic anhydrase in crustacean gills. In *Comparative Aspects of Transport Across Gills*, eds. R. Gilles and M. Gilles-Baillien, Springer-Verlag, Heidelberg, New York. pp. 159-168.
14. Burnett, L. E. and B. R. McMahon. 1985. Facilitation of CO<sub>2</sub> excretion by carbonic anhydrase located on the surface of the basal membrane of crab gill epithelium. *Respir. Physiol.* 62:341-348.
15. Mangum, C. P. and L. E. Burnett. 1986. The CO<sub>2</sub> sensitivity of the hemocyanins and its relationship to Cl<sup>-</sup> sensitivity. *Biol. Bull.* 171:248-263.
16. Mangum, C. P., L. E. Burnett, and R. F. Lee. 1987. The influence of serum lipids on oxygen binding of *Callinectes sapidus* hemocyanin. *Comp. Biochem. Physiol.* 86A:39-41.
17. Burnett, L. E. and B. R. McMahon. 1987. O<sub>2</sub> Uptake, Acid-Base Balance and Branchial Water CO<sub>2</sub> Content during Air Exposure in Intertidal Crabs. *Physiol. Zool.* 60:27-36.
18. Mangum, C. P. and L. E. Burnett. 1987. The response of sipunculid hemerythrins to inorganic ions and CO<sub>2</sub>. *J. Exp. Zool.* 244:59-65.
19. Burnett, L. E. 1988. Physiological response to air exposure: Acid-base balance and the role of branchial water stores. *Amer. Zool.* 28:125-135.
20. Burnett, L. E., D. A. Scholnick\*, and C. P. Mangum. 1988. Temperature sensitivity of arthropod and molluscan hemocyanins. *Biol. Bull.* 174:153-162.
21. McMahon, B. R. and L. E. Burnett. 1990. The crustacean open circulatory system. A Reexamination. *Physiol. Zool.* 63:35-71.
22. Burnett, L. E. and D. W. Towle. 1990. Sodium uptake by perfused gills of the blue crab, *Callinectes sapidus*: Effects of ouabain and amiloride. *J. Exp. Biol.* 149:293-305.

