

1974. MEXICO – Hunt for *Dendroctonus pseudotsugae*.

From 1956-1974, I had studied the Douglas-fir beetle throughout the western U.S. and was wondering if it might also occur in the Sierra Madre mountains of Mexico. Other scolytids had been collected from Douglas-fir near San Juanito, Chihuahua, by S. L. (Steve) Wood. Thus, I knew of a general location and I had the name of a forester (Cosme Rodriguez Bojórquez) with the Rio Verde Lumber Co. in Chihuahua City who might be of help. So, on March 3, 1974, armed with collecting gear and a Spanish phrase book, I headed south from Moscow, Idaho, in my camper truck for a 36-day trek through the mountains of northern Mexico. It turned out to be an epic trip. Afterward, I sent 581 specimens to Wood for identification. Seven species were new to Mexico and as many as 8 additional species were un-described. And, Yes! I did find the Douglas-fir beetle!

After negotiating the border crossing, we (wife aboard) sought out Cosme in Chihuahua City. He was away somewhere so we decided to head for San Juanito in the distant mountains. After a day of probing primitive roads that have no signs, we returned to Chihuahua to await Cosme. Unknowingly, this was a stroke of good fortune. Lauro Barragan, a native of San Juanito, was assigned as our guide. Not only did Lauro speak English, he understood what Douglas-fir was and, furthermore, he was going to take us to it en route to San Juanito. So, off we went on a circuitous route that was to extend far into the night.

Hours later, we were winding our way high up in the mountains to a place called La Magdalena. A few miles farther brought great excitement. Here among an assortment of oaks and pines were some large Douglas-fir! A rare, disjunct, tree in Mexico. Then, as if by a miracle, I spotted the telltale frass on a tree right alongside the road! Quicker than a clerid, I chopped out a piece of bark and collected some adult brood. I still marvel at how that all clicked together.



By now it was late in the day and we resumed driving to our destination and came to a river. Fortunately, I had been advised to go in March which is the dry season. We forded the river from one side to the other repeatedly for miles and miles without benefit of a bridge. The going was slow and rough. Before long, the swaying snapped the camper tie-downs slowing us even more. Darkness descended. Lauro began monotonously counting the crossings: "uno, dos, tres ... veinte uno, ... treinta ... ", etc. up into the forties. We finally arrived at San Juanito well after mid-night.



Later (1977), I revisited this site with colleagues from Chapingo and subsequently conducted a mating test of Mexico and Idaho beetles (Furniss 1981, Furniss & Cíbrán 1980). I described this population as the subspecies, *Dendroctonus pseudotsugae barragani*, after Lauro (Furniss 2001). Details of those events follow this account of my 1974 trip. -- Malcolm M. Furniss

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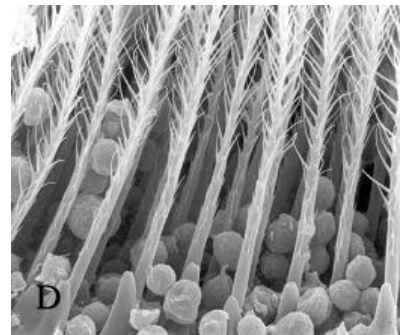
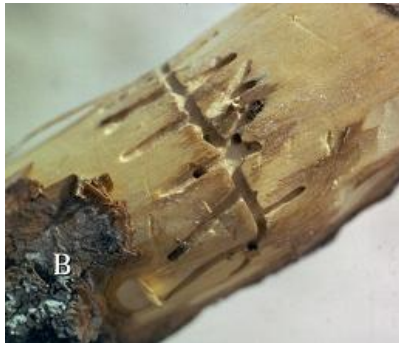
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Continuing in Mexico. March-April 1974

On a very primitive road 34 miles south of Durango City toward La Flor, we encountered an amazing sight. There along the road was a wilted pine tree! Or, so it seemed. Then, we began to see others of all ages and soon realized that their drooping needles were a species trait. Later, I learned that the pine was *Pinus lumholtzii*. I was amazed to find scolytid galleries in dead limbs that were intermediate between bark beetles and ambrosia beetles. They deeply etched the sapwood and had cradle-like tunnels at right angle to the gallery. I noted that the pronotum of females had setaceous patches on each side. They were identified as *Pityoborus rubentis* by S.L. Wood. Some years later, I was examining ascospores in pits on *Ips* beetles and decided to see if these patches held spores. They did, indeed, and the spores were those of an ambrosia (yeast) fungus. A reviewer of the subsequent manuscript (Furniss et al. 1987) objected to calling these fungus repositories "mycangia" (not



classical description of the time). However, Lekh Batra, USDA Mycology Lab, Beltsville, MD, sided with us and that publication widened the accepted definition. I had no trouble applying the term to pits on *Ips typographus* and *I. pini* in publishing subsequent studies.-- Malcolm M. Furniss

