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LOCALIZED PLANKTON BLOOMS AND JUBILEES ON THE GULF COAST

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ABSTRACT The writers describe various small types of plankton blooms such as those occurring in boat slips, the head of a large bayou and a strip type bloom of *Chaetoceras* on the Gulf beach. Oyster kills from "poison water" draining off of marshes are said to be caused by plankton bloom. Small "jubilees" are said to be caused by localized blooms and one of these is described as it occurred.

In November 1938, Dr. Margaretha Brongersma-Sanders visited Walvis Bay, South Africa, where fish kills were commonly reported as being caused by hydrogen sulfide. She came to the conclusion that the kill was caused by a plankton bloom and that the hydrogen sulfide was a result and not the cause of the mass mortality (Brongersma-Sanders 1943).

When the senior author joined the Texas Game, Fish and Oyster Commission as its second marine biologist in 1939, his first job was to investigate a recurring summer fish kill in Offatts Bayou in Galveston. The area is a deep hole at the inner, blind end of Offatts Bayou, separated from the rest of the bayou by the 61st Street causeway of Galveston. Gunter (1942) thought that organic material caused these boils of hydrogen sulfide and "milky" water. Later, Mrs. J. B. Cross (Connell and Cross 1950) of the Medical School at Galveston attributed this mortality to a plankton bloom of *Gonyaulax* and she published a note on it in *Science*. Both J. W. Hedgpeth (1951) and the senior author (Gunter 1951) replied to her in print, disagreeing with her ideas. However, Gunter realized years later that the lady was correct.

Many times, the senior author has also observed small plankton blooms in the blind ends of boat slips around fish houses and shrimp factories. Presumably this results from organic material thrown into the water and not dispersed.

A peculiar localized plankton bloom followed a spell of rainy weather when the sea was calm and glassy along the Gulf beach of Mustang Island. It is quite out of the ordinary for south Texas; he saw the glassy calm twice during 20 years. Corpus Christi holds the record as the windiest city in the United States, the average wind speed being about 11 miles per hour all the time. Following rainy weather and the flat, glassy calm, a narrow band of diatom bloom developed along the beach extending out 15 or 20 yards. The water turned brown, somewhat like murky tea, and contrasted with the yellowish-green Gulf, which clarifies greatly during periods of still water. The bloom consisted

of billions of *Chaetoceras* sp., a common open sea diatom. Presumably this bloom takes place next to the beach when nutrients are washed out by the rains and the water becomes still. It was traced to the south end of Mustang Island, a distance of some 16 miles, and it extended to Padre Island and on out of sight.

There is another unrecognized bloom which has been reported several times. Actually it is a type of mortality. The trouble is generally said to be caused by "poison water" coming from somewhere, usually the marshes. A spell of rain takes place following a long dry spell, and it is reported that black and poisonous water carries down into the bays and kills the inhabitants, including oysters. The fact is nothing poisonous is generated in the marshes by a long dry spell. Some components are washed out of the marsh by rains, and a plankton bloom is stimulated. This is characteristic of a great many plankton blooms including the Florida red tide (Gunter et al. 1948).

This is the case even with plankton blooms in freshwater ponds. Many workers with a marine or freshwater laboratory or even a college laboratory are acquainted with a common complaint: "Day before yesterday we had a big rain and last night all my fish died. I think poison washed off from the land next door." But the plaintiff will also tell you that the color of the pond water changed to green, red or rusty brown. These kills may be caused by poisonous elements of the plankton even in fresh water, but then too, freshwater kills usually take place in the middle of the night and may be said to be from oxygen lack. In the bays the same oxygen deficiency will occur and this will cause oysters to close up. According to Dr. J. G. Mackin (personal communication) if the oysters are heavily infected with *Perkinsus marinus*, or if they have to close due to oxygen lack, or because of a heavy influx of fresh water, they die very quickly. This phenomenon is not easily documented and although there have been several reports in state conservation agencies, etc., printed references are difficult to find. One was given in the *Eleventh Biennial Report* of the Louisiana Department of Conservation for the year 1932-33. The heaviest rainfall in the history of the New Orleans weather office was said to have occurred in a 2-week period in July and the water

was held back in the marshes by strong south winds until it became saturated with rotten vegetation and it was poisonous to oyster life. A similar instance happened about 6 years ago in Escambia Bay, Florida. It was never published but the area was examined by biologists of both the state and federal government and a private concern. Suits were filed because oysters were killed. The state and federal biologists reported that these oysters were heavily infected with *Perkinsus marinus* and they felt that this offered some connection. Actually there was a sharp salinity change which apparently caused the oysters to close; also there was a plankton bloom in part of the bay.

