The Dead Sea Is Alive and, Well . . .

Well, not exactly alive, but undergoing a geological transformation that has apparently not occurred for thousands of years, and perhaps never before. This past winter, the Dead Sea "turned over"—that is, the very salty bottom layer of the sea and the less salty upper layer combined to form one homogeneous body of water. This means, according to Joel Gat of the Weizmann Institute in Rehovot, Israel, that many of the geochemical processes that previously occurred in the lake are gone and that others have taken their place. "A whole new ball game is going on now," he says.

The Dead Sea stretches for about 85 kilometers along the border between Israel and Jordan, its surface some 390 meters below sea level. Its name derives from the fact that few living organisms can survive in its extreme saltiness; it is about nine times as salty as the ocean. It is that salty because the Jordan River continually washes small quantities of salts into the sea while water is lost from it only by evaporation. The previously existing stratification arose from the same source.

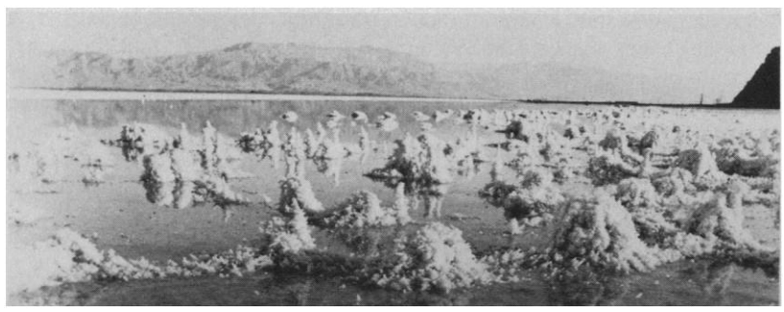
For hundreds of years, Gat says, fresh water from the Jordan constantly fed the less salty layer of the sea, which occupied roughly the top 40 meters of the 320-meter-deep body of water. Because the amount of water entering the lake was more or less equal to the amount lost by evaporation during the region's extremely hot and dry summer, the lake maintained its stable, stratified state. Or at least it did until man began interfering with the flow of the Jordan.

Shortly after the establishment of Israel as a state, water was diverted from the Jordan for agricultural and industrial use. The river's flow was reduced to a virtual trickle, Gat says, and the sea's upper layer began to recede by evaporation. As the water evaporated, the density of the upper, less salty layer approached that of the older and deeper waters. By 1975, he says, it was clear that the layers would mix, and an international team of investigators began monitoring the situation. This past February, they confirmed that the complete overturn had occurred. The layered structure was gone, water temperature was uniform (except for the immediate surface, which was warmed by the sun), and concentrations of trace metals such as iron, manganese, and lead were identical from the surface to the bottom.

The most notable change in the Dead Sea, now that circulating waters carry oxygen to the bottom, is the disappearance of hydrogen sulfide, a constituent that made bathing in it comparable to a so-called "sulfur spring cure." A more important change is the increased precipitation of salts (accompanying photo) at the Dead Sea Works, one of the world's major producers of potash and other industrial chemicals. Technicians there have had to revise many processes in order to keep pumps and other equipment from being overwhelmed by the increased salt production.

The flow of the Jordan is not likely to increase at any time soon, and hence investigators will have plenty of time to study the geochemical implications of the turnover. Israeli planners are, however, considering the construction of a canal connecting the Dead Sea to the Mediterranean Sea; the difference in elevation between the two bodies of water could then be used for electric power generation. If such a plan is implemented, the Dead Sea will receive a renewed influx of much less salty water, Gat says, and will probably return to its historic, layered state. The ultimate change in the surrounding countryside will probably be small or negligible, but, if nothing else, the incident will have proved at least one thing: Even a dead sea can turn over as a result of man's despoliation of the environment.

—THOMAS H. MAUGH II



far from the one now held by the ACS.

Despite the backing off from recommendations of annual smears for all, there is little inclination to eliminate them completely, for the test does appear to be saving lives, contrary to what some critics have maintained. The mortality rate from cervical cancer was already dropping in this country in the late 1940's, before screening became popular, and the critics suggest that Pap smears have made little or no contribution to the continuing decline.

According to Holleb, this natural decrease is only one of the factors producing the drop in the cervical cancer death rate in the past three decades. Better surgical techniques for hysterectomy, the most common therapy for the cancer, have also contributed. And so has the use of Pap smears for screening.

A number of studies comparing screened and unscreened populations of women support Holleb's contention about Pap smears. A recent example is a study being conducted in Iceland under the aegis of the Cancer Society there.

According to Nicholas Day of NCI, who is collaborating in the study, the death rate from cervical cancer in Iceland, unlike that in the United States, had been gently rising at the time the study began in 1964. Since then the mortality rate has declined, with the decrease particularly marked since 1970. The mortality rate of the screened women—about 85 percent of the total—is now essentially zero. That of the unscreened women is, if anything, slightly higher than the 1965 rate. The Iceland results, says Day, also support the contention that annual Pap smears are not necessary, at least for women who have had two consecutive negative tests.

Day points out that other studies, including those carried out in Finland and in Scotland, have produced similar findings. He concludes, "If a screening program is properly organized and includes most of the population, you should see a decrease in both the incidence and the mortality of cervical cancer."

Day points out, however, that Iceland with its small and relatively homogeneous population is an ideal place for carrying out such a program. In the United States, with a large, diverse population, the situation is far from ideal. Especially worrisome is the fact that women of the lower socioeconomic classes, who are most likely to need annual smears, are the least likely to get them. For the Pap smear does do some good, even if low-risk women do not need to make it an annual event.

—JEAN L. MARX