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Furniss, M. M., J. Y. Woo, M. A. Deyrup, and T. H. Atkinson. 1987. *Prothoracic mycangium on pine-infesting Pityoborus spp. (Coleoptera: Scolytidae)*. *Ann. Entomol. Soc. Am.* 80:692-696.

Concluding the March - April 1974 Mexican trip.

I had learned from Don Bright that Douglas-fir occurred on a mountain (Cerro Potosi) in Nuevo Leon and I wanted to see if the Douglas-fir beetle might be there. Also of interest was that he had described two *Ips* spp. from a dwarf piñon pine (*Pinus culminicola*), which itself had been described from there. We traveled south from Monterey

through Linares to a little community called 18 de Marzo at the base of the mountain. Proceeding on, we encountered a stand of Douglas-fir on the lower slope but it was much too young to harbor the beetle. Various pines occurred near the summit (11,000 ft), including a 5-needle pinyon pine (*P. culminicola*), which reminded me of ornamental Mugo pine. I collected two new species (later described as *Pityophthorus culminicola* Bright and *P. endemos* Bright) from faded branches; they had not yet laid eggs. We camped at the summit and had (Idaho) elk burger enchiladas with cheese and Mexican tortillas. In the morning, the sun shined on a lovely scene of broken clouds below us extending inland from the Gulf of Mexico.



From there, we journeyed to Durango and then to Mazatlan on the west coast and crossed the Gulf of California by ferry to La Paz. Ten miles north of La Paz, I collected five specimens of a very small scolytid from an unidentified desert shrub (photo B). It was *Liparthrum albosetosum* Bright, the only specimens known other than the holotype that was described from one specimen from a light trap near Pénjamo. Does anyone recognize the host shown in the photo?

Of the many collections on this trip, I conclude with *Araptus attenuatus*, described later by S.L. Wood. They were infesting the stems of candle plant, *Pedilanthus macrocarpus*, 30 miles west of Bahia de Los



Angeles, Baja California. This unusual scolytid host exudes a profuse amount of milky, sticky, substance when cut and it has a pithy center when dry. Years after I sent the six specimens to Wood, I found 49 additional specimens (geotypes) that I had reared at Moscow. They were donated to the W.F. Barr Entomological Museum, University of Idaho. So, on April 1, we exited Mexico at Tijuana after a memorable and historical 22-day journey through northern Mexico. Later (1976), I met David Cibrián-Tovar of the Universidad Autónoma Chapingo at the WFIWC in Wemme, Oregon. That was to lead to my re-visiting Mexico and studies of the Douglas-fir beetle and *Dendroctonus rhizophagus*. -- Malcolm M. Furniss

1977. Return to Chihuahua, Mexico and describing *Dendroctonus pseudotsugae barragani* Furniss.



In April 1977, David Cibrián and Edgardo Hernandez of the University of Chapingo, Mexico, and I visited the location in Chihuahua where I had discovered the Douglas-fir beetle in 1974. We traveled in my camper truck, which was outfitted with a "motor sierra" for falling trees, axes, assorted collecting gear, and containers for bringing back live Douglas-fir beetles (under permit) for a mating test with Idaho beetles.

East of La Magdalena, we located a large, 212-year-old, infested tree and I proceeded to fall it. However, it was already a bit late so I quit after removing a strip of very thick bark to lessen the diameter and putting in the undercut. In the next morning, I eventually felled the monstrous tree (photos A), which my buddies were now jokingly calling "El Diablo," and I collected several hundred adult beetle progeny. I also took bark samples for comparison with data from Idaho. A mix of

similarities and differences was apparent. For example, it was evident that the braconid parasite, *Coeloides vancouverensis*, so common in the U.S., was absent in this and other trees that we felled.