Conversations over such matters as these brought forth the following information which was written by Mr. Charles H. Lyles, formerly Head, Statistical Division, National Marine Fisheries Service, later Director, Mississippi Marine Conservation Commission, and now Executive Director of the Gulf States Marine Fisheries Commission.

Because of the paucity of knowledge of occurrences and causes of jubilees* on the Mississippi Gulf coast, Lyles decided to record as much as he knows of them at the present time and to add to this as they occur.

To the best of Lyles' knowledge a jubilee was first described to him by a man named Gussie Cruse in August of 1940. Cruse had just speared about (estimate) 150 pounds of flounder along the beach west of the mouth of Graveline Bayou. Apparently jubilees were "old hat" to him.

As an infrequent visitor to the Gulf coast during the next decade, Lyles' knowledge of jubilees was limited to descriptions by individuals who participated in them.

In the early 1950s, however, Bellefountain Beach became more populated and consequently the jubilees appeared to be more numerous. Possibly it was a case of closer observations, with the result of more sightings.

Jubilees occur on Bellefountain Beach most often in the early morning hours between midnight and daylight. Lyles has observed only one during daylight hours. This occurred Friday morning, August 27, 1971. It was during this jubilee that he reached the conclusion that the event is triggered by a dinoflagellate bloom. It was centered at the mouth of a small bayou that empties into Mississippi Sound on Bellefountain Beach just south of a community swimming pool owned by Ocean Beach Estates. The total length of the bayou is not more than 1 mile. The jubilee spread about 1 mile to the west and ½ mile to the east of the mouth of this small stream. The area could be clearly delineated by the color of the water. It was a yellowish-brown. Flounders, eels, crabs, small menhaden and miscellaneous species seemed to be affected.

A breeze sprang up about 9:30 a.m. and the water

became mixed, color disappeared, and life returned to normal except that many dead fish, such as small flounders, hogchokers, small menhaden and eels lay dead on the beach for some time.

Another known jubilee occurred August 4, 1972. Lyles was not present.

On August 5, 1973 at about 1:00 a.m., the water became a dark tea color at the mouth of Graveline Bayou close to the Benefield Place (Leaning Oaks) on Bellefountain Beach. There were no outright kills, but crabs, shrimp, flounders and lots of baby sea cats became sluggish and showed all the symptoms of a jubilee.

On August 18, 1973 from 3:00 a.m. to daylight, the largest jubilee Lyles ever observed extended from Graveline Bayou west to St. Andrews cut, and perhaps farther. There were crabs, lots of eels, some croakers, lots of menhaden, lots of flounders, a few stargazers and other miscellaneous species dead and dying in red-colored water.

In general, jubilees occur during a neap tide and most likely with a very, very slight movement of air from the north. They are not seen to happen in turbulent water. They occur most often from late July to early September. To Lyles' knowledge none have ever been observed in cool weather. They are always accompanied by a discoloration of water in the affected area and usually occur during drainoff after a heavy rain shower.

SUMMARY

The point of these remarks is to call the reader's attention to the fact that there are localized plankton blooms taking place at many locations and many times up and down the Gulf coast. They have also been reported on the Atlantic coast. They appear to be responsible for many localized cases of fish kills. Their onset is often characterized as following rainy weather and a few days of calm. It thus appears that some land component or components are washed down by the rains into waters near shore. Whether or not these are the usual fertilizer salts or some trace element that acts as a chelating agent is not known.

Such phenomena seem to occur more frequently than they did in the past, probably because of increased nutrients flowing into our salt waters in recent years due to various activities of man.

Several types of unicellular organisms seem to be involved. Two of them are known, *Chaetoceras* and *Gonyaulax*. No human ailment has been reported from the eating of crustaceans or fish caught during a jubilee. However, it is now well recognized that a toxic substance is produced in blooms of naked dinoflagellates.

*Jubilee is the name given to fish kills, usually as they are seen developing, along the Gulf coasts of Alabama and Mississippi. They have been observed as far west and south as Corpus Christi Bay,

Texas. The largest and most notorious one took place on the east shores of Mobile Bay, Alabama, and it may have had a different cause than the one given here (cf. Loesch 1960).

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