SCIENCE NEWS

Science Service, Washington, D. C.

THE CAUSE OF HEADACHE

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"TIDES" in the brain make a headache—the "morning after" kind or otherwise, Dr. Temple Fay, professor of neurology at Temple University Medical School, Philadelphia, told members of the American Neurological Association meeting in Atlantic City on June 1. Headaches, it appears, may be classed relatively as wet ones (high tide) and dry ones (low tide). The headache of the "morning after" is a wet one, though not all wet ones are due to alcoholic indulgence. General overindulgence in food and fluids brings on this kind.

What makes a headache, reduced to simple terms, is the amount of fluid in and around the brain. Too much or too little of this fluid results in stretching the large blood vessels that supply the brain. The stretching is what hurts. Dr. Fay determined this by stretching the nerves of these blood vessels in the brains of patients undergoing brain operations.

The wet headache—too much fluid in the brain—is most common in the overweight, hydrated person who consumes large quantities of food and fluid and does not eliminate enough fluid. This person should, in general, reduce the amount of liquid consumed to not more than one quart a day.

The headache noted in the common type of underweight, overactive, nervous individual arises when fluid from the body is too rapidly lost from the skin or kidneys and can not be properly retained in the brain cavity. This type of person, with the advice of his physician, should increase his fluid consumption to three or more quarts per day along with extra feedings.

These directions, Dr. Fay pointed out, apply to the true variety of headache, and should not be followed until medical examination has ruled out other conditions which may refer pain to the head. The beneficial use of certain drugs for headaches was ascribed to their effect in regulating the fluid and blood volume relationship in the brain.

The large blood vessels which give a headache when stretched are the only structures in the brain that carry pain fibers. Besides stretching because of too much or too little fluid, irritation of these vessels at other places on their path to and from the brain gives rise to pain felt in the head as a headache. Such irritation may arise in the neck, chest or abdomen, and this explains the headaches that may accompany infections in nose, throat or in diseases of the chest and abdomen.

The discovery of the mechanism of headache reported is based on many years of research by Dr. Fay and other investigators. He also reported a test, called a cephalalgiagram, for determining whether a headache is of the wet or dry variety.

WARM TEMPERATURE AND BLOOD FORMATION

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DISCOVERY of a hitherto unknown but fundamental relation between temperature and blood formation was announced at the meeting of the American Medical Association. The discovery, which may give physicians new leads to the treatment of infections and blood diseases, was made by a group of Chicago surgeons, Drs. Charles B. Huggins, W. J. Noonan and B. H. Blockson, of the University of Chicago.

The blood factory of the adult body is located in the marrow of certain bones. This factory can not operate at low temperatures, it appears from the experiments reported by Dr. Huggins and associates. No blood is made in the marrow of the bones of the hands, feet and lower parts of the arms and legs because it is too cold there.

No application of the discovery to disease or its treatment was made. The authors of the paper are at present content to have found an answer to the question of why the marrow in some bones is the red, blood-forming variety while the marrow of other bones is yellow and forms no blood.

Certain practical aspects suggest themselves, however. New knowledge about the mechanism of blood formation may well be expected to prove helpful in finding the causes and better methods of treating blood diseases. This discovery also suggests that it may be a good thing when a sick person has fever because when the temperature goes up it may favor production of more blood which the patient needs to fight the infection. Physicians who treat disease by inducing fever, a method being demonstrated at the medical meeting, may come to revise their methods as a result of this latest discovery. Raising the body temperature a slight amount for a week, the discovery suggests, might prove more beneficial than elevating it to a high point for a few hours once or twice a week, as is now the practice.

Discovery of the importance of temperature for blood formation in the bone marrow was made by ingenious experiments which, as Dr. Huggins explained them, seemed so simple that the layman might wonder why no one had thought of them sooner. One reason is that the experiments required the use of modern surgical technique and a modern physical instrument, the thermocouple, which detects small differences in temperature in body tissues. The red, blood-forming marrow in bones changes abruptly to the yellow variety in the extremities; the sharp line between the two, seen in the specially prepared skeletons of small animals which Dr. Huggins exhibited, suggested that the cause must be physical rather than chemical. With thermocouples the temperature of the bones above and below the line of change in marrow

color was measured, and it was found that the bones with yellow marrow were definitely colder.

Proof of the causative relation of temperature to blood formation was obtained by operations in which the tip of an animal's tail was inserted within its abdomen, or the feet of baby rats were dropped into the abdomens of their mothers. Instead of turning yellow, the marrow of these extremities stayed red and continued to form blood when in the new warmer location within the body. The temperature of 96 degrees Fahrenheit, it was found, is required for blood formation by the bone marrow. The marrow of the red, blood-forming variety is found in all bones at birth, but by the time a baby is about a year old the marrow in the extremities has turned yellow.

