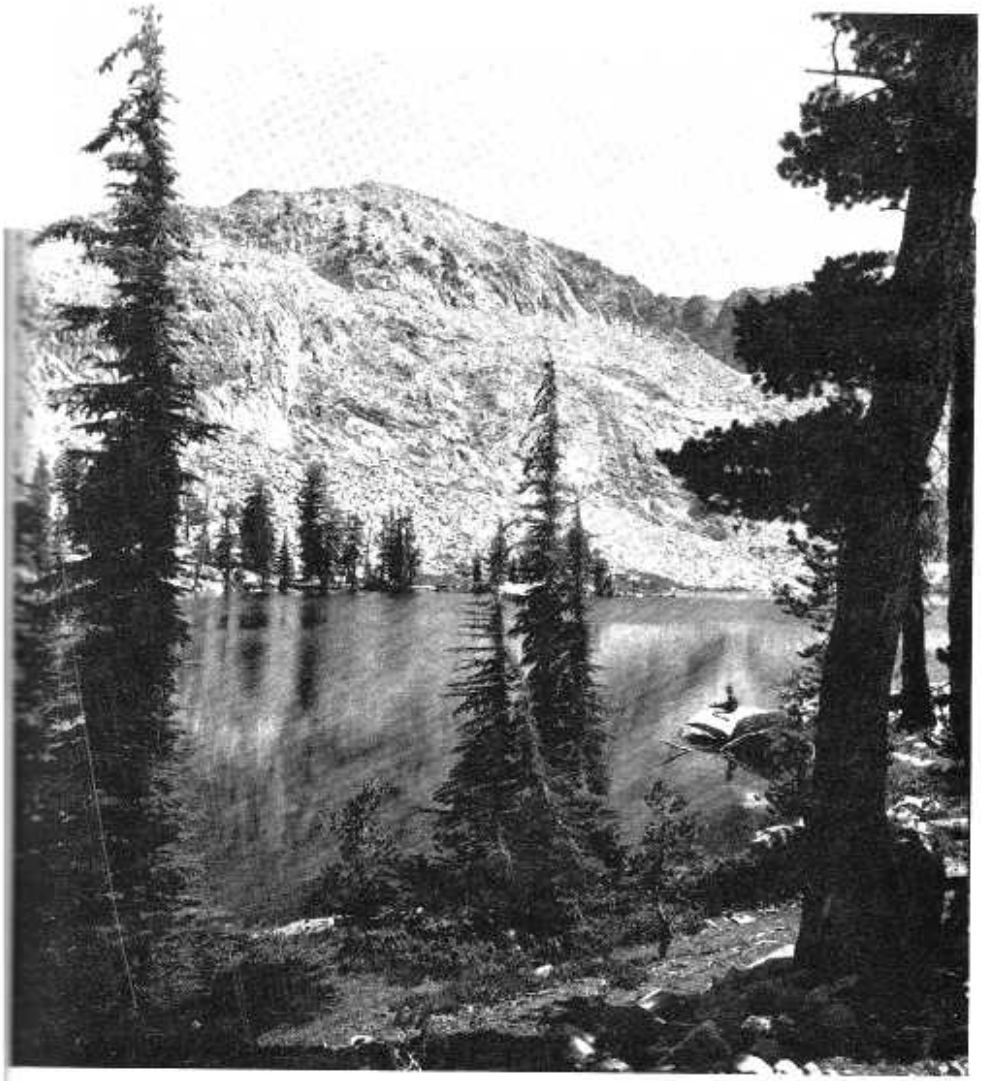
YOSEMITE NATURE NOTES

VOLUME XXXVI · NUMBER 5 MAY 1957



Upper Chain Lake, Gale Peak in Background

The future of these high country forests is in danger.

Yosemite Nature Notes

THE MONTHLY PUBLICATION OF

THE YOSEMITE NATURALIST DIVISION AND
THE YOSEMITE NATURAL HISTORY ASSOCIATION, INC.

John C. Preston, Superintendent
G. D. Gallison, Assoc. Park Naturalist
D. H. Hubbard, Park Naturalist
W. C. Bullard, Asst. Park Naturalist
R. W. Carpenter, Park Naturalist (Trainee)

VOL. XXXVI MAY 1957 NO. 5

WHAT'S HAPPENING TO YOSEMITE'S FORESTS?

