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FOOD FROM SHALE

By Dr. Edwin E. Slosson

The oil shales with which our country is so abundantly supplied may some day in the far future come into play to help out our failing food supply as well as our dearth of gasoline. The problem has already passed from the question of possibility to the question of profitability. The chemist is confident that he can make edible fats from shale oil, but he cannot yet compete with the cottonseed or the hog.

In fact, the chemist has now up his sleeve processes for making fats from almost any kind of carbonaceous material; coal, lignite, petroleum, wood tar, sawdust, and other unappetizing stuff. He can not only make the scores of fats and oils that are found ready made in plants and animals, but he can make hundreds of other that nature never thought of. And othersthat he has most recently patented prove to be just as nutritious as those that the human race has been living on for the last hundred thousand years or so.

The reason why the chemist can make synthetic fats in such variety is because they are all built on the same simple structure, a long chain of carbon atoms, hand in hand like the chains of paper dolls that we used to cut out of a folded newspaper. Each carbon has two hydrogens attached on the side, except one of the end ones which carries two oxygens. This is what is known as a "fatty acid" and there is a large family of these fatties. All those found in nature have very oddly an even number of carbons in the chain, but the chemist can make the missing odd members that come in between, and so complete the series. The most common fats and oils , such as butter or lard, olive or peanut oil, consist mostly of various mixtures of those members of the family having 14, 16 or 18 carbons in the chain. These are combined with glycerine in the fat foods, but if you substitute sodium for the glycerine, which you can easily do by adding lye- your great grandmother knew how if you don't- you will get a soap.

Now tar, petroleum, shale oil and other mineral oils consist of similar carbon chains, but lacking the oxygen-tipped end which makes the acid. Often indeed the chain has no end for it is hooked up into a ring. But the chemist has discovered that he can introduce the oxygen by driving hot air through the mineral oil, or by using that concentrated and active form of oxygen known as "ozone". The combination may be aided by high pressure of some heavy metal, such as manganese, lead or mercury, thatacts as a catalyst or carrier for the oxygen.

After the oil is cracked up andoxidized by such means, alkali is added and soap is produced. The yield is poor and the process is expensive, but proffers enticing possibilities of future development. In Germany much has been accomplished in this field, and in the United States many chemists are actively engaged in cracking up petroleum to produce various useful products. What they have found out will not be revealed to the public until it has been whispered into the ear of the Commissioner of Patents, but it is known that they have found it possible to get, not only a greater yield of gasoline, but also fatty acids, and a lot of alcohols and other oxidation products, that are much in demand of late for the new lacquer solvents.

But supposing we can get fatty acids from coal or mineral oils, where can we get the glycerine that is necessary to combine with them to form edible food? To rob the natural fats of their glycerine to add to our synthetic fats would not get us ahead any. One solution to this problem is the discovery that glycerine may be made by fermentation from sugar or molasses. During the war a thousand tons a month were made by this method in England where glycerine was needed in large amount to make nitroglycerine.

But there is another possibility that I will only hint at in closing since it may be regarded as chimerical. These fatty acids will unite not only with glycerine but also with the sugars and starches. This would add to their nutritive power, for such a food would give at once the fats and carbohydrates essential for diet; butter and potatoes, not merely on the same plate but in the same molecule. How much a synthetic food would taste I don't know, but doubtless the chemist could fix up the flavor to suit.

BLOODY WATERS OF BAY REVEAL MARINE MYSTERY

Why Frenchman's Bay, Maine, periodically becomes blood red at noontime, should be probed further, according to Prof. Ulric Dahlgren of Princeton University.

For several years it has been observed that each summer, at periods about a month apart, the moderately deep water near the entrance of the bay becomes blood red about midday.

Prof. Dahlgren has traced this crimson color to a hitherto undescribed habit of a marine worm. This worm casts its red eggs in untold numbers into the bottom waters of the bay. During a rapid development these rise to the surface at about the middle of the day. As the day goes on, however, the worms in their tadpole stage start away from the light and move toward the bottom, so the water takes on its natural color again.

