periments conducted in England during the hot summer weather demonstrated the remarkable efficiency of this method of increasing the comfort of those housed under canvas. This method has also been used for the insulation of food stores, with efficiency and economy, and aboard ships for the insulation of corridors and apartments in the vicinity of funnels.

In fact, it appears that reinforced aluminum foil can be used for insulation against heat or cold in a wide variety of ways, and this material has the advantages of being durable, cheap, easy to apply, and light in weight.

Science News Letter, September 7, 1935

CHEMISTRY

Chemist Sees Eventual Profit In Gold From Sea Water

A "MILESTONE" in the path leading to the commercial extraction of gold from sea water was the opinion of Thomas Midgley, Jr., chemist and vice-president of the Ethyl Gasoline Corporation, regarding the report of the new gold extraction process announced by Dr. William E. Caldwell of Oregon State College at the recent meeting of the American Chemical Society. Mr. Midgley said:

"Despite Dr. Caldwell's modesty in depreciating the advance that he has made in extracting gold from sea water, it is my opinion that this is one of the milestones on the path to progress that eventually will lead to the commercial extraction of gold from sea water.

"Less than two years have passed since I made the statement at the American Chemical Society meeting in St. Petersburg, Fla., when the announcement was made that bromine was being commercially extracted from the sea for use in ethyl gasoline, that 'it is no more impossible to extract gold from sea water now than it was to extract bromine from sea water ten years ago.' The work of Dr. Caldwell and the recently announced proposal of Dr. Colin G. Fink of Columbia University to extract gold by electroplating it upon the propellers of ships carry science forward to its goal."

Science News Letter, September 7, 1935

CHEMISTRY

Government Chemist Less Optimistic on Ocean Gold

By DR. EDWARD WICHERS
Chemist, National Bureau of Standards

RECENT articles in scientific journals and in the public press indicate that speculation about the economic recovery of gold from the sea is again to the fore. The published reports, however, make one suspect that important evidence on the actual content of gold in ocean water is being overlooked or ignored. Of the numerous scientific investigations on this subject, the most thorough and comprehensive work is undoubtedly that of the late Prof. Fritz Haber and his associates, published in Germany in 1925 and 1927.

Before this work was done, the weight of the evidence seemed to indicate that ocean water contained 5 to 10 milligrams of gold per ton (5 to 10 parts per billion). Although it would be necessary, on this basis, to treat 1 to 2 tons of water to get 1 cent's worth of gold (at $35 per ounce), a process was developed by Haber which was thought to be capable of profitable operation. In fact, the work was undertaken with the hope that the inexhaustible supply of gold in the sea and in the Rhine might be used to rescue Germany from its post-war economic collapse.

Much to the surprise of Haber and his associates, their results showed that the average content of gold in the Atlantic Ocean is only 0.008 milligram per ton (about one-thousandth as much as previously supposed), that water from a certain part of San Francisco Bay contains about twice that amount, water from polar regions perhaps 5 or 6 times as much, and that an occasional sample of glacial ice, carrying detritus scoured from rocks, may contain a few milligrams of gold per ton.

[Editor's note: Recent technical articles and statements in the press by L. C. Stewart, W. H. Dow and Prof. C. G. Fink state that gold occurs in sea water of the Atlantic Ocean in concentrations of 2.3 parts per billion.]

The difference between current estimates of 2.3 parts per billion and the value found by Haber, which amounts to a ratio of 300 to 1, largely determines whether the economic recovery of gold from the seas is almost within reach or must remain a will-o'-the-wisp. Of course, no one can be dead sure that Haber's estimate is the correct one. On the other hand, there is no published work on this subject which can begin to compare with that of Haber and his associates (at least ten in number). Carried on, as it was, over a period of years, involving the assay of over 5000 samples, with the most minute attention to every conceivable source of error, stimulated by the glamorous hope that Germany might be financially redeemed, and directed by a thoroughly dependable scientific mind, this work may well be regarded as a classic of chemical research.

It would be well for all who concern themselves with this subject to refrain from further public speculation about it unless they are able either to successfully refute Haber's conclusions, or to show that the economic recovery of gold from water containing 1 part in 50-100 billions is even within the shadow of reason.

