Monarch Butterflies Found at Last
The Monarch's Winter Home

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Photograph by Bianca Lavies

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I gazed in amazement at the sight. Butterflies—millions upon millions of monarch butterflies! They clung in tightly packed masses to every branch and trunk of the tall, gray-green oyamel trees. They swirled through the air like autumn leaves and carpeted the ground in their flaming myriads on this Mexican mountainside.

Breathless from the altitude, my legs trembling from the climb, I muttered aloud, “Unbelievable! What a glorious, incredible sight!”

I had waited decades for this moment. We had come at last to the long-sought overwintering place of the eastern population of the monarch butterfly.

Every wide-eyed child and meadow walker in the eastern United States and nearby Canada knows this colorful butterfly, by sight if not by name. It skims and dips in summer over fields and gardens from Texas to England, from Florida to Minnesota. But in winter the monarch vanishes from the regions. Where does it go?
Until now, no one had known. But here before me, on scarcely twenty acres of lofty wooded slope in central Mexico, the monarchs crowded by the millions to while away midwinter months in semidormancy.

I am a Canadian zoologist, Toronto-based. With the tireless help of my wife, Norah, I have spent much of my time since 1937 studying the ecology, and especially the migration, of the monarch butterfly.

Monarch migration is a marvelously intricate pattern of behavior, baffling in many of its aspects. The butterfly has long been known to travel great distances, somewhat as birds do, on a round trip keyed to seasonal changes and the reproductive cycle. For the monarch, as for the feathered flocks, southward migration's clear and evident purpose was to escape the killing frosts of winter.

Some monarchs flying south in the fall return to their summer breeding grounds, we knew, though none ever survive longer than a year. Where, then, did the eastern butterflies pass that single overwintering of their brief lives? One of the earliest questions asked, it was to be among the last answered.

Our first problem was to track the insects on their journeys, and plot the distances and directions of their flight; to do that, we had to mark them. But how do you mark a migrating butterfly, a delicate, featherweight insect that depends totally on freedom of flight?

It took many years—and many failures—to develop a foolproof way to tag a monarch. As long ago as 1937 we experimented with a printed label, affixed to the butterfly's wing with liquid glue. But tags and butterflies got tangled and sticky, and many of the insects couldn’t stay airborne.

Norah and I next had labels printed on gummed stock, like postage stamps. We tested them on the Monterey Peninsula in California, where western monarchs from the intermontane valleys of the Great Basin have always congregated in midwinter. This experiment, too, failed dismally: A night of rain washed the gummed labels off the clustered monarchs. Over the sodden grass our thousand tags lay like soaked confetti.
But then a friend suggested trying the type of pressure adhesive label used for price tags on glass merchandise. With an added fixative, this worked perfectly. Now we had a tag that would readily adhere, with a gentle squeeze, to the membrane of a butterfly’s wing where the scales had been removed. The harmless labels even stuck to monarch wings deliberately soaked in water.

**Thousands Join in Tagging Wings**

In 1952 I had written a magazine article on “Marked Monarchs,” which included an appeal for volunteers to assist in our tagging program. Twelve people responded, launching our Insect Migration Association. By 1971 it numbered six hundred; thousands have taken part over the past 24 years. The tiny labels carry identifying letters and numbers, and the words: “Send to Zoology University Toronto Canada.” Over the years hundreds of thousands of migrating monarchs have been tagged all across the continent. Reports have poured in from enthusiastic collaborators of all ages and walks of life. We have received tagged specimens from Maine and Ontario to California and Mexico, from Florida to the shores of Lake Superior.

Many tagged monarchs reached us alive, in packages lined with the field flowers they were feeding on when netted. A California golfer was about to drive his teed-up ball, when a butterfly alighted on it. Although unable to check his swing, he sent us the tagged remains in the name of science.

Early in 1965 I joined the staff of Scarborough College of the University of Toronto. Our program gained momentum. Grants in aid of our research came from the National Geographic Society, the National Research Council of Canada, and as donations from volunteer associates.

Our knowledge of the monarch proliferated as data flooded in. We learned, for example, that almost all males die on the way north from the wintering grounds. We also confirmed that the insects won’t fly at night. One tagged butterfly—captured, released, and captured again—flew 80 miles in one day.

During the summer in Ontario we found not only fresh, flawless monarchs; many were somewhat worn, and still others badly travel-tattered. This suggested several overlapping generations, the most worn having
flown from farthest south, and the freshest having only recently hatched somewhere much closer on the northward migration route.

We also found that monarch populations include migrants and nonmigrants. What a fascinating complication this was!

After considerable study we concluded that most of the migrating monarchs are those that hatch in late summer, when daylight hours decline. The late females do not develop productive ovaries—and thus do not mate—until they fly south to that elusive overwintering place. (This light-responsive infertility probably holds for male monarchs as well.) As daylight lengthens in the wintering area, the monarchs—now sexually mature—feel the urge to mate and fly north, breeding new generations along the way.

Still, we wondered where the migratory monarchs spent the winter. Despite our hopes, fieldwork in Florida and along the Gulf Coast disclosed no mobs of wintering monarchs. Widely scattered recoveries gradually enabled us to plot migration routes on a large wall chart. A pattern developed: a diagonal flight path, northeast to southwest, across the United States. Most of the butterflies, it seemed, passed through Texas to Mexico.

In our search for the overwintering place, years passed, years of frustration. Norah, late in 1972, wrote to newspapers in Mexico about our project, asking for volunteers to report sightings and to help with tagging.

In response came a letter, dated February 26, 1973, from Kenneth C. Brugger in Mexico City. “I read with interest,” he wrote, “your article on the monarch. It occurred to me that I might be of some help...”

