UNUSUAL NUMBERS OF DEAD BIRDS ON THE WASHINGTON COAST

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In the month of May, 1942, great numbers of dead sea birds were observed on certain beaches along the coast of the state of Washington. While it is not uncommon to find an occasional murre, shearwater, or gull that has succumbed from the effects of crude oil or other injury, the number of birds thus found at a given time would perhaps number one or two per mile of coast line. Greater numbers are observed after severe storms. In the present instance, however, the influx of bird carcasses was not preceded by a period of stormy weather, and there were attendant circumstances that lead us to believe that the birds were poisoned by a marine organism.

A slight increase in the numbers of dead birds along the beaches was first noted on May 5, while the senior author was investigating a sudden outbreak of paralytic shellfish poisoning. The State Department of Fisheries had received many reports that cats and chickens were dying along the Washington beaches from eating the viscera of razor clams. Three humans living on the Olympic Peninsula and several on Vancouver Island were killed by the same type of poisoning. In connection with the death of chickens the senior author examined the digestive organs of several and found uniform symptoms in each: the entire length of the intestine was greatly inflamed, and the blood vessels were enlarged and sharply outlined. The inflammation, followed by death, was experimentally produced in chickens by feeding them offal from razor clams dug on May 5.

The epidemic of clam poisoning is believed to have been caused by the planktonic organism, *Gonyaulax catenella*, specimens of which were found in razor clam stomachs at Copalis. *Gonyaulax* is a microscopic organism known to "bloom" under certain circumstances in such numbers as to tinge the water red and produce for brief periods the condition known as "red tide." To the best of our knowledge such a tide was not actually observed along the Washington beaches.

Long windrows of pelagic barnacles, *Lepas fascicularis* (identified by Dr. Dora P. Henry), appeared on the beaches during the month of May. These excited the interest of local residents, most of whom stated that they had not previously noted the species. In conversation with Dr. Harvey C. McMillin, however, we were told that while he was investigating shellfish problems on the Pacific beaches he collected eight quarts of *Lepas fascicularis* on the Washington coast in 1929 and observed them on the Oregon coast in 1931. The possibility is suggested that the barnacles, being plankton feeders, may have consumed large quantities of *Gonyaulax*.

On Copalis Beach, on May 5, four dead adult gulls (unidentified species) were dissected and their intestines found to present the same inflamed condition as that of the chickens previously examined. Two of the gulls had eaten small crustacea and clams, represented by broken bits of carapace and shell. Three dead White-winged Scoters (*Melanitta deglandi*) examined on May 7 had inflamed intestines. The stomachs of two of these birds contained fragments of small crabs and several snails (*Alectrion perpinguis*). Several other birds examined had empty stomachs and inflamed intestines. Of all the birds examined, none showed outward evidence of injury.

On May 7 fifteen to twenty dead birds were noted in ten miles of Copalis Beach, including California Murres (*Uria aalge californica*), Pacific Loons (*Gavia arctica pacifica*), gulls, White-winged Scoters, a Tufted Puffin (*Lunda cirrhata*), and two Sooty Shearwaters (*Puffinus griseus*). On May 13 Mr. Howard Harris, State Fish-

eries Inspector, counted thirteen dead birds on seven miles of Grayland Beach. On May 17 Mr. Harris and Mr. Stan Phillips, Chief Inspector, estimated about 1,500 dead birds along fifteen miles of Grayland Beach.

On a five-mile strip immediately south of Grayland on May 19 Dr. Kelshaw Bonham and the junior author counted 127 dead birds. About one dozen were fresh and near the surf, the remainder were a few days to several weeks old and were higher on the beach. The tally was as follows:

California Murres	81	Herring Gulls	2
Pacific Loons	23	Western Gulls	2
Sooty Shearwaters	12	Pacific Fulmar	1
Unidentified gulls	5	Tufted Puffin	1

Over a measured mile on Copalis Beach, on May 21, 189 dead birds were counted but were not tallied by species. At this rate seven times the number were present on Copalis Beach as on Grayland Beach two days previously. Fred Menath, operator of a hotel at Copalis, stated that in twenty years' experience he had not seen as many dead birds at one time.

On May 26, Grayland Beach was again examined and 85 dead birds were found along a three-mile strip, including 50 California Murres, 15 Pacific Loons, 15 Sooty Shearwaters, and 5 unidentified gulls. On the same beach on May 28 very few newly killed birds could be found; the most recent birds appeared to have been dead for a week or two. On June 5 only 2 loons and 3 California Murres were counted along fifteen miles of beach. On June 10 four dead birds were found in ten miles of Grayland Beach, namely, 2 California Murres, 1 White-winged Scoter, and 1 loon. On June 14 a Black-footed Albatross (*Diomedea nigripes*) was found dead with a broken wing on the beach; no other dead birds could be found. The beach was barren of dead birds on June 16 to 18. Birds found in the early part of May were for the most part fresh and appeared to have died shortly before appearing on the beach, while those found later in May seemed to have been dead for some time. It is probable that the causative agent had disappeared before May 25. No freshly killed birds were in the group counted on May 26; all had been dead for at least a week. The counts on the various ocean beaches indicate that the greatest numbers washed ashore between May 17 and May 26.

Fishermen reported large numbers of dead birds floating about ten to twenty miles off the Washington coast from May 5 to May 15. These may have been washed upon the beaches later in the month. There were also reports by halibut fishermen of large numbers of "divers" and "whale birds" (identified on further questioning as murres and shearwaters) floating dead on the water about 30 miles offshore in Hecate Strait, British Columbia, from about May 25 to June 12.

The *Gonyaulax* bloom had subsided by May 16 on the Washington coast, and because there was a definite lag in the appearance of dead birds on the beaches from a few days to several weeks from their death, it seems more than coincidental that the peak of occurrence of dead birds was about two weeks after the crest of the red tide organisms. About two weeks after the disappearance of *Gonyaulax* the numbers of dead birds found on the beaches and seen off the Washington coast began to decline.

The available evidence leads to the conclusion that the birds probably were killed by toxic marine organisms of the group Dinoflagellata. It is our belief that small fish and crustacea near the area of occurrence of the red tide had been feeding on a diet excessively rich in organisms of the *Gonyaulax* type, and that birds subsequently

feeding on the fish and (or) barnacles and other shellfish were the victims of secondary poisoning. It has seemed desirable to place our observations on record as a clue to ornithologists who may, at a future date, have an opportunity to investigate bird mortality of a similar nature. Further information on the subject of paralytic shellfish poisoning is given by Hermann Sommer and K. F. Meyer (Mussel Poisoning—A Summary. 1941. Calif. State Dept. Pub. Health, Weekly Bull., 20, 1941:53-55).

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