Just what influences this worm to lay its eggs with such a monthly bill-like regularity is yet to be determined. Other marine worms, however, show similar periodicity which some have tried to connect with the influence of the moon on the tides.

There are varieties of mosquitos that do not drink human blood, but live exclusively on the nectar of flowers, on the sap of certain plants, and the juice of overripe fruits.

EVIDENCES FOR EVOLUTION

MAN BEFORE BIRTH HAS TAIL LIKE THAT OF MONKEY

Embryology Proves That Man's Ancestors Once Had Appendage Like Those Now Sported by Monkeys in Zoo.

By Dr. Adolph H. Schultz,
Research Associate, Carnegie Institution of Washington.

(Dr. Schultz is one of America's foremost embryologists and from his laboratory located in the Johns Hopkins Medical School, Baltimore, has come much new knowledge about the early stage of the human being.)

How can a self-respecting scientist claim that his and everybody else's ancestors once possessed tails like those of monkeys? For no less a reason than that every man at an early stage in his own life-time is ornamented with such an appendage, which, to be true, serves no other purpose than that perhaps of making him feel justly proud of the fact that this organ long ago ceased to be a permanent part of his outer body.

The embryologist has irrefutable and abundant proof to demonstrate that man, long before birth and when measuring but a third of an inch, bears a true external tail one sixth the length of his body. This tail projects for a considerable distance beyond the place where the legs branch from the trunk. It contains anywhere from 7 to 9 vertebral rudiments, bringing the total number of segments in the spinal column to as many as 38. This tail soon becomes completely overgrown by neighboring parts and disappears from the surface. Some of the vertebral rudiments become resorbed so that in adult man there are only 4 or 5 of them left - small vestigial bones of the so-called coccyx, at the lower end of the spine which in adult man consists of only 33 or 34 vertebrae. Even the last of these lies in full-grown man, when sitting on a chair, very considerably above the seat. This goes to show that the embryonic tail of man, particularly the bony elements in it, shifts in a n upward direction in the course of growth. The spinal cord projects at first beyond the 38th vertebra, that is to say to the outermost tip of the tail; with the advance in age this vital part of his nervous system also migrates upward, and even more so than does the spinal column, since in the adult the cord reaches only as far as the 21st vertebra.

Embryology furnishes still further justification for comparing the vertebral rudiments in the tail of unborn man with the tail vertebrae in monkeys. In many of the latter are found on the lower side of the first few caudal vertebrae typical so-called chevron bones, which protect the blood vessels supplying the well-functioning tail. In an exactly corresponding place in the human embryo occur rudimentary structures which can unmistakably be identified as nothing else but these chevron bones.

The undoubted tail vertebrae, amounting in total length to about 16 per cent. of the sitting height in the embryo, have shrunk in adult man to less than 4 per cent. of the latter measurement. Even in adult life these last segments

of the spine are readily diagnosed by the muscles, which are attached to them, as true tail vertebrae. In some individuals a greater variety of these muscles if found than in others; they are always of a rudimentary character, but they invariably correspond to muscles found in the tails of monkeys. Whereas in man they are no longer capable of wagging the tail, which has become internal, their purposeless existence can alone be explained as last vestiges of formerly well functioning muscles.

The regular, normal occurrence of a proportionately large outer tail at an early and temporary stage in the development of man, together with the unequivocal remnants of true tail vertebrae and muscles, in the full-grown person, forms overwhelming evidence for the only logical assumption that man, as well as monkey, descended from ancestors with well developed tails. Only from such progenitors - no matter how remote - can man have acquired these absolutely useless but significant structures, and, indeed, this reminds one of the passage in the Bible: "The sins of the fathers shall be visited upon the children."

In some apes, notably the orang-utan, the evolutionary reduction of the tail has gone further than in man, since in the former only three, sometimes two, tail vertebrae have remained and the adjoining muscles are still more rudimentary than in man's own anatomy. Moreover, a human being is born occasionally with an outer tail. Such a case, for instance, occurred some few years ago in Baltimore, and a reputable scientific journal gives an account of a 12 year old boy who had an outer tail of the record length of nine inches. These so-called soft tailscontain no vertebrae, but blood vessels, muscles, and nerves, and are of the same consistency as the short tail of the Barbary ape.

