

**ESPECIALLY FOR FIELD COLLECTORS**

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**AN EXPEDITION TO MEXICO FOR MEGATHYIMIDÆ**

by P. S. REMINGTON

The final letter of instructions from DON STALLINGS, dated July 6, 1959, reads, in part: "Enclosed is a list of what to bring. While this is a *Megathymus* hunting trip, I doubt that you will see a single 'Meg' on the trip. Just might at one point. Will see you the 27th at Eagle Pass, Texas." When some of my friends learned that I was about to hunt butterflies that I would never see, they were confirmed in their opinion of me. I was a little uncertain myself, but I had great faith in the STALLINGS-TURNER clan, who have really collected more specimens and discovered more species of Megathymidæ than any one else in the world. To see their collection in Caldwell, Kansas, is a liberal education.

The primary objects of this expedition were to collect testes of Mexican butterflies for chromosome studies and to obtain larvæ and pupæ of the puzzling complex of Megathymidæ from the northern Mexican deserts. At this season of the year no 'Meg' adults would be on the wing, but the larvæ, if they could be located in the *Yucca* and *Agave* plants, would be nearly full grown and prime for pickling. This explains the cryptic statement above — that we would never see the butterflies we were hunting. Let me say at the start that our efforts were successful and we did bring back several hundred pickled larvæ and pupæ of six or more species for morphological study.

During his year of research and study at the Genetics Laboratory and the Department of Entomology at the University Museum at Oxford, England, Dr. CHARLES L. REMINGTON had found significant differences in the larvæ of butterflies which are useful in distinguishing closely related species, such as are found in the family Megathymidæ. His need for more material was the reason for our rendezvous in late July on the Mexican border at Eagle Pass. Not only did we need the preserved larvæ, but we wanted to relate the larvæ to their food plants, for this is an important point in studying the biology of an insect.

After complying with the formalities at the Mexican side of the border in Piedras Negras, we followed Highway 57 south about forty miles and then camped in a field by the roadside. This highway is a good black-top road which we followed all the way to Saltillo, almost 300 miles.

However, we took three days to make this distance because we collected intensively in the desert areas all the way.

It might be of interest to describe our equipment and the members of the expedition. Our cavalcade was always led by the STALLINGSES in their station wagon containing DON, Mrs. VIOLA STALLINGS and son JACK. Then came representatives of three generations of REMINGTONS — Dr. CHARLES, son ERIC and the writer. Then the TURNERS in their station wagon—Dr. J. E. and his mother, Mrs. R. C. TURNER, who has had a great deal of experience in 'Meg' hunting. Three pieces of equipment are necessary for this type of collecting: 1) a long-bladed sharp digging spade, 2) a strong, sharp knife, and 3) a pair of horsehide gloves. Nets were a forbidden diversion in the field when collecting 'Meg' larvæ, and the stern Kansans enforced the rule from the beginning. The spade is for digging up the underground *Yucca* caudex or severing the *Agave* plant at its base. The knife is for trimming the roots or parts of the plant containing the larvæ so that they could be more easily carried to the cars. The horsehide gloves are protection against the innumerable spines of all desert plants including the 'Meg' food plants, and also to prevent contact with the juice of the *Agave*, which is extremely irritating to the skin.

The two station wagons carried complete camping equipment for the whole party. This included two tents (with canvas floor), sleeping bags, cooking equipment, food boxes and, most important item of all, water cans. The STALLINGS and TURNER families have made this trip before and have learned to carry their own food and water entirely. In this way all possibility of dysentery is avoided. Water presents the greatest problem. Since we could not carry more than 32 gallons for the party, it had to be conserved for drinking, cooking and the absolute minimum of washing. When we reached Victoria we were able to renew our water supply by obtaining distilled water. Collecting 'Megs' in the Mexican desert is hot, hard work. The temperature was well over 100° F. in the day time and one quickly becomes dehydrated. The effort of digging and cutting, driving a few miles to a new spot, digging and cutting again, seems terrific. Yet there was great beauty too on the desert plains and especially in the passes through the mountains that ring the deserts. My kodachrome slides bring back these scenes in a memorable way.

