

Wider aspects of a career in entomology. 14. University courses and teaching

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This series of articles outlines some ancillary aspects of my entomological career, for the potential amusement of readers. It reports the sometimes unexpected challenges of working in new places and in the real world, an approach that serves also to expose some conclusions about research and other entomological activities and some information about insects and their environments. This article stems from my experience with university teaching.



I taught at universities for a few years following my early work in Canada on cold hardiness and arctic insects. Later, my travels on behalf of the Biological Survey of Canada included guest lectures and seminars in university settings, as well as informal advice to students.

No seminars had been required during school or undergraduate studies in England, unlike North America. Furthermore, there were no graduate courses in which talks could be practiced, and graduate students seldom gave papers at scientific meetings. Therefore, my very first seminar (at the Imperial College field station) was a summary of the results of my thesis. Every PhD student was required to make such a presentation, although it was not part of the official oral examination.

The duration prescribed was 20 minutes, which seemed to be an eternity, so I learned my talk word for word to offset any nervousness or other difficulties. Subsequently, it took me some time to get used to presenting information—although 20 minutes soon seemed too short!

I gave hundreds of presentations over the next 40 years, but still liked to prepare more intensively than most of my North American colleagues. Indeed, I developed detailed notes for university courses, and then distributed them to the students, and continued to use detailed notes for lectures and seminars throughout my career.

Students appreciated the course notes. One told me a few years later that at his next university he had passed them on to a faculty member, who then used them, unmodified, to teach his own classes. Imitation is supposed to be the sincerest form of flattery (even in the absence of acknowledgement), but the practice would also have saved him the many hours of work needed to prepare each lecture!

My time in the Department of Entomology at North Carolina State University in Raleigh (1972–1974, noted in *ESC Bulletin* 51: 89) included lectures and laboratories about insect ecology and pest populations, part of an MSc program in insect pest management.

The first set of assignments handed in by that class of graduate students amazed me—not because the work was impressive, but because so much of it was awful. Typical students had little knowledge of science in general (let alone of ecological or entomological subjects), and many appeared to lack familiarity with the rules of English grammar. I had to adjust my expectations to ensure that they were treated fairly.

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My undergraduate teaching in the Department of Biological Sciences at Brock University in St Catharines, Ontario, lasted only 2½ years (1974–1977) but included all or part of 11 different courses, from first to fourth year, in biology, general ecology, zoogeography, and insect diversity and ecology. Those courses involved lectures, laboratories¹, tutorials, and seminars, as well as work with individual students on special topics and honours research. Field courses (see below) emphasized entomology. There was also a special-topics course at the graduate level, although only an MSc program was in place at that time.

Students were asked to examine and identify a range of taxa during the entomology laboratories. The specimens they handled suffered remarkable abuse, but in anticipation of damage I had prepared a separate course collection. Fortunately, replacement specimens of many taxa could be obtained from the nearby Niagara Escarpment.

Habitats there included Carolinian woodland (Figure 1), especially on the slopes, and open areas on the top (Figure 2), contrasting with the heavily farmed lands of southern Ontario (Figure 3). Moreover, during visits to the area with students, insects could easily be found to demonstrate ecological and other themes (e.g., Figures 4, 5, and captions), thus helping to consolidate the lecture material.

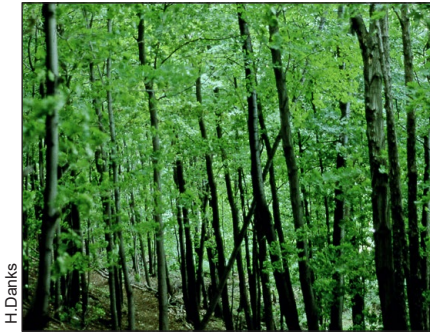


Figure 1. Carolinian woodland on the Niagara Escarpment near Brock University, shown in 1975.

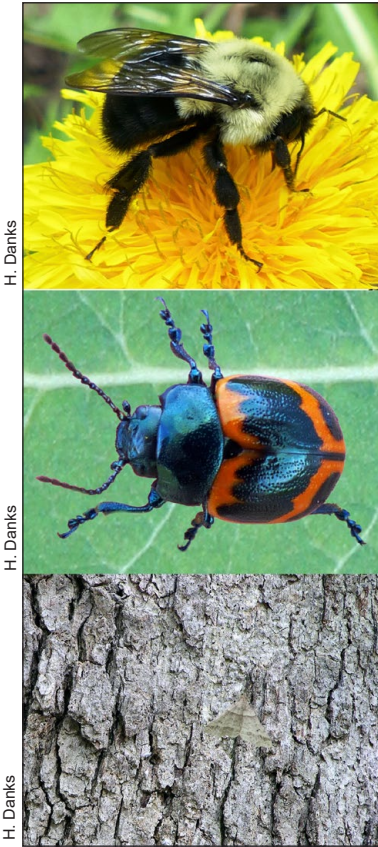


Figure 2. Open habitat on the Niagara Escarpment near Brock University, shown in 1975.



