SCIENCE NEWS

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THE CONCENTRATION OF VITAMINS OF COD-LIVER OIL

DRS. HARRY E. DUBIN AND CASIMIR FUNK, biochemists, have at last succeeded in taking the bad taste of cod-liver oil out of the mouth of babes. Until the discovery of vitamins a decade or so ago, no one but grandmother knew why cod-liver oil was so good for childish ailments, and she just knew. When it was found that this vile-tasting oil was the richest known source of two vitamins, one preventing rickets in children and the other warding off a serious eye disease that results in blindness, efforts have been made to develop an extract of it that would be easy to take.

The success of Drs. Dubin and Funk not only does this, but also provides a convenient starting point for the actual chemical isolation and identification of vitamins, becauses it furnishes a purer material several thousand times as strong in vitamin content as the original oil. Laboratory tests on animals and clinical tests on a large number of children, by Drs. Louis Fisher, director of the Infantorium and Nursery of the Hecksher Foundations of New York, have shown that both the antirachitic and antiophthalmic vitamins are retained in the extract.

The problem of making vitamin extracts or of preserving vitamins under artificial conditions has always been a difficult one, because those unknown substances are very easily destroyed. Even the simple cooking of many foods destroys a large part of the vitamin content. The success of Drs. Dubin and Funk was the result of several years' work.

They first made an acid extract of cod-liver oil using either acetic acid, the essence of vinegar, or formic acid, an acid found in ants. In this way they obtained from 2,000 grams, or nearly two pounds, of cod-liver oil, 50 grams of a substance that retained all the vitamins, and left the bulk of the oil behind, as well as almost all the taste.

The extract portion was made into a kind of soap, with caustic potash, just as animal fats were once made into soap with lye leached from wood ashes. From this saponified portion, one half of a gram of a crude active concentrate was obtained. It was a brown sirupy mass which crystallized into light yellowish brown needle-like crystals radiating from a central point. An organic substance, cholesterol, which occurs in animal tissue was eliminated, and the final potent extract from the 2,000 grams of cod-liver oil weighed only one tenth of a gram.

The chemical composition of this substance has not yet been established; the experimenters found that it contains carbon, hydrogen and oxygen, and that sodium, sulphur, phosphorus and chlorine, elements frequently occurring in organic substances, are absent.

LOCAL IMMUNITY

GERMS of diseases that are deadly to an animal or a human being if they find their way into the part of the body they usually afflict, may be entirely harmless if they are planted in another organ or tissue. Doses of anthrax germs a thousand times larger than an ordinary fatal injection have been introduced into the bodies of guinea pigs with no more effect than so much salt water; yet if the slightest trace of the fluid containing them found its way into a scratch on the skin, the animal very quickly died.

These experiments, which promise revolutionary results in the sciences of bacteriology and pathology, are being conducted at the Pasteur Institute, in Paris, by Dr. A. Besredka, a young Russian scientist, according to Dr. Erwin F. Smith, pathologist of the U. S. Department of Agriculture, who recently returned from a tour of inspection through European laboratories.

Dr. Besredka, he says, has discovered an entirely new principle in bacteriology which has been named "local immunity." According to this principle, disease-causing organisms are frequently quite impotent to do harm away from their usual habitat. Anthrax, for example, is always an affliction of the skin and surface tissues. Dr. Besredka devised means for planting cultures of the germs deep in the muscular tissue, in the lungs and elsewhere in the bodies of guinea pigs. Aside from a little inflammation, probably due to the mechanical irritation of the instruments used, the animals showed no signs of harm from the usually deadly organisms. Less serious skin infections, like those caused by staphylococcus, the germ of boils, were shown to act in the same way.

Dr. Besredka's discoveries have already become of practical importance in medicine. After showing that susceptibility to bacterial infection was local, the Russian scientist also showed that immunity could be conferred more effectively by serums and other preventive means if applied equally directly to the regions usually attacked by the disease. Since typhoid fever is a disease of the digestive tract, Paris physicians are now following Dr. Besredka's principle and administering anti-typhoid serum through the mouth rather than by means of injection into the arm. Dr. Besredka claims that when administered in the ordinary way the serum gets no chance to act until the blood has carried it from the muscles of the arm into the intestinal tract.

SOAP AS A GERMICIDE

SOAP has a value as an aid to health even greater and more direct than has hitherto been suspected. The ordinary routine of dishwashing and laundering or cleaning the face and hands is fatal to germs of such dangerous diseases as pneumonia, diphtheria, blood poisoning and other serious infections. Dr. John E. Walker, of the service laboratory of the Army and Navy General Hospital at Hot Springs, Ark., has concluded extensive experiments which showed that common soaps were effective germicides in at least three types of infections, while soap made with coconut oil was markedly destructive to the organisms of typhoid fever.