The embryologist in searching for truth in his field cannot escape noting the striking resemblances between man, ape, and monkey in early development which can be understood only by assuming one common origin for all, from which they inherited the tendency for the same growth processes. These processes have become modified in certain forms through a variety of later specializations. A long chain of proof has been produced by science for the further conclusion that the human body in a number of points is less removed from ancestral conditions, and hence remainod in some parts more original and primitive, than have some of man's simian cousins.

NEW KIND OF SOUTH SEA ISLAND SNAILS ACTUALLY EVOLVING TODAY

Columbia Professor Discovers New Species of Land Snails in Tahiti's Jungles Not There Sixteen Years Ago.

By Dr. Henry E. Crampton,
Professor of Zoology, Columbia University.

To the majority of people, evolution means a long line of successive generations, and the production of a new kind of living thing differing from its earlier ancestors to such an extent that it can justly be called a new species. This is evolution, it is true, but the special student knows that the larger differences which come about in long time are the accumulated smaller variations such as all creatures display when they are compared with their immediate parents. No one has yet found a single animal or plant that is exactly like either of its progenitors or like another of its own family. Hence everyone knows that "individual differences" come about naturally. When such differences are summed up in

time to be more obvious contrasts, we speak of "varieties", or "sub-species"; and when two kinds of descendants from common ancestry come to be even more separate, they are called species.

During nineteen years, the present writer has been investigating the processes of change displayed by some of the land-snails that live in the forests and jungles of many islands of the South Seas. At first sight, the animals do not seem interesting, but nevertheless their study has revealed abundant evidences that new "kinds" have actually come into existence within that short period of time. Some of these "kinds" are only slightly different from their parent stock, but others are more distinct, and, as real varieties, they are well on their way to the status of new species.

The evidences in question have been secured through a fortunate combination of circumstances. An American naturalist named Garrett worked among the islands of the great Pacific Ocean during many decades of the nineteenth century, and he left full descriptions of the species of snails belonging to a genus called Partula, as they were distributed in his time. He showed how each group of islands possesses its own species not found elsewhere, and how each island of a single group is the home of unique kinds which are closely related to the species of nearby places but which have come to be distinct in correlation with the separation of the islands where they occur. Furthermore, the different valleys of an individual island, like Tahiti, bear distinct varieties of one and the same species, which are even more nearly related to one another, as their differences are relatively slight in degree.

My own work consisted in going over much of the ground covered by Garrett, collecting all of the species and varieties in the various valleys and islands, and comparing them as they now exist with what Garrett observed and described. Many a colony proves to be a much changed assemblage when contrasted with what it was a few decades ago.

Perhaps the most striking evidences were found in Moorea, an island near Tahiti in the Southern Seas. Eighteen years ago , new "kinds" were found which were apparently not known to Garrett, and which could not have been present in his time in the valleys where they first came to light. It is still more important that the writer has found, during the last three years, new kinds of very distinct nature which had not been present in the same areas sixteen years previously. Many of these are what the biologist calls "mutations", or offspring that differ from their immediate forebears in very obvious respects and degrees. For example, a few rare specimens possess shells that twist in a spiral that is the exact opposite of what the parent had. Others are "dwarfs", while still others display patterns of color that are unique.

Thus we have in nature the elementary episodes of real bodily change that need only to be added up during successive generations to result in the production of varieties and even species of new character. It does not require very much in the way of reasoning to recognize that such elementary episodes are just as truly evolution as the longer process of organic change which is accomplished merely by the summing up or accumulation of the small diversities that come about with every new generation.