Figure 3. An agricultural landscape in southern Ontario.

¹No laboratory was feasible for the zoogeography course, but a time-slot had been assigned each week anyway: the last 2 hours on Friday afternoon. Students elected to hear a double lecture without a break so that they could leave early.



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Figure 4. Examples of insects easily observed in the field to illustrate adaptations of colour and other features. Top to bottom: bumble bee (warning coloration to deter predators, structures to collect food from flowers); milkweed beetle (warning coloration); geometrid moth on tree bark (camouflage colour, pattern, and posture to avoid predation).



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Figure 5. Examples of insects easily observed in the field to illustrate key features. Top to bottom: grasshopper (hindlegs for jumping, stridulation for mating); dragonfly (large eyes and adept flight for hunting); gall of the goldenrod gall fly (plant response induced to obtain food and shelter).

Students were invited to bring in additional specimens. During one laboratory, a student reported finding on his bath a tiny arthropod of unusual appearance, and he asked me to identify it. His classmates crowded around expectantly, as a glance down his microscope revealed ... a crab louse (Figure 6). “Interesting,” I said. “Let me check on that and get back to you.” Later, when his find (including claws adapted for grasping hairs) was explained privately, he did not seem to realize that the identification had been deferred deliberately!

One of my lectures in that course focussed on Orthoptera. After the bulk of the material had been covered, a quick check of



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Figure 6. The crab louse *Phthirus pubis*. Length 1–2 mm.

the clock showed that 20 minutes were still left—prompting me to elaborate on the behavioural and other traits of grasshoppers and their allies, discuss the economic importance of certain species, and tell anecdotes from the field. Another check of the clock showed that ... 20 minutes were left. The clock had stopped, and just then the bell rang to indicate the end of the period, deferring the remaining content to the next session.

Another course included a visit to the nearby Vineland research station of the Canada Department of Agriculture (now Agriculture and Agri-Food Canada), where scientists had generously agreed to explain their work in apple orchards. After a talk about the management of insect pests, a student asked: “What treatment would you recommend for a backyard apple tree?” The student was aghast when the researcher replied: “A chainsaw.” A neglected or inadequately treated tree (Figure 7) generates thousands of pests that infest commercial orchards.



Figure 7. A neglected garden apple tree.

Fortunately, most of my classes contained fewer than 70 students (some only half that number) and it was possible to learn their names and know them as individuals rather than simply as a room full of people, a route to teaching more effectively. Individual differences among students depended chiefly on their personalities and abilities, and appeared to be unrelated to the subject of a given course.

Significant traits included basic intelligence, diligence, organizational ability, judgment, willingness to cooperate, and interest in the subject. Performance reflected the interaction of those features. Many students did their best, but lazy students did not realize their full potential. Hard-working but struggling students might not fully comprehend the information, though some would memorize sections of the textbook in order to regurgitate the text word for word during tests. A few students specialized in trying to avoid work².

There were modest daily penalties for failing to meet deadlines for the submission of reports. Nevertheless, many students left their assignments until the last minute, although weeks might be available to prepare them³. Of course, some latecomers tried creative (but invariably inadequate) excuses⁴.

Most students established consistent individual patterns of performance. Therefore, to guard against bias, I began to mark questions backwards from the end of each test without looking at the names. Even so, individuals continued to earn the same grade for different tasks. Also, during end-of-term evaluations conducted by the department, considerable numbers of students had similar marks (even the same percentage for the whole term) in completely different courses taught by faculty who had not previously exchanged any information about them.

²Some of these students prepared elaborate (or ridiculous) excuses, laid on the charm for the instructor, or argued for extra marks, for example. Many sought clues to the content of examinations so as to study only those topics. A number tried to exploit fellow students by doing little during joint laboratory exercises, or by borrowing lecture notes and lab reports.

³The morning after one deadline, I was working in my office before the constant interruptions that would soon start. A report was slipped under the closed door, with the notation *Submitted at 11:25 p.m. on 10th*, to which could be appended *Delivered at 7:25 a.m. on 11th ...*

⁴Including attempts at humour comparable to “insects ate my homework” or “there was a bug in my computer”.

Each class had a distinctive “group personality”, an attribute that might differ strongly between successive years of the same course; it depended chiefly on the mindset of students with leadership abilities as well as on individual attitudes. Some groups were heavily involved, eager to learn, and a pleasure to teach. At the other extreme, one or two classes could euphemistically be called “challenging”, and it was sometimes difficult to ensure that the few keen students there were not disadvantaged.

Subsections of the same course might be strikingly different too. One large first-year course, which explored the relevance of biology to human societies, was divided into small groups for tutorials. Most tutorials held beginning students, but a few were made up of teachers attending evening classes for additional training. The teachers could develop a topic with little guidance other than hearing biological information and its context; but persuading the young students to join in discussions was like trying to get blood out of a stone at first, demonstrating that successful teaching relies on finding ways to engage the participants and make them feel comfortable.

Course evaluations by students received increasing attention during my time at Brock University. Student opinions are informative but sometimes misleading, depending on the instructor⁵, and also on the students.

Undergraduates in biology were required to take two out of three core courses during their second year. The course on ecology was regarded as the easiest of the three, but two of three faculty now teaching it (including me) were new, and it had become more difficult. Marks from the first major test were unexpected: they were distributed bimodally (cf. Figure 8), with a typical spread around 65–70%, plus a smaller set of much lower marks.

The weak students proved to have chosen the course because it was reputed to be easy, and such “course-spotters” complained to the Chair of the department and filled out highly critical evaluations. The Chair summoned the three of us to a meeting and appeared to take the side of the critics. I responded that we thought the course was good, but would change it if ordered to do so, an offer that—as expected—he declined! The following year, when course-spotters had enrolled elsewhere, it was especially satisfying to send him the positive course evaluations ...

My 3-hour final examination in zoogeography tried to elicit information and concepts, and also called for longer answers on a few subjects that could be chosen from a range of questions. Students taking a second-year sociology examination in the same room finished quickly, and most left within an hour; their examination was scheduled for 3 hours too, but consisted chiefly of easy True-False questions⁶. A few other questions (based on assigned reading) were equally easy, so

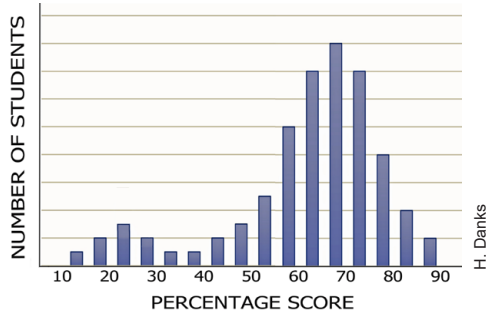


Figure 8. A bimodal pattern, simulating a typical range of examination scores plus a separate mode of underperformers.

⁵For example, well known experiments, begun in the 1970s with a professional actor introduced as “Dr Fox”, showed that students rate an expressive lecturer highly irrespective of the value of the material presented. Low-content lectures, even those deemed highly attractive and valuable by the students, resulted in poor performances in subsequent examinations. Lectures with substantial content led to vastly superior test performances, which were similar whether the lectures were monotonous and relatively unpopular, or expressive and well received. Other variables include the likelihood that students required to take courses in which they have no interest will rank them lower. Wider impacts, such as subsequent interest in the subject, are more difficult to evaluate.

⁶One of the most sophisticated questions read: People in authority (such as teachers) use positive reinforcement (such as rewards) and negative reinforcement (such as punishments) to influence behaviour; True or False.

the exercise was a course-spotters delight: most people would receive an A without attending any of the course. Moreover, answer sheets used machine-readable pencil marks, so that scoring (like preparing the test itself) required little effort, unlike my long hours of marking zoogeography papers!

University lectures and seminars during my later travels on behalf of the Biological Survey of Canada synthesized information about insect diversity and faunal patterns in Canada. Others treated adaptations such as dormancy and cold hardiness. Entomology faculty were unfailingly helpful, and many students asked good questions after the seminars. However, at a university in Ontario one senior zoology professor asked me: “Why haven’t you people put out a book like *The birds of Canada* so that the rest of us can identify our insect species?” Evidently, he did not know the true diversity of the arthropods, suggesting that biology students in his department were not well served. Perhaps, when he was a student himself, his course on animal diversity had been too easy!

My teaching at Brock University included two field-course modules for degree credit. They were part of the Ontario Universities Field Biology Course, and so contained students from several different universities. A module on tropical field biology, in Belize, was characterized in ESC *Bulletin* 51: 153.

My other field course, on insect ecology, was held at the Queen’s University Biological Station in southern Ontario (Figure 9). This site has a variety of habitats, and also allows access to Lake Opinicon (Figure 10).

The class lasted about a week. Initially, everyone collected in a meadow, using sweep nets and pan traps, for example, and then examined the material in the laboratory. Subsequently, students could choose (according to their interests) one of several separate projects carried out by a few students each.

Most field courses were held in early summer (like mine) or at its end, so that they would not interrupt the period when students might want to take summer jobs. Unfortunately, that year the scheduled period in May was unusually cold and wet, and two of the separate projects were particularly compromised.



Figure 9. The locations of Queen’s University Biological Station (*QUBS) and Brock University (*Brock U) in southern Ontario.



Figure 10. Part of Lake Opinicon. The Queen’s University Biological Station is located in the centre of this image. (Perimeter shoreline of the whole lake 57 km, surface area 787 ha, maximum depth about 11 m.)

One project assessed the diel periodicity of emergence of lake-inhabiting chironomid midges (e.g., Figure 11), by emptying emergence traps throughout the 24-hour period. Relatively few insects appeared. Instead, chilled students sheltered in any suitable clothing they could find, motionless in the cold as they waited for the next sampling period.

Another project studied pollinators, but the students looked in vain for insects flitting about showing interesting behaviours and patterns of flower visitation. Instead, chilled pollinators sheltered in any suitable vegetation they could find (e.g., Figure 12), motionless in the cold as they waited for the



Figure 11. Lake chironomids, female (top) and male. Length up to about 1 cm.

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Figure 12. A potential pollinator sheltering in vegetation. Length 1.3 cm.

weather to change.

Most participants in my module were diligent and effective, but two friends (not from Brock University) evidently had come for a vacation rather than for study. They spent more time on the lakeshore, and fetching beer from the closest village, than making any effort in a project, and seemed surprised that the instructor would notice their many absences and frequent custody of fishing

rods. Neither one submitted a final report after returning home.

Another module of the Ontario Universities course took place at the same facility that week. It was led by a senior professor from one of the Ottawa universities. He came at the beginning of the course, had the students dig up soil cores and transfer them to white trays, told them to sort out what they could find, and went back to Ottawa. He returned only for the last day or two. Clearly, the sociologist at Brock University was not the only professor who made little effort to challenge his students.

Participants at the biological station were expected to present their findings at the end of each course. The first student spoke on behalf of the soil-core group. He reported surprisingly few taxa, and justified the limited results by noting that the project “had been done using simple equipment.”

In contrast, our general sampling revealed considerable diversity of arthropod form and function, and allowed some quantification. The student who presented those results was a fluent speaker, and he chose to echo the previous presentation by saying, in a sarcastic tone, that our work “had been done using simple equipment, ...like sweep nets.” Other students described detailed results from their separate projects.

Participants in my course told me later that many students from the other group were upset to discover how little they had been taught. This fact would not have worried any “course-spot-ter”—nor two of the people in my own module!

Travel to field courses was often noteworthy. The trip from St Catharines to Lake Opinicon included a 400-km drive in a rented passenger van, carrying equipment for the course as well as Brock University students. In Belize, an execrable “bus” ride (described in *ESC Bulletin* 51: 157) and a rudimentary boat cruise (Figure 13) were required to reach the study sites.

Nevertheless, those experiences were less striking than a journey to the island of Jersey for one of my own field courses as a student. That island is reached by ferry across the English Channel, a body of water renowned for rough seas (cf. Figure 14). A classmate who greatly feared sea sickness decided that the solution was to dull his senses with repeated doses of vodka. He did escape sea sickness, but we had to carry him off the boat.

The return crossing was particularly rough. Pallid faces validated the idiom “green around the gills” as many students struggled to fight off waves of nausea. Others staggered queasily towards the dreadful sounds and smells coming from bathrooms so crowded that people overflowed into the corridors, where they leaned weakly on the walls or groaned helplessly on the floor, trying not to add to the spreading mess.

Two seasoned crew members stood nearby and surveyed the chaos. “We have another group like this on the way back,” said one, with an air of resignation. The other looked skyward and rolled his eyes.

That abominable journey lasted for hours, with no respite from rough seas or retching passengers. The ordeal did have some value, however: recalling it demonstrated that every difficulty during my own courses was inconsequential!



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Figure 13. Fishing vessel towing a boat full of students about 25 km to a field site in Belize in 1976.



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Figure 14. Rough seas viewed from a ferry.

