

Choosing a Career: The Fascination of Entomology¹

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Consideration of what draws people to a particular profession seems more appropriate for entomology than for many other fields. Entomology has not had a very good press. This may be typified by an incident when a distinguished scientist was being interviewed about his research on parasitic Hemiptera. The reporter wanted him to be photographed for the newspaper while squinting at a bedbug on the tip of his nose.

The public's image of an impractical eccentric, rather aimlessly chasing about with a butterfly net, is still with us. Popular identification of the term *scientist* comes more easily with *zoologist* or *biologist* (and, of course, *physicist* or *astronomer*) than with *entomologist*. Besides being slightly ludicrous to some, entomology is esoteric to most. The lay public does not have much of an idea of what entomologists do, or for that matter, why they do it. Even today not many people know that insects are essential to the continuation of life as we know it or, the other side of the coin, the great impact of some insects on human health and economics.

However, my thesis today is the interest engendered by entomology, and I think the great importance of entomology to human welfare is not a primary impetus for most people who become entomologists. Insects are fascinating in themselves for the vast majority of entomologists. It is the nature of this fascination that I would like to analyze. An essay of this sort is naturally subjective, and this one is based primarily on my own perceptions. Others will have different views, and I hope this presentation will stimulate further analysis of the subject.

What leads people to become entomologists is not the same question as what is fascinating in this field of study. The element of chance appears to be universal in influencing the choice of a career, whether it be entomology or any other.

Chance may involve a fundamental aspect of one's background, such as having a parent who is an entomologist, although it seems to be the exception for entomology to carry through from one generation to the next. More often it is a chance exposure that may come early or late in individual development. This was very evident in the responses that many members of the Hawaiian Entomological Society kindly provided to my questionnaire. It seems that most entomologists have an interesting story about what brought them into contact with the subject. I once compared notes on this with a British acarologist.² My acarologist friend is a good

¹Presidential Address, presented at the December 1977 meeting of the Hawaiian Entomological Society.

²Entomology is considered in the broad sense, so that *arthropod* can be substituted for *insect* in most cases.

example of late exposure. After getting his degree in a broad field, along the lines of applied zoology, he chanced to meet another graduate on a bus, who told him about a civil service opening in acarology and who, furthermore, happened to have with him a copy of the notice and form for applying. That was it for my friend.

One respondent to the questionnaire described his interest as a "natural process" stemming from observing insects in his yard at the age of five or six and seeing colored illustrations of insects in *National Geographic Magazine* at about the same time. This is typical of a large group. In my own case, the roots (as told to me) go back to age three, when I was praised for identifying bird pictures in Doubleday's *The Nature Library* series. This initial interest in biology was reinforced by the availability of a vacant lot behind my house, where many insects could be observed, and was then followed by a formal insect collection in my early teens. The record in this category among our responding members is one who started an insect collection at age four and had settled on entomology as a career before entering the first grade.

Another large group was influenced by mentors (such as teachers or professors) or peers (such as fellow students), either early in school (e.g., "seventh-grade teacher") or late (e.g., "the first professor met on a nonacademic basis" or "because a good friend decided to pursue entomology in our junior year"). The importance of personal contacts is shown by the influence of Brighton C. Cain on a group of Boy Scouts in Oakland, including Robert L. Usinger, E. Gorton Linsley, Elwood C. Zimmerman, W. Harry Lange, and J. Linsley Gressitt (Usinger, 1972).

I have the permission of Rev. J.C.E. Riotte to summarize his experiences, illustrating the persistence of providence or entomological interest, or both. He was first exposed to entomology by his father at the tender age of four and began rearing and later collecting butterflies and other insects. This avocation was dropped entirely during his university days and was not reinitiated until he was well installed in his parish in eastern Europe. Seeing a rare sphingid caterpillar got him started again, but then there was a long interruption with WW II and its aftermath. It was not until 1952, some years after his moving from Europe to Canada, that Father Riotte saw two different and interesting sphingids at the same place during one day and recommenced his studies. Fortunately, he has continued his work on Lepidoptera since then.

I have spent more time than I intended on the experiences that bring people into entomology. In preparing this talk, I have become more aware of the complexities of the subject, and that it could be greatly expanded. Some entomologists do report a strong sense of contributing to human welfare as bringing them into the field. Others were attracted by the financial security or the badge associated with some civil service positions in entomology. Entomology provides a social refuge for many, in being esoteric and scholarly and able to be pursued alone in the laboratory or the field. We begin to get into psychological and sociological areas that I will not attempt to analyze and that are far afield from the core of my subject.

Having digressed at some length, I will return to the question of what in

entomology fascinates entomologists. In this, many facets are shared with other branches of biology, science, or even scholarly endeavor as a whole. But my interest is from the entomological viewpoint, and there are features that at least have more significance in entomology than in other fields.