BRILLIANT NEW STAR FLASHES OUT IN SOUTHERN SKIES

Flashing out from obscurity to a temporary brilliancy exceeding that of the Pole Star, a nova, or "new star" was discovered in the southern skies on May 25 by R. Watson, an amateur astronomer at the Cape of Good Hope, South Africa, according to an announcement by Dr. Harlow Shapley, director of the Harvard College Observatory. The nova is in the constellation of Pictor, the "Painter", which can never be seen from points north of the Tropic of Cancer, but which from New Zealand, SouthAFrica and the southern part of South America, can be seen in a part of the sky as prominent as that occupied by the Great Bear for American observers.

While such new stars are not uncommon, an average of about eight or ten a year having been discovered since the Harvard Observatory, with the assistance of its southern branch at Arequipa, Peru, began to search systematically for them, one of the brightness of that in Pictor is rare. According to Dr. Shapley it is the brightest that has been since August 1920, when one appeared in the constellation of Cygnus, the Swan, or "Northern Cross". Nova Cygni III, as the astronomers refer to it, because it is the third that has been recorded in that constellation, was of the 3.5 magnitude on August 20 when it was discovered, and on the 24th it had reached the second magnitude, but by Sept. 10, it was again too faint to be seen with the unaided eye. Nova Pictoris is being anxiously watched to see if itcontinues to become brighter. Dr. Shapley stated that the Harvard branch station in Peru has been notified of it, as well as other observatories in Argentina, Chile, Mexico and Cuba.

The cause of a nova is still in doubt,but many astronomers believe them to be due to the collision of a star with another, or to its passage through a mass of nebulous material. In such a case the friction would generate a great amount of heat, and the star would become much brighter. This theory is given support by the fact that most novas are seen to be surrounded by nebulous material for a considerable time after their outburst.

EXPLODING METEORS CLAIMED CAUSE OF LUNAR CRATERS

Millions of meteors, hitting the moon with a speed of as much as fifty miles a second, and exploding with a violence greater than thatof T. N. T., dynamite, or nitroglycerine, were responsible for the multitude of craters that can be seen to cover the surface of our satellite, when viewed with a telescope or even a pair of binoculars, according to a new theory proposed by A. C. Gifford, of the Hector Observatory at Wellington near New Zealand. The action of the meteors was much the same as that by which exploding shells produced miniature editions of the lunar craters in the battlefields of France, when earth thrown into the air by the force of the explosion returned to the ground to form in a ring somewhat higher than the surrounding plain.

These meteors were not greatly different from those that now reach the earth, but while thousands of them enter the earth's atmosphere daily, frictionwith the air is so great that most are burned up before they reach ground, and when this occurs at night, a "shooting star" is the result. The few that do land have been so greatly slowed down that they can do little damage. Since the moon has no appreciable atmosphere, they hit the lunar surface with their full speed, frequently of 40 miles a second. "With this velocity," says Mr. Gifford, "if the meteor is stopped within one-tenth of a second, it will penetrate two miles into the surface.

In this time it is changed into a gas, but confined temporarily in a severely limited space. The pressure is so intense, the expansion so rapid, that it is instantaneously shattered and ejected by an explosion five hundred times as powerful, and much more rapid than that which would result if an equal mass of dynamite were exploded in a cavity within the lunar crust".

As further evidence in support of his theory, Mr. Gifford has calculated the shape of a crater formed in such a way, and his figures closely resemble those of actual craters seen on the moon through a telescope.

NEW CURE FOR PELLAGRA ANNOUNCED BY GOVERNMENT

The United States Public Health Service has announced results of experiments which prove that severe cases of human pellagra can be either prevented or cured by means of dried yeast. Surgeons Joseph Goldberger, G. A. Wheeler, and W. F. Tanner, after the successful treatment of 25 out of 26 patients, have united in a report which reveals that they were led to this discovery by following another disease in dogs.

Black tongue, a bacterial disease with somewhat similar effects on the skin as are produced in severe cases of pellagra, also a bacterial infection, was produced experimentally in dogs. Then the dried yeast was given. The cures were so satisfactory in the cases of the dog disease that the Public Health Service surgeons tried the yeast treatmenton pellagra patients. As early as the second or third day after the treatment beneficial effects were noted.

