

FOUNDERS' WESTERN FOREST INSECT WORK CONFERENCE AWARD SPEECH

RAMBLINGS

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Ladies and gentlemen, fellow forest entomologists. I am particularly pleased to receive the Founders' Award of the Western Forest Insect Work Conference, because above all else, I consider myself to be a forest entomologist. It might be customary on an occasion such as this to make a lengthy speech on the lives and times of long-dead founders of our profession. I am certainly deeply in their debt, and profoundly honoured to receive this award in their memory.

However, I have been a forest entomologist for 38 years, and am certainly venerable enough to be considered at least a bit of a founder in my own right. Therefore, I'm going to give a long speech about myself. You will doubtless find mention of my own mentors, who by age alone, lie even closer than me to the true beginnings of our profession.

I have entitled this presentation *Ramblings* for good reason. Firstly, our vocation involves a great deal of travel. Secondly, at my age, this title increasingly describes my way of thinking. So I'm going to ramble through my life to give you some idea of the experiences and thoughts that have shaped one of your colleagues. This is my story.

My travels began early. I was born in 1938 in Berkeley, California, nine months after my father got his Ph.D. One year later, the family moved to Vancouver, where my father had taken a position as an Assistant Professor in the German Department at the University of British Columbia (UBC). I don't remember the trip, but I understand that I cried a lot and was generally unpleasant.

It was not until 1946, when I was eight that I genuinely fell in love with travelling. That summer, our family of four set out for Berkeley in

our 1940 Chevrolet sedan. I remember the old cement road surface of Highway 99, with strips of tar between the plates, the forested hills of Oregon, and the broadening plains of northern California. One night I laid in bed in the auto court (later known as a motel), and listened to the diesel freight trucks passing by. I felt an almost overwhelming sense of adventure, of expectation, of wonder and of freedom. To this day, the smell of diesel exhaust makes me long to travel again.

The summer that followed was idyllic, full of warm earth and the scent of eucalyptus in the California sun, real blue jeans with long pant legs, and learning to roller skate on an empty street. While most of my time was my own, each afternoon my mother would sit on the front porch of our rented house, and read out loud a chapter from an Oz book. At first she read only to my friend Ricky and me. But word spread, and before long, by early afternoon there would be a sizable crowd of expectant listeners sitting patiently on the dry lawn, probably about a three-block catchment area.

What do Oz books have to do with forest entomology? Well, they are fantasy, at least to me. Fantasy leads to imagination. I know that imagination expressed in play by children leads, in turn, to originality in adults. Today I firmly believe in unstructured play for children. Although my play today is somewhat more structured (I have to publish the results), as a forest entomologist I still get to play in the woods. Perhaps some of my originality stems from that carefree California summer.

Some of you may know me as determined and highly competitive in nature. I may have honed these traits at summer camp in August of my 12th year, when I still went by my middle

name Harvey. Morecroft Camp was nestled in a beautiful second-growth forest around two little coves on the east shore of Vancouver Island near Nanoose Bay. There was lots of time for imaginative play, but by the age of 11 my inclination for that passtime had ended, and I spent most of my unstructured time with other boys, throwing rocks into the water. The camp had both girls and boys, and we were divided into two mixed-sex tribes, the Nanaimo (to which I belonged) and the Nanoose. We had a month-long competition in many activities dreamed up by our imaginative counsellors. One day they announced that the boys would have a cross-country run (the girls at that time being considered too delicate for such a feat). I was timid and lacked confidence. I quailed at the prospect. I loved to run, but I was awfully slow.

Off we went in a closely bunched pack, a few loudmouths proclaiming their certain victory. But the course was long, and the day was hot. Gradually, the pack strung out. To my surprise, about a third of the way through the race, I found myself in a group of three boys, in front! A strapping 14-year-old named Ross quickly fixed that, and bolted away, never to be seen again. I was left with Bradley, a taciturn 13-year-old who gradually pulled away from me. I lost sight of him at the turning point, and ran alone the entire return leg down the dusty road back to camp. I ran partly out of new-found determination, and partly out of fear of what might be catching me from behind, a fear that I have never quite lost.

