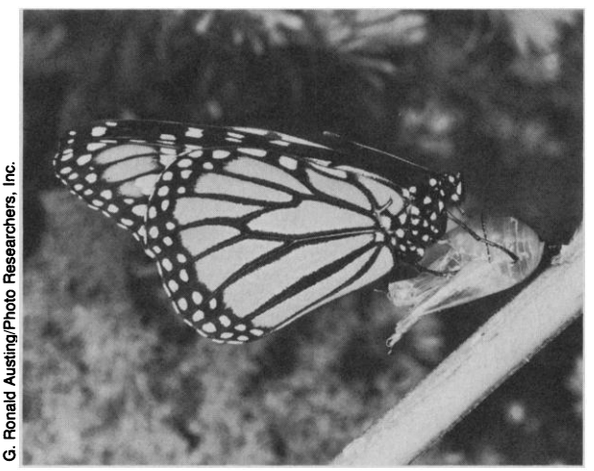
# Mexico Acts to Protect Overwintering Monarchs

*The government has created a reserve that may ensure the continuation of a remarkable natural phenomenon*

As shorter days and chilly nights signal the approach of autumn, North American monarch butterflies are embarking on a remarkable journey. During the next few weeks, those east of the Rockies will fly to a tiny patch of fir forest in rugged mountains near Mexico City, where they will wait out the winter. About 100 million of the spectacular orange and black butterflies (*Danaus plexippus*) will survive the journey, some traveling from as far north as Canada. A similar migration is widely accepted to be under way in the West, as some 10 million monarchs head for about 40 winter roosts along the California coast.



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**The migratory monarch.** *Its annual long-distance migration has been declared a "threatened phenomenon." Although its winter habitat in Mexico has now been declared an ecological preserve, sites in California are still being lost to urban development.*

This mass migration, which is believed to be unique in the insect world, has become increasingly precarious in recent years. The once remote winter sites in Mexico have come under pressure from logging and agricultural development, and several roosts in California have already been lost to condominium construction and urban growth. So serious has the threat to the monarch's winter habitats become that 3 years ago the International Union for the Conservation of Nature designated the annual migration a "threatened phenomenon," the only such designation it has ever made.

Now, however, there is guarded optimism among conservationists that the eastern monarchs, at least, have been given some crucial protection. On 25 August, the Mexican government issued a proclamation declaring the monarch's overwintering sites an "ecological preserve." Logging and agricultural development will be prohibited at six sites totaling almost 5,000 hectares, and restrictions will be placed on the use of land in an 11,000-hectare buffer zone surrounding them.

The proclamation is a major victory for a Mexican conservation group, Monarca A.C., and the World Wildlife Fund, which has provided substantial support. Says Curtis Freese, director of Latin American and Caribbean programs for the World Wildlife Fund, "this is a big and important step in wildlife conservation." If the overwintering sites can be preserved, "future generations in Mexico, the United States, and Canada will be able to enjoy the beauty of the monarch and the spectacle of its migration."

The monarch's winter habitats in Mexico and California provide a delicate mix of climatic conditions that are essential for the insect's survival. The Mexican sites, the first of which was discovered only 10 years ago by Canadian entomologist Fred Urquhart, are on the southwest slopes of volcanic mountains, some 3,000 to 3,400 meters above sea level. Dense stands of oyamel fir trees provide protection from rain, hail, and occasional snow, and the sites offer exactly the range of humidity that the butterflies require.

How the butterflies find their way to these tiny areas is a mystery, as are many other aspects of the insect's astonishing life cycle. The key to its existence is the milkweed, a plant that grows prolifically in North America.

When the monarchs leave their winter roosts in early spring, they retrace part of the long journey they made the previous fall and lay their eggs on milkweeds in northern Mexico and the southern United States. The emerging caterpillars receive not only nutrition from the plants but also chemical defense against predators, for the milkweed contains extremely bitter poisons that the caterpillars and later the butterflies themselves store in their bodies. The insects loudly proclaim their toxicity to would-be predators by their striking colors.

According to studies by Lincoln Brower of the University of Florida at Gainesville, this new generation, the progeny of the monarchs that overwintered in Mexico, then recolonizes the rest of the eastern United States and southern Canada. As many as five generations may pass before the long journey back to the winter sites begins.

The generation that emerges in late August differs slightly from its ancestors in being sexually suppressed. Probably responding to changes in daylight hours and nighttime temperatures, members of this generation begin the trip south to a remote area that they have never seen. According to studies reported by Brower and his colleagues at an international meeting on the monarch, hosted by the Natural History Museum of Los Angeles County on 2 to 5 September, a crucial stage of the journey occurs in Texas and northern Mexico, where the insects build up lipid reserves as they feed on nectar from fall-flowering plants. By the time they arrive at the winter sites in mid-November, they are 50% fat.

Their arrival provides an awesome sight, Brower says, as hundreds of thousands of the brightly colored butterflies spiral out of the sky to take up residence in the fir forests. Throughout the winter, they remain relatively quiescent, but on warm, clear days they will fly en masse in search of water. By mid-March, as spring approaches, the monarchs head north again.