Since much of the recent speculation on the subject has been related to the Dow Company's bromine plant, a few calculations based on Haber's estimate of the content of gold in the Atlantic, and on data prepared by Stewart, might be illuminating. According to Stewart, the plant produces some 15,000 pounds of bromine per day, which is worth, at the currently quoted price, about $5,000. If the plant were operated at the full stated capacity of the two intake pumps, and the metal were completely recovered, the yield of gold per day would be slightly less than 30 cents, a figure whose significance in colloquial usage should not be overlooked.

If Haber's estimate is correct, an economic process for the recovery of gold must be capable of handling and treating not less than 1000 tons (240,000 gallons) of average ocean water to get 1 cent's worth of gold. Although the process devised by Haber was extraordinarily simple and cheap, in principle similar to the purification of public water supplies, the water required a head of 12 feet to flow through the filter at a suitable rate. If such a process were operated on the basis of producing one ounce, or $35 worth, of gold per day (assuming quantitative recovery) the cost of power, at the rate of 0.2 cent per kilowatt hour, needed to lift the necessary quantity of water from the level of the sea to a height of 12 feet, would be perhaps 3 times the value of the gold recovered. This is only the cost of the power to pump the water, without regard to the much larger costs of plant, labor, and chemicals. Even some "free" source of power, such as that provided by tides, could in all probability be used to generate electrical energy worth several times as much as the gold which would be recovered from a hypothetical plant using the same quantity of power.

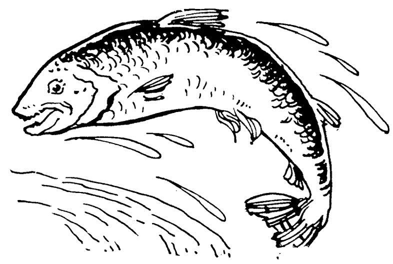
Science News Letter, September 7, 1935

In some coal mines of Illinois and Indiana, dynamite blasting has been discarded in favor of compressed air which releases the coal in larger and more valuable chunks.

PHYSIOLOGY

NATURE RAMBLINGS

by Frank Thone



More Water Than Dust

MORALISTS of the old school were very fond of reminding man of his earthy origin, constantly quoting the admonition of Genesis: "Dust thou art, and unto dust thou shalt return."

As a matter of quantitatively measurable fact, however, man and all other living things are far more water than they are dust. When they perish, only a little of them goes back to the dust of the earth; the greater part evaporates into thin air.

Anyone who has ever had the sorrowful task of attending to the disposal of the remains of a deceased friend who specified cremation rather than burial will recall how little is left at the end of the process. These ashes, or "dust," that represent all that was really solid of a full-grown man, hardly make a double handful.

What becomes of all the rest? Mostly water, evaporated away. The blood fluids alone account for something like three gallons, or between 25 and 30 pounds. The muscles, fat and other soft tissues will yield something like 75 per cent. of their weight in water. The marrow in the bones, and the very bones themselves, ooze water.

But even if you were dried out to a mummy, as desiccated as the late King Tut after 3,000 years in dry storage, there would still be water to extract before you were reduced to the final "dust." For "this too, too, solid flesh" can melt and resolve itself in dew, even as Hamlet wished it might.

Muscle and fat, glands, connective tissue and nerves, are composed mainly of two types of chemical compounds: hydrocarbons and proteins. The hydrocarbons are combinations of hydrogen and carbon and oxygen in varying proportio s. The proteins contain the same elements, plus nitrogen and a trifling amount of sulfur.

When either of these compounds is heated to the point where their structure breaks down, there occurs what chemists call "destructive distillation." To a considerable extent, each oxygen atom pairs off (or rather "triples off," for oxygen is a bigamist) with two hydrogen atoms, to form water. Oxygen from the air comes in and picks up the carbon atoms and the excess hydrogen, forming carbon dioxide and more water. Most of even the dried mummy vanishes as vapor, leaving only the pint or so of solid mineral remains as ashes or "dust."

Chemically speaking, therefore, man is not dust. Man is mostly gas and water.

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Iron-mining activity has given Sweden a polar city of 11,000 inhabitants, at Kiruna.