After returning to Idaho, I replicated a test of the "intra-specific" and reciprocal crosses. Cross-mated beetles from Chihuahua and Idaho produced 67% fewer progeny than did pairs of beetles from within either locality (Furniss & Cibrián Tovar 1980, Furniss 1981). Upon examining the galleries of Mexican pairs and Idaho pairs, another striking difference was seen. The number of times a female crossed her gallery to deposit a series of eggs was consistently greater for Idaho pairs (10-13, left photo C) than for Mexico pairs (3-4 right photo D) for galleries of comparable length. The galleries of scolytids are characteristic for each species; such a distinct difference is indicative of considerable genetic drift between the disjunct populations involved. Later, I compared their anatomical features and described the Chihuahua population as the sub-species *D. pseudotsugae barragani* (Furniss 2001) after Lauro Barragan of San Juanito who guided me during discovery of this beetle in Mexico in 1974. -- Malcolm M. Furniss



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Reinstating species status of *Dendroctonus rhizophagus* Thomas and Bright



This exclusively Mexican species is superficially similar in appearance to the sympatric red turpentine beetle, *D. valens*. However, it only infests young pines, especially *Pinus engelmannii* in its juvenile "grass stage" (Cibrián in photo), whereas *D. valens* normally infests mature pines throughout much of North America. It was described from Chihuahua and Durango by Thomas and Bright (1970) and placed in synonymy under *D. valens* by Wood (1974).

This is an account of cooperative work with David Cibrián of the University of Chapingo leading to reinstatement of *D. rhizophagus* as a valid species. I had met David at a WFIWC meeting in 1976. We went on a field trip to Chihuahua in 1977 to collect Douglas-fir beetles, as previously described. Our association continued and we made an extended field trip in my camper truck through northern Mexico and southwestern USA in 1981.



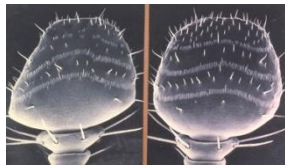
Relevant here is our visit to Mesa del Huracan, Chih., from where *D. rhizophagus* was described and our stopping at Brigham Young University, Provo, Utah, to confer with Steve (S.L.) Wood concerning our comparative studies that showed *D. rhizophagus* to

be a valid species. Wood was well underway toward publication of his monograph on Scolytidae of North & Central America (Wood 1982). We were anxious that *rhizophagus* should not remain a synonym in that monumental publication!

At Mesa del Huracan, we met Oscar Estrada (photo at left), a student at University of Chapingo who was studying the biology and control of *D. rhizophagus*. It was causing great economic damage to newly planted pine plantations in this area, 40% of which were susceptible *P. engelmannii*. One or two females create a gallery at ground level. Larvae mine downward in the root and excavate weevil-like pupal cells that deeply score the wood. Curiously, all host species of pines usually out-grow susceptibility by the time that they are 1.5 meters tall.

... Now, I must back-track. The particulars reside in my files but the gist of it is that a few years earlier, David and I agreed to conduct comparative biological and anatomical studies of *rhizophagus* and *valens*, which we had reason to believe were, indeed, distinct species. Consequently, his associate, Rodolfo Campos, and I examined adults with SEM and light microscopy at Moscow (Furniss & Campos Bolaños 1982) while David and Oscar gathered biological information in the field (Estrada Murrieta & Cibrián Tovar 1982).

Thus it was that, on May 12, 1981, I dropped-off David to visit Steve Wood in the Monte L. Bean Museum while I found a parking place. I had some reservation about the matter at hand, not knowing how our case might be received by the Master of scolytid taxonomy. So, maybe I did drive around the lot a few times to give David a head start. But I need not have worried. After presenting our findings, Steve agreed and *D. rhizophagus* gained species status in his monograph (although too late to have been included in the species key!).



So, what were the adult characters separating these beetles? We listed 10 such characters of the adult. Of these, the one that I find to be both definitive and easily seen involves the shape and color of the antennal club. That of *rhizophagus* (left photo) is somewhat angular and the basal segment is black while the distal segments are light reddish brown; that of *valens* is more rounded and uniformly reddish brown. Also, the body of *rhizophagus* is invariably black while that of *valens* is generally reddish brown. --

Photos and text by Malcolm M. Furniss



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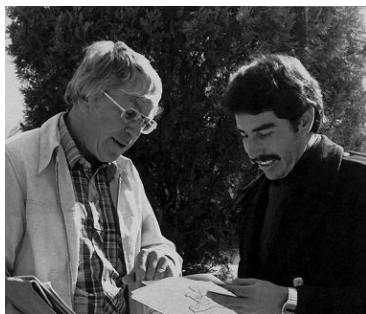
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1980. 1st National Symposium on Forest Parasitology, Urapan, Michoacan.