THE AUDIBILITY OF LANGUAGE

THOSE who would create a universal language should take account of the new science of acoustics. Such is the suggestion of Dr. Vern O. Knudsen, of the University of California.

Apparently little or no attention has been paid to the question whether the words of Esperanto or other artificial languages are readily understandable in spoken form. In view of the vast amount of time wasted in retarded telephone calls and acoustic confusion in poor auditoria, the creator of a language should avoid the use of syllables frequently misunderstood.

Incidentally, English is probably not the best language in this respect. For example, the terminal consonant group "ng," so common in English, is perhaps the worst offender in the alphabet. In the Los Angles auditorium tests, words ending in -ng were misunderstood more than half the time. In general, words ending in consonants are more likely to be missed than those ending in vowels. This fact often causes trouble for persons attempting to dictate strange material over the telephone.

Dr. Knudsen's tests have been conducted so far only in English. It is already suspected that Spanish will prove superior, with its large number of words ending in vowels—Valencia, Santa Barbara, poco tiempo, etc. The Chinese language may prove to be still better. To be sure, western people are often highly amused to hear a Chinese express meaning by sounding a vowel in two successive pitch tones. This may, however, prove to be the most scientific way of making one's self understood under difficulties.

Perhaps Dr. Knudsen's commendation of vowel sounds explains the great popularity of the expression which Europeans call the "American double grunt"—that is, the "uh-huh" of every-day speech. While this expression has a semblance of consonant sounds, its real merit seems to lie in the inflection pitch and time placement of vowel sounds. By variations in these factors, astonishing differences in meaning are obtained under good acoustic conditions. In short, "uh-huh" is an idea easily put over.

SEVEN FACTORS OF PERSONALITY

SEVEN primary elements that go to make up human intelligence just as the primary colors of the rainbow may be mixed to produce the thousands of beautiful hues with which we are familiar, have been announced to the scientific world by Dr. Louis L. Thurstone, authority on mental testing at the University of Chicago. They may replace present measures of I.Q. and mental age. Four long years of research with complicated statistical and mathematical techniques enabled Dr. Thurstone to identify and name these seven "primary colors of personality," They are:

1. Number facility. This is an ability necessary to the accountant and mathematician. As Dr. Thurstone put it, "its appearance as a primary factor is not surprising in view of the common observation that many otherwise intelligent individuals seem to have a mental blind spot in dealing with numbers."

2. Word fluency. Here is a talent necessary for the political speaker, the salesman and teacher.

3. Visualizing ability. Some persons are visually minded and learn best through seeing things or pictures of them.

4. Memory. Scientific justification does exist for the disputed popular idea that memory is distinct from other mental abilities, and that a person can be described as having a good memory in general without specification as to what he can remember well. Dr. Thurstone's experimental findings agree with the common observation that people of superior intellect sometimes reveal surprisingly poor memory.

5. Perceptual speed. This is the ability that enables some people to scan a page of names or numbers to find a particular item quickly, while others must examine each item.

6. Induction. Dr. Thurstone explains induction as "involved in several tasks in which the subject must discover some principle or rule that governs the material." More experiments should reveal whether originality and inventiveness are involved.

7. Verbal reasoning. This might also be called deduction or the ability to see relations between words. The experiments showed that this is something different from mere fluency with words.

These "dimensions of intellect" which may become important for mental testing and vocational guidance, were discovered after examination of 240 university students who volunteered to take a total of 56 psychological tests. Dr. Thurstone's conclusions were embodied in a report to the American Council on Education.

CHEMICAL-INDUSTRIAL COMPETITION

WEAKENING scientific unpreparedness would certainly follow the adoption of oft-heard pleas to "stop all research for a few years, and let the world catch up." Warning against this peril was sounded by Dr. Charles M. A. Stine, vice-president of E. I. duPont de Nemours and Company, speaking before the recent Dearborn Conference on Agriculture, Industry and Science.

Not merely economic aggression by better prepared chemical-industrial powers, but disruption of American industrial and economic life by warfare in distant parts of the world, where our neutrality is not even called in

question, through the breakdown of vital raw-material supplies, could easily result from such a policy of throttling research.

"Let us not deceive ourselves," Dr. Stine said. "The world trembles on the brink of changes that may make or unmake peoples. There are menaces of war, which, should it come, would disrupt orderly trade and force us to maintain ourselves apart. Foreshadowed is the increasingly rapid introduction of new goods, new materials and new methods, some of which will be revolutionary in effect. No longer can we be sure that the raw materials, from which we made our goods yesterday, will be the raw materials with which men will work to-morrow. Man has learned the secret of material creation and a new age impends. We can't halt these changes. Regardless of what we feel or do, regardless of what laws we enact, time and progress will move on, if not in our land, then in other countries. Either we will lead or be led, advance or go backward. We can't even elect to stand where we are. In this situation, our one insurance against being ignominiously outclassed is continued and accelerated research."

