SCIENCE NEWS

Science Service, Washington, D. C.

THE ECLIPSE AND THE WEATHER

ECLIPSE observation results seem to summarize themselves broadly as: success toward the southeast, near the coast; failure at the farthest inland stations, at least partial success in between. It was the weather's doings. A great cloud mass stretched itself across Quebec and part of New England, blotting out the sun toward the west, reaching fingers of haze and broken cloud to annoy astronomers and other observers in the middle stations that clustered around Fryeburg, Maine, and Conway, N. H., but not reaching the area near Portland soon enough to get ahead of the racing shadow of the moon.

It was in the Fryeburg-Conway region that the doubtful weather conditions tried scientists the most sorely. Here the largest army of astronomers had assembled, bringing the heaviest celestial artillery. While parties farther east blessed their luck that gave them perfect observing and photographing conditions, and their disappointed colleagues some hundreds of miles westward could sit as philosophically as possible under a blanket of completely interdicting cloud, the Fryeburg-Conway parties had regular political weather—yes-and-no weather. So they could only go through their carefully-rehearsed program of photographing the sun and its spectrum, and hope that at least a part of the plates would be of real value to science.

Only the airplane parties, which could spurn the clouds and rise as high as gasoline-impelled wings could lift them, did not need to worry about the clouds. These reported complete success in their programs, astronomical, physical and meteorological. The only difficulty is that the most important work at an eclipse is that done with the telescopic "big Berthas" and as yet there is no way known to fly one of these ten thousand feet off the ground and above the clouds.

All round, therefore, the total eclipse of 1932 will have to be voted, if not a failure, still not a hundred per cent. success; but something between the two. Wherein it differs not at all from most of our more commonplace undertakings.

THE CELLULOSE MOLECULE

How big is a molecule of cellulose, and how is it put together? This question, which is of practical as well as of scientific importance, because cellulose is the principal constituent of all wood, as well as of cotton, flax, rayon and other textile materials, occupied much of the attention of chemists attending the York meeting of the British Association for the Advancement of Science. The more chemists know about the size and make-up of the cellulose molecule the more they can do with it.

Professor W. N. Haworth, of the University of Birmingham, said that the cellulose molecule is a chain composed of glucose units arranged as rings. The ends of the chain are chemically "loose," not looped back on themselves. The molecular weight of cellulose, he stated, is about 30,000; this indicates that the molecule is, comparatively speaking, enormous; the molecule of glucose for example has a molecular weight of only 180.

German chemists have been trying to measure the length of the cellulose molecule, but they are still in rather wide disagreement. Professor H. Staudinger, of the University of Freiburg, stated that one of these chain-molecules is 4,000 Ångstrom units long, while Professor Hermann Mark, of the University of Karlsruhe, found a length of only 600.

An Ångstrom unit is the inch of the light-measuring physicist. It is one ten millionth of a millimeter, and a millimeter is about the width of an ordinary lead pencil mark.

Professor L. Zechmeister, of Pecs University, Hungary, with Dr. W. Grassman, of the University of Munich, are using an interesting method in their efforts to measure the elusively tiny cellulose molecule. They approach the problem indirectly, through observations of the effects on cellulose products of enzymes extracted from Aspergillus, the blue-mold fungus.

COLONY MANAGED BY SCIENTISTS

THAT the British Government should found an experimental colony to be run by engineers, scientists and economists was the unusual proposal made at the meeting of the British Association for the Advancement of Science by Professor Miles Walker, of the University of Manchester, in his address as president of the section of engineering.

"The object in view would be to ascertain how far it is possible with our present knowledge and the best methods of manufacture and distribution for a group of say 100,000 persons to maintain themselves and continually to increase their wealth when freed from the restraints and social errors of modern civilization." According to Professor Walker, a community in which engineers and scientists were the leaders in place of our present-day rulers would be free of many of the defects of our civilization.

"All through our 'civilization' vested interests block the way to improvement. Long after science has shown the way to make things better for the people, unintelligent control and stupid prejudice preserve the old evils and refuse to be convinced.

"There are many things to be ashamed of in our great cities. Not the least of these is the waste that goes on. There is waste of heat in domestic fires; waste of byproducts in the consumption of coal, thereby producing dirt; waste of fresh air by pollution; waste of sunshine, and, above all, the waste of labor that might be applied in stopping all the other desolation and loss; waste of money by paying dole while there are obvious jobs for everybody.

"If engineers were in control, they would so order matters as to neutralize this waste at the source."