Beauty may be in the eye of the beholder, but there are some nearly universal perceptions of what is beautiful. People generally respond with pleasure to bright and vivid colors and to the reflective brilliance of iridescence. In our society, most people can appreciate the beauty of certain butterflies and moths, with their large expanse of wings and frequent association with flowers. That few other insects are thought to be beautiful by the majority seems to result at least partially from the conditioning of western culture. Many other cultures see or have seen beauty in the color and brilliance of a variety of beetles and other insects, in the graceful sweep and play of a cricket's antennae, in the conformation of a scarab. The early entry of many entomologists into a field of interest that becomes a life-long career may be related to lack of prejudice, that is the greater ability of the young to see without prejudgement. The entomologist who told me he was "hooked for life" when as a young boy he saw a box of pinned iridescent tiger beetles might have seen them as just a box of "bugs" at a later stage in life.

However, there is beauty in arthropods that is very much in the eye of the beholder for most entomologists. After all, macrolepidopterists and coleopterists who concentrate their study on the showier forms of insects are a minority among entomologists. I suppose that very nearly every entomologist has an esthetic appreciation for the group or groups he or she studies. In part, this is related to the small being magnified. The details of color, contours, and surface structures as seen through a microscope are often intrinsically beautiful to the human eye, assuming that one does not have a developed prejudice against insects that prevents such appreciation. Fortunately, there are an increasing number of books that bring this sort of beauty to the general reader through macro and micro-photography. However, there are many groups that do not come into this area of general appreciation. For example, I find fleas beautiful, but not all entomologists share this perception. (I will restrict this to the flea under the microscope and not the flea that bites me—an obvious prejudice). For the entomologist, it seems that almost any group under study can have beauty. There is symmetry, there is an endless variety of forms and shapes, and there is a complexity and elegance of working parts. This sort of attractiveness is greater among arthropods than among many other groups because of the hard exoskeleton, which allows for a constancy of form and the development of contours and surface structures not possible in a soft-bodied animal.

The entomologist's sense of beauty per se grades into an appreciation of the *adaptive results of the evolutionary process*. This involves function, including behavior, as well as form. Among fleas and many other ectoparasites, there is a strong correlation between the attachment structures and the nature of the host's hair or feathers. Thus, the spacing of the spines in the combs on fleas and the space between claw and tarsus of lice are in

proportion to the thickness of the host hairs. Observing such a refined adaptive relationship gives the entomologist a sense of esthetic fulfillment. As a functional example, I have experienced a similar satisfaction in observing the precise adaptation of a burrowing flea (*Tunga monositus*) to bring about a synchrony of parasite development, host response, and the nutritional needs of the flea.

I have not meant to imply, by exclusion, that entomology is largely a question of classification and observation. *Experimentation* is a major aspect of work for both the basic and the applied entomologist. Experimental research is an intellectual challenge, an intellectual game. The development of a promising hypothesis and the successful completion of a test represent a tiny part of the experimentalist's time, the rest often being a kind of drudgery; but the smaller part is ample reward for the greater. Some years ago I was involved in testing a tick for the growth of a pathogen from mammals. We had repeatedly recovered the microbe from this tick species in the field and suspected it as a vector. The laboratory results indicated that the pathogen can survive in ticks but does not reproduce and, with negative bite transmission studies, this essentially ruled out the tick as a significant vector. Because each test required triple passages in laboratory mice and because of the long survival of the pathogen in ticks, this single study took most of a year of demanding and intricately planned laboratory work. I believe the creative experience of such scientific experimentation, and observation too, is very close to creativity in the humanities. It seems unfortunate to me that too few students of the humanities receive enough training in the sciences to appreciate this.

An urge to *classify and systematize* seems to be fundamental in the human psyche. It is related to a need to bring order out of chaos that is expressed in nearly every facet of human culture. Classifying is a corollary of collecting, whether it be stamps, match books, beer cans, or renaissance paintings. The ability of preliterate peoples to name or identify, i.e. to classify, great numbers of organisms in their environment is often extraordinary. The systematic biologist is engaged in one of the more challenging and constructive tasks of classifying, one that is essential to all other work in biology. Many entomologists began their studies or are fulfilled by them because of this classifying urge. Along with this, there may be gratification in being the expert on a group. The widely held expectation among lay persons that an entomologist will be able to identify any insect is obviously far from the truth. Each systematist specializes in certain groups, and there usually will be only a handful of others in the world working on one of the same groups. Almost automatically one becomes at least the local, if not the national or world, expert. (That the expert may be a poor systematist does not subtract from the gratification.)

The *opportunity to get out into the field* was noted by several respondents to the questionnaire. An outdoor life or a love of the out-of-doors often came first for those who developed an early interest in insects. I know many entomologists who will find justification for getting into the field but none that I know seek reasons for avoiding it. I find that my most vivid and satisfying memories of travel all involve natural surroundings away

from cities and towns. A career in entomology usually means an opportunity for some exciting travel and, while this may not have been foreseen, it is an important fringe benefit to many.

If there is any common feature that touches all of the many fascinations of entomology, perhaps it is a *sense of discovery*. And how much there is to discover. It is estimated that less than half of the species in most groups have been described, and for some groups it is a tenth or less. This basic inventory may never be completed, and certainly studies in phylogeny, morphology, bionomics, population dynamics, physiology, and economic entomology are without limit. There will continue to be an opportunity for at least some of those who are fascinated by insects and other arthropods to enter a fulfilling career in entomology.

LITERATURE CITED

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