We started collecting about 13 miles south of Allende in Coahuila. Here we collected larvæ of a member of the *Megathymus yuccæ* complex, and a few miles further we found at least two more species belonging to the *Agathymus mariæ* complex and to the *A. estellæ* complex. This particular area — in fact, all the way to Saltillo and beyond — is the home

of a most confusing group of species which have not yet been finally worked out. It is hoped that the study of the larvæ, so carefully labelled and preserved, now going on in the Yale laboratory, may solve some of the puzzles. So the specific names I shall give refer to complexes, rather than to definitely determined species. The name *Agathymus* is used for the *Agave* feeders, as proposed in FREEMAN's "Revision of the Genera of the Megathymidæ" (*Lep. news* 12: 81-92; 1959). There are of course other large differences between *Megathymus* and *Agathymus* besides the food plants.

The distance from these first two collecting spots near Allende to our next spot near Gloria was over 100 miles. Most of the small towns we passed through were drab and uninviting: a few adobe buildings and huts usually plastered with Coca Cola signs. Bus stations, garages and walls of roadside buildings even far from towns were often marked with huge election slogans in Spanish — "Progress with Matteos Lopez." They were evidently effective, for he was elected President of Mexico and is extremely popular. Five miles south of Gloria we found three species of *Agathymus* — *A. mariæ* (B. & Benj.), *A. estellæ* (S. & T.), *A. hoffmanni* (Free.) — and a member of *Ægiale*, near *hesperiaris* (Wlk.). The collecting was becoming richer, also hotter, as we drove south. A heavy shower one evening cooled us off momentarily just as we were setting up camp. It was soon over and the sun came out and made a lovely double rainbow.

On July 29th we collected intensively near the pass in the Sierra de la Gavia mountains, at 3000 feet altitude. This is the spot which DON STALLINGS regards as the most prolific yet known, for variety of Megathymidæ. Three of the five genera are found here and at least six species. We began to see this as soon as we dug out some larvæ. It was obvious that we had several species. The question is often asked; how does one locate the larvæ? It is an art that has been developed to a high degree by the STALLINGS-TURNER combine. I can remember hiking through a large stand of *Yucca* plants in western Nebraska one July day in 1955 where I expected to find evidences of *Megathymus leussleri* Holland and found no trace at all, either imago, eggs, larvæ, or 'tents'. This was probably due partly to my inexperience with this very special type of collecting. In the first place, except for those in the Century Plant type of *Agave*, the 'Megs' almost invariably inhabit young plants. I had looked mostly on well-developed plants. By closely observing the experienced members of this party, I found that one can usually spot an infected plant by the 'tent' and tiny pellets of frass around the base of the leaves, if it is a *Yucca*. Then further examination of the plant usually

reveals the burrow and a vigorous thrust of the spade turns up the whole underground caudex and plant. With the sharp knife we trim off the plant close to the caudex, put it in a pile with others and eventually carry them all back to the cars for later attention after supper.

If the plant is one of the smaller *Agave*, such as *A. lecheguilla*, the commonest one we saw, the procedure was much the same. If it is one of the larger Century Plants, one looks for a sort of brownish pucker, usually on the under side of the leaf, and cuts the leaf across to see if there is a larval burrow. If one finds a burrow, the spade is used again near the base and the whole plant is "popped", that is, uprooted or snapped off at a chosen point. Then the leaves are plucked off much the way they are in peeling an artichoke, until the leaf with the larva in it is uncovered. We found as many as six full-grown larvæ in one *Agave* plant. If the collector is seeking the adult butterfly, he takes the plant or root home and waits for the larva to complete its feeding, pupate, and then emerge. A letter from DON STALLINGS at Caldwell, just received, states: "Boy, have we had bugs hatching out! We are getting close to the end now, but there are still some fifty to seventy-five pupæ that can and should hatch. I'm not at all sure that they are going to help — just add to the confusion."

