

SCIENCE NEWS

MIRA, THE STRANGE STAR

Science Service

THE recent discovery of a very faint companion to the well-known variable star, Omicron Ceti, called Mira or the "Strange Star," is baffling astronomers and may necessitate a revision of present theories of the size and distribution of the stars.

In 1596 the Dutch clergyman, David Fabricius, noticed a strange star in the constellation the Whale, which he had never seen before. Later observations showed that the star was not constant but varied in light and was only visible for a short time every year. For this reason the star was given the name Mira, the "Strange Star." After more than three hundred years of observations astronomers thought that they had come a little closer to the solution of the mystery of this star.

It was found that the star varies from the second magnitude at maximum to the ninth magnitude at minimum when it is sixteen times too faint to be visible to the naked eye. The time in which these light changes take place has been determined to be a period of eleven months, or exactly 330 days. Examined in the spectroscope the star shows a spectrum which the astronomers at the Harvard Observatory call of class M which means that it is a red star. In contrast to the majority of red stars which are not variable, however, Mira shows bright lines due to hydrogen in its spectrum.

That is in short all the knowledge we had about this peculiar star until a few years ago. It was discovered at Mt. Feibest by Dr. A. H. Joy that when the star was at its feeblest the spectrum had a certain peculiar aspect which up to that time had only been ascribed to blue stars. It was therefore concluded that a blue star might be very close to the red star, but a search for this blue companion with the great telescope of the Yerkes Observatory yielded no results.

Repeating the spectrum tests, the blue star still seemed to be there and again the star was examined for duplicity, this time by Professor R. G. Aitken of the Lick Observatory. In the clear sky of California he succeeded in seeing a tiny little star close to the variable. The angular distance as measured in the telescope was only a second of arc, or equal to the angle spanned by an inch at a distance of three and a half miles. The little star was about half a magnitude or one and one half times fainter than the variable which at that time was of the ninth magnitude.

This discovery has baffled astronomers a good deal. They must choose between two alternatives: That the blue star and the variable are physically connected, or that they simply by mere chance seem to be together in the sky and may really be at entirely different distances from us. In the first case, since we know the distance of the larger variable approximately, we can tell that the blue star is in reality ten times fainter than the sun or ten thousand times fainter than any other blue star of

that type. If, on the other hand, the stars are not physically connected and the blue star is of ordinary brightness, it must be 8,000 light years off and that lands it in a region of space where we know no other star of this kind. Observations in the near future will enable us to decide which of the two is the right conclusion, for the variable star itself has a motion in the sky which will decrease the distance between the two stars seven tenths of its value in three years.

When that time comes it may be found necessary to form a new and third hypothesis to account for its existence and peculiar behavior.

ELECTRICAL TREATMENT OF FIELDS

Science Service

YIELDS of grain have been doubled in some cases through the application of electricity to fields during experiments made by Professor Vernon H. Blackman for the electro-culture committee of the British Ministry of Agriculture and Fisheries.

The electrical discharge was from overhead wires, but was not applied during the whole growing season. Experiments so far completed demonstrate the extreme complexity of the whole problem, however, and further work is planned.

Earlier experiments in the field seemed to hold out little hope that electro-culture would ever become a commercial proposition. In these the discharge varied in the different trials from two to twelve ten-thousandths of an ampere per acre and the voltage varied from 25,000 to 56,000. The discharge was applied for from 6 to 8 hours daily from April to August. The cost of course was quite prohibitive, and the increase in crop yield was small and inconstant.

As it seemed nearly impossible to sift out the various possibilities working on a large scale in the field, later experiments were carried out, chiefly in the laboratory, or in pots, or in small scale plots. These experiments showed first that the very high voltages used in the earlier work, far from being necessary, were much less effective than much smaller ones. For instance, currents passing through plants of the order of one hundred millionth of an ampere were injurious in the case of the early vegetative stages of maize, whereas currents as low as three ten-billionths of an ampere had an accelerating action on growth.