It is only in severe cases of pellagra that such dried yeast treatment is necessary as in milder cases careful feeding is sufficient, the surgeons declare. Brewer's yeast has been used so far, but the experimenters believe that bakers' yeast will work as well.

PREDICTS USE OF SMOKE TO BUILD AND PAINT HOUSES

Fine dust from chimneys will, undoubtedly , inthe near future, find some commercial use in the industries either as filler for paint, fertilizer, or other products, or as a base for some building material, according to Prof. A. G. Christie of Johns Hopkins University.

Much work is now being done to develop methods of catching the fine particles which fly up the chimney with the flue gases , he pointed out.

"It should be a public duty, " he says, " to reduce as far as possible the discharge of dust and smoke from chimneys of stoker plants and of those using pulverized coal. Such dust floating in the air lessens the amount of sunlight reaching the surrounding earth, increases fog condition, increases the cost of keeping cities clean, increases disease, and lessens the health and vitality of those who breathe the air it contaminates."

The economic loss frommental disease in this country is estimated at $200,000,000 annually.

SEA BIRDS FOLLOW ICEBERGS TO OBTAIN FOOD

Because of the large quantity of food brought down by icebergs, birds are following them out to sea, according to reports received here from the U.S. Coast Guard Cutter "Modoc", on ice patrol duty in the North Atlantic.

"Increasing presence of bird life," said Captain Wolf, " has been noted upon approach of the vessel to iceberg areas. In the immediate vicinity great numbers of fulmars were found, resting in the water among the fragments broken or washed off, and circling about the berg. When the ship left the vicinity, numbers of the birds would follow some distance, then leave to return to the ice. It would appear that the sea fowl find an added food supply in the vicinity of the bergs, by the action of these masses of ice in breaking up the seas which dash against them. At various times were observed shearwaters, fulmars, murre, kittiwakes, and a few dovekies."

UPPER LAYER OF EASTERN POPULATION NOT REPLACING ITSELF

In the great, thickly populated regions of the New England, Middle Atlantic, East North Central and Pacific states, the large class of people now sending their children to college did not have enough progeny to reproduce themselves. This fact is revealed in a study made by Dr. Warren S. Thompson, director of the Scripps Foundation for Population Studies at Miami University.

Under the conditions of 20 years ago it probably took about 3-3/4 to 4 children per family having children to replace the class as a whole, Dr. Thompson explained, and in these sections of the country this production rate is not quite maintained on the average.

In the other four sections of the United States, however, the parents of college students are doing more than keeping the population stationary and are on the average having a sufficiently large number of children to cause the numbers of their class to increase.

"The people of the South, the Mountain States and the states between the Rockies and the Mississippi are still adding rather large increments to the population annually, "says Dr. Thompson. "It is interest ing to note that the peoples of these states are of Teutonic stock, using this term in its broad significance, and consequently the same type of stock which originally settled this country is probably still adding the largest proportion of our annual increase."

Dr. Thompson found that while the people engaged in professions, trade and managerial work had the smallest families, farmers had the largest number of children.

The average number of children in each family from which college students come is as follows for the different divisions of the United States: New England, 3.51; Middle Atlantic, 3.59; East North Central, 3.86; West North Central, 4.40; South Atlantic, 5.31; East South Central, 5.05; West South Central, 5.05; Mountain, 4.09; Pacific, 3.94.

STOMACH ACTS AS LUNG ON SWALLOWED AIR

Breathing through our stomachs as we do through our lungs was recognized as a possibility by Dr. A. D. Dunn of the University of Nebraska Medical College in a talk before the Omaha branch of the American Chemical Society.

Gas on the stomach and consequent eructation or belching is caused by swallowing air. The air is sometimes swallowed voluntarily and sometimes without the person realizing it. The oxygen of the swallowed air is absorbed in the stomach and replaced by carbon dioxide - the same exchange that takes place in the lungs, except on a smaller scale.