As I rounded the corner into the grassy field that marked the finish line, I was astonished to see the crowd of girls and counsellors waiting for their fellow tribespersons. They were equally astonished to see me. I heard someone say "It's Harvey!" And they cheered. It was the first time that I had ever heard applause for something that I did on my own. And I won three points for the Nanaimo tribe. From that day on I loved competition.

Because of my father, I also came to love British Columbia. My father grew up in Germany. At the age of 17, he discovered, to his surprise, a great family secret. He had been born an American. When he was four, his widowed mother had returned with him and his sister to Germany after the death of his father. He

promptly left home, made his way to Hamburg, and got a one-way passage to New York (the place of his birth) working as a cabin boy on a freighter. He arrived at Ellis Island with nothing but his birth certificate and a pair of brass knuckles that he had found on the ship. After some time, the authorities located his snobbish New England relatives. They spurned him, but did find him a job in a coal mine in upstate New York. There he re-learned English by correspondence courses, and after that worked his way west across America. At the age of 24, he quit a highly skilled job as a photoengraver, and entered UCLA where he majored in German literature and botany. Years later, when anyone asked him where he learned to speak such good German, he always said UCLA.

As a German professor, he wasn't very good. But he was a passionate amateur archaeologist, and he became very good at that. When he was 40, UBC allowed him to switch to archaeology, as long as he kept his full teaching load in German. But money was short, and so he took me with him in the field as a docile source of cheap labor. I learned the craft well, in surveys and digs all over the province, and it satisfied my need for both adventure and travel. I learned to think, not only like my father, but like a native who relied on nature, and thus to really appreciate nature. The life was tough. We camped outside, we got very hot, very wet, and very dirty.

I remember particularly one enchanted day when I was 13. We were surveying the upper Kootenay River south of Cranbrook, before the land was flooded by the Libby Dam in Montana. We came across a sandy knoll near a shallow stretch of river, a perfect place to wait for game to cross. Sure enough, the knoll was littered with obsidian and basalt flakes, and broken arrowheads where the native hunters had sat making and breaking tools while they waited for game. And while my father busied himself elsewhere, I sat on top the knoll, imagining myself to be a fearsome hunter, waiting for my elk to cross the river.

Now almost 50 years later, in my profession as a forest entomologist, I retrace my father's footsteps across the land, from Squamish to Kitwano, from the Chilcotin Plateau to Invermere, from Yahk to the Liard River Valley.

And everywhere I go, I feel my father's spirit watching over me.

Speaking of my father, his ghost rose unexpectedly last year on a forest health field trip out of Vanderhoof in north-central B.C. At one stop in the usual tour, the gathering of forest entomologists and pathologists assembled around a somewhat overly enthusiastic Forest Service Recreation Officer, who was to tell us about culturally modified trees. While his audience patiently fed the local mosquitoes, he explained at length that the lodgepole pines with basal scars that we thought were because of fire were actually native food trees. As the Indians traveled along the network of trails in early spring when food was scarce, they would strip the basal bark from one side of the vigorous young trees, and scrape off the thin layers of freshly laid cells near the cambium. The nutritious pulp sustained them until other food sources became more plentiful.

After enlightening us about native food trees, our teacher went on to talk about cultural deposits in the area, including a large prehistoric village site on which a potato farm now sat. Unable to contain myself, I blurted out that I had visited that farm with my father in 1952. "Who was your father?" he asked. "Carl Borden" I murmured, suddenly embarrassed. "Not Charles E. Borden, the famous archaeologist?" he asked excitedly. "That's him" I replied. "And what do you do?" he said. "I'm a forest entomologist" I told him proudly, expecting approval. "Oh" he said, looking at me as if I had some sort of genetic defect, and moved on to another topic.