It was also found that it was unnecessary to continue the discharge throughout the whole period of growth of the crop; but that one month's treatment was at least as effective as a continuous one. The second month of growth appeared the best time to apply the treatment. In one such case an increase in grain yield of 118 per cent. was obtained. It is interesting that in most cases of greatly increased grain yield the increases of total plant growth were very slight, indicating that the electrical discharge had stimulated the reproductive processes

of the plant without affecting vegetative growth. This discriminating effect was hitherto unsuspected. Finally, it was shown that the daily discharge can be reduced from six hours to one without reducing its effectiveness.

The discovery of these facts, making possible increases in yields, notably of grain, from discharges of lower voltage, of shorter total duration and given only for a small part of the day, has made the investigators quite hopeful that electro-culture may some day become an economic possibility.

THE NATIVES OF EASTER ISLAND

Science Service

DR. WILLIAM E. SAFFORD, economic botanist of the U. S. Department of Agriculture, in a report to the Bishop Museum of Honolulu, has presented plant and linguistic evidence in refutation of many fanciful theories woven about the lonely Easter Island in the South Pacific erroneously reported to have disappeared following the Chilean earthquake. He traces the kinship of the mysterious inhabitants of this tiny volcanic land with the people of the Malay Archipelago and finds indications that they are of much more recent origin than the various tribes of American Indians.

Easter Island, it has been claimed, was formerly inhabited by a strange race distinct from the natives of Hawaii and the other Polynesian islands. According to Dr. Stafford, however, among the plants introduced into Easter Island in prehistoric times there are a number whose vernacular names are identical with the same species in Hawaii and many of them can be traced to the Malay Archipelago, the cradle of the Polynesian race.

Attacking the theory that certain South American Indians are descended from the same race which inhabits Easter Island and that the island was a stepping stone used in the peopling of America, Dr. Safford stated that from the very close similarity of the dialects of widely separated tribes like the Hawaiians, the New Zealanders, and the Easter Islanders, and the identity of many of their myths, their gods and their calendar systems, it is certain that their separation from one another must have taken place at a very recent time when compared to the very ancient dispersal of the American stocks upon our own continent.

PROFESSOR KAMMERER

Science Service

AN airing of the biological problem of the inheritance of acquired characteristics is now taking place, Professor H. S. Jennings, of Johns Hopkins University, said to-day in a statement on Dr. Paul Kammerer prepared at the request of Science Service. Dr. Kammerer, an eminent biologist, of Vienna, is in this country on a lecture tour and his arguments and experiments in favor of the transmission of environmental effects have created considerable public as well as scientific interest.

"Dr. Paul Kammerer has carried on more extended and serious experimental investigations on the inheritance of acquired characters than any one else has ever done," said Professor Jennings. "For many years continuously he studied, mainly in amphibians and reptiles, the

changes induced by altered environments on their instincts, markings and structural features, and the heritability of these changes. The accounts of these investigations are published with great detail in standard journals of research; they report that in many different cases such 'acquired characters' are inherited.

"In the interest of the solidity of science, any investigator who brings revolutionary conclusions, opposed to the common experience of workers in the same field, meets skepticism and thoroughgoing criticism; his work is not accepted until it has been sifted for all possible sources of error, and has finally been confirmed or refuted by the work of others. Though inconvenient, the history of science shows this to be necessary, and no investigator can escape it. Such a sifting the work of Kammerer is now undergoing. The materials with which he works are extremely variable in their genetic and other phenomena; some investigators hold it probable that unconscious selection among the variations, rather than the inheritance of acquired characters, may account for Kammerer's results. Attempts have been made to point out in his work errors, which, if they are typical, would raise a presumption of inadequate care in so difficult and complex a field; but none that are fatal to his general conclusions have yet been demonstrated. A number of investigators are repeating crucial parts of his work; until their reports come in a final judgment is not possible. Some eminent students of modern genetics feel certain of the overthrow of his conclusions; some eminent biologists in other fields believe strongly in their validity. If confirmed, the work would of course be of tremendous importance.