23. Lai, C. N., J. B. Graham and L. E. Burnett. 1990. Blood respiratory properties and the effect of swimming on blood-gas transport in the leopard shark, *Triakis semifasciata*. J. Exp. Biol. 151:161-173.
24. Burnett, L. E. and C. P. Mangum. 1991. Differences in hemocyanin O<sub>2</sub> affinity in *Carcinus maenas* from Maine and Arcachon. J. Exp. Biol. 155:675-678.
25. Burnett, L. E. 1991. Integrating undergraduate laboratories into the curriculum. Advances in Physiol. Education Am. J. Physiol. 260:S25-S28.
26. Burnett, L. E. 1992. Integrated function of respiratory pigments (Compleat Crab Symposium). Amer. Zool. 32:438-446.
27. Dwyer\*, J. J. and L. E. Burnett. 1996. Acid-base status of the oyster, *Crassostrea virginica*, in response to air exposure and to infections by *Perkinsus marinus*. Biol. Bull. 190:139-147.
28. Cochran\*, R. E. and L. E. Burnett. 1996. Respiratory responses of the salt marsh animals, *Fundulus heteroclitus*, *Leiostomus xanthurus*, and *Palaemonetes pugio* to environmental hypoxia and hypercapnia and to the organophosphate pesticide, azinphosmethyl. J. Exp. Mar. Biol. Ecol. 195:125-144.
29. Burnett, L. E. 1997. The challenges of living in hypoxic and hypercapnic aquatic environments. Amer. Zool. 37:633-640.
30. Boyd\*, J. N. and L. E. Burnett. 1999. Reactive oxygen intermediate production by oyster hemocytes exposed to hypoxia. J. Exp. Biol. 202:3135-3143.
31. Willson\*, L. L. and L. E. Burnett. 2000. Whole animal and gill tissue oxygen uptake in the Eastern oyster, *Crassostrea virginica*: Effects of hypoxia, hypercapnia, air exposure, and infection with the protozoan parasite *Perkinsus marinus*. J. Exp. Mar. Biol. Ecol. 246:223-240.
32. Mikulski\*, C. M., Burnett, L. E. and Burnett, K. G. 2000. The effects of hypercapnic hypoxia on the survival of shrimp challenged with *Vibrio parahaemolyticus*. J. Shellfish Res. 19:301-311.
33. Burnett, L. E. and W. B. Stickle. 2001. Physiological responses to hypoxia, Pages 101-114 in Nancy N. Rabalais and R. Eugene Turner (eds.), Coastal Hypoxia: Consequences for Living Resources and Ecosystems. Coastal and Estuarine Studies 58, American Geophysical Union, Washington, D.C.
34. Boleza\*, K. A., Burnett, L. E. and Burnett, K. G. 2001. Hypercapnic hypoxia compromises bactericidal activity of phagocytic cells against opportunistic environmental pathogens. Fish and Shellfish Immunology 11:593-610.
35. Towle, D. W. and L. E. Burnett. Osmoregulatory, Digestive, and Respiratory Physiology of the Blue Crab, *Callinectes sapidus*, Chapter 9, pp. 419-450. In Biology of the Blue Crab, Maryland Sea Grant, eds. V. S. Kennedy, L. E. Cronin, 800 pp.
36. Burnett, L., N. Terwilliger, A. Carroll\*, D. Jorgensen, D. Scholnick\*. 2002. Respiratory and acid-base physiology of the purple sea urchin, *Strongylocentrotus purpuratus*, during air exposure: Presence and function of a facultative lung. Biol. Bull. 203:42-50.
37. Burgents\*, J. E., K. G. Burnett, L. E. Burnett. 2004. Disease resistance of Pacific white shrimp, *Litopenaeus vannamei*, following the dietary administration of a yeast culture food supplement. Aquaculture 231:1-8.
38. Holman\*, J. D., K. G. Burnett, L. E. Burnett. 2004. Effects of hypercapnic hypoxia on the clearance of *Vibrio parahaemolyticus* in the Atlantic blue crab, *Callinectes sapidus*. Biol. Bull. 206:188-196.
39. Burnett, K. G. and L. E. Burnett. 2005. The impacts of hypoxia on disease resistance in crustaceans. In: (Eds. Cipriano, R.C., Shchelkunov, I.S., and Faisal M.) Health and Diseases of Aquatic Organisms: Bilateral Perspectives. Proceedings of the Second Bilateral Conference between Russia and the United States (21 - 28 September 2003, Shepherdstown, West Virginia. Michigan State University, East Lansing, MI. (363 pp., ISBN 0-9765653-0-7)
40. Burgents\*, J. E., L. E. Burnett, E. V. Stabb, K. G. Burnett. 2005. Localization and bacteriostasis of *Vibrio* introduced into the Pacific white shrimp, *Litopenaeus vannamei*. Dev. Comp. Immunol. 29:681-691.
41. Burgents\*, J. E., K. G. Burnett, L. E. Burnett. 2005. Effects of hypoxia and hypercapnic hypoxia on the localization and the elimination of *Vibrio campbellii* in the Pacific white shrimp, *Litopenaeus vannamei*. Biol. Bull. 208:159-168.
42. Tanner\*, C. A., L. E. Burnett, K. G. Burnett. 2006. The effects of hypoxia and pH on phenoloxidase activity in the Atlantic blue crab, *Callinectes sapidus*. Comp. Biochem. Physiol. 144A:218-223.

43. Burnett, L. E., J. D. Holman\*, D. D. Jorgensen, J. L. Ikerd\*, K. G. Burnett. 2006. Immune defense reduces respiratory fitness in *Callinectes sapidus*, the Atlantic blue crab. *Biol. Bull.* 211:50-57.
44. Scholnick, D. A., K. G. Burnett, L. E. Burnett. 2006. Impact of exposure to bacteria in the Penaeid shrimp *Litopenaeus vannamei*. *Biol. Bull.* 211:44-49.
45. Burge, E. J., D. J. Madigan\*, L. E. Burnett, K. G. Burnett. 2007. Lysozyme gene expression by hemocytes of Pacific white shrimp, *Litopenaeus vannamei*, after injection with *Vibrio*. *Fish & Shellfish Immunology* 22:327-339.
46. Allen\*, S. M., L. E. Burnett. 2008. The effects of intertidal air exposure on the respiratory physiology and the killing activity of hemocytes in the Pacific oyster, *Crassostrea gigas* (Thunberg). *J. Exp. Mar. Biol. Ecol.* 357:165-171.
47. Macey, B. M., C. K. Rathburn\*, L. K. Thibodeaux\*, L. E. Burnett, K. G. Burnett. 2008. Clearance of *Vibrio campbellii* injected into the hemolymph of *Callinectes sapidus*, the Atlantic blue crab: The effects of prior exposure to bacteria and environmental hypoxia. *Fish & Shellfish Immunology* (in press).
48. Macey, B. M., I. O. Achilihu\*, K. G. Burnett, L. E. Burnett. 2008. Effects of hypercapnic hypoxia on the inactivation and elimination of *Vibrio campbellii* in the Eastern oyster, *Crassostrea virginica*. *Applied and Environmental Microbiology* 74:6077-6084.
49. Williams\*, H. R., B. M. Macey, L. E. Burnett, K. G. Burnett. Differential localization and bacteriostasis of *Vibrio* among tissues of the Eastern oyster, *Crassostrea virginica*. *Dev. Comp. Immunol.* (in press).