In February 1980, Mexican workers in forest entomology and pathology met at Urapan, Michoacan, similar to the way that the Western Forest Insect Work Conference began in 1949-50. However, the disciplines of forest entomology and pathology were highly integrated in Mexico (hence "Parasitology") whereas in the USA and perhaps Canada the two disciplines had been traditionally separate. Early-on in the USA there was rivalry regarding which got credit for death of a pine tree. Gradually, such issues have subsided with better understanding of the relationships of insects, disease organisms, and their hosts. In the case of the WFIWC, a joint annual meeting with its forest pathology work conference counterpart now occurs every 5 years.

Because of my own work in Mexico, I was one of three foreign speakers invited to participate in the symposium. The others were Frank G. Hawksworth (1926-1993), a well known dwarf mistletoe specialist, and Stephen L. Wood, still the World authority on Scolytid taxonomy. My qualifications were far more humble. I had discovered *Dendroctonus pseudotsugae* Hopkins in Chihuahua, Mexico, in 1974 and had, in 1977, conducted a controlled breeding test with beetles from this population and those from Idaho. I presented the results at this symposium, which ... along with anatomical and behavioral data ... resulted in my describing the Chihuahua population as the sub-species, *D. p. barragani* in 2001.

The section on Forest Entomology was divided into Taxonomy, Detection & Evaluation, Biology & Ecology, and Control. Steve Wood spoke on the Scolytidae of Mexico. Hawksworth's paper, in the Phytopathology section, dealt with the dwarf mistletoe genus *Arceuthobium* and its importance in silviculture in Mexico. David Cibrián, University of Chapingo, was involved with 5 papers including both sections. He has become the most prominent forest entomologist in Mexico. In all, there were 25 entomological papers and 12 pathology papers (about the right proportion!).



The symposium clearly served its purpose. Young Mexicans, whom I presumed to be students, readily sought out others during breaks. They had no inhibition about introducing themselves to Wood, Hawksworth and myself. I photographed Frank and Vanancio Andrade of Chapingo discussing a point of interest.. -- *Malcolm M. Furniss*

1982. 2nd National Symposium on Forest Parasitology, Cuernavaca, Morelos.

The second symposium was held in Cuernavaca, Morelos, during February 17-20 at the Hotel Casino de la Selva. Dignitaries included the president of the entomological society of Mexico and the undersecretary of Forestal y de la Fauna. Again, Wood and I were invited to present papers as at the first symposium. William F. Barr, University of Idaho, was invited and spoke on the Cleridae and Bupretidae of Mexico. David Cibrián was involved with numerous papers as was Thomas H. Atkinson who was then at the Postgraduate College at Chapingo and engaged in scolytid taxonomy.

Two papers dealt with the *Dendroctonus rhizophagus*: One on biology by Oscar Estrada and David Cibrián, and one by me and



Rodolfo Campos on comparative anatomy in relation to *D. valens* with which it had been synonymized by Wood. The information in those papers had been brought to Wood's attention in 1981, resulting in resurrecting *D. rhizophagus* in Wood's 1982 monograph.

At conclusion of the meeting, we all were taken by bus on a field trip. Several of us Americanos thought the purpose was to collect insects, which we did with the usual zeal. That is, until two guys showed up toting rifles wanting to know what we were doing. It turned out to be some sort of park. Bill Barr was the one who blew our cover with his conspicuous net and beating sheet.

Still telling tales out of school: Thereafter, Wood, Atkinson, and I, went on a scolytid collecting trip southward to Guerrero state. Everyone scattered like leaves in autumn. Then we reassembled and displayed our catch. Wood, who likes to gather infested wood to scrutinize in detail back at the car, held up a small pine that he had pulled out of the ground, roots and all. The point of his interest were some Pityophthorus in the stem. About then, I noticed the tell-tale pupal cells of *D. rhizophagus* in the roots! This unexpected find extended the beetle's known distribution by hundreds of miles. -- *Malcolm M. Furniss*