The Mexican habitats are crucial to the survival of the eastern monarchs. Although some butterflies will overwinter along the Florida coast and on islands in the Gulf of Mexico, they are wiped out in winters when there are heavy frosts. "The only safe haven is in Mexico," says Brower. The relatively small area occupied by the winter sites means that only a limited amount of forest clearing would destroy the habitat.

The overwintering sites are mostly on communally owned lands, and the pressure on the forest comes chiefly from local farmers who chop down the trees for firewood and building poles and to clear plots for

agriculture. Monarca, with support from the World Wildlife Fund, is launching a program to help the local inhabitants improve agricultural and forestry techniques to compensate for the loss of their land. The monarch preserves could, however, greatly help the local economy. Freese notes that last year alone more than 50,000 people visited the sites, and local artisans are already catering to the tourist traffic.

The situation in California is more complex. It is generally accepted that the western monarchs follow a similar migration to those in the east, leaving their winter roosts in early spring to migrate inland and northward, and their descendants will return in the fall. At least one scientist challenged this notion at the Los Angeles meeting, however. Adrian Wenner of the University of California at Santa Barbara argued that there is scant evidence that western monarchs undergo a true long-distance migration in the fall, and proposed instead that the butterflies simply expand and contract their range with the seasons. Wenner did not win many converts, however. "There is no question in any of our minds that migration is taking place," says Christopher Nagano, staff biologist with the Monarch Project, a conservation group based in Portland, Oregon.

In any case, it is clear that the monarch's western winter habitats are disappearing at an alarming rate as prime ocean real estate is turned over to commercial development. The Monarch Project has been attempting to locate roosting areas and, according to Nagano, seven of 45 known sites have been destroyed in the past 2 years alone.

How many more sites could be lost before there is a serious impact on the monarch population is anybody's guess, but entomologists, including Wenner, are expressing growing concern. Wenner also argues that it is essential to preserve patches of milkweed.

The Monarch Project is having at least some impact in zoning decisions and the granting of building permits. A few years ago, Nagano says, government agencies "used to laugh" when told that proposed developments might destroy the butterfly's winter roosts. "Now," he says, "some agencies come to us to ask whether developments will endanger sites." But this is not always enough. According to Nagano, commitments have been made to preserve the monarch roosts in development plans, but the trees have been cut down anyway. The Monarch Project is now hoping that growing public awareness of the monarch's unique and spectacular migration will provide sufficient pressure to preserve the phenomenon for future generations. ■

COLIN NORMAN

# ICSU Bids for Bigger Share of the Limelight

*But a contested presidential election reflects continuing tensions over the role of an organization to which most scientists belong but many know little about*

*Paris*

CONTESTED elections for top posts are rare in the International Council for Scientific Unions (ICSU), the umbrella body that links together 20 international unions representing individual scientific disciplines, as well as 71 national academies and research councils. Next week, however, delegates attending ICSU's 21st General Assembly in Berne, Switzerland, will, for the first time in many years, be asked to make a choice between two rival candidates for the next president.

Some of the scientific unions belonging to ICSU have decided to back an "outsider" candidate, Swiss chemical engineer Heinrich Zollinger, against Indian physicist M. G. K. Menon, the original nominee of the executive committee. Their unusual move suggests the depth of feeling over one of the most divisive issues currently facing the international scientific community—how to react to South Africa's apartheid policies in the context of ICSU's support for the free movement of scientists.

***Some are urging that ICSU should fill the void created by UNESCO's decline.***

In particular, Zollinger's main backers—such as the International Union of Pure and Applied Chemistry and the International Union of Crystallography—are also pushing a resolution that would prevent ICSU-affiliated organizations from holding scientific meetings in countries (such as India) which require South African scientists to declare their opposition to apartheid before being granted entry visas (if, indeed, they are offered visas at all).

Both candidates for president have strong scientific credentials. But Menon has long been active in government science policy circles in India, as a top science adviser to both Prime Minister Indira Gandhi and, more recently, her son Rajiv Gandhi. Zollinger, a former president of Switzerland's National Science Foundation, is said to appeal more to those who argue that politics should be kept at arms length from science. Indeed, when he was president of IUPAC several years ago, he came personally into conflict with the Indian government over the admission of Israeli scientists to a scientific conference.

Divergent perspectives are not new within the scientific community on how it should relate to governments and to political issues that impinge on science. Indeed, tensions have never been far below the surface in discussions among those who, for a variety of reasons, have sought to organize science on a global scale.

Participants in these discussions tend to fall into two camps. One argues that since basic science is primarily funded by governments, its international organization should also be a government responsibility, with scientists acting largely as advisers. Those in the second camp accept that government backing is required—for example in providing both the funds and the facilities needed to mount large-scale global research projects—but argue that decisions on how funds are allocated should be left in the hands of the scientific community.

Partisans of the first approach, such as prominent British scientists Julian Huxley and Joseph Needham, were largely responsible in the immediate postwar years for adding science to what was initially to have been merely the United Nations Educational and Cultural Organization, thus turning it into UNESCO.

For the past 40 years, the broad scope of UNESCO's activities and the size of its science budget (currently $35 million a year) have tended to overshadow those of ICSU, an older body which evolved in 1931 out of the International Research Council. The IRC was itself established in 1919 with George Ellery Hale, the founder of the National Academy of Sciences' National Research Council, as one of its chief architects, and ICSU has remained the main channel