"The fact that this is an actual breathing process for the stomach probably explains why swallowing air and belching gives a feeling of relief in some cases of stomach trouble," says Dr. Dunn, "Stomach-gas, then, is not, as many suppose, a trouble in itself, but a natural attempt to relieve some other trouble."

Yeasts and bacteria, contrary to some authorities, cannot cause stomach-gas. Dr. Dunn, who has made an intensive study of this problem, showed that the gastric juice in the stomach is too acid for them to work. This explains why eating yeasts and raisins together fails to render an alcoholic "kick".

GIRLS MORE HEADSTRONG THAN BOYS

If your baby girl at eighteen months yells when you want her to comply with some mere adult wish or your three-year old pushes you away and says, "No, I won't," do not be alarmed at this show of obstinacy. Periodic spells of resistance to even pleasant suggestions are part of the normal development of the normal child, according to Dr. D. M. Levy, psychiatrist, formerly with the Illinois Institute of Juvenile Research, who has made an extended investigation of resistance in children.

Babies of less than six months tend to be calm, even when just awakened or interrupted at meal time, says Dr. Levy; but from, six months on, perverseness increases until the third year, often with a minor high point of resistance at the eighteenth month, which is particularly apt to appear in the case of girls. After the third year resistance gradually decreases until the child at five years readily cooperates with an adult who knows how to make himself agreeable. Girls, on the whole, show more resistance than boys.

In the course of his work Dr. Levy examined many babies and soon found his associates agreed with him that three-year olds showed the greatest resistance to any kind of examination, even to the "games" which compose the mental test for a youngster of that age. To check up on this general feeling, Dr. Levy devised a series of simple tests which could be given uniformly to children from six months on, to test, not mentality alone, but degree of resistance in complying with the directions given. Seated on the mother's lap, each child is tested as to its ability to grasp objects in front, above and behind the head. Placed on the floor by the examiner, the baby is next tossed a ball with instructions to catch it, and then is asked to throw the ball back to the examiner. The baby is then placed on a table by the examiner and further tests given. All the time the baby is closely observed as to its behavior, and careful notations made in writing together with the age of the baby and other data needed. The number of tests the baby refuses to perform gives the degree of resistance.

To check the results, a number of children were examined in their own nursery under favorable conditions - and the percentage of resistant babies remained the same. Personal dislike for the examiner was tested by having the mothers ask their children to perform the tasks - and the babies were still contrary. Therefore Dr. Levy concluded that gradually increasing resistance to the third year, followed by a decrease, is normal in the growth of a child's personality.

NEGROES LIKE SAME COLORS AS WHITE PEOPLE

Negroes and white people are about the same as regards their preference for gay colors, according to anarticle in the next issue of the "Journal of Comparative Psychology". Tests were made by Miss Florence M. Mercer, of the Texas [illegible] Women's College, on 1006 negroes in the Texas public schools.

It was found that negro children inthe first and second grades had a strong liking for red, with blue, green, violet, orange, yellow and white following in order of preference. This order of color preference changes throughout the succeeding higher grades until in the eighth grade it was found that preference for blue led all colors by a wide margin and that red had dropped to the zero level of color choice.

Education operates achange in native color preference and seems to produce in the negro a suppression of color preference for all colors but blue.

Miss Mercer states that similar results were obtained in a like experiment on white school children and that comparison of the results indicates little difference in color preferences between the two races.

MOST CHILD POISONINGS DUE TO STRYCHNINE

Of seventy deaths due to accidental poisoning during 1924 among children between the ages of one and four years insured in the industrial department of the Metropolitan Life Insurance Co., twenty-four were due to strychnine. This was four times as many as the number due to lye and other alkalies, which came second in numerical importance. "Cathartic pills, containing strychnine and left within the reach of children, were one of the most important sources of poisoning," the company stated.

It is estimated thatonly 50 per cent. of the school children in this country have ever had their eyes tested.

The almond is related to the peach which it resembles in manner of growth and character of blossoms and leaves.

The hottest place in the world is Azizia, an inland town of Italian Tripoli, where the temperature was recently found to register 136.4 degrees; over two degrees hotter than the record for Death Valley.
