

Not enough bees

When the Wall Street Journal last year reported that "the nation's honey bees slowly but steadily are being exterminated," the message came as no surprise to entomologists in Minnesota, where beekeeping is a \$7-million-a-year business. Their thoughts on possible causes, effects, and remedies of the problem are outlined in an article by Bob Drechsel in *MINNESOTA SCIENCE* (Summer '75), published by the Agricultural Experiment Station of the University of Minnesota.

The drop in bee population is sometimes blamed on pesticides, but some believe that herbicides do more damage by destroying forage. A team of UM entomologists also found that two-thirds of the apiaries in the country are infested with a severe bee disease, nosema, caused by microsporidia that damage the insect's digestive system. Ironically enough, much of the skyrocketing price of honey (from 12 cents per pound in 1970 to more than 50 cents per pound in 1973) resulted from rising sugar prices, since beekeepers must use a sugar mixture to feed the hives during winter.

Bees have perhaps 10 to 20 times as much economic value for their pollination activities as for their honey, so preventing any further deterioration of their population is taking on higher and higher priority. Steps include increased treatment of hives with fumagillin to prevent nosema, better care of hives in winter (when one-quarter of the domestic hives are perishing, compared to 5 percent with proper care) and more judicious application of pesticides and herbicides. (Some popular substitutes for DDT are far more harmful for bees.)

Save the lion

Though it is not yet an endangered species, the lion has begun to dwindle over much of its range, and the National Wildlife Federation draws attention to the lion's plight in the current (Sept.-Oct.) issue of its magazine, *INTERNATIONAL WILDLIFE*.

Roving editor Norman Myers reports that the lion's effective range has been cut in half during the past two decades, while the number of lions has shrunk from about 400,000 to 200,000. Most of the pressure comes from ranchers who want to use the savannah for raising stock, and have begun extensive poisoning programs that kill other predators as well. By the end of this century, Myers predicts, only a few thousand lions may be left.

He suggests a partial remedy that would have appalled conservationists only a few years ago: Make the lion more valuable economically through carefully controlled trophy hunting. "The most feasible way to convert lions into dollars is through sports hunting and wildlife observation by tourists," he says. "If it is properly managed to ensure a continuous stock of lions and a constant flow of dollars year after year, it should satisfy both world conservationists and local stockmen."

The forests rebuild

The tussock moth infestation that plagued the forests of the Pacific Northwest from 1972 to 1974 (SN: 9/1/73, p. 138) has finally been brought under control by aerial spraying of DDT. Some 799,000 acres of timber in Oregon and Washington were damaged, with a total loss of \$28.1 million, after salvage. Now rebuilding begins.

The Boise Cascade Corp. has just announced successful replanting of nearly 200,000 ponderosa pine and Douglas fir seedlings, with more to come. Geothermal energy was used in a vast nursery to speed maturity of the seedlings so that they could be transplanted a year earlier than if they had been raised outdoors.

OCTOBER 4, 1975

Dirac's cosmology not crystal clear

A few years ago P.A.M. Dirac presented a cosmological theory based on relations among the fundamental constants of physics that makes some rather strange predictions (SN: 2/9/74, p. 92). One of these is that new matter should be constantly created as time passes.

If this is so, then the dimensions and densities of ancient crystals should differ from those of modern ones. Kenneth M. Towe of the Department of Paleobiology of the Smithsonian Institution asserts in the Sept. 11 *NATURE* that an examination of three-billion-year-old rocks indicates this is not so. Their crystal spacings are the same as modern ones and so, apparently, is the number of atoms in the unit crystalline cell.

A way around the difficulty suggested by J.H. Gittus is that the new atoms do not disturb the regular crystal but fall into interstitial positions at vacancies and dislocations. Towe responds that this would require more than 30 percent of the atoms in a three-billion-year-old crystal to be interstitials, far more than the crystal can accept.

Groups in the nucleus

One of the new mysteries of nuclear physics is that when nuclei that possess even and equal numbers of neutrons and protons are broken by bombardment with accelerated particles, the fragments knocked out the nucleus are preferentially single or multiple alpha particles (two protons plus two neutrons). In the past both pi and K mesons have produced this effect.

O. Artun and 10 colleagues from the Center for Nuclear Studies at Saclay and the University of Clermont-Ferrand in France report in the Sept. 22 *PHYSICAL REVIEW LETTERS* that the same effect occurs in bombardment by medium-energy protons. The interaction mechanism is nearly unknown, they say, but the results indicate qualitatively the breaking of an excited system (the target) by severing the weakest bonds between groups of nucleons strongly bound within themselves.

Quasar 3C 279: A variable feast

A number of quasars and related BL Lacertae objects exhibit striking variations in brightness over the years. It now appears that the most variable and most luminous of those now known is 3C 279. Such is the conclusion of Lola J. Eachus and William Liller of the Center for Astrophysics at the Harvard College Observatory and Smithsonian Astrophysical Observatory (*ASTROPHYSICAL JOURNAL*, 200:L61).

The determination is the result of a survey of the photometric history of such objects that Eachus and Liller have been involved in. They examined archival plates in the Harvard collection going back more than 45 years. 3C 279's greatest recorded brightness, 11.27 magnitude, came on a plate taken April 12, 1937. The known minimum is 18.0, recorded in 1965 by Allan R. Sandage and collaborators.

Thus it appears that 3C 279 can change by at least 6.7 magnitudes "and thus becomes the most variable QSO or BL Lacertae object yet studied." Assuming that its redshift is cosmological, its intrinsic brightness in 1937 was minus 31.4, "making it optically one of the most luminous known objects."

The swiftest variation in 3C 279 in the years since 1929 was 2.2 magnitudes in 13 days in 1936. This implies that the object is no more than a few light days across, and the problem of finding a mechanism that produces more than 10^{54} ergs of luminous energy in a volume as small as a billionth of a cubic parsec is a serious one. It appears also that 3C 279 is prone to outbursts about every seven years, and therefore its variations may be periodic rather than random.

217