#### Symposium Lectures:

- "Ion and CO<sub>2</sub> Transport Across Isolated Perfused Crab Gills," Symposium on Cellular Mechanisms of Ion Regulation in Arthropods, A.S.Z., Louisville, Kentucky, December 1982.
- "The Function of Carbonic Anhydrase in Crustacean Gills," Symposium on Comparative Aspects of Transport Across Gills, 1st International Comparative Physiology and Biochemistry Congress, Liege, Belgium, August 1984.
- "Physiological Responses to Air Exposure: Acid-Base Balance and the Role of Branchial Water Stores," Symposium on Mechanisms of Physiological Compensation in Intertidal Animals, American Society of Zoologists, Baltimore, Maryland, December 1985.
- "Non-Convective Mechanisms: Limits of O<sub>2</sub> and CO<sub>2</sub> Transport," Workshop on Limits of Gas Exchange and Transport in the Invertebrates, American Physiological Society, San Diego, California, October 1987, organizer.
- "The Pattern of CO<sub>2</sub> Movement Across Crab Gills", Symposium on The Function of Carbonic Anhydrase - Its Role in Ion and Gas Transfer, Society for Experimental Biology, Warwick, England, March 1990.
- "Integration of Respiratory Function," Symposium on The Compleat Crab, American Society of Zoologists, San Antonio, Texas, December 1990.
- "Implications of simultaneous hypoxia and elevated carbon dioxide," Symposium on Hypoxia: Molecules to Mud Flats, Estuarine Research Federation, November 1993, coorganizer.
- "Environmental challenges of organisms struggling to live in estuaries," Symposium on Molecules to Mudflats: Biological Adaptations to Estuaries, American Society of Zoologists, December 1995, coorganizer.
- "Transition for Water to Air: Requirements for Acid-Base Regulation?" Symposium on Transitions from Water to Air, International Conference on Comparative Physiology and Biochemistry, Skukuza, Kruger National Park, South Africa, September 1997, organizer.
- "Challenges of Living in Hypoxic and Hypercapnic Estuaries" Symposium on Dissolved Oxygen in Estuaries, Estuarine Research Federation Annual Meeting, Providence, Rhode Island, October 1997.
- "The Effects of Hypoxia and Hypercapnia on Cellular Defenses of Oysters, Shrimp, and Fish" Symposium on Physiological Challenges of Aquacultured Animals, 5th International Congress of Comparative Physiology and Biochemistry, Calgary, Alberta, August 1999, coorganizer.
- "Metabolic Regulation and Hypoxic Stress in Invertebrate Systems" Symposium on Enantiostasis and Unstable Physiological Systems: A Tribute to Charlotte P. Mangum, Experimental Biology 2000, Cambridge, England, July-August 2000.
- "Hypoxia, Habit, Habitat and Immune Response in Marine Organisms" Symposium on Genetic and Phenotypic Responses to Hypoxia in the Individual, International Congress of Comparative Physiology and Biochemistry, Salvador, Bahia, Brazil, August 2007.

- “The Metabolic Consequences of Immune Defense Coupled with the Demands of Exercise in Marine Crustaceans” Symposium on Cross-tolerance Towards Environmental Stress: Molecular Mechanisms and Ecological Case Studies, Society for Experimental Biology, Marseille, France, July 2008.