SCIENCE NEWS

Science Service, Washington, D. C.

SOME PAPERS READ AT THE BOSTON MEETING OF THE AMERICAN ASSOCIATION

WHILE the universe as a whole may be expanding, as recent astronomical theory contends, the portion of the universe closest to man and the earth, extending for millions upon millions of miles out into space as far as the famous Clouds of Magellan and the Andromeda nebula, is not expanding. This is the conclusion of Dr. Harlow Shapley, director of the Harvard Observatory, announced when he was presented the Rumford Medal of the American Academy of Arts and Sciences. He has studied intensively the region of the cosmos relatively close to us and he finds that there is a local supergalaxy, a sort of universe within a universe, consisting of our own Milky Way system, the two clouds of Magellan, the Andromeda nebula and two companions, and two other external galaxies. This supergalaxy seems to behave as a single unit and it does not show the expansive nature attributed to the universe as a whole by the theory of Abbe Georges Lemaître, the Belgian priest-cosmologist. Dr. Shapley's study has doubled the size of the Large Magellanic Cloud, which is the nearest of the external galaxies and a spectacle of the southern latitude skies for four hundred years, since the time of the world-explorer Magellan, whose name it bears. The dimensions heretofore accepted have been doubled, and Dr. Shapley rates the Large Cloud as not less than twenty thousand light years in diameter. This makes it larger than the average external galaxy, but it is still much smaller than our own system and the great Andromeda nebula. Using photographs made at the Harvard Observatory's southern station in the Orange Free State of South Africa, Dr. Shapley has found that there are several millions of giant and supergiant stars that are of higher candle power than our own sun, some of them ten thousand times as bright. A gigantic mingling of our own Milky Way galaxy with the Large Magellanic Cloud some time in the past, many, many thousands of years ago, may have occurred, Dr. Shapley surmises from irregularities in the cloud. He finds an intimation in the arrangement of newly found star clusters in the cloud that it is a deformed or broken-up spiral and he believes that the disfiguring may have been caused by the passage of the cloud through our Milky Way at a remote past time.

VAST areas on the outskirts of the Great Nebula in the constellation Andromeda, "dark" to our insensitive eye, and "dark" even to the best photographic plates, have been detected by means of a new photoelectric "eye" attached to the hundred-inch reflecting telescope at Mount Wilson. Dr. Joel Stebbins and Dr. Albert E. Whitford, of the observatory, told of their new exploration of the outlying parts of this "island universe" before the meeting of the American Astronomical Society. The "eye" consists of an extremely sensitive photoelectric cell, which causes a minute electric current to flow when light or invisible radiations fall on it. Amplified by means of a suitable vacuum-tube hook-up, this current causes a galvanometer to register its intensity. The investigation began in the dark space outside the great spiral nebula, and the astronomers "felt their way in." Long before they reached a point visible either to the human eye or the photographic plate, the galvanometer was registering strongly. There is evidently enough "dark" material in the suburbs of this nebula, and presumably of others as well, to more than double its diameter. This has an important bearing on the astronomy of the galaxy in which our own solar system is a small unit. Previous measurements have indicated that ours was a bigger mass of stars than others which we can see with our telescopes. But this addition to the size of our neighbors put us on a plane of cosmic equality again.

SEXTANTS and binoculars used by the Navy and on ships at sea can be improved for observation under certain light conditions by attaching to them polarizing prisms, Dr. E. O. Hulburt, of the Naval Research Laboratory, told the American Physical Society. Such a device admits light that vibrates in only one direction. It has long been known, Dr. Hulburt said, that the light of the sea and of the sky is a mixture of plane polarized and unpolarized light. He found that a polarizing prism properly oriented would darken the sea relative to the sky, reduce the brilliance of the sun path and render the horizon more distinct. In bright weather it increased the visibility of objects against the sea background. This is expected to make observations at sea more accurate and easier.