Because my parents, who were both successful academics, expected me to succeed scholastically, I chose to be mediocre. I was not supposed to do blue collar work, from which they both escaped, so I got various blue collar jobs, such a farm laborer, waiter on the railroad, and steel worker. Things came to a head in 1957 with a grade of 10% in Physical Chemistry at UBC, washing me nicely out of pre-med. So much for "my son, the doctor."

Not prepared to face the consequences of my failure, I ran away to California to visit my relatives, who I just knew would be glad to see me. It is thus not surprising that I overstayed my

welcome, and failed to realize this until a crisis loomed. What to do? I didn't want to give up, grow up and go home. So I chose the military. I thought the Coast Guard would be nice. But it would be a month before they took me. So I walked around the corner in downtown Oakland and joined the Marines. Two days later I was in boot camp.

Now this was a rude shock. For the first time in my life I had to really face up to the consequences of my decisions. In the first place, I found the Marine Corps to be an organization totally devoid of and unreceptive to either humour or intelligent ideas, both of which I tried valiantly to offer. Secondly, Gunnery Sergeant McCants and his three assistant drill instructors seemed to be universally convinced that I had few skills of any use to the Corps, and they were especially intent on letting me know that I had no future at all in marching. Lastly, they were training us to kill people. But no-one wanted to be a cook, so I volunteered to go to cook's school to get out of the infantry. I hated it, and I was bad at it, the worst cook in the Corps, a trained killer of another sort if you will. It was a long 4 years.

I had enlisted between wars, and thus didn't endanger anyone, and I had time to grow up. Gradually I began to think that maybe, if I actually worked hard, I might succeed as a scholar. For my last tour, I was stationed at Marine Corps Air Station, Kaneohe Bay, Hawaii. Finally my time came to return to San Francisco for discharge. We were four miserable days at sea on an ancient troop carrier. On the morning of the fifth day, we were roused out of our racks at zero dark thirty, and herded up on deck in a pitch-black, dank and foggy world. We sat there for two hours. Slowly the fog turned grey as dawn approached. Suddenly, the fog parted ahead of the ship, and there to my amazement, in brilliant sunlight in an otherwise grey world, not touching land but suspended from cloud to cloud, was the Golden Gate bridge. Surely this was a divine signal, my personal sign of a bridge that I could cross to a better life.

It was. Because I didn't want to return to UBC, the scene of my past failures, I had gained admission to Washington State University as a wildlife biology major. Ever eager, I arrived several days before classes began, and went to

visit Dr. Irvin O. Buss, the senior wildlife biologist at the university. He asked if I wanted to go on a game check with some graduate students. I jumped at the chance. So off I went in a pick-up truck up to the town of Okanogan, where we stationed ourselves with a state Fish and Game Officer near the exit of a forestry road. We intercepted each and every grouse hunter heading home with a proud brace of birds. How could they resist three students who wanted to take samples from their birds, especially if they were guarded by a gun-carrying cop? The first student (with permission, of course) snipped off the wing tip and tail feathers for later analysis. The second aged the bird by shoving a blunt probe up its nether parts, searching for a diverticulum in the cloaca. And I (with permission, of course) removed the food-laden crop and gouged the eyes out with scissors, dropping each into separate vials of ethanol. I'll never forget the forlorn look on the faces of the hunters as I handed their once proud birds back to them. "This is wildlife biology?" I thought. "There has to be something better than this."

There was. In my second semester, I had to take an entomology course. I knew, halfway through, that I was going to be an entomologist. "Don't do it" said my botany professor. "DDT has solved all the really important entomological problems." Then it dawned on me that there were insects in the forest. Could I truly have my cake and eat it too? Could I work with insects in the forest, and return to those wonderful days of summer camp and roaming archaeological surveys? "Don't do it" said my entomology professors, intoning that forest insects are of little consequence compared to the really important pests of agriculture and medicine. So I decided to become a forest entomologist. Today I feel somewhat vindicated as the mountain pine beetle continues to kill about a billion dollars worth of timber every year in British Columbia.

