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Brown Pelican Reproduction

D. W. Anderson *et al.* (Reports, 21 Nov. 1975, p. 806) attribute the improvement since 1970 of brown pelican reproduction in Southern California to lower DDT residues in "the discharge at a sewage outfall associated with a Los Angeles plant that manufactured technical DDT."

The following observations are pertinent. Before 1970, the effluent from the factory mentioned by Anderson *et al.* (the Montrose plant) had drained into Southern California coastal waters by way of the Los Angeles County sewage treatment plant for more than 20 years without any reported effect on brown pelicans. During this period, the DDT in the effluent from the plant's settling pond averaged 10 to 15 pounds per day.

One month after the 1969 Santa Barbara oil spill, Risebrough reported that the pelicans were not reproducing because of high DDT residues (*1*). At the Wisconsin DDT hearings, which were characterized even by an Environmental Protection Agency (EPA) attorney as "a circus" (*2*), he had testified (*3*) that the brown pelican on Anacapa Island, off the Santa Barbara coast, was "extinct," "gone." Under cross-examination at the 1971–72 Washington DDT hearings, however, he retracted this statement (*4*). The pelican was not extinct after all.

In 1974, L. R. Axelrod of the EPA testified (*5*) before the House Appropriations Committee's subcommittee on agriculture that mercury was the principal suspect in eggshell thinning. The concentration of mercury in crude petroleum has been reported to be as high as 18 parts per million (*6*).

Noise, fright, and intrusion also cause birds to produce eggs with thin shells. Frequent visits to the brown pelican colonies by investigators, sometimes in helicopters, were stopped by the Department of the Interior as a result of protests. The pelicans have since made a quick recovery.

If DDT persists for decades, how could the pelicans have recovered so quickly? Either DDT is not as persistent as its detractors maintain, or it was not the cause of the pelicans' decline.

I believe the final judgment of the scientific community will be that DDT is not responsible for the depletion or extinction of living organisms except for insect pests.

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The excessive DDT contamination of the Southern California Bight in the late 1960's and early 1970's was associated with a number of wildlife problems that have been examined in a series of other reports (*1–3*).

Of the points raised by Sobelman, only three refer to the data and conclusions of our *Science* report. Observations before 1969 include a report of thin-shelled eggs from Anacapa Island in 1962 (*4*), a decline of Southern California brown pelican populations beginning in the mid- to late 1950's (*2*), and suggestions of reproductive problems on Los Coronados as early as 1963 (*5*). Investigations specifically directed toward this problem were begun in 1969 (*5, 6*).

We believe it important to stress our conclusion that this contamination resulted principally from an industrial discharge rather than agricultural or urban runoff. Sobelman maintains that the high DDT residues in the sewer pipe below the Montrose plant (*7*) and the more than 200 metric tons of DDT in the sediment offshore from the sewer outfall (*8*) did not originate at the Montrose plant. DDT residues entering the waste treatment plant of the Los Angeles County sanitation districts dropped sharply in 1970, after the changeover by Montrose from a settling pond disposal to a sanitary landfill disposal (*9*). Sobelman has so far not published any data supporting his conclusion that the effluent from the settling pond contributed only 10 to 15 pounds of DDT per day to the sewage system. Nor has he published any description of the analytical methodologies employed. The wide interest generated by this prob-

lem and its implications to global marine pollution suggest that he do so without delay.

As documented in our report and in a more recent article (*3*), the brown pelicans are still laying thin-shelled eggs on Anacapa Island, and reproduction is not yet normal. Nor have the DDT residues declined to acceptable levels. Aerial fallout of DDT, originating largely from point sources near the Montrose factory and its sanitary landfill site, is now a major source of DDT input to the Southern California Bight (*10*).

As yet, there is insufficient support for the hypothesis that a visit by a scientific investigator to a seabird colony can cause eggshell thinning in eggs laid on previous days.

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Errors in Mathematical Proofs

Gina Bari Kolata's article "Mathematical proofs: The genesis of reasonable doubt" (Research News, 4 June, p. 989) contains one passage which is both out-of-date and somewhat misleading. She alludes to an unresolved debate over a result in homotopy theory, in which two investigators are described as possessing long, complicated, and mutually contradictory proofs which could not be reconciled. Kolata is referring to a paper by myself and Emery Thomas of Berkeley (*1*), which for a time was contradicted by work of H. Toda and S. Oka in Japan. In fact, the issue remained open for somewhat more than a year but was settled in July 1974—2 years ago—when Toda and Oka found an error in their proof (*2*). The conflict drew attention precisely because such controversies are almost unheard-of in mathematics, as opposed even to physics and chemistry.

To say that the proofs were so long and complicated as to be "nearly impossible to check" is also a red herring. Our proof, for example, takes 13 pages (not 400) and has been used and generalized by a number of other workers. Actually, the conflict persisted as long as it did only because just one outside person, J. F. Adams, took the trouble to verify the details of our proof independently. This is the real problem: many published mathematical articles undoubtedly contain serious undiscovered errors, not because the mistakes are too difficult to find, but because contemporary pure mathematics has become so abstract and fragmented that few people bother to look carefully for errors.

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Linguistic Deterrent?

Gina Bari Kolata, in her article, "Strategies for the control of gonorrhea" (Research News, 16 April, p. 245), notes that the incidence of gonorrhea has declined remarkably in Sweden, whereas this has not happened in Denmark. I suggest that a major factor here may be the fact that in Sweden protective devices are referred to as *kondoms*. The Danish word for contraceptive is *svangerskabsforebyggende middel*. The sheer effort of uttering all ten syllables must surely be a deterrent to their purchase and use.

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