

Scientists Discuss Bad Habits, Floods and Electrons

The annual meeting of the American Association for the Advancement of Science, with numerous associated organizations, held in Nashville, Tenn., from December 26 to 31 brought together several thousand of the country's leading scientists. A few of the most interesting and important papers are reported on this and the following pages. Next week more will be presented.

New Cure for Bad Habits

A new story of how habits are formed and how they may be cured was advanced before psychologists of the American Association for the Advancement of Science by Dr. Knight Dunlap, professor of psychology at Johns Hopkins University.

Bad habits, such as stammering, biting finger nails, or using a slang phrase can be overcome by voluntarily doing the undesirable thing, according to Dr. Dunlap's theory, and he described cases in which this method has been tried and found successful.

The psychologist's first subject to try the habit cure was himself. To break up the habit of writing "hte" on the typewriter for "the", he set to work deliberately and wrote half a page, singled spaced, of the "hte" combination, with the thought in mind that this was a "word" that he would not write in the future, unless it was done deliberately. About a week later he put in a second practice period, writing about one-third of a page. Since then, in a period of three months, the error of typing has not occurred, even once, he stated.

The theory is being tested with stammerers in a public school, Dr. Dunlap said, with favorable results.

"In the case of stammerers, the vital point is to study the specific type of stammering, and then induce the patient to reproduce voluntarily his characteristic verbal performance, criticising and assisting him until his voluntary stammering is as nearly as possible like his involuntary," he reported. "From that point on, the technique is complicated, and we do not expect to have it perfected until many cases have been experimentally subjected to it."

Thumb sucking and similar wrong habits of two- and three-year-old children have been treated at the Child Institute of Johns Hopkins University, he said, with results that show the method is useful even at such early ages.

In all cases patients have been selected who desired to cure the bad habit, for one reason or another, and

have been carefully instructed that the voluntary performance, under the experimenter's control, would assist in abolishing the undesirable behavior at other times.

Dr. Dunlap's theory is in opposition to the generally accepted theory that repeating an act tends to fix it as a habit. Repetition in itself is important only because it brings into play other factors which establish the habit, he believes. In experiments so far conducted, it has been assumed that attention, expectation, and desire are among the important factors in making and breaking habits.

Science News-Letter, December 31, 1927

Shortest Men in Tropics

The shortest people in the world are found in the climates of extreme heat or cold where the food supply is difficult and precarious, Prof. R. Bennett Bean of the University of Virginia told the Association.

The Negrillos of central Africa average around four feet four inches, according to Professor Bean's figures, while the Aymaras of central South America are close seconds. Next to these groups come the Eskimo, Lapps and Siberians, who live in regions of Arctic cold with a poor food supply. The tallest people, Professor Bean pointed out, are found in the temperate climates where active life is possible and an abundant food supply prevails, notably around the shores of the Baltic Sea, eastern Africa, and the plains and pampas of the Americas.

"Looked at in its broadest sense," he stated, "environment molds the individual, selection retains the fittest under different environments, and heredity carries on the results."

"Certain stocks may move into areas for which they are not fitted and remain for a time. Such conditions exist throughout the world today where recent movements of peoples have taken place, but ultimately there is a survival of the stock best fitted for the environment. The unfit stocks disappear in time by amalgamation, eradication or dispersal."

Sea areas and probably sea food have an influence in reducing stature by increasing the iodine intake, Professor Bean stated. The present Mediterranean peoples, for instance, and the primordial British, have small statures and so also the Japanese, yet

they come from taller continental stocks.

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Indians from Cro-Magnons?

The possible claim of the red-skinned natives of the Americas to descent from the noblest line of the Old Stone Age in Europe was set forth here recently by Dr. Ales Hrdlicka, noted anthropologist of the U. S. National Museum, Washington, D. C. Dr. Hrdlicka has just returned from a European trip during which he re-examined practically all of the known remains of paleolithic man. Speaking before the anthropological section of the American Association for the Advancement of Science, he outlined certain striking similarities both in bodily structure and in cultural customs between the Indians and the latest of the races of the Cro-Magnon type.