By Hal Roth

As thick as thin pencil lead and a quarter of an inch long, a pink black-headed caterpillar called the needle miner is destroying our Yosemite forests.

In 1954, the infestation covered 46,000 acres of lodgepole pine forest in the upper Tuolumne watershed. Thousands of acres of trees are already dead and the blight is spreading epidemically, leaving miles and miles of ghost forests in one of our most famous national parks. When infested with the needle miner the weakened forests are prey for the dreaded mountain pine beetle which, when once started in the lodgepole forests, can sweep into healthy stands of sugar pine, among the most valuable timber in the country.

"We can't say for certain," says Emil Ernst, Park Forester, "what the extent of the needle miner is in Yosemite since the infestation is increasing tremendously in both intensity and area. Probably over 60,000 acres now. Way back in 1947 it was obvious that the Tuolumne area was in difficulty; since then it has become worse every year."

Stands of lodgepole pine form the forest cover in much of the High Sierra, especially in the most intensely used recreational areas. In campgrounds and picnic sites the shading pine canopy is essential for public use. Loss of the trees results not only in the destruction of aesthetic values and recreational ruin, but a complete loss in usage of man-made improvements.

"The values in the Tuolumne country are tremendous," says Ernst. "The needle miner may destroy the entire forest recreational potential of the Upper Tuolumne Basin, in fairly high use now and certainly the most important part of the park for the future. The area is hardly opened up and already the Park Service has several hundred thousand dollars invested in campgrounds and developments.

"We estimate that in 1955 approximately 100,000 park visitors passed through the Tuolumne Meadows area in spite of the poor access road," says Ernst.

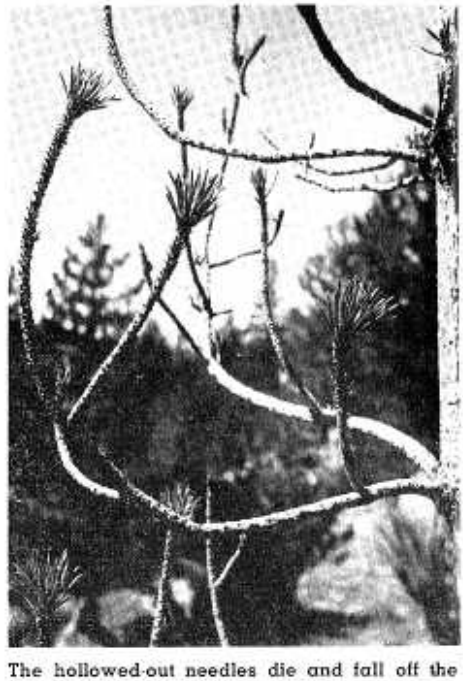
The damage is caused by the larvae of the needle miner, a tiny whitish moth with a wingspread of a quarter of an inch. Each larva eats —or rather mines out—from three to five pine needles, hollowing out the leaves and causing them to die. Since there are billions and billions of larvae in the epidemic, the trees are being stripped of their foliage and choked to death. One can go through miles of the region north of

The healthy foliage of the Lodge Pole Pine is attacked by the larva of the Needle Miner.

Tuolumne Meadows—as I did on horseback—and see thousands of de-foliated trees, the brownish hollowed-out needles in deep piles on the ground around the trunks. The annual ring growth has become thinner and thinner and finally stopped completely as the tree increasingly lost its leaves. Four successive two-year generations of needle miners cause 75 to 90 per cent de-foliation.

In the course of an epidemic 80 to 90 per cent of the mature trees are killed either directly, from the effects of continued de-foliation, or indirectly, from the mountain pine beetles which are attracted to the weakened trees. Twice in the recorded history of Yosemite, from 1910 to 1922, and from 1933 to 1940, the needle miner has struck at the lodgepole pine leaving ghost forests of bleached snags. The present epidemic has come just as the new forests had begun to thrive, only this epidemic is affecting more land and is catastrophic since the area is part of an important national park with increasingly intensive use. If the mountain pine beetle outbreak continues, it can spread to the valuable sugar pine stands in Yosemite and the nearby national forests. Besides the Yosemite outbreak, a needle miner infestation covers 10,000 acres in Sequoia National Park, Yellowstone, Crater Lake and Banff, Canada have needle miner problems.

The problem in needle miner control was lack of basic information about the insect. Almost nothing was known about it. The scientists had to start at the beginning. Insects and diseases harmful to plants are often controlled with sprays or by doing something that will break the life sequence of the pest—like destroying the gooseberry plant to interrupt the white pine blister rust cycle.



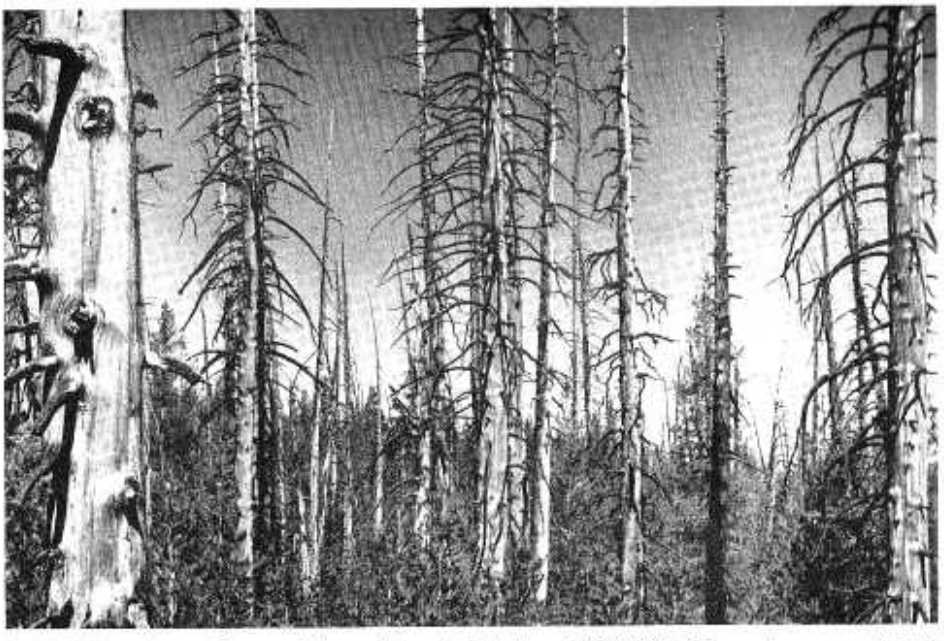
The hollowed-out needles die and fall off the tree causing it to choke to death.

In the Conness Basin near Young Lake these thousands of Lodgepole Pines are dead, victims of the Needle Miner. Only Hemlocks in foreground and a very few in the forest beyond have escaped.

In 1954, the mountain pine beetle infestations increased. In the more severely needle miner de-foliated areas, thousands of lodgepoles showed the characteristic signature of beetles under the bark. A large-scale beetle control project, supplied by an air drop, was attempted in the Conness Basin, in the Upper Tuolumne watershed, where some of the heaviest needle miner attacks have occurred. About 1,700 trees were treated by laboriously felling and burning the infested bark. A later survey showed an additional 3,945 beetle-infested trees in the area.

Because the needle miner outbreak is so intense, prolonged and persistent, a field camp was established at Tuolumne Meadows by the Division of Forest Insect Research of the California Forest and Range Experiment Station. Factors giving rise to epidemics, their prolonged character, and the causes of their eventual decline are little understood. The study is attempting to determine the biological and ecological factors which account for the rise and fall of epidemic populations. The scientists have undertaken systematic studies to determine population trends as a basis for prediction or early discovery of outbreaks.

The lodgepole needle miner in Yosemite has a two-year life cycle, each generation beginning in the odd numbered years (1953, 1955, etc.) with uncanny regularity. Since the needle miner is a true caterpillar, it goes through four stages in the two-year sequence: egg, one month; larva, 21 months; pupa, one month; adult moth, one month. In 1953 a new



Dead Lodgepoles at Tenaya Lake evidence infestation of 1912-1922. Young trees are already infested with Needle Miners.

generation began that was greater than any since the epidemic started in 1945. This cycle reached the adult stage in July 1955.

The scientists at the camp are making population counts at each stage of development. By systematically selecting groups of needles and counting the eggs or larvae, the degree of infestation can be accurately determined. By keeping records of the egg, larval, pupal, and adult populations, the degree of epidemic and the course of the infestation can be plotted.

Natural enemies of the needle miner are being checked to see if it is possible to decrease the epidemic populations by introducing, or aiding in some way, enemy parasites. A needle miner virus was found and identification work is being done under the electron microscope at the University of California.

The best—and most immediate—control hope appears to be insecticides. Endrin, Dieldrin, and Malathion are being tested.

"Malathion, or organic phosphate, has proved outstanding so far," says Entomologist Struble. "Just a flick of the sprayer and every insect in the sprayed area is killed. It even kills the larvae and pupae inside the needles.

"But testing insecticides isn't as simple as spraying a few trees," says Struble. "The recent tests have been encouraging, but we have to find out how long the spray will last, how they effect the trees, what will happen to fish and wildlife, and the effects on other insects.

"We make careful population counts of the needle miners before and after the spray tests, treating the trees in the pilot plots with different chemicals in varying concentrations. Knowing when to spray is another problem. At certain stages, when the insect is more vulnerable, it is possible to use smaller—easier applied and cheaper—concentrations of the sprays and still kill the needle

Through burning "Midnight Oil" a great discovery was made.

miners. A light spray isn't so likely to upset the ecological balance in the forest."

In their quest for information the scientists were stumped by one thing: when do the needle miners mate? Everyone propounded vague hypotheses but nothing was conclusive. If only it could be found out. One night New Zealand Entomologist Dave Morgan was working late. He wanted a newly picked leaf cluster so he went into the woods with his flashlight and got down on his knees to strip a few leaves from a lower branch. Then he saw it.

"Quick lads," shouted Dave through the darkened row of tents. "I've found out when the little beasties do it. Come out with your flashlights." Soon all the entomologists were out in the woods on their knees late at night holding flashlights and observing the mating cycle of the *Recurvaria Milleri.*

The entomologists soon hope to make definite spraying recommendations. "The work should then be far enough along to give reasonable assurance of success," they say. The problem of applying the spray may be solved by using the new, more powerful helicopters which can carry a substantial payload up to 12,000 feet. These machines cost up to $300 an hour to operate.

"That would be cheap if we can find out something," says Park Superintendent John C. Preston. "The Conness Basin beetle control project cost $18,000 alone. Control of the needle miner is one of the most important problems in Yosemite today. There are millions of dollars' worth of trees in the Tuolumne high country that we've got to protect. Future campground development will be impossible if they're lost. The area is one of our best places for expansion from the overcrowding in Yosemite Valley. We have tried our best to knock out the needle miner but weren't sure what we were up against. We had to start almost from scratch. But you can be sure we'll work until we get it. Who wants to camp in a ghost forest?"

EDITOR'S NOTE: We are indebted to **Westways,** monthly publication of the Automobile Club of Southern California, for permission to reprint this article which appeared in their November 1956 issue.

AN ASCENT OF SING PEAK

By Richard Wason, Ranger-Naturalist

While neither a high nor particularly difficult climb, an ascent of Sing Peak (10,544 feet), in the south boundary country of Yosemite National Park is, apparently, not common. This may be due to its remoteness from well-traveled trails or its proximity to Gale Peak (10,690 feet), a more popular challenge for the rock climber. At this writing, the only recorded ascent of Sing Peak in 1956 was made by the author and Wally Abersold, Yosemite Fire Control Aide, on August 13.

After having camped overnight at Upper Chiquito public camp in Sierra National Forest, we hiked cross-country following the shoulder of the east fork of Chiquito Creek, eventually reaching the saddle between Madera and Sing Peaks. From here a rather easy scramble over the highly weathered metamorphic rocks brought us to the summit. A superb panorama of mountain peaks was part of our reward. A vast portion of Yosemite's high country — from the valley of the South Fork to the west, to Yosemite's rooftop, Mt. Lyell, to the northeast — was spread out before us. Standing on a mountain summit and looking out indefinitely in any direction without glimpsing a single sign of civilization is always a humbling experience, and we are the richer for having done so once again.

Looking into the register cashed in a cairn at the summit, we discovered that apparently the first ascent of Sing was made by Mr. Claud Laval and Dr. W. W. Chase of Fresno on August 22, 1915. At least 14 other persons had climbed the peak, in addition to what must have been a most hardy and faithful dog named Rip. The present register was placed by Richard Bower of Oakland, California, on September 3, 1948, after a serious accident had been suffered by one of his party in traversing from Gale Peak. In his notation Bower reminded us that the peak had been named for Ah Sing, Chinese cook for the U. S. Geological Survey team that mapped the Yosemite area at the turn of the century. Perhaps Sing is the only person ever to be memorialized for the quality of his flapjacks!

Our descending route brought us to a point below Chain Lakes where we picked up the trail to Moraine Meadows and our camp for the night. The South Fork of the Merced yielded several fine eastern brook trout for breakfast, after which we made our way via Fernandez Pass to Clover Meadows and a lift back to our car at Chiquito, courtesy of the U. S. Forest Service.

Some interesting, if not unusual, bird observations were made. Close to timberline on the ascent to Sing, we caught a brief glimpse of a hummingbird which was attracted, apparently, by the abundant blooms of Pride of the Mountains (*Penstemon newberryi*). In descending from the peak we flushed a sooty grouse that made off in its typically noisy flight, and a half-dozen grosbeaks were visitors to our camp at Moraine Meadows.

I was particularly interested in the variety of tree species to be seen on the trip from Fernandez Pass to Clover Meadows. Hiking down hill has a way of making distance go by faster, but I had the impression of a very marked telescoping and overlapping of normal altitudinal

Looking North from Fernandez Pass.

ranges — all of the Hudsonian and Canadian zone species being found in one rather short section of the trail.

Completion of this rather hurried two day trip left us somewhat footsore and weary, but firmly convinced that the south-eastern part of Yosemite is a region of great beauty and interest and deserving of greater visitation.

ANOTHER WINGED TRAVELER

By Henry G. Weston, Jr., Ranger-Naturalist

The beautiful orange and black monarch (*Danaus plexippus*) is one of the best known of our native butterflies, occurring abundantly in many parts of the North American continent. Some people know it better as the milkweed butterfly because of its association with the milkweed plant. In Yosemite Valley it is a common sight flitting about the occasional extensive stands of snowy milkweed.

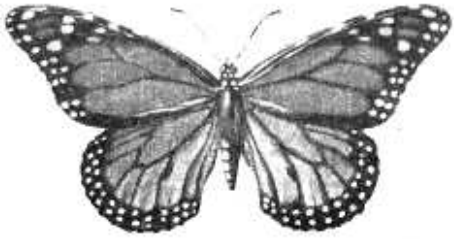
In the insect world one finds that many species spend parts of their respective life cycles in rather close proximity to specific kinds of plants. In the case of the monarch in Yosemite Valley, the showy milkweed is utilized. The adult female will lay tiny pale green eggs on the under-

surface of a milkweed leaf. The caterpillar or larva that hatches from each egg feeds on the tissues of the leaf. As the caterpillar reaches its maximum size it assumes a greenish color on which traverse bands of black and yellow are superimposed. This larval stage then forms a cocoon or chrysalis, also attached to the milkweed. This cocoon is a beautiful object, frequently being rather appropriately called "the little green house with gold nails" because of its pale green color and raised metallic gold spots. After a week or two the winged adult appears and the cycle is complete.

The monarch is also known as the "wanderer" because of its travels. Of the several hundred insects that are known to migrate, this species is probably the most widely known. In North America it is probably the only butterfly that can be designated as a true migrator; moving like a migrating bird down the map each fall.

Several factors undoubtedly aid the monarchs in their movements. Some sort of a chemical adaptation seems to render them relatively unpalatable to predators. Hence they are not commonly used as food by insectivorous birds. This plus the fact that they are very powerful-winged and therefore capable of long flights seems to adapt the species well for migration.

The monarchs, unlike many insects, are not adapted to passing through the winter in the colder climates. Hence perhaps the need for the generally southward fall movement. As they move through Canada