Ken Brugger proved the key that finally unlocked the mystery.
Traveling in his motor home with his dog, Kola, he crisscrossed the Mexican countryside. He searched especially in areas where tagged monarchs had been recaptured, and places where other visitors had reported numerous butterflies. “Go out in the evening,” we instructed him. “That’s when you’ll see the monarchs moving about looking for a place to roost.”

In a letter written in April 1974, Ken reported seeing many monarch butterflies in the Sierra Madre flying at random as if dispersing from a congregating site.

“Your data and observations are exciting,” I replied. “We feel that you have zeroed in on the right area.”

Ken Brugger doubled his field capability by marrying a bright and delightful Mexican, Cathy. Late in 1974 he wrote of finding many dead and tattered butterflies along the roads in a certain area. “You must be getting really close,” we responded. These butterfly remains suggested that birds had been feeding on large flocks of monarchs.

Swiftly came the dramatic conclusion. On the evening of January 9, 1975, Ken telephoned us from Mexico. “We have located the colony!” he said, unable to control the excitement in his voice. “We have found them—millions of monarchs—in evergreens beside a mountain clearing.”

Mexican woodcutters, prodding laden donkeys, had seen swarming butterflies and had helped point the way.

**Breathtaking Climb to an Awesome Sight**

With further support from the National Geographic Society, Norah and I made plans to visit the site early in 1976. Photographer Bianca Lavies would join us and the Bruggers. We met on January 9, at a mountain motel in the Sierra Madre, and from there negotiated steep roads to a village where we picked up our guides. Reaching one high summit, we left our vehicle and set out afoot toward the “Mountain of the Butterflies.”
Norah and I are no longer young. At 10,000 feet, as we walked along the mountain crest, our hearts pounded and our feet felt leaden.

The rather macabre thought occurred to me: Suppose the strain proved too much? It would be the ultimate irony to have come this far and then never witness what we’d waited so long to see!

From the summit, dotted with junipers and holly glistening with hoarfrost, we had to descend steeply. Down, down we stumbled to a clearing surrounded by stately oyamel trees, a kind of fir.

Then we saw them. Masses of butterflies—everywhere! In the quietness of semidormancy, they festooned the tree branches, they enveloped the oyamel trunks, they carpeted the ground in their tremulous legions. Other multitudes—those that now on the verge of spring had begun to feel the immemorial urge to fly north—filled the air with their sun-shot wings, shimmering against the blue mountain sky and drifting across our vision in blizzard flakes of orange and black.

One of our guides, Juan Sanchez, added up the tall trees. He estimated more than 1,000, every one garbed in monarchs!
While we stared in wonder, a pine branch three inches thick broke under its burden of languid butterflies and crashed to earth, spilling its living cargo. I stooped to examine the mass of dislodged monarchs. There, to my amazement, was one bearing a white tag!

By incredible chance I had stumbled on a butterfly tagged by one Jim Gilbert, far away in Chaska, Minnesota. Later Mr. Gilbert sent me a photograph of the very field of goldenrod where he had marked this frail but tireless migrant.

**Other Assemblies Probable**

How could we be sure that this was the sole congregating area for our wintering monarchs? We couldn’t. In fact, on their 1975 discovery trip, the Bruggers found two nearly equal concentrations a few miles apart. While I think it possible that the monarchs assemble in two or three or maybe even four overwintering roosts, I feel certain they are all situated within a restricted range in the same general area.

We know that monarchs will lay eggs only on milkweed plants. Because more than half of North America’s hundred species of milkweed are native to Mexico, a tempting hypothesis arises. May it not be that, far back in geologic time, the monarch originated in Mexico? Now, in returning there each winter, the butterfly is “going home,” after straying, perhaps over eras of a warming trend, farther and ever farther north.

Anyway, I’m convinced that the monarch’s selection of the Sierra Madre for overwintering is no random choice. Butterflies are poikilotherms, that is, creatures that adjust their body temperatures to the ambient
air. At this 9,000-foot elevation, winter temperatures hover from just below freezing to just above. Ideal for monarchs! Inactivated by the chill, they burn up almost none of the reserve fat they’ll need on their northward flight.

I believe the monarchs overwinter in this chosen area because it provides suitable conditions at the terminus of their naturally converging migration routes.

In our visits to the site over a span of several days we tagged about 10,000 butterflies, using distinctive fuchsia-pink labels. To our delight, two monarchs bearing these tags were recovered several months later, in April, in northern Texas, 1,000 miles from the overwintering place. Others may well appear as far north as Canada. Such an event would resolve one uncertainty: whether any monarchs from central Mexico make it back to the northern limits of the species’ range.

As with our understanding of bird migration, awesome voids remain in our knowledge of the monarch’s comings and goings. Not the least of the mysteries is how such a fragile, wind-tossed scrap of life can find its way (only once!) across prairies, deserts, mountain valleys, even cities, to this remote pinpoint on the map of Mexico. Certainly some instinct or programming is involved.

At the end of our last day at the site, we climbed back to the mountaintop. Scattered flights of butterflies displayed the restlessness that soon would possess the whole mass of monarchs. Some mysterious signal, probably involving the angle of light from the ascending sun, within a few weeks would trigger the northbound migration flight.

Maybe, in a few months, one of the beautiful monarchs we had just seen sipping nectar from a woodland flower would alight on a milkweed plant in my backyard at Scarborough, Ontario, to lay her eggs. Perhaps I would tag her progeny, and another numbered monarch might make the incredible journey to Mexico’s Sierra Madre.