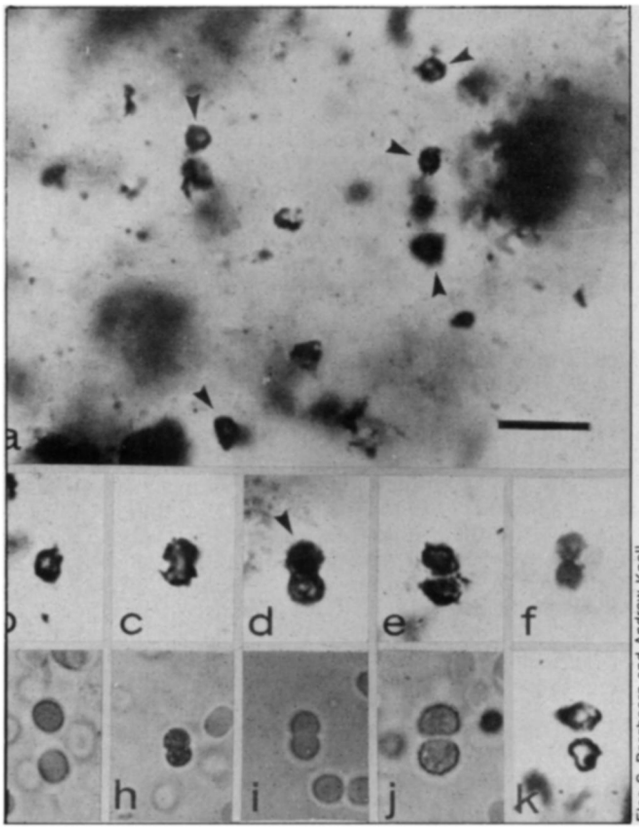
The Figtree fossils: Oldest algae yet



Preserved microfossils of 3.5-billion-year-old algae are seen contained in Figtree chert (a). Closer examination reveals the primitive cells in various stages of cell division (b-f, k) comparable to the "pinching off" observed in the modern, unicellular blue-green algae Aphanocapsa *(g-j).*

Elso S. Barghoorn and Andrew Knoll

In the rugged, green Barberton mountain land of southeast Swaziland, ancient history is strewn about the roadsides—in full view, there for the picking. But it was not until recently that scientists discovered the paleontological goldmine chunking off from the group of rocks known as Figtree—a 2,150-meter-wide band of stone running through the mountain range.

Trapped within loose slivers of Figtree chert are microscopic pools of water containing what are believed to be primitive forms of algae, some "frozen" in the act of cell division. The rocks are dated at 3.5 billion years, making the algae the oldest fossilized material found to date, according to Elso S. Barghoorn, Fisher professor of natural history at Harvard University.

Barghoorn and his colleagues gathered the rocks in August 1975, and have since worked at confirming the existence of the algal cells. The key rested in whether or not these ancient spheres had divided as do present-day blue-green algae. Miscrosopic scrutiny of the chert has convinced Barghoorn that these are indeed microfossilized algae, and he will report his findings in SCIENCE later this month.

Although it is "not completely understood how chert precipitates," Barghoorn believes that over the years the hard rocks evolved through silicate, gel and finally crystallization stages as they lost their water content. But tiny drops of water remained within the crystalline formations, preserving the floating plankton fossils for billions of years, the paleontologist says.

Several years ago, Barghoorn found what he believed were algal-like fossils in Figtree rocks not far from the site of his 1975 discovery. But that earlier find was questioned by other scientists, he said, because there was not conclusive evidence of cell division. In the latest rocks, however, there is no question in Barghoorn's mind that the algae underwent simple, binary fission, where two cells were "pinched off" from one.

The oldest previous microfossil was found in the early 1950s by Barghoorn and the late Stanley Tyler. The fossils, which were found in Gunflint chert in Schreiber, Canada, were dated at two billion years. □

Saccharin and cancer: Confounding data

Until recently, the controversy over whether saccharin causes bladder cancer or not was based exclusively on animal studies, especially on a Canadian animal study in which 100 rats were fed a diet containing seven percent saccharin. Three of the animals, as well as 14 of their offspring, developed bladder tumors (SN: 3/19/77, p. 182).

Now the first clinical study showing a positive association between saccharin and bladder cancer in humans is reported in the Sept. 17 LANCET by another group of Canadian researchers—G. R. Howe, J. D. Burch and A. B. Miller of the National Cancer Institute of Canada and of the University of Toronto, and their colleagues. An editorial in the same issue of LANCET explains that the research results were published because they have already been publicized in the lay press. The editorial reasons that the results can now be carefully assessed by a scientific as well as by a consumer audience. However, the editorial does point out some serious weaknesses in the study and concludes that "the case against saccharin [remains] unimpressive."

Howe and his colleagues conducted a case-control study of bladder cancer in the Canadian provinces of British Columbia, Nova Scotia and Newfoundland. All newly diagnosed cases of bladder cancer in the three provinces between April 1974 and June 1976 were identified through provincial cancer registries and cooperating pathologists and urologists. Bladder cancer was diagnosed in 821 patients, and 632 of them (480 men and 152 women) were interviewed in their homes, using an identical questionnaire. Most interviews were conducted within three months of diagnosis and all were conducted within six months. For each case, an individual control (matched for sex, age and neighborhood of residence) was also interviewed.

The subjects were questioned about demographic variables, residential history, occupational history, consumption of beverages and preservative-containing meats, medical history, use of analgesics and smoking. To test the hypothesis, based on animal data, that use of saccharin might increase the risk of bladder cancer, three questions were asked. The first question was: "Do you now or have you ever used sugar substitutes?" If the answer was "yes," the number of tablets or drops usually used and the frequency and duration of use of a particular brand were determined. The second and third questions asked for similar information on the use of diet drinks and for dietetic foods. All questions were sent to the Canadian NCI for coding and analysis.

As Howe and his co-workers report, they found a positive association between the use of artificial sweeteners, particularly saccharin, and the risk of bladder cancer in males, which did not appear to change when controlled for variables such as smoking and coffee consumption. "Our results suggest a causal relationship between saccharin use and bladder cancer in males, especially when they are considered in conjunction with results in animals," the researchers conclude. However, the scientists were not able to find a link between saccharin and bladder cancer in their female subjects, which they believe might be due to some difference in saccharin metabolism between men and women.

The LANCET editorial reaches somewhat different conclusions in assessing this data. For instance, it points out that