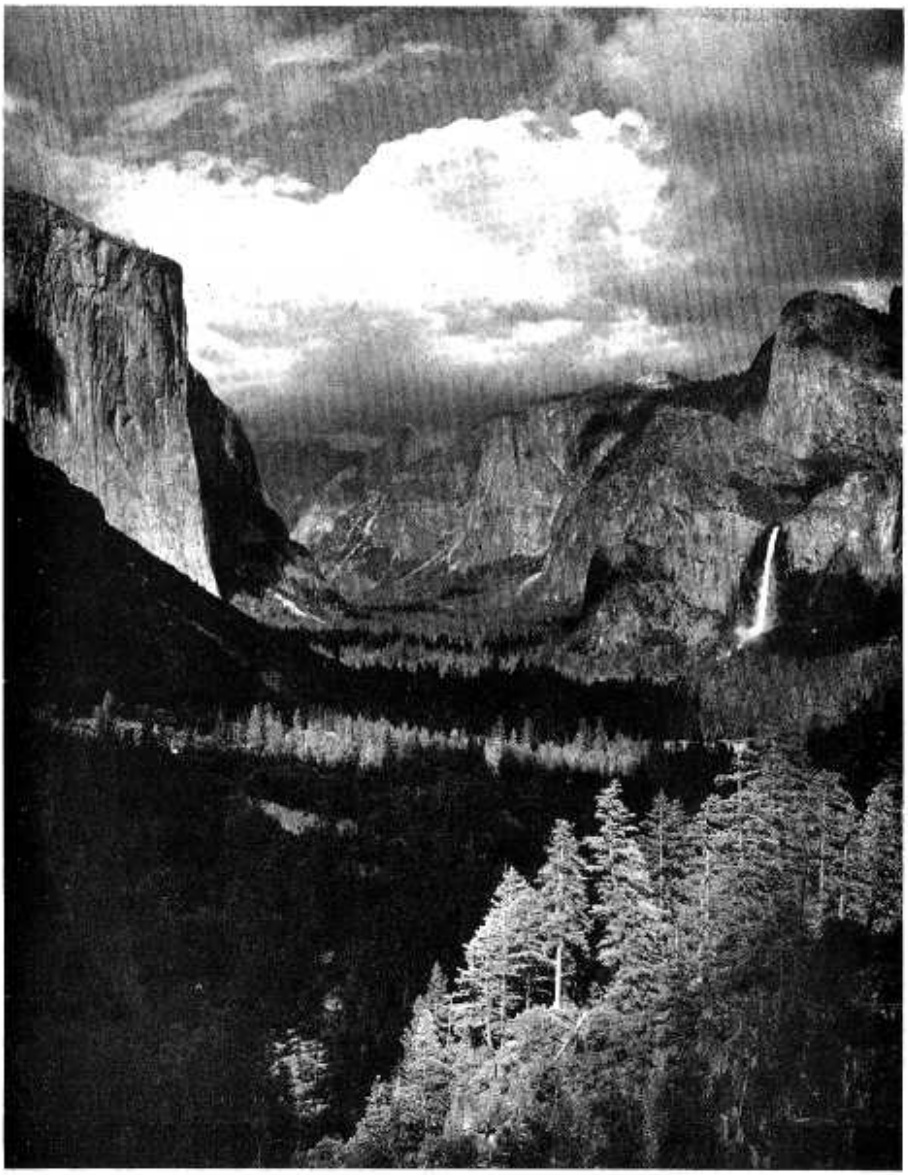
The Monarch.

and the United States, covering many miles, 2000 or more in some cases, they swarm together. Teale, in studying these butterflies as he traveled westward across the United States, described what he saw as "in a continental movement, the butterflies were sweeping in a steady insect tide toward the south."

Movement southward or, as in the case in the Yosemite region, probably generally westward to lower elevations, a swarming instinct seems to take hold of the individuals. Certain groves of trees in various parts of the country furnish annually a resting place for the butterflies during the winter season. The trees so utilized are known as "butterfly trees." Perhaps the annual movement referred to receives most attention at Pacific Grove, California. There millions of monarchs utilize groves of Monterey pine as their winter homes. This town is one of the few insect sanctuaries found in the world today as a city ordinance has been passed to protect them from harm. Teale, in referring to Pacific Grove, states that year after year, the pines house as many as 2,000,000 individuals during the winter months, all concentrated within an area of only a few acres.

The why and how of the movements of these insects continues to puzzle the scientific world. The mon-

archs move generally southward each fall in great swarms but in the spring they travel northward, frequently singly, and in a rather leisurely manner. Hence this latter movement is seldom noticed. Apparently only a few of the millions that move south in the fall return to the north in the spring. The life cycle is too short to permit individuals to bridge the gap, from fall to fall. Instinctively, without leaders, the butterflies return year after year to the same grove of trees. How do they find their way? This and many other questions still remain to mystify and challenge scientific and layman alike.



Yosemite Valley is a summer breeding area for Monarchs.