RADIOACTIVE water, captured by geologists in wells dug by farmers in Michigan, disclosed the existence of a fault or crack in the earth's deep rocks, although it was masked by a thick overlying layer of earth, according to Professor Alfred C. Lane and Dr. W. R. Bennett, of Tufts College. Water samples, collected and rushed to Purdue University for analysis, showed varying degrees of radioactivity—the closer to the fault the wells, the more active the waters. This was because radioactive substances from deeper within the earth's crust were rising through the crack and charging the water. Professor Lane also called particular attention of chemists and physicists to the necessity for knowing the geological sources of the materials they work with in the laboratory. Many elements are now known to exist in several varieties, or "isotopes," practically identical in their chemical behavior, but differing in atomic mass or weight. There is, for example, a good deal of "light lead" from Canada, which is one atomic unit lighter than most lead that comes to market; and lead salts made from it may get the careful calculations of scientists a little off unless they know where it comes from and figure accordingly. Similarly, there are different atomic weights of naturally occurring calcium from different sources. It is said to be of considerable importance both to the chemist and

the physicist as well as to the geologist that they should know the source of the material that they are using and not simply take something out of a bottle.

WHEN the sun is pouring out its light and heat most energetically the weather in parts of the world may be growing colder and stormier instead of warmer. An explanation for this climatological paradox was offered before the meeting of the American Meteorological Society, by H. H. Clayton, of Canton, Mass., a well-known student of weather science. Changes in weather trends, and in the mutual relationships between weather conditions in different parts of the world, are to be accounted for on the basis of shifts in what Mr. Clayton calls "centers of action"—veritable weather factories that hover persistently above certain spots on the globe. There is a tropical center of action over the South Atlantic between tropical Africa and the mouth of the Amazon River, and another over the Indian Ocean. Similar centers of action exist in the temperate zones. If these centers stood still things would be much easier for meteorological science; but they don't, and it is in their shifts, as correlated with fluctuations in solar radiation, and in the regular seasonal changes in the sun's position that Mr. Clayton sees the clue to much that has hitherto been baffling in weather studies, and perhaps a key for the eventual solution of the much-probed riddle of long-range forecasting. When solar radiation increases, the centers of action in high latitudes move farther north and increase in intensity, that is, the pressure over cold regions in those latitudes becomes abnormally high and the temperature falls, while simultaneously the belts of low pressure in equatorial regions widen and develop centers of low pressure in middle latitudes.

H. W. CLOUGH, of Arcade, N. Y., discussed the weather of the present century, past and prospective. Four long cycles of solar activity have been recognized; their lengths are 37, 83, 300 and 1,400 years. Similar cycles have been traced in meteorological and other terrestrial conditions. The 37-year cycle culminated recently in the extraordinarily mild winters that have been experienced, as well as in the severe droughts of recent summers. The 83-year cycle brought its last spell of mild winters about 1860 and is due to repeat in 1940. The present tendency toward mild winters may be intensified by the partial overlaps of the two cycles. The longer, 300-year cycle reached its mild climax last in 1725 and is due for another one about the end of the present century. Finally, the last minimum epoch of the 1,400-year period may be placed at around 650 A. D., with the next to be expected in the middle of the twenty-first century.

GLANDS are not all-powerful in determining the course and limits of development of human and animal bodies. Hereditary factors in the other tissues have their own say about the matter, Professor C. R. Stockard, of Cornell University Medical School, New York City, indicated in an address prepared for the Boston meeting. Admitting the great influence of the various ductless glands on the normal development of the body, and in causing gigantism, dwarfism and even abnormal mental conditions when their own growth or secretions are not normal, the speaker called for certain qualifications in doctrine: The internal secretions are so powerful in their effects that many investigators have been led too far in thinking them the actual determiners of the pattern for size and form. Only recently has the question been asked whether these strange glandular secretions are capable of calling forth the same effects on all individuals; or whether something deeper in the individual's constitution may not influence the manner in which it reacts to the secretions. In other words, is the reaction of tissues of the body to a peculiar internal secretion a function of the composition of the tissues as well as the quality of the secretions? In order thoroughly to answer such a question it becomes necessary to control and modify the hereditary composition of the tissue in animal types which exhibit growth reactions of the kind commonly interpreted as being due to peculiar secretory quality. The many peculiar structural types exhibited among the fancy dog breeds are exactly comparable to deformities attributed to diseased internal secretions in man. Crossing or hybridizing these dogs in definite ways makes it possible to break up the structural complexes and recombine them in such manner as clearly to test whether the hereditary composition of the tissues is capable of regulating or determining the responses to the internal secretions. The indications are that the tissue constitution determines its mode of response to any modifications in the secretion. Thus gigantism and dwarfism, and many other such deviations from the usual pattern, are primarily hereditary or genetic in origin and only secondarily associated with modifications in the internal secretions.