Dr. Hrdlicka said in part: "The recent revision which I have made of practically the entire extent of skeletal material from the Aurignacian times throws important new light on the problem of the Aurignacian ('Cro-Magnon') man, a light which is at considerable variance with previous assumption. The new conclusions are in brief as follows:

"Early Aurignacian skeletal remains are exceedingly rare; the mass of the known remains belongs to the later, evolved, Aurignacian.

"The tall and powerful men of the Grimaldi caves represent not a racial character, but individual or a family variation. There are three of these skeletons, all male and all approaching giantism. Other skeletons from the same place are of ordinary dimensions.

"The assumed superiority of the brain of the Cro-Magnons over other races, past and present, is not sustainable, especially if the influence of stature on the size of the skull is discounted.

"The two negroid skeletons of Grimaldi (now preserved in the Museum of Monaco) are negroid more or less only in their facial appearance. Their low orbits, the forehead, the cranial vault, and all the main characteristics of the skeleton are so close to the rest of the Grimaldi individuals and to other members of the Grimaldi race, or Upper Aurignacians, elsewhere, that they can safely be regarded as fundamentally of

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the same type and derivation. The negroid features of their face may be duplicated among other non-negro races, particularly the Malay and some of the American Indians. They differ very perceptibly even in the two skeletons.

"The supposed much greater antiquity of the two negroid skeletons is not supported either by their physical characteristics or their state of preservation, and the matter would seem to need a reconsideration. The case was plainly a double burial, and as such the remains may have been introduced into strata to which they would not properly belong.

"Some of the most characteristic and distinguishing features of the later Aurignacians relate to the shape and size of their ribs, which are unusually broad and strong; and to the shapes and relative sizes of their leg bones (tibia and fibula). The special characteristics of the leg bones extend as far as the Predmost skeletons of Moravia and the Paviland skeleton of England.

"There are growing indications that the uppermost Aurignacians may have been closely affiliated with the *far-away* European or Siberian ancestors of the older oblong-headed aboriginal Americans. There are many features in common to the two. The vault of the skull is often very similar in shape and size. Low orbits and other facial characteristics of the Aurignacians are also now and then met with in the Indians. There are certain Aurignacian-like similarities in the aboriginal American stone and bone culture. The habit of burying quantities of red ocher with their dead, was also common among the American Indians. While none of these items are decisive, they are nevertheless suggestive; and there is no inherent impossibility in the later Aurignacian influence, both morphological and cultural, reaching the old stock which eventually gave us the Indian. There are many indications that from the Middle Aurignacian times man began steadily to increase and extend over the earth; and that he remained much the same in physique through the succeeding terminal parts of the Paleolithic period and up to the Neolithic times when, according to the best evidence we now possess, he began gradually to extend or advance over into America."

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Electrons Like X-Rays

Experimental evidence in favor of some of the newest developments in electrical theory was reported to the American Physical Society by Dr. C. J. Davisson of Bell Telephone Laboratories, New York City. These experiments were concerned with the measurement of the way in which a beam of electrons is scattered by a single crystal of nickel. They showed that the scattering was governed by the same laws as those which govern the scattering of X-rays by a crystal.

"The scattering of X-rays by a crystal results in the production of strong scattered beams in just certain directions," Dr. Davisson stated, "and this fact has always been explained on the hypothesis that X-rays are an electromagnetic wave disturbance of the same sort as radio waves and visible light. Our experiments show that a beam of electrons shows these same characteristic scattering effects as X-rays. The inference seems to be that there is some sort of a wave-motion associated with the motion of a beam of electrons."

The experiments, which were performed jointly with Dr. L. H. Germer of the Bell Telephone Laboratories, showed that the observed wave-length of the electron beam was exactly that which is predicted by the quantum theory.