By locating the larvæ in the manner described above, STALLINGS has had kinds of butterflies emerge back in Caldwell which had never before been seen by any lepidopterist, simply because no one had ever been at those spots in the Mexican deserts at the time the adults emerge there. Already twelve new species have been determined and named in this way and more are waiting for final determination. At this pass in the Sierra de la Gavia mountains we found larvæ belonging to the following complexes: *Agathymus mariæ*, *A. estellæ*, *A. hoffmanni*, *Ægiale hesperiaris*, *Megathymus violæ* (S. & T.), and *M. beulahæ* (S. & T.). In one *Yucca* root a larva had pupated. STALLINGS put the pupa in a cage and the butterfly emerged a day or two later and thus I had my first look at a beautiful living *violæ*. Except for one other adult butterfly which I saw flying near the road the next day, these were the only live adult *Megathymus* that were seen on the whole trip.

Now we were approaching Saltillo and found another good collecting spot twenty-five miles northwest of the city, still on Route 57. Here on the upland desert plateaus in the shadow of the mountains were many giant *Yucca* similar to the California Joshua Tree. No larvæ were in these, but some in the small *Yucca* around them. Again we found *Agathymus mariæ*, *A. estellæ*, and *Megathymus beulahæ*. This was a

beautiful camping spot. In the morning as we ate breakfast, the clouds were hanging low over surrounding cliffs. Then we "prospected" the area for 'Megs'. By now we had worked out a good system. Three or four of us would scatter over a small area searching for the tell-tale signs of 'Meg'-infested plants. Mrs. VIOLA STALLINGS was our best finder. As likely plants were located, a tissue-paper 'flag' would be stuck on each plant and the three men with the spades would then come along and dig up those plants. One has to keep a sharp watch for the desert rattlesnakes, whose protective coloring blends so perfectly with the gray sand and gray roots that we almost stepped on one.

Back in camp in the evening there was much work to be done after supper and we often worked far into the night under the light of a Coleman lantern. First we had to cut open the roots of the *Yucca* and cut through the fleshy leaves of the *Agave* to free the larvæ. A pile of shattered desert plants marks the site of every one of our camps. After the larvæ had been separated from the plants, they were dropped in boiling water, (in our regular cooking pans, broad-mindedly permitted by the women of the party!) then cooled, then dropped in Pampel's fixing solution for pickling. Before our horrified gaze, CHARLES munched several to assay the natural taste, as compared to the famous fried 'Meg' larvæ canned and sold as delicacies. Such devotion to science deserves a medal. He especially tried to detect taste differences in larvæ of different species of *Agathymus*, but did not notice any in this first trial. While all this table work was going on JACK and ERIC often set up a lamp out in the desert and collected Tiger beetles, moths, and other prizes that came to the light. Typical snatches of conversation as the work went on might be: "this plant has two white worms in adjacent burrows!"; "here's a blue worm!" (they were rarer); "this plant has a white and a blue worm in separate burrows!"; "oh boy, this complex gets more confusing all the time!"; "Oh, oh! this one didn't make it through, he died before he got very large"; "this fellow is coy, doesn't want to come out; guess I'll have to 'tickle' him with a straw from the other end of the burrow"; "CHARLES, do you have to pickle *all* these larvæ? Hate to think of all the rare 'Megs' we're passing up this way."