PREHISTORIC MAN IN BRITAIN

WHEN man first came to Britain, the Thames ran into the Rhine. For in the earliest days of the Old Stone Age, in the beginning of the Ice Age, or even before its beginning, sea-level was much lower along the shores of western Europe, and the North Sea was dry land, with the ancestor of the Rhine draining its broad valley and receiving the Thames as a tributary.

This was the beginning of the picture of the pre-history of man in Britain sketched before the geologists of the British Association for the Advancement of Science by their sectional president, Professor P. G. H. Boswell, of the Imperial College of Science and Technology, London.

Prehistoric man in Britain did not leave any frescoed or sculpture-decorated caves, as he did in France and Spain; and his actual skeletal remains are few and far between. But there are considerable numbers of stone tools of all the principal stone age culture levels, and these can be made to tell a fairly well-connected story.

The earliest stones credited with being shaped by man are crude hand-choppers. So rough is the workmanship on these that many students refuse to believe that they are man-worked at all, believing them to be merely the results of accidental breaking. However, if these "pre-Chellian" stones really represent human workmanship, then man was present in Britain even before the Ice Age, and the animals he hunted (or fled from) included the elephant, the hippopotamus and the rhinoceros.

Stone implements of the next succeeding culture type, the "Acheulean," still exceedingly rough and crude, have been found associated with bones of reindeer and mammoth, indicating the onset of colder times; for these two beasts were both Arctic in their natural habitat choices. Following this stage came the "Mousterian" culture, commonly associated with the low-brow Neanderthal race. Mousterian flints have been found with bones and plant remains of temperate-zone type; the British Neanderthaler had things a little easier than his predecessor of Acheulean days.

And so the advance and retreat of man in Britain continued, following the retreats and advances of the glacial ice fields, each successive improvement in his flint workmanship suggesting a further step in his cultural advance.

MINING INDUSTRIES' INCREASING NEED FOR SCIENCE

PROFESSOR A. O. RANKINE, of the Imperial College of Science and Technology, London, in his address before a session of the British Association for the Advancement of Science pointed out that economy during this era of depression should not lead to neglect of the development of the sciences such as geophysics.

Professor Rankine deplored the fact that in scientific undertakings we have not developed as yet one of the principles that is fundamental to the family. When there is a call, as now, for economy, it is not the full-grown and robust branch but the new born and under-developed which first feels the pinch.

Progress in the application of physical methods to prospecting has come within the past forty years, he showed. Eötvös, physicist of the latter part of the nineteenth century, Professor Rankine called "the reluctant pioneer." This physicist had invented a torsion balance, and the geologist de Böckh with difficulty persuaded him to use this instrument to locate and delineate salt domes. Eötvös regarded it as debasing his science to use his instrument for a purely economic purpose. Such use, however, was responsible for further refinements in the instrument, an advance in pure physics cited by Professor Rankine to emphasize the point that physics and geology, working hand in hand, get nearer the truth than either one alone.

The torsion balance of gravitational method has been the most successful method of applying physics to prospecting, by the measurement of gravitational disturbances. The seismic method has been most successful in determining the depth of water by means of the echo-sounding machine, but it is far less accurate in application to the solid earth because the attenuation of vibrations with distance is far greater and there are many other disturbing factors. The magnetic method Professor Rankine considers the best as well as the cheapest, where it is applicable, but he has long felt the need of a new instrument to correct for the daily variation of the earth's field, for temperature changes and for internal friction. He has been at work on such an instrument on the same lines as the torsion balance of Eötvös, but has not eliminated the mechanical difficulties of construction. The electrical method, which was used as early as 1830, has up to now been a jealously guarded trade secret and is therefore the least known geophysical method.

SCIENCE IN ENGLISH SCHOOLS

BETTER science courses for elementary and secondary schools of England, which will train the children for life rather than for examinations, were urged by W. Mayhowe Heller before the British Association for the Advancement of Science.

The speaker pointed out that the teaching of science in English schools has increased greatly during the present generation. "As a measure we might take the number of school balances in use. Forty years ago the number could not have exceeded a few hundreds; to-day it must run well into six figures."

The quality and purpose of the instruction has, however, retrograded rather than advanced and the blame for this is placed upon a lack of common sense in teaching and upon artificial constraints, such as those placed on the schools by the examination system.

"The curricula of many schools—especially secondary schools—are based upon the demands of external examinations, and take little thought of the human material handled or the shape into which it should be molded to fit accurately into its place in the machine of life. It results in mass-production from the same mold without reference to the markets it is intended to supply.

"School science for the average boy and girl should, in the first place, provide broad and real knowledge that will, as far as possible, render intelligible the phenomena of common experience; and, secondly, provide a training in the formation of sound judgments and alertness. Its teaching can not be adapted to traditional linguistic methods.''

Mr. Heller advocated the formation of a national clearing-house for educational research such as the proposed Imperial Institute of Education.

THE WORKER'S HEALTH AND HIS JOB

DR. ANGUS MACRAE told members of the British Medical Association at their centenary meeting in London that the industrial worker's health depends not only on sanitary, healthful work environment, but on the mutual suitability of the worker and the job.

The industrial physician of the future must not be content merely to reject candidates because of physical defects. He must be ready to help those with defects to find suitable employment, and he must certainly make some effort to guide the fit and the superfit, whom he accepts, to suitable tasks in his own plant. Dr. Macrae, in commenting on recent efforts to protect the health of workers in certain trades, suggested that every trade may be dangerous, or at least unhealthy for certain types. ''Improvements in methods and conditions of work will not suffice to make a man a good worker or a healthy worker if, physiologically, he is a square peg in a round hole.''

Physician, psychologist, teacher, parent and employer are all concerned and must all work together at the task of fitting the individual to the proper job. Physical strength and mental ability must be known, and equally important are such intangible attributes as natural aptitude, character and temperament. Dr. Macrae spoke a good word for the often maligned intelligence tests, and described some of the new psychological tests designed to show special abilities and temperaments.

While the work of vocational guidance naturally should begin at the end of school, it should not stop there. Many older workers need such guidance, particularly if accident or ill health has befallen them after years of employment. Nor should vocational guidance be limited to the children of the laboring classes.

ITEMS

NOISE, and the problems associated with it, will be investigated in the new acoustic laboratories described at a meeting of the British Association by Dr. G. W. C. Kaye, superintendent of the department of physics at the National Physical Laboratory at Teddington. He stated that in the laboratories each of the experimental rooms is as completely isolated as possible, the massive double walls are on independent foundations, and the rooms are asymmetric both in plan and elevation. Dr. Kaye pointed out that noise is generally regarded as an attendant evil of present-day civilization, though the problem is really one of long standing. There is, however, a steadily increasing volume of public opinion which is making its influence felt beneficially in many directions.

STONES, no less than men, animals and plants, are attacked by germs. And these bacterial onsets can cause serious damage to building materials. So stated Professor S. G. Paine, of the Imperial College of Science and Technology, London, before a meeting of the British Association. Reviewing the work of other botanists as well as his own researches, Professor Paine pointed out that primarily this bacterial disintegration of stone is beneficial, for it is one of the things that breaks down solid rock into soil fit for farms and forests. But on the works of man the bacteria, some of them the identical ones that are helpful in the soil, often work havoc. A new type of bacterium has been discovered during the researches under the direction of Professor Paine. This species is able to live on certain sulfur compounds that naturally occur in some kinds of stone, leaving sulfur deposits on the surface.

EFFICIENT digestion has been an aid to evolution. This, in brief, was the thesis of a paper presented before the zoologists of the British Association, by Dr. C. M. Yonge, of the Marine Laboratory at Plymouth, England. The lowest forms of animal life, the protozoa, all surround their food and digest it inside the cell. This makes for a good deal of labor, first in getting the food particle inside, then in getting the indigestible parts out again, besides cluttering up the cell during the process. The higher animals digest their food outside the cells. Nothing enters the cells until it has been reduced to a solution or otherwise liquefied. This makes for greater speed and efficiency in the feeding process, and leaves the animal free to pursue non-feeding activities a larger part of the time.

EXPERIMENTS showing that iodine-containing compounds probably control sleep in man and hibernation in other animals were reported by Dr. G. S. Carter to the British Association for the Advancement of Science meeting in York, England. Dr. Carter experimented with hearts taken from frogs in winter and in summer. He found that thyroxin, which is the iodine-containing secretion of the thyroid gland, produced in the heart of the winter frog a curve of temperature and pulse rate typical of the heart of the summer frog. Other glandular substances did not have this effect. He concluded that the amount of thyroxin in the circulating blood controlled the hibernation of frogs and similar animals. Other experiments suggested that a similar rhythm in the amount or activity of iodine compounds in the circulation plays a part in the production of man's daily sleep.

DR. CLAIR E. TURNER, of the Health Education Research Laboratory of the Massachusetts Institute of Technology, and associates, found in a study of 1,000 school children that fewer than twenty of them gained weight every month of the school year. When children who failed to show any gain in three months were compared with those gaining regularly, three times as many were found to have unhygienic habits, twice as many had serious physical defects, and twice as many had had recent illness.