A PLEA to spare a little time from the study of cosmic rays and relativity for the study of the chemistry of the body was made by Professor Lafayette B. Mendel, of Yale University. He called attention to many points about the vitamins, the gland secretions and the composition of foods that still require investigation. Milk, for instance, is one of the best studied of foods, yet its chemical composition is not accurately known even today. The text-books state that it contains 4 per cent. of protein, but this figure is only an estimate, based on the accurate determination of nitrogen. Furthermore, it includes a number of nitrogen compounds that are not proteins, and while these are only present in minute amounts, they may have physiological value. Sometimes the milk is analyzed more discriminatingly so that the protein item can be subdivided into casein and other milk proteins. These different proteins undoubtedly play somewhat different rôles in nourishing the body and they are distributed in unlike proportion in milks of different species of animals as well as in foods prepared from such milks. The figure given for the percentage of fat contained in milk really represents the percentage weight of the milk components that can be dissolved in certain organic solvents, notably ether. Most of these compounds are true fats, but a considerable percentage of the ether extract may be made up of other types of complex fatty derivatives which are not true fats. Since

there is a wide-spread belief that certain fatty acids are indispensable in nutrition, it seems desirable for the chemist to find out more details about the fatty constituents of the foods we eat. The fact that cow's milk contains citric acid is rarely referred to, and its significance is unknown. Here is another problem for research, and Professor Mendel indicated many others in his address.

ANTHROPOLOGISTS attending scientific sessions recently held in Boston were urged to act speedily to agree upon principles governing a standard table for child growth studies. Professor T. Wingate Todd, of Western Reserve University, said that tables setting standard weights for given heights in children do not meet the needs of those studying child growth. He described measurements of Sicilian-born school children in Cleveland public schools, showing that maturity needs to be considered no less than weight and height. The Sicilian children were, on the average, only as tall as American children a year younger than themselves. They were not malnourished, however, for despite their smaller build they were only seven months behind Americans in weight. When x-ray studies of skeletal development were made, the Sicilian boys were found to be four months behind American boys in bodily maturity, and the Sicilian girls were only two months behind American girls. Investigations of Negro children gave comparable results. And in further studies of children from under-privileged homes it was found that while these children were not so tall and heavy as children in economically secure homes, yet the under-privileged children showed neither malnourishment nor under-development. Principles for constructing a reliable table upon which samples of child population can be compared were outlined. Children of each age group should be of identical physical maturity as well as identical age. The socio-economic level should be approximately identical in a series. The date of the sample must be defined, for successive generations have different diet and different social environments. Sexes and human stocks must be segregated. And the samples should be uniform in geographical origin.

THE study of the organization of human nature by observation of the interrelations of the millions of possible combinations of traits and tendencies is an endless task, according to Dr. Edward L. Thorndike, of Teachers College, Columbia University. The organization of human nature may be studied in the genes (the carriers of heredity) and in the unlearned tendencies which are our only present clew to the genes for mental traits. It may be studied in the habits, tendencies, abilities, and so on, into which the original unlearned tendencies are transformed. But these, Dr. Thorndike explained, consist of millions of probabilities that such and such situations will bring out such and such responses of thought, feeling or action. All these things are hard to measure, and there is even dispute as to what the unlearned tendencies are. So it has been customary to simplify the task by assuming the existence of realities in human character to correspond to what are commonly spoken of as leadership, inventiveness, memory, imagination, reasoning, originality, honesty, perseverance, and so on. This simplification is not without danger from the point of view of the scientific man.

DO exceptionally bright children keep their intellectual advantage over their fellows after they are grown? The answer would seem to be in the negative, to judge from an investigation being conducted at the Graduate School of Education of Harvard University. A report of progress of this investigation was made by Professor Edward A. Lincoln. The intelligence of superior pupils, as measured with the Stanford-Binet test, drops substantially during a period of five or more years, and girls lose more than boys. The pupils who were re-examined after a lapse of only two years did not show so great a loss; thus apparently it does not occur early in the school career.

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