environment

DDE found in eggs from 1948

A heated debate has long existed over the involvement of DDT in the sudden decrease of eggshell thickness in many predatory birds beginning around 1947. DDT was introduced as an insecticide in the United States in 1945, and DDE—a breakdown product of DDT—has become increasingly implicated as the main organochloride compound causing birds to lay eggs with abnormally thin, uncalcified shells. Ecologist David B. Peakall of Cornell University presents evidence in the Feb. 15 SCIENCE that should end the controversy for good.

The contents of peregrine falcon eggs are not available for the years before 1963, so direct proof of the involvement of DDT in the late 1940's has been lacking. But Peakall now reports he has detected the presence of DDE in the dried membranes of five peregrine eggshells collected in California from 1948 to 1950. He extracted the DDE by injecting a solvent into the shells and removing it four hours later. He measured the amount of organochlorines present by gas-liquid chromatography.

"Since the percentage of lipid in peregrine eggs is known," explained Peakall, "it is possible to calculate the original amount of DDE in the egg contents on a wet weight basis and thus compare the residue levels with eggshell thickness, as has been done for more recent specimens." The calculated values fit a previously known relationship found in Alaskan eggs collected from 1967 to 1970. "Thus," Peakall concludes, "at least as early as 1948, DDE was present in peregrine eggs in sufficient concentrations to account for eggshell thinning."

Pollution concern for coral reefs

Coral secrets a mucus that serves primarily as a cleansing agent for the coral but also traps zooplankton and provides a nutritional food source for many small reef-fish species. Andrew A. Benson, biologist and director of the Physiological Research Laboratory at the Scripps Institution of Oceanography, warns that petroleum may be entering the marine food chain through the mucus—a justifiable concern if the buildup of oil from spillage increases and drilling is allowed near reefs.

Benson explains that coral mucus is rich in triglyceride and wax ester, the latter "a compound used by most fish of the temperate and polar oceans for their source of energy." Oil can be easily absorbed by the wax globules and transferred, when eaten, into the fish digestive system.

"Although we don't have a quantitative measure of what fraction of the pollutant is transferred through the mucus," Benson says, "we believe that ingestion of petroleum does shorten the lives of reef fish, and would have long-range effects on their population.

"Many reefs are near shipping lanes, a fact which increases their chances of exposure to oil. But the Great Barrier Reef is especially vulnerable," Benson notes, "since it is adjacent to a shipping lane on the east coast of Australia, and there have been oil spills near Torres Strait off Cape York, Australia, a short cut from the Indian Ocean to large Australian ports."

The Australian Commonwealth government established a Barrier Reef Petroleum Drilling Commission last year to review requests from oil companies. Though the commission had finished taking evidence in July 1973, Barrier Reef conservationists have requested that hearings be reopened based on the recognition of possible petroleum pollution of the coral mucus.

aerospace

Satellites to track satellites

A pair of satellites designed to handle nothing but data and communications for other satellites and spacecraft is planned by NASA as a way of saving money and improving communications between the ground and earth orbit.

Hubs of a proposed Tracking and Data Relay Satellite System, the two satellites will be placed in synchronous orbits, some 23,000 miles above the Atlantic and Pacific Oceans. From their lofty view, they are expected to provide communications more than 85 percent of the time, compared with 15 to 20 percent for the present ground-based system, with up to 40 satellites and spacecraft simultaneously. Scientific data, computer commands and voice communications will all be carried by the TDRSS, with a capacity of 250 million bits per second.

The system will cover only objects in orbits below about 3,100 miles, leaving deep-space probes, synchronous satellites and ascent-to-orbit operations to ground-based facilities.

NASA's present low-orbit tracking network of 19 stations is being reduced to 15 or 16 with the end of Skylab, and about eight more stations, most of them on foreign soil, will be phased out when the TDRSS begins.

The system, including a primary ground station, probably in the southwestern United States, will be built and owned by industry, and leased by NASA for seven-to-ten-year periods. It has not been budgeted yet, but the agency hopes to have it operating by early 1979 so that it will be available to handle operations of the space shuttle, a likely source of much of the system's work.

Updated rockets have old-time failures

Two NASA rockets—one of them the agency's first new major configuration in six years and the other an old standby with a new engine—have malfunctioned in flight in less than a month. But neither failure appears due to new aspects of the designs.

On Jan. 18, NASA launched its 100th Delta rocket, a tried-and-true performer, this time carrying a British Skynet communications satellite. The only major change was the substitution of an H-1 engine from the Saturn booster series for the Delta's less-powerful first-stage engine. The H-1 worked fine. Sometime between the first and second firing of the second-stage engine, however, the controlling voltage was lost to a valve that was supposed to aim the engine to raise the rocket's orbit before releasing the satellite. Even then the third stage worked as it was supposed to, but since it started from the wrong position, due to the slow tumbling of the second stage, the satellite entered too low an orbit and burned up in the atmosphere, a blow to the limited British space program.

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Old technology let down the new a second time on Feb. 11, when the first launch of the newly combined Titan-Centaur booster, scheduled to carry the Viking spacecraft to Mars next year, ended in failure. Again the major new development worked as planned: A huge, bulbous fairing enclosing both the Centaur and the payload (in this case a Viking test model and a small satellite) properly controlled the rate of pressure loss inside, as the booster climbed through the atmosphere. The villain seems to have been the liquid-oxygen booster pump in the Centaur, which had also been a culprit early in the rocket's development.

Assuming that the problem can be corrected, the next Titan-Centaur launching will be that of the Helios near-solar probe, scheduled for September.

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