Describing the experimental method, Dr. Davisson explained that the source of the electrons was a hot filament just as in ordinary radio tubes. The voltage used ranged from about fifty to 375. The beam of electrons impinged on a nickel crystal, and some of them were absorbed in it, while others were scattered back from the surface. Of those that are scattered back some come back without having lost any speed—they have elastic encounters with the crystal like the impact of a billiard ball on a cushion.

A little collecting device was arranged so that it would be moved to various positions in front of the crystal to find how many electrons were scattered in the various directions without loss of speed. With this arrangement the number of electrons scattered in different directions was found to depend on the direction in the same way as does the scattering of X-rays by a crystal.

"The situation confronting physicists with regard to electrons is now something like the dilemma confronting the theory of light," the speaker declared. "For many years all the facts concerning light could

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Higher Floods Possible

High though the 1927 floods of the Mississippi were, and the most disastrous in our history, they did not represent the highest possible. It is conceivable that a future one may occur with crests two to four feet higher. This was the opinion expressed before the symposium on floods at the meeting of the American Meteorological Society by Dr. H. C. Frankenfield, in charge of the flood investigations of the U. S. Weather Bureau. Dr. Frankenfield was careful to add, however, that the chances of the maximum occurring are exceedingly remote.

"The lower Mississippi floods," said Dr. Frankenfield, "are caused mainly by heavy and favorably distributed rains over the great central basins. The Missouri River above the mouth of the Platte, and the Mississippi River above the mouth of the Wisconsin, do not contribute materially. In 1927, the time, amount and distribution of the rains was so favorable that the greatest flood in our history occurred.

"The amount of contributing rainfall for the floods of 1922 and 1927 did not differ materially and other factors were materially alike in January and February. The difference resulted from the March and April precipitation, the excess during April, 1927, determining the question in favor of 1927. The water depths over the entire basin from January to April, inclusive, in 1922 and 1927 were 10.58 and 10.79 inches, respectively, a difference of only 0.21 inch, not enough to cause any material difference in flood crests had it not been for the differences in the character of the distribution.

"Speaking in very general terms, a water cover of about 10 inches over the Mississippi basin from January to April, inclusive, will probably result in a more or less great flood from Cairo southward. The flood of 1927 did not exhaust the possibilities as to flood crests. Had the levees remained intact the stages in 1927 from Cairo to the Passes would have averaged a few feet higher than those recorded, and under the most favorable combination of contributory factors even still higher stages could occur."

The methods by which he has predicted disastrous floods of the Mississippi weeks in advance as told by Dr. Isaac M. Cline, in charge of the New Orleans Weather Bureau, were one of the features of the symposium.

The Mississippi has reached high

stages more frequently in recent years than in times gone by, said Dr. Cline, even though the historic floods of 1782 and 1796 probably carried a greater volume of water than the flood of 1927. The reason for this is, he explained, that there has been great improvement in recent times to levee construction, which has held back the waters in the channel, that otherwise would have flowed over the land.

"Increase in the strength and height of levees has decreased the frequency of crevasses," Dr. Cline said, "but has increased the danger of disastrous overland floods from such breaks as occur, because of the increased head of water within the levees. Hence the forecasting of overland floods is of greater importance to the general public than is the forecasting of channel floods. Protection of life and property from overland flood waves requires a forecast of the rate of travel of the wave, and the closest approximation to the depth of water that may be expected at various points.

"The rate of travel is governed by the character and slope of the land. Overland floods in Louisiana have been found to travel at a rate of about 8 miles per day, air-line distances. In Mississippi the rate of travel is about 50 per cent. greater than in Louisiana.

"To forecast the depth of overland floods, topographic maps are absolutely essential. The first efforts at such a map for the Atchafalaya Basin was prepared by the Weather Bureau during the emergency in 1927, so that warnings could be issued for the overland flood following the Bayou des Claises crevasses. This information was also given to the U. S. Engineers and others who could make use of the information in helping the people out of the flooded area."

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Storms Grow in Travel

How a great "cyclone" or general storm area, increases in size as it moves northeastward across the United States and Canada, or the western Atlantic, was described by Dr. W. J. Humphreys, of the U. S. Weather Bureau at Washington.

"As a general or cyclonic storm moves northeastward across the eastern United States and Canada," he said, "or over the Western Atlantic, it often increases rapidly in size and intensity. This storm consists of a swirl between cold air from the north on the northwestern side and warm humid air on the southeastern side.

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Storms Grow in Travel

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"As the storm moves farther north the cold side becomes still colder while the warm side changes but little in temperature owing to continuous condensation. Also in this part of the world, there are no high mountains to block off the free flow of either the cold air from the north or the warm humid air from the south. That is, as the storm moves northeastward the difference in temperature between its warm and cold sides increases, and the winds are but little obstructed. It therefore grows larger and stronger the farther it goes in this direction and in this region."

Dr. Humphreys also told why these storms increase faster by night than by day.

"In the eastern United States the northwestern portion of a general storm area is free, or nearly so, from clouds, and the southeastern cloud-covered," he explained. "The cloudy portion cannot cool much by radiation at night, while the clear portion

can and does. Similarly, on the cloudy side very little heat gets through to the earth from the sun, while on the clear side there is abundant sunshine.

"Evidently, then, the temperature difference between the two sides of the storm becomes greater during the night and less through the day. But the intensity of the storm increases with this temperature contrast, hence, in the eastern United States, and in various places, the general or cyclonic storm grows faster by night than by day."

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The population of Java has doubled in 25 years, a remarkable rate of increase.

Roots of the cat-tail plant are rich in starch and make nourishing food.

Records indicate that Indians of the Iroquois tribe obtained as high a yield in their crops as farmers of today.

Electrons Like X-Rays

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be explained by assuming it to be simply a wave motion. Then the quantum theory, in the hands of Planck, Einstein and A. H. Compton, showed that radiation had also to be regarded as having something corpuscular about it. Similarly, for many years electrons were believed to be simply corpuscles of negative electricity. But now recent developments in quantum theory, confirmed by these experiments, show that there is something wave-like about them."

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Impure Gelatine in Movies

The millions of dollars invested in the movies and the pleasure of the millions of people who daily attend them is based on chemical impurity in gelatine. This announcement, in effect, was made by Dr. C. E. K. Mees, director of the Research Laboratory of the Eastman Kodak Company.

"It has recently been found" said Dr. Mees, "that the sensitiveness of films is not due to the grains of silver bromide only but is in some way connected with the presence on those grains of specks of some other substance, and the Kodak Research Laboratories after a long and careful study have found that these specks are produced by an accidental impurity present in the gelatine. This impurity is derived from the plants eaten by the animals from whose skins the gelatine is made. There is only a very small amount of it in the gelatine, but it is a compound which contains sulphur, and when the gelatine is used for making the film, the sulphur reacts with the silver bromide and produces specks of silver sulphide on the crystals.

"In some way or other these specks increase the effectiveness of the light to which the film is exposed in the camera and enable the light to change the silver bromide so as to form a trace of metallic silver. Then this silver acts during developments as a nucleus on which more silver can deposit by the chemical process until the whole of the silver bromide crystal is turned into silver. Each of the original crystals of the film therefore after exposure to light becomes a grain of silver in the developed film, and it is of these grains of silver that the image projected on the screen is composed."

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BLACK WHITE or SPECKLED?

THE "COMMITTEE ON THE NEGRO"

organized for the anthropological and psychological studies on the American Negro published its first Anthropological paper in the *American Journal of Physical Anthropology*, Vol. X, No. 2. Dr. A. Hrdlicka, of the United States National Museum reviews this interesting and important subject and gives a bibliography of 269 titles.

Read the Anthropological paper on this great problem in the *American Journal of Physical Anthropology*.

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