"The recent reports by Pawlow, Guyer, Stockard, Griffith, Kammerer and others show that we are in for another upheaval and airing of the problem of the inheritance of acquired characters. Since this is upon us, it is desirable that it be made as thorough as possible. Americans should therefore welcome the opportunity of hearing Dr. Kammerer's conclusions from his own mouth; experience has shown that the personality of the worker is not irrelevant in such fields to the question of how he came to his conclusions. The history of former upheavals of this matter does not predispose one to predict a favorable outcome of the test now in progress. But while we wait, Dr. Kammerer must be given credit for the most courageous and thoroughgoing attack that has ever been made of this important problem; for bringing to light many important matters, whatever their final significance; and for giving a powerful impetus to further investigations in this field."

NEW FUNCTIONS OF THE THYMUS GLAND

Science Service

ANNOUNCEMENT of the discovery of one of the important and hitherto unknown uses of the thymus gland was made by Dr. Oscar Riddle, of the Carnegie Station for Experimental Evolution at Cold Spring Harbor, N. Y., to the American Society of Zoologists at their meeting in Cincinnati on December 11. Dr. Riddle, who is on the staff of the Cold Spring Harbor Laboratory for

Experimental Evolution, said, that, while of little use in human beings, the thymus gland was indispensable to the lower vertebrates in that it made possible the formation of egg membranes and shells.

While it had already been known, Dr. Riddle said, that the thymus gland in man had some influence on the growth of the bones, the new results show that the gland does produce an internal secretion, and that none of the vertebrates except the mammals could reproduce their kind without it. Pigeons which laid malformed eggs, deficient in membrane and shell, were given small doses of thymus extract and some afterwards began to lay normal eggs. Examination of the pigeon showed their own thymus glands to be diseased.

The gland lies between the heart and the breast bone. In childhood and in the young animal it is of very considerable size. It begins to diminish in size about the time of adolescence, but in human beings in general it persists throughout life.

"It thus becomes clear that though the thymus is almost without use in the human being, it is in fact a sort of 'mother to the race,'" said Dr. Riddle. "The higher animals could not have come into existence without it. For, even while our ancestors lived in the water, it was the thymus of these ancestors which made possible the production of the egg-envelopes within which the young were cradled and protected until they were ready for an independent life."

LONG-DISTANCE VISION

London Times

M. EDOUARD BELIN recently gave a demonstration at the Royal Society of Arts of the process of transmitting and reproducing writing, drawing and photographs without wires.

M. Belin stated that much had been said during the last few years respecting telephotography. For a long time past the inventors had been concerned with experiments in their laboratories and in practical applications. The latter had proved how difficult it was to overcome the obstacles which separated the laboratory from practical application, and that was the reason why the results, so long expected, had only now been achieved. To-day the object appeared to have been attained, and it was opportune not only to make it known, but also not to limit merely to telephotography a result which had so much wider a scope.

Besides telephotography, that was to say, the transmission at a distance of photographs, it also embraced teleautography, which concerned the reproduction of drawings, and especially of handwriting itself, by telegraphy. Lastly, there was television, which must not in any way be looked upon as simply an improvement on telephotography, but constituted a thing quite apart, which was nearly, and would soon be actually, vision at a distance, a problem long considered as chimerical, but to-day looked on as possible, and which to-morrow would be one of the realities.

Following a certain principle, inventors determined to resolve what seemed at the time the impossible problem

of television. After recalling the names of the chief among them, it was well to mention the particular line of studies of the inventors who attained the result of telephotography. In all that had to do with the transmission of pictures, England had held an important place.

The Belin system of telephotography had to undergo many improvements in order to be not only of practical use, but also to respond to the actual conditions of the telephonic system. His system, which was now sufficiently well known, had led to apparatus which were equally adaptable to teleautography, for the use of which the French postal and telegraph authorities erected the first stations in Paris, Lyons and Strasburg. Messages thus transmitted were authentic, and even the transmission of shorthand would probably become general. An alternative application of the same system permitted absolute secrecy in telegraphic and radiotelegraphic transmissions. Autograph messages had been transmitted by wireless telegraphy in France and America, and quite recently he was able, with the aid of his assistants, to transmit by wireless real photographs in half-tones.

For several months, the researches in the laboratory at La Malmaison had shown in principle that television was no longer an impossibility. All the experiments were made with wireless, and M. