Comments and Communications

Absence of Vitamin A in Liver Oil of the Brown Shark

In determining vitamin A concentrations in the liver oils of some 53 species of aquatic animals, the oils containing the least vitamin A were found to be those from the brown shark (*Apristurus brunneus*) reported here. A male (51 cm) and female (45.5 cm) were taken in Puget Sound on January 21, 1944. The livers were analyzed within a week and found to contain 80 percent and 73 percent oil respectively. The whole oil, when analyzed by the antimony trichloride method, failed to show a measurable amount of Vitamin A. The carcasses, which appeared normal, were discarded before the livers were analyzed; therefore a vitamin A test was not made on the other organs. However, vitamin A, when present in sharks, is usually stored in the liver. The brown shark reaches a length of about 60 cm.

While the occurrence of shark livers without measurable amounts of vitamin A is apparently rare, our observations are not unique. In a study of several hundred soupfin sharks (*Galeorhinus zyopterus*), W. E. Ripley and R. A. Bolomey (*Fish Bulletin No. 64*, State of California Department of Natural Resources, Division of Fish and Game, Bureau of Marine Fisheries) found three instances where livers from immature males contained no vitamin A. They observed the same phenomenon in a number of fetal livers. These findings are in marked contrast to those for most of their other specimens, two of which had livers containing over half a billion international units.

This note, based upon two specimens, is not intended to imply that vitamin A is usually lacking from the liver oil of the brown shark. Rather, it is to point out that the absence of vitamin A in certain specimens raises a question as to its function in the shark's metabolism.

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Radioactive Phenomena at the Hillside Mine

A recent Geiger counter inspection of the Hillside Mine in western Yavapai County, Arizona, showed very high radioactivity throughout the entire mine. Although some areas of commercial grade uranium ore were detected and sampled, there were many places in the mine where no mineralization exists and where no samples could be taken that showed radioactivity when taken away from the mine, but where the background count on the Geiger was ten times normal.

At the shaft station on the 1000-ft level the activity was especially intense, although this station is in country rock. And at close proximity to a high speed, electrically driven ventilation fan at that station the activity was so great that we had to be cautious to prevent damage to the instrument, although our counter is equipped with three ranges of meter sensitivity. The fan was shut off, but the activity continued and seemed to be centered in dust particles that were adhering to the grid at the air intake of the fan. About two ounces of this dust, when removed, showed radioactivity greater than pure pitchblende. After about an hour the activity of this dust sample had declined over 50 percent and overnight it declined more than 90 percent.

This was a very puzzling situation, as it was not easy to believe that an ordinary electric field could produce radioactive isotopes that gave off gamma rays. (Our Geiger counter is equipped with a shield that cuts out all but gamma radiation, and this shield was in place.)

In studying the matter I came across an article on radioactivity by Sir Ernest Rutherford, the late famous British physicist, which practically hit the nail on the head. He writes as follows (words in brackets are mine):

> Radium (which is a product of the disintegration of uranium) is transformed directly into Radon (a gas) which in turn goes through a rapid series of transformations called Radium A, B and C. Radon changes first into Radium A, a substance of period 3 minutes emitting only alpha rays. Radium A changes into Radium B, a product of period 26 minutes emitting beta rays of penetrating power small compared with those emitted from the next period Radium C. The products included under the title Radium C have proved of considerable importance for they not only emit very penetrating alpha and beta rays but are the origin of the gamma rays arising from radium in equilibrium. . . .
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> When a wire charged negatively has been exposed for some time in the presence of Radon it becomes coated with an invisible film of Radium A, B and C. After removal from incoming Radon for 2 minutes Radium A has practically disappeared and the alpha rays arise entirely from Radium C. . . . Twenty-four hours after removal the activity due to Radium B and C has become exceedingly small. There still remains however a very small residual activity, first noted by Mme. Curie. . . . This active deposit of slow change was examined in detail by Rutherford and by Meyer and Schweidler. It was shown to consist of successive products called Radium D, E and F. Radium D emits slow beta rays and is half transformed in 16 years.
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> [The subsequent breakdown of Radium F is into lead—a stable end product.]

So this seems to answer the puzzle about the fan dust. The grid at the fan takes on a negative charge and collects the radon or its various short-lived products, which are highly active but disappear in a short time. The large volume of air continually drawn through the fan amplifies the effect.

All this indicates the presence of radon gas in the mine and this would also account for the tremendously high background count in all places in the mine, even where no samples containing uranium could be obtained.

There has been no attempt to measure the amount of radon in the mine atmosphere. The mine has been worked, off and on, for 50 years and no ill effects have been noted.

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