ITEMS

A WIDE-SPREAD epidemic of infantile paralysis is not expected this summer by officials of the U. S. Public Health Service. An outbreak of the disease at St. Mark's School for boys near Boston, in which eight paralytic and eight non-paralytic cases have been reported, is described as "very sharply localized" and is not expected to cause any general spread of the disease. Public health officials will not make any definite predictions on epidemics, but they point out that the extensive outbreak of infantile paralysis in the South last summer was well under way by this time of the year. If there were to be another epidemic this summer there would probably be definite signs of it by now.

ONE out of every five white persons born will eventually die of heart disease, under present conditions of mortality, a survey of deaths during a twenty-year period just completed by the Metropolitan Life Insurance Company shows. Heart disease is the chief cause of death at every age period after 45. During the period surveyed, 1911–1930, diseases of the heart, blood vessels and kidneys were responsible for more than one fourth of the deaths from all causes. A great many premature deaths from chronic diseases of heart, arteries and kidneys could be prevented by preventing childhood infections, syphilis, rheumatic fever and other infections of early life since these infections are often the initial cause of the chronic diseases that develop later and go on to a fatal end.

TWENTY-FOUR large cities have a place on the honor roll of the American Medical Association, having had no deaths from typhoid fever during the year 1935. These cities are: Bridgeport, Conn.; Cambridge, Mass.; Elizabeth, N. J.; Erie, Pa.; Fort Wayne, Ind.; Grand Rapids, Mich.; Jacksonville, Fla.; Jersey City, N. J.; Long Beach, Calif.; Milwaukee, Wis.; Newark, N. J.; New Bedford, Mass.; New Haven, Conn.; Omaha, Neb.; Paterson, N. J.; Peoria, Ill.; San Diego, Calif.; Scranton, Pa.; Somerville, Mass.; Springfield, Mass.; Tacoma, Wash.; Trenton, N. J.; Wichita, Kans., and Youngstown, Ohio. Eight of these cities—five of them in New England—had no deaths either from typhoid or diphtheria in 1935. They are: Bridgeport, Cambridge, Erie, New Bedford, New Haven, Scranton, Springfield and Tacoma. At the other end of the scale are seven cities with high death-rates from typhoid. In the order of high mortality from the disease, they are: El Paso, Tex.; New Orleans, La.; Nashville, Tenn.; Tampa, Fla.; Norfolk, Va.; Knoxville and Memphis, Tenn.

WILD animal resources of the vast Asiatic holdings of the USSR are to be drawn upon for contributions to the Moscow Zoological Garden, by several expeditions now taking the field. The expected captures range all the way from polar bears and walruses of the Arctic to giant leopards and panthers, and mountain sheep and goats, from the mountainous region in Central Asia.

SEVEN ages of a butterfly, no less marked than Shakespeare's seven ages of man, have been studied by Austin H. Clark, of the U. S. National Museum, on one little-known species, the golden-banded skipper. During its "infancy" as a caterpillar, this insect changes its skin five times in about five weeks. Then it "pupates" as a violet-tinged white chrysalis. Finally, as the seventh stage in its life, it emerges as a full-grown butterfly.

AN all-glass engine cylinder, the only one of its kind in the world, was demonstrated at the eleventh annual aircraft engineering research conference sponsored by the National Advisory Committee for Aeronautics. Through the transparent walls of the cylinder investigators are studying the air movements and the distribution of fuel spray in research which is designed to bring greater acceleration and power output for airplane engines.

NEUTRONS have been found twelve miles up in the air above the earth's surface. The stratosphere neutrons are not as potent in energy as some of those created in the scientific laboratories, but they are much more numerous at the high altitudes. Dr. L. H. Rumbaugh and Dr. G. L. Locher, of the Bartol Research Foundation of the Franklin Institute, at Swarthmore, have reported these discoveries in *The Physical Review*. The Rumbaugh-Locher report is based on months of study of the records obtained on the stratosphere flight, last fall, of the National Geographic Society-U. S. Army Air Corps balloon *Explorer II*.

A STUDY made of a winter-sleeping bat by Dr. Alexander Wetwore, assistant secretary of the Smithsonian Institution, has been published in *The Journal of Mammalogy*. Dr. Wetmore found a hibernating bat in the folds of an awning over one of his office windows, early last winter. He put it into a blanket-fold in a small ventilated box, and left it on the window-ledge all winter long, making daily readings of the temperature. It was a winter of record cold for Washington. Temperatures as low as six degrees above zero were recorded from the bat's nest. Yet when he opened the box in early spring, the bat was none the worse for its long chilly sleep.