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Necessary Undergraduate Biology Training

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Call it "hands-on education" (see [1] for a great review of this paradigm from the perspectives of science educators), but I propose that undergraduate biology students who are book and laboratory educated must equally learn to "get the feel for it." I use this to describe the ability of a biologist to walk through a landscape, quickly assess the habitat, and get the feel for what kinds of plants and animals could be found and what ecosystem interactions are taking place. This is an essential skill for any biologist. In this unconventional commentary, I provide anecdotal experiences supporting the need for undergraduates to "get down in the dirt", become muddy or soaked, and try to think and feel like the plants and animals they must learn about. It doesn't matter whether that learning is labeled as hands-on, experiential learning or education, student-centered, or challenged base instruction [2-4].

I remember the perplexed look on a senior wildlife major's face, who had taken a required natural history course, when I pointed to an old cavity tree and asked him to tell me about it and what animals might be within. He was graduating that year with a natural resources degree, but still needed to learn how true naturalists, or students of natural history, are connected with their surroundings like the plants and animals they study. Recently, I felt the same way when a graduate biology student studying the biophytoremediation potential of a plant did not know the plant's growing season, plant zone, or soil requirements. The student had only grown it in a lab using hydroponics.

I learned how to "get the feel for it" when I took my first field biology class. The professor drew transect lines on a topographical map for us to follow, dropped us off, and said he would pick us up at the end of the day. We were to record and report on each vegetation change we observed as we followed our compasses. An important plant biologist skill I learned was searching the undergrowth with a gestalt or mental picture of the shape, size, and color of the indicator plants of disturbance and successional changes. Scraping my legs for over an hour, while navigating through a hillside of mountain laurel (*Kalmia latifolia*), changed my life as a biologist. Based on that experience, I once made my own biology students crawl like babies in a dense growth of Japanese knotweed (*Fallopia japonica*) to see how it would be difficult for other plants to grow with little light and ground space. They quickly understood how invasive species compete with native plants.

Ecography depends on field observations and museum records collected by naturalists that detail the location and distributions of plant and animals. Whereas a museum specimen label might list the general location, the naturalist's field book contains detailed descriptive information about habitat in which the specimen was found. However, the occurrence of an organism is only made known to science through the experience of the biologist or survey technique adopted when searching for it. In my experience, it is a little of both. My undergraduate mentor taught one of the most valuable lessons about field work. With an equal number of museum special snap traps, he told me to think as if I were a shrew or vole, look for their runways, and place the museum special snap-trap "just so." With both of us using the same exact technique, he said, "Let's see who catches more specimens." My attempt to outdo him failed, and the score was zero for me and two for him, with his two being new county records for water shrew (*Sorex palustris*) and southern bog lemming (*Synaptomys cooperi*). My reward for failing was checking another trapline in the pouring rain, while he sat dry in his van, listening to hard rock music. He clearly had a better feel for placing traps in just the right places.

When I took an ecology course as a biology major, the introductory textbooks and undergraduate lectures told me that a monocrop, such as a cornfield, would have little diversity. This would mislead any young biologist, who might dismiss this habitat and consider it biologically uninteresting. Fast forward to me watching dragonflies catch bumble bees in corn field after I had graduated. I saw a flash of red on the wings of one of the dragonflies. Having the feeling it was a meadowhawk (*Sympetrum* sp.), I waited until it patrolled its territory again. I swept net my way into collecting a new record for *S. costiferum*. My knowledge of odonate ecology and behavior helped, but it was rejecting that a cornfield is biologically dull, combined with the feeling I had seen a meadowhawk, that truly landed my trophy.

As a professor, in my publications and technical reports, I - like many biologists - list references for ecological census techniques for the plants and animals I am surveying [5-7]. I don't dare reveal that I think plain luck and stamina are equally important. Was it my knowledge of freshwater mussels and my ability (or some might say, "sampling effort" [8]) to stick my head in a plastic viewing bucket for hours over two days surveying for *Alasmidonta varicosa*, or the luck at finding a specimen on the end of the final day in the last stream riffle I checked? I had passed this riffle at first because I was too tired, but decided to go back and check with a "what the heck" attitude and a feeling that I might have some luck after all.

At seminars, I am often asked how I find animals. I reply that I use the "wandering-point-transect observation survey census method" (a personally imagined method) to sound smart and avoid letting people know that I just aimlessly walk around the woods and stop to look at interesting things, whenever I start to "get the feel for it." Teaching this technique to undergraduates would most likely be shunned by curriculum and accreditation review boards. But perhaps there is a biological basis that justifies my call for students to feel what they learn [9:9]:

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"It is simply not enough for students to master knowledge and logical reasoning skills in the traditional academic sense… the physiology of emotion and its consequent process of feeling have enormous repercussions for the way we learn and for the way we consolidate and access knowledge. The more educators come to understand the nature of the relationship between emotion and cognition, the better they may be able to leverage this relationship in the design of learning environments".

Whether teaching students in the woods of Connecticut or in the monte of south Texas, I want them not only to learn biology, but also to observe and feel biology at work in the natural world around them.

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References

1. Haury DL, Rillero P (1992) Hands-on approaches to science teaching. Questions and answers from the field and research. ERIC Clearinghouse for Science, Mathematics, Environmental Education, Columbus, OH.
2. Apple Inc (2009) Challenged based learning. White paper.
3. Deway J (1959) Experience and education. MacMillian, New York, NY.
4. Kolb DA (1984) Experiential learning: experience as the source of learning and development. Prentice Hall, Englewood Cliffs, NJ.
5. Sutherland WJ (2006) Ecological census techniques Cambridge University Press, Cambridge, UK.
6. Heyer R, Donnelly MA, Foster M, McDiamid R (1994) Measuring and monitoring biological diversity: standards methods for amphibians. Smithsonian Institution Press, Washington, DC.
7. Wilson DE, Cole RF, Nichols JD, Rudran R, Mercedes SD, et al. (1996) Measuring and monitoring biological diversity: standards methods for mammals. Smithsonian Institution Press, Washington, DC.
8. Kovalak WP, Dennis SD, Bates JM (1986) Sampling effort required to find rare species of freshwater mussels. In: Isom, BG (ed) Rationale for sampling and interpretation of ecological data in the assessment of freshwater ecosystems. American Society for Testing and Materials, Philadelphia, PA.
9. Immoridino-Yang MH, Damasio A (2007) We feel, therefore we learn: the relevance of affective and social neuroscience to education. Mind Brain Educ 1: 3-10.