We went into Saltillo, a very attractive city, where we did a little shopping and found our Spanish to be less than adequate. Then we took Route 40 toward Monterrey, about sixty miles away. This is a heavily travelled road and traffic rumbled by our camp site most of the night. We camped about ten miles east of Saltillo. We were at a high elevation and welcomed the cool evening breeze that came down from the nearby mountains. As usual, the plum jam, home-canned beef and gravy, and

ready-mix mashed potatoes were in heavy demand. The next day we collected thoroughly at two localities along Route 40, one ten miles east of Saltillo and the other twenty-five miles east of Saltillo. The plants along here were mostly *Agave*, the familiar *A. lecheguilla* and the large Century Plant, and so we again took larvæ in abundance of *Agathymus mariæ* (complex), *A. estellæ*, *A. hoffmanni*, *Ægiale (hesperiaris)*, and *Megathymus beulahæ*, which builds a tent in the center of what is possibly an *Agave* resembling *Agave schottii* in Arizona. The plant looks more like a *Yucca* than an *Agave*. DON says that *M. beulahæ* no doubt thinks the plant is a true *Yucca*. The larval harvest was huge. CHARLES had brought what he assumed to be more than ample supplies of vials and fluids, but the vials ran out early and various improvisations had to be made, much to the amusement of our Kansas companions, who knew all along that no one but they or H. A. FREEMAN would have expected such quantities.

We followed Route 40 into Monterrey, which is a large bustling industrial city. Many modern buildings, factories, an airport, parks and a world of traffic, including automobiles of ancient vintage rolling along next to sleek modern cars and of course lots of wagons drawn by burros and crammed with wicker furniture and every imaginable native product for sale. We finally found Route 85 and followed it north forty-two miles to Mamulique Pass in the state of Nuevo Leon where the steep hillsides are covered with *Agave*. Here we took larvæ that may be in the complex of *Agathymus estellæ*. When we had finished here, we turned back to Monterrey and continued south without more collecting for 180 miles to Ciudad Victoria in Tamaulipas. A three day stay was planned here where relatives of the TURNERS, Dr. ROSS DICKSON and his wife Mrs. JULIA DICKSON (for whom *Agathymus julizæ* is named), own and operate Turner's Restaurant, which I can heartily recommend to any travellers along Route 85. We had pleasant rooms above the restaurant and especially enjoyed the luxury of a hot shower. We used the three days to relax, go sight-seeing in the city, and around the city do some collecting of testes for chromosome studies (see the papers in the *Journal*, vol. 13: pp. 193-203; vol. 14: 37-57, 127-147, 179-201). There is tropical jungle nearby and the collecting is very rich. So once more our evenings were spent in the familiar task of papering butterflies, most of which were semi-tropical species unfamiliar to us. This was an ideal place for lush collecting of butterflies that trickle across the border as rarities in the U. S. A. Even here the experienced members of the party soon spotted some *lecheguilla* plants and found *Agathymus* larvæ in them. DON tentatively calls them the *A. remingtoni* complex after CHARLES. The plants here

and also further south are always found hanging over steep inclines, so that digging them out involves no little risk to life and limb.

It was with regret that we bade goodbye to our gracious host, Dr. DICKSON, but not to our hostess, for Aunt JULIA joined the expedition and went south with us on August 3. Our destination was a wonderful collecting spot called El Salto in the state of San Luis Potosí. As we drove south in our usual cavalcade we stopped to take pictures of a large sign erected by the Mexican government which announced that we were crossing the Tropic of Cancer. Henceforth we knew that we were really collecting "tropical" specimens.

As we approached Antiguo Morelos, about 100 miles south of Victoria, we saw some cliffs festooned with *Agave* of the *lecheguilla* type and again larvæ of the *Agathymus remingtoni* complex were found. There is confusion among botanists as to the identity of the various species of *Yucca*, *Agave*, and *Manfreda* plants, upon which Megathymidæ feed, so the names I used in this paper must not be considered accurate. This was not an arid desert type of location, but tropical jungle. It was decided to push on to El Salto and set up camp, then come back the next day to hit this spot hard. At Antiguo Morelos we turned west on Route 80 and drove about 30 miles to a gravel road where a sign pointed north to El Salto. We reached this spot in the late afternoon and at once set up camp on the bank of the river.

I cannot speak too glowingly of El Salto, which might be freely translated as "The Jump Off", for here a good-sized river simply pours over a high cliff and makes a spectacular water fall. All of us kept taking pictures of it. The snowy fall contrasts with the turquoise-colored water below it and the water is so pure one can drink it and cook with it. It is delightful to swim in. The mist from the falling water is carried some distance and encourages the growth of a lush tropical jungle all around. The next day we got out the nets, little used on this trip, and collected butterflies to our hearts' content. Most lepidopterists dream of some day collecting brilliant blue *Morpho* in the tropics. Well, here we all realized our dream. Young ERIC was in his element and out-collected all of us. I counted more than twenty *Morpho peleides* Kollar on a short walk through the jungle, each one indescribably beautiful in the bright sunlight and seeming as big as dinner plates. However, I did not catch all of those twenty, for most of them soar regally over the trees or hop in a peculiar fashion through the dense jungle growth.

Much of our catch at El Salto has still not been identified, but it includes the following species: *Papilio idæus*, *P. cresphontes*, *Battus philenor*, *Heliconius charitonius*, several *Mechanitis*, *Dryas julia*, *Agraulis junio*,

*Anteos clorinde*, *Kricogonia lyside*, *Phæbis agarithe*, *P. philea*, *Eurema proterpia*, *E. दौरा*, *E. nise*, *E. boisduvaliana*, *E. mexicana*, *Zerene cesonia*, *Anartia jatrophae*, *A. fatima*, a *Dixethria*, *Ageronia glauconome*, *Eunica monima*, *Anæa aïdea*, *A. perenna*, *Chlorippe laure*, *C. pavon*, *Metamorphasteneles*, *Mestra amymone*, *Libytheana bachmanii*, *Microtia elva*, *Eudamus alcæus*, *E. zilpa*, *Chioides catillus*, *Urbanus teleus* (or *tanna*), *Polythrix octomaculata*, *Grais stigmaticus*, *Onenses hyalophora*, *Heliopetes sublinea*, *Myscelus amystus*, *Phocides polybius*, many Riodinids and Theclines. This was a lepidopterists' paradise. It was old stuff to DON and Doc, so they went back to Antiguo Morelos for more *Agathymus remingtoni* larvæ, while we collected through the jungle around the falls, stopping frequently for a swim. The material taken for chromosome studies is probably the principal scientific booty from here and has been reported in the papers referred to above.

Our stay at El Salto was all too short, for we had to leave on August 5 and head back to the Rocky Mountain Biological Laboratory at Gothic, Colorado, where Dr. REMINGTON was needed for important meetings. Our friends were to stay two more weeks and collect many more Megathymidæ through central Mexico. As we left them at El Salto we promised ourselves that this was one spot we would some day revisit. We arrived back in Victoria in time for another lunch at Turner's Restaurant, then set out for Monterrey and across the border at Laredo. It took some tall explaining and the appropriate Federal permit to get our plants and specimens through the Agriculture Department inspectors. We had a last fling at the 'Megs' as we drove through southern Texas. Habit was too strong for us and we stopped to examine beds of *Agave* on a desert slope near Langtry. Although it was almost dusk, we discovered the tell-tale signs of a few larvæ and we once more dug up some *lecheguilla* plants, which later produced a *maria* type of *Agathymus* in the Yale laboratory.

We are deeply indebted to the STALLINGS and TURNER families (it is really one family) for giving us the opportunity to live and collect with them on this expedition. The whole family have dedicated themselves to the task of unravelling the secrets of the Megathymidæ and they go about it in a most intelligent, harmonious and tireless way. The evening sessions as we sat around the tents exchanging ideas and building theories about the 'Megs' were especially memorable. These were ten days we shall not forget.