The soap in greatest use in hospitals is the "official soft soap." The substitution of coconut oil for the linseed oil used in making this soap renders it germicidal against the typhoid bacillus as well as against the other three organisms. Although this change would make the soap more irritating to the skin, it would be desirable, and it would be especially useful in case of typhoid epidemics.

All the soaps tested were more antiseptic at higher temperatures. The organism causing boils, known technically as *Staphylococcus aureus*, completely resisted all soaps, even at a higher temperature, except a sodium resin soap.

Dr. Walker found that when the hands were washed with ordinary care the lather formed contained about eight per cent. of soap. This amount he said was more than enough to kill the pneumonia, diphtheria and streptococcus bacilli. The most careful washing of hands, however, did not kill the staphylococcus or boil-forming organisms, which showed that soaps alone could not be relied upon for complete surgical sterility.

In spite of claims put forth by manufacturers of special soaps, they were found to be no more effective than the average household kind. Foreign substances mixed with the soap often interfered markedly with the germicidal action.

THE SIMILARITY OF CHINESE AND INDIAN LANGUAGES

NEW light has been thrown on the ancestry of the American Indian by Dr. Edward Sapir, the Canadian anthropologist now on the faculty of the University of Chicago. Dr. Sapir said that his research work on Indian linguistics has convinced him of the identity of the language of certain Indian tribes with that of the primitive Chinese.

The similarity of the two tongues and the linguistic distribution of tribes scattered at random over the Americas have convinced Dr. Sapir that these groups must have entered this continent as a wedge from Asia. By a close comparison of the primitive Chinese, Siamese and Tibetian, all in the same language category, with the language of the "Nadine group" of North America, Dr. Sapir has found the same peculiarities of phonetics, vocabulary and grammatical structure on both sides of the Pacific Ocean.

The American Indian groups speaking the language of the Nadine group are found in all parts of the North American continent from northern Mexico to the southern boundary of Alaska, widely distributed among other Indian tribes whose language and customs are entirely different.

With minor changes the Navajo of New Mexico speaks the language of the Sarcee in Alberta, and the linguistic stock of the Tlingit, just south of the Eskimos in Alaska, is much the same as that of the Hupa in California.

It is probable, according to Dr. Sapir, that the migration of Asiatics speaking primitive Chinese or Tibetian took place at some time in the past, and that these immigrants settled or moved over the mountains and plains, some remaining in northwestern Canada to become the Tlingits, and others moving out to the Queen Charlotte Islands off the west coast to form the Haida group, and still others penetrating to the deserts of the Southwest.

From the modern Chinese, which in academic circles is considered relatively simple, students of linguistics can reconstruct primitive Chinese which is far more complex than any of the dialects known to the Mongolian layman of to-day. Dr. Sapir has discovered not only that the Indians of the Nadine groups speak with a tonal accent, raising or lowering of the voice to give certain meaning to words, in a manner similar to the tonal peculiarities of the early Chinese, but also that the meanings of certain words are identical. Further, he has disclosed the fact that the Indians have retained certain prefixes and suffixes that long ago have disappeared from the Chinese speech, but which are clearly discernible in the early forms.

AN ANCIENT VIKING STRONGHOLD

A POWERFUL Viking fortress, the headquarters of a northern chieftain of at least thirteen hundred years ago, was uncovered and identified near the city of Norrkoeping recently by two Swedish archeologists, Dr. Arthur Norden and Colonel N. D. Edlund. Since the name of the place, "Ringstad," is identical with one mentioned in the Icelandic Edda, or collection of historic legends, as the estate of the heroic Helge Hundingsbane, this may have been the seat of one of the mightiest of Vikings. The location at the head of the Bravalla Bay is of obvious strategic importance, and remains of primitive fortifications, or palisades, have been traced in several directions.

What was first unearthed was the stone foundations of an ancient dwelling with several adjuncts, characteristic of the Viking Age. As the structures themselves had been built of wood hardly anything but charcoal remained of them, but on the site of what had formerly been the blacksmith shop, where horses were shod and swords forged, there was found in a good state of preservation a bronze clasp that had evidently been brought to the shop for repairs and had then been lost. An adhering bit of rust indicated that attempts had been made to mend the broken pin with iron. This clasp was easily identified as belonging to the seventh century A. D., but a spear point found on the site of the women's building dated from the third or fourth century, while other objects classified themselves as late as the fourteenth, so that the place had apparently been occupied as a human dwelling for a thousand years. In the course of time it had either been burnt to the ground and had then been forgotten, or the occupants had moved to a stone fortress, Ringstaholm, about three miles farther south.

The stone foundations extend about one hundred and fifty yards in one direction and sixty in the other. Besides the women's house and the blacksmith shop, there are traces of a banquet hall with benches attached to the long side walls, as described in the sagas, and down by the river banks signs of a slaughter house, where barbecues were prepared at Yuletide and when the warriors

returned from their raids. Of the wooden piles used in fortifications the best preserved remnants were uncovered by the drainage of the river.

