

# SICB Newsletter



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## Experiences in Integrative and Comparative Biology

This installment of "Experiences" is a special one for me. We show here an essay from Dr. John Vernberg, who was the president of our society, then the American Society of Zoologists, in 1982. I first met John when I was a graduate student in the newly formed Marine Science Program at the University of South Carolina. Dr. Winona B. Vernberg was my major advisor and it was this remarkable husband and wife team that inspired all of us to embrace our passion for science and do it with good humor and healthy collaborations. And yes, I came to know and "love" the Gilson Respirometer pictured with the essay.

*Lou Burnett, SICB Secretary*

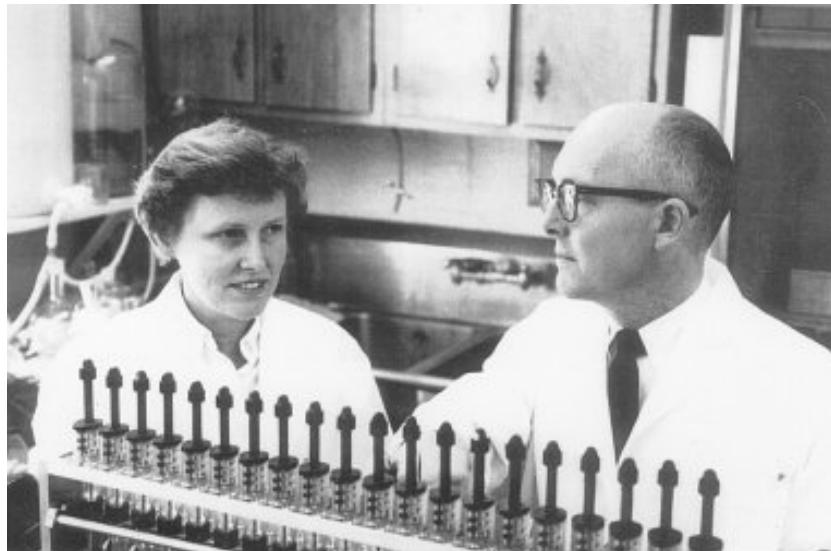
### ***John Vernberg***

To highlight specific research experiences from a database of 49 years of pre- and post-doctoral research endeavor is a daunting task. The research path leading from submitting a dissertation to retirement was far from being a straight line! However, there is a common thread which links the apparent deviations in the direction of the path represented by my different research projects. A fundamental question originally stimulated my scientific efforts and it continued throughout my career: What mechanisms enable an organism to live in an environment consisting of a complex of interacting abiotic and biotic factors? My research was not restricted to the study of a given species but was problem directed. This proved to be an adaptive opportunistic response by me because outside factors, such as job location and family, dictated to a degree a new environment to study with a new set of experimental animals. For example, my graduate work was done at Purdue University studying the physiological ecology of salamanders associated with the Ross Biological Reserve. My first post-graduate "job" was at Duke University which also had a forested reserve area. However, the allure of the ocean with a high diversity of organisms and habitats exerted an overpowering force pulling a Midwesterner to the shore where the Duke Marine Laboratory is located.



***F. John Vernberg in the salt marsh***

At first I studied the comparative tissue metabolism of several fish species in relationship to their locomotor behavior. Perhaps, because I enjoyed the beach, I took an interest in the intertidal zone. Not only was there an appealing fauna assemblage, ranging from mammals to micro fauna, but the rhythmic tidal action exposed organisms to daily aerial and submerged environmental changes as well as marked seasonal changes.



***Winona B. Vernberg and F. John Vernberg in the laboratory using the Gilson Respirometer.***

Our latitudinal studies expanded to include the offshore fauna when an oceanographic ship (R/V Eastward) became available. Working at sea on a 120-foot vessel is a real research experience! Now we could compare metabolic patterns of species characteristic of colder water north of Cape Hatteras with that of species inhabiting the warmer waters associated with the Gulf Stream.

Another bend in our research path resulted when we focused our attention on the question of how environmental factors influenced the physiological ecology of both a parasite (trematodes) and the various hosts that the parasite inhabits when completing its life cycle.

How does the genome of an individual animal enable the organism to function in the wide range of habitats it encounters which may vary from anaerobic to free-living aerobic and/or cold-blooded to warm-blooded hosts? Also, what impact does the parasite have on the host? These studies involved metabolic measurements, determination of survival rates of intact organisms, and behavioral studies. Unfortunately the techniques of present day molecular biology and genetics were not readily available to us during this period of our research careers.

These studies, which have been described in greater detail in our various publications, are presented here to demonstrate that our research experiences have been exciting to us and totally unexpected based on the knowledge of the environment we had when finishing graduate school. As technological advances are made, the researcher has an opportunity to expand his/her horizons and some day to look back and remember the high points with more clarity than the frustrations.

One way of studying how animals respond to their environment is to compare the physiological responses of various species and/or different populations of one species to various physical and biological factors. A few examples of the comparative approach will briefly demonstrate this approach. Dr. Richard Tashian and I began a study on the ecology and physiology of latitudinally separated species of fiddler crabs, genus *Uca* which Dr. Winona Vernberg and I continued. Studies ranged from determining and comparing functional responses of adults and developmental stages at both the organismic and tissue/cellular levels of various species from tropical and temperate zones. In addition, interspecific competition of species at the area of their overlapping geographic ranges was conducted to determine the role of behavior and physiological responses in limiting the distribution of species. Although our studies predated the current intense interest in the impact of global warming, the results are relevant. Naturally it was necessary to study populations of fiddler crabs along the Atlantic coast from their most northern limits in Massachusetts to their southern limits in southern Brazil and Argentina. Winona and I accepted this scientific mandate, after all someone had to do it! Seriously, we found the experience greatly broadened our thoughts on ecophysiological phenomena (and to answer the urge to satisfy our need to honor the creed of the United States Navy "to see the world" which was instilled in us during our period of service in World War II).