My first day as a forest entomologist in 1963, however, did not go at all well. Earlier that year, I had narrowed my choices down to Oregon State University and the University of California at Berkeley, and had visited both campuses. Oregon State was acceptable, with interesting students like Gary Pitman, Bob Gara and Mike Atkins, but they seemed to complain a lot. At Berkeley, there were more faculty and a whole bunch of students

happily crammed into the basement of Agriculture Hall. I opted for Berkeley. Happy to leave Pullman, Washington, I said goodbye to Edna, my already long-suffering wife of one year, who returned to Vancouver to live with her parents, while awaiting the birth of our first child. And I, oblivious to any familial duties, headed off south in our Volkswagen beetle (I even took the car). Once again, California beckoned, this time where Ron Stark had offered me a summer job as a research technician at the princely sum of \$475 per month.

Two days later, I arrived at the Department of Entomology in Berkeley very early in the morning. I signed in and asked where I could begin work. They told me Blodgett Forest, showed me a where it was on a map, and suggested I begin the following day. "Not likely" I said, jumped in the beetle and headed up through Sacramento, Auburn, Cool and Georgetown, arriving at Blodgett Forest headquarters in a cloud of red Sierra dust at about 1:45 p.m., ready to go to work. It was hot and silent. There was nothing moving, no sign of human life. Where was I to work? Whom would I work with? I wandered around aimlessly, raising little puffs of red dust.

Suddenly, out of the corner of my eye, I spotted something moving. Yes, it looked like a hard hat behind a ridge of fresh dirt, obviously an excavation for a new building behind it. I bested the ridge and called out "Hi" to the diminutive person facing away from me under the orange hat. Suddenly he wheeled to face me, a revolver raised in line with my chest. "Don't shoot, I said. I'm just a new graduate student" (at that moment I thought, one without much chance of a very long tenure). "Oh", he said, "nice to meet you", lowering the gun. This was Dick Tinus, a gun aficionado and fellow graduate student, who had been practicing quick draws in the basement excavation of what was to be Ron Stark's A-frame. Dick went on to become a very accomplished tree physiologist with the US Forest Service in Flagstaff, Arizona.

Only a little shaken (I was, after all, an ex-Marine cook), I explained my quest for Ron Stark, my new boss. "All the entomologists are up in the staff house", he said, pointing up a slight rise to a very new frame building, with a high front porch,

not yet with any stairs, and as I was soon to learn, studs, but no walls in the interior. I looked at my watch—2:00 p.m. What would they be doing in there? I made my way around to the back, finding a low stoop and the back door slightly ajar. I pushed it open. On the far wall, in a small bed, I instantly recognized the prostrate form of Dave Wood, clearly sound asleep. To the left, Ron Stark, also asleep. To the right, similarly dead to the world, Imre Otvos and Jule Caylor, both forest entomology graduate students. I looked again at my watch, 2:05 p.m. What to do? I backed out quietly, closed the door behind me, sat on the stoop, and thought about Oregon State.

But I was irrepensible. I had to get to work—I was already on the payroll. So I boldly marched inside, up to the slumbering Ron Stark, and gently shook him by the shoulder. He turned his head, opened one eye, got me in focus, and asked "Who are you?" (or something like that). "I'm John Borden, your new graduate student," I eagerly replied. After a protracted silence, while he evidently mulled over this disquieting news, he uttered two more words, which I recall were not exactly comforting. So I went and sat on the stoop again, this time thinking really seriously about Oregon State.

Gradually, however, the people inside began to stir and stumble around. I soon learned that there had been a little celebration the previous night (such events seemed to occur quite frequently in 1963), and there had been a need to catch up on some lost sleep. The crew had not shirked work, however. They had gone straight from the Buckeye Bar and Grill out to the forest to take the pre-dawn reading of Dave Wood's boiler gauges, plugged into trees to assess their oleoresin exudation pressure as a measure of their potential resistance to bark beetles. In a series of tasks, with which I was to become all too familiar that summer, they had removed the sticky and resinous gauges, packed them into surplus ammunition bags, brought them back to headquarters, cleaned them with pressurized xylene while they had breakfast, and returned to the woods to plug a new set of trees. They had left the most healthy of the revellers, Alex Pannesenko, the mad Russian, out in the woods to take readings throughout the day, and only then had they taken a brief little nap.

It turned out to be a great summer. I loved working for Ron Stark, who showered me with ideas for research. In addition to carpentry on his new A-frame house and laboratory, I began to work out the life history of a cone-boring tortricid, and I supervised three summer students who completely debarked five fallen white firs, yielding much valuable life table data on the fir engraver. Both studies resulted in publications in refereed journals, not a bad start for a first summer of work.

I admired Ron greatly for his uncanny ability to recognize and nurture potential talent that others had missed in his students. He supervised each individual differently, with great patience, and only as much as necessary. Toward that end, he took me aside one day and told me to cool it because I was beginning to annoy people. Looking back, I wonder what took him so long. In August, he gave me the week off that I requested, so I could make a mad drive to Vancouver, where I arrived 1.5 days before the birth of our first son. But most importantly from a professional standpoint, when I came to him the following January to explain my new-found passion for insect antennae, and my desire to work with Dave Wood on olfaction in bark beetles, he unreservedly gave me his blessing.

And so the irrepensible John Borden came under the guidance of the irrepensible Dave Wood. With Dave's enthusiastic stimulation in a suddenly hot field, I raced through my masters and Ph.D. degrees in three years flat. But Dave also taught me the benefits of sharing ideas, the value of maintaining the highest possible standards in research, the sheer joy of rigorous editing, and particularly about scientific ethics. I had come to value his highly ethical nature the previous summer, because the boiler gauge project (which unfortunately never yielded publishable data) was done because of his disappointment with a study by another group, that had obtained contradictory data over a two-year period, but only published the "good" data from the first year. I again saw and admired his enduring sense of ethics over the next three years as he and Milt Silverstein steered their way cleanly through the highly competitive (and sometimes cutthroat) early days of bark beetle chemical ecology.

In 1966, I was hired by Simon Fraser University, a new university in British Columbia, which had sent a recruiting team to scour western US universities for likely faculty candidates. It was a good choice. My research career has allowed me to work with many forest insects in numerous situations, to emphasize basic as well as applied research, and to supervise 101 bright and able graduate students. Most unfortunately, Jim Richerson, my first Ph.D. student and a brilliant behaviorist, died of a massive heart attack two years ago in Alpine Texas, where he was head of the Biology Department at Sul Ross State University.

My success has been facilitated by a series of postgraduate mentors. These include: the late John Chapman, a scientist at the Pacific Forestry Centre, who taught me about ambrosia beetle biology and the importance of odour meteorology; Hec Richmond, British Columbia's first consulting forest entomologist, who enthralled me with tales of ambrosia beetle swarms following logging trucks out of the woods, and who made it possible to do our first industrial experiment; and Bryan Beirne, the first Director of the Pestology Centre at SFU, who taught me how to avoid becoming an administrator. I have also had many gifted collaborators such as chemists Milt Silverstein, Cam Oehlschlager and Keith Slessor, and more recently Gerhard and Regine Gries. Since 1974, I have been dependent on two long term employees, Research Associate Harold Pierce, and my Technician Leslie Chong, whose efforts I deeply appreciate. In soap-opera fashion, my real wife calls Leslie "John's other wife".

There have been successful discoveries, the chance to influence government policy, and opportunities for international travel. I would like to tell you, through specific examples, a little about each of these.

Probably the most profound of the discoveries made through collaborative research were the early ones on the chemical ecology of ambrosia beetles. There were no high-tech short cuts to identifying pheromones when we began our work in 1967. Our first two targets were the striped ambrosia beetle, *Trypodendron lineatum* and its companion *Gnathotrichus sulcatus*. My then-technician, Eveline Stokkink, and I spent

several years collecting litter and duff containing overwintering *Trypodendron* in the wet snow and cold spring rains around coastal dryland sorts. *Gnathotrichus*, which overwinters in its host, was collected in hundreds of infested stumps and logs, which were placed in Old Blue, a 10 × 50 foot trailer, that had served many years in the construction industry before ending its days as a insect-rearing cage.

We were fortunate to be able to collaborate with Milt Silverstein, one of the truly great pioneers of the new field of chemical ecology, who had recently moved to the New York State College of Environmental Science and Forestry at Syracuse. We satisfied his ever increasing demands for more starting material by collecting the pheromone-laden frass from 21 000 male *Gnathotrichus* and 25 000 female *Trypodendron*. The frass was shipped in dry ice to Syracuse. *Gnathotrichus sulcatus* was the easy one. Its pheromone was identified as a simple 8-carbon compound, 6-methyl-5-hepten-2-ol, and given the trivial name sulcatol. What was more interesting was that it had two optical isomers, both of which were required to induce attraction, the first discovery in the world of such a phenomenon. Some time later, John McLean worked with Milt Silverstein to discover that males of the closely related species, *Gnathotrichus retusus*, produce and utilize pure (S)-(+)-sulcatol, now dubbed retusol by Phero Tech. The commercial demand for this compound stimulated Cam Oehlschlager to develop an innovative synthesis using porcine pancreatic lipase, the first industrial use of enzymes to produce a pure optical isomer of an insect pheromone.

The pheromone of *Trypodendron lineatum* was more difficult. We had identified a probable compound in 1970, but it was a 10-carbon, tricyclic molecule that defied synthesis for six more years, and thus could not be field tested. So in 1977 we naively published the tentative structure. By the spring of 1976, however, we did have a total of 23 mg of synthetic lineatin, produced by a long and difficult synthesis. Bear in mind that a milligram would be about the diameter of a period on a printed page, and this was about 2/100 of that, a virtually invisible amount. We made a benzene extract of synthetic lineatin and waited for good weather.

On April 28, 1976 John McLean and I climbed into the truck (we only had one at that time) and headed for Vancouver Island. It is perhaps ironic that the experimental site was on the shore of Lake Cowichan, where for many years lindane was aerially sprayed onto log booms in the lake at the astounding rate of 1 kg per ha. The spray program had been halted in 1970 when lindane was found in oysters at the mouth of the Cowichan River, leaving the forest industry with no effective direct control method for ambrosia beetles. At about 1:00 p.m. we set up a two-replicate experiment, two control sticky traps baited with benzene, and two experimental traps, each baited with half of the pheromone extract. It was a sunny afternoon, but cool, about 17°C. Bill Nijholt had an experiment on the same site in which he was catching no *Trypodendron* in traps baited with a-pinene and ethanol. Because of this, we had debated whether to even set up our experiment, but finally irrepressible curiosity won out. We waited a long hour, and then checked the traps, prepared for the worst. But the first trap had six beetles on it (John remembers hundreds, but I'm sure there were six), and the next trap had about the same. What a feeling of exaltation! We had a pheromone for a major forest pest that by today's prices causes about \$200 million in damage every year in B.C.

One week later, when we terminated the experiment, we had caught 350 beetles. But we waited two more years to publish until we had verified this result with the product of two other synthetic schemes that respectively yielded 20 and 30 mg of lineatin. Soon after that, Keith Slessor devised a commercial synthesis, and after developmental research by John McLean, Staffan Lindgren and Terry Shore, in 1981 the world's longest running pheromone-based commercial integrated-pest-management program was started by Phero Tech. Today three different companies offer the program: Phero Tech, Eveline Stokkink's company, Woodstock, on Vancouver Island, and Bugbusters Pest Management in Prince George.

But there was one sour note. Remember I mentioned something about publishing naively? It came as a disappointing surprise that there was another synthesis for lineatin developed in Europe. By the time we published our careful results from three different syntheses, Pierre Vité

and Alf Bakke had filed a patent for the use of lineatin in several countries, including Canada. Both I and Phero Tech, which had to pay royalties for many years, learned a great deal from this episode.

One opportunity to influence government policy arose through my association with Norm Alexander, the only graduate student I have had who was older than I, and the only one without a first degree. Back in 1975 Norm and I were riding in a pickup truck on the old stage coach road heading from Princeton toward Norm's field research site near Kelowna. Having a captive audience, Norm began to rant and rave about his pet grievance, the lack of forest pest management in the British Columbia Forest Service, there being at the time one lone Oxford-educated, Victoria-bound forester, Mike Finnis, who was responsible for pest management in some 30 million hectares of working forest. Now this was a long dirt road we were travelling, but Norm was relentless. Finally in desperation, I convinced him that if he was so adamant about this sorry state of affairs, we should write a brief for Dr. Peter Pearse's Royal Commission, which was then touring the province trying to figure out how to fix the province's tenure system.

So Norm and I met in my office after work, and met and met. Norm would rant and rave, and I, with great composure, would translate his rantings and ravings into erudite and compelling prose. At the end, we produced a brief. We appeared before the Commission. Norm, by my recollection, did most of the talking. Peter Pearse appeared to listen intently, but his report was a disappointment, reflecting the writings of Ma Murray, British Columbia's most famous frontier journalist, and long-time publisher of the Bridge River-Lillooet Weekly News. She said that having a Royal Commission was like using an outhouse. "It takes its seat, makes a report and lets the matter drop." Dr. Pearse's report talked only vaguely about contractual obligations and the pest management responsibilities of the Forest Service and industrial licensees.

But someone in government did listen well. We had proposed a five-person organization for each of the province's six forest regions. Each region would have a supervisor of pest management under whom would serve a pest

management researcher and an operations specialist, each with a technician. What was implemented was something not very different. In each region, a pest management coordinator would supervise a regional forest pathologist and an entomologist. In Victoria, a similar group would sit. While there has been some modification and downsizing in the six regions over the years, the basic format persists. What's more, most of the province's 42 forest districts now have a forest health officer.

Today, I am proud to say that all six of the province's Regional Forest Entomologists were my graduate students. One of them, Lorraine Maclauchlan, was very instrumental in writing British Columbia's new Forest Practices Code. In doing so, she managed to ensure that pest management is featured in 14 sections of the Act, in three regulations, in numerous standards, and in at least nine forest practices guidebooks. Of particular impact is the inclusion of forest health in the Operational Planning Regulations, which means that forest health issues must be considered before harvesting, and included in all resource management planning documents.

One of my most interesting travel experiences occurred in Nazareth, Ethiopia. I had been fortunate enough to hook up with the UNDP and FAO in 1988, and worked for them as a consultant until 1996 when the money dried up. In one assignment, I had conscripted my chemist collaborator, Keith Slessor, to accompany me to Kenya to review a project on desert locust pheromones at the International Centre for Insect Physiology and Ecology in Nairobi. It seemed only natural to drop in on our friend Tsedeke Abate on the way home. When he was a Ph.D. student at SFU, Tsedeke had told me that Ethiopians used leaves and berries of the pepper tree, *Schinus molle*, to repel flies. I sensed a potential chemical ecological coup that could have far-reaching implications.

So we checked into one of Addis Ababa's best hooker-infested hotels, and the next morning, we took off with Tsedeke and his driver, Safu, headed for the government research station in Nazareth. There we had to decide how to test Tsedeke's folklore experimentally. There was little available equipment. So we used dinner plates from the canteen, with a petri dish in the middle. In the

dish we put the fly bait, some moist Ethiopian bread soaked in pea sauce and sour milk. Around the petri dish we put nothing (as a control), pepper tree leaves or berries, or macerated leaves or berries. Then we sat on stools outside the canteen (where we expected lots of flies), with the dishes on the ground in front of us, prepared to count all the flies that landed. We soon attracted a sizeable audience, who murmured and tittered on occasion, waiting expectantly for something momentous to happen. Nothing did. Only five flies landed in an hour.

So we sent Safu into town with instructions not to return until he found a place with flies. He came back quite soon, with good news. There were lots of flies around the slaughter house. So the next day, we set out for the slaughter house to repeat our experiment. We also added a second, more sophisticated experiment using ethanolic extracts of leaves and berries, carefully made by Keith Slessor with a mortar and pestle that he found in the lab.

The slaughter house was on the edge of town, in the middle of a grassy compound bounded by a high stone wall. The plain outside was strewn with bones of the unfortunate, spread by robbing hyenas. To one side of the tiny shack in the middle of the compound that served as the actual slaughter house was a cement pad, with a putrid, offal-filled shallow trench around its periphery. Beyond that was a convenient manure pile so we added a manure topping to the previous day's baits. We never did see the inside of the slaughter house, but from time to time we heard the plaintive last cries of an interesting assortment of animals as they faced their doom.

Safu was right. There were lots of flies. We placed the plates in the putrid ditch, and sat there in the increasingly hot Ethiopian sun counting the flies. We replicated over time, as the sun rose higher and hotter, and we began to feel increasingly unwell. And all the while, perhaps sensing our sickness, we were watched by vultures sitting on the stone wall patiently waiting for us to breath our last and fall off our stools.

The experiment worked, and back in Canada a graduate student isolated and identified two terpene alcohols that accounted for all of the

bio-activity. They were not as potent as we would have hoped, and nothing practical ever came of this research. I did eventually realize, however, that in this project, and in many others in which I took part or observed in my travels, we were guilty of practicing scientific colonialism. In this practice, scientists from the developed world venture abroad to work in developing countries. We do field work in-country, often involving well-educated scientists from the local area (sometimes even avoiding being patronizing). But we do the tough stuff that requires a scientific and technological infrastructure, back in home laboratories. Then we turn over the discoveries to developing countries, leaving no equipment and no sophisticated technology, and can't understand why they're not grateful. I strongly feel that as long as we practice scientific colonialism (in any field, including forest entomology), developing countries will be most unlikely to acquire a scientific and technological infrastructure. I have long since ceased to work in Canada on problems of developing countries, and have encouraged both individuals and government to help in establishing the scientific and technological infrastructure that will allow developing countries to become part of the developed world.

Back home in Canada, I have the rare privilege of being able to do useful work every year in the forests that I love. About 2 years ago,

I was returning from somewhere in the east, probably yet another futile rambling to Ottawa. It was a brilliant, cloudless day. As the aircraft began its descent to Vancouver, I looked out to the south from about 20 000 feet, and spread before me was the mountainous landscape spanning Hayes Creek and the Similkameen Valley east of the southern interior town of Princeton. As we advanced, I could see each valley: Shinnish Creek, Siwash Creek, Spukune, Red, Whistle and Willis Creek, Wolf Creek where I had surprised two young grizzlies taking a noon-time nap, and further off to the south, Whipsaw, Lamont, Copper, Friday, Saturday and Sunday Creeks. I could see the forestry roads leading up each valley, many with the names of the creeks they followed, but others with evocative names like Commander, Stemwinder and Rattler. Plainly in view were numerous recent cutblocks, every one logged because of the mountain pine beetle. I knew them all, and had done experiments in many. And at Sunday Summit, I could pick out the telltale red trees, marking the challenge of the continuing infestation. I knew this land. I knew its problems and its people. I had a small, but significant part to play in the protection of its forest resources. I was what I was always meant to become, a forest entomologist from British Columbia. And then I thought, there is nothing finer that one could be.