EVIDENCE FOR A LAND BARRIER ACROSS THE ATLANTIC

AMERICA and Scotland were formerly joined by a bridge of land, according to evidence discovered by a geological expedition under the leadership of Drs. E. O. Ulrich and C. E. Resser, of the U. S. National Museum, and Professor R. M. Field, of Princeton University, who have just returned to this country with several hundred pounds of selected fossils.

Fossils of trilobites, extinct crab-like animals, found in limestone at Durness, Scotland, were discovered to be exactly similar to those from Northeast Newfoundland and entirely different from those found in Southeast Newfoundland, Wales, Central England, Southern Scandinavia and Central Europe. Comparison of these ancient marine animal remains on both sides of the Atlantic indicates that some sort of land barrier prevented the mixing of animals from the Arctic sea on the north and the Atlantic on the south. This isthmus was evidently narrow, the Arctic and Atlantic animals being found in rocks within one hundred miles of each other at both the American and European ends.

Work has been started on the more detailed study of the fossils in order to determine more accurately the distribution of land and sea during the Cambrian and Silurian epochs of geological time, when the trilobites with corals unlike those found to-day flourished abundantly.

In collecting the specimens, the expedition visited England, Wales, Scotland, Norway, Sweden, Denmark, Germany and Czechoslovakia, and held frequent conferences with leading European geologists in an endeavor to correlate the rock strata of America with similar outcrops in Europe.

THE SCIENTIFIC LIGHTING OF THEATERS

IMPROVEMENT of the "movies" by more scientific lighting of the theaters is urged before the Royal Photographic Society by Dr. K. C. D. Hickman, of the department of chemistry at the Royal College of Science. This does not require more lights, but a better arrangement of the illumination. Chief of his recommendations, which are based on a study of the operation of the human eye, is that instead of surrounding the screen with black velvet or other dark hangings, this area should be fairly bright. The screen itself, however, should not receive any light, other than that from the projector.

The chief trouble with the lighting in the theaters is in contrast. "Only a small portion of the retina—the sensitive lining of the eye—is being used," Dr. Hickman states, "while the outer portion is being kept dark; whereas anywhere else, it would all be subject to the same illumination. It is the field of view embraced by this outer region which determines the sensitiveness of the eye. This increases the contrast and apparent brightness, giving the picture a fictitious strength and brilliancy, and also it induces eye-strain. A collateral effect is the destruction of all sense of blackness, for it is impossible to appreciate as black the shadows in scenes whose darkest parts are brighter than the surroundings in the theater.

The improvements suggested by Dr. Hickman consist in arranging the side lights so that they can not shine on the screen. The region around the screen might be illuminated by making it of light color and projecting light on to it from an extra stereopticon in the booth, using a slide with a central opaque portion, so that none of it would go on the screen. Another method suggested would be to have the screen a short distance from the wall, with lights back of it. In this way the lighting of the theater would be more uniform and the effect would be more that of an actual scene viewed through a window.

ITEMS

THE earthquake which shook Nicaragua and other parts of Central America on Sunday night, October 4, has been traced to southeastern Honduras, according to Commander N. H. Heck, in charge of the earthquake investigations of the U. S. Coast and Geodetic Survey. Commander Heck states that "the epicenter, or point of maximum disturbance, was at 14 degrees 30 minutes north latitude and 85 degrees 30 minutes west longitude, which places it in the Colon Mountains near the Nicaragua-Honduras boundary. The quake occurred at 11 hours 9 minutes and 2 seconds P. M. eastern standard time. We have arrived at this result by means of reports obtained by Science Service from seismographic stations at the Dominion Observatory, Ottawa, Canada; Fordham University, New York; the U. S. Weather Bureau at the University of Chicago, and the Coast and Geodetic Survey's stations at Tucson, Ariz., and Cheltenham, Md. A peculiar feature of the quake was that it was apparently most severe in Managua, Nicaragua, nearly 200 miles from the epicenter, while Tegucigalpa, the capital of Honduras, about a hundred miles distant, seems to have escaped unscathed."

EVEN a sand grain must travel to become well-rounded and acquire a polish. It must travel extensively, too—for most sand grains a journey from the center of the continent to the ocean, twice repeated, is necessary. Voyages by water smooth off the grains more rapidly than air travel, and even when traveling by wind, they rub each other only when they are rolling along the ground. These are among the results of a three-years' study of sand grains conducted by Professor Gustavus E. Anderson, of the University of Oklahoma. The immediate objective of his research was to gain some light on the origin of sandstone deposits, especially the oil-bearing sandstones. It is often of great importance for the oil prospector to know whether a given sandstone formation was laid down as wind-blown or as water-borne sand, and up to the present practically no laboratory investigations have been conducted to check up on the numerous extant theories. Professor Anderson simulated field conditions by tumbling sand samples of various types in bottles on rotating drums, some of the bottles containing sand in water, others sand without water. By keeping them constantly on the move he was able to get in a few hundred hours the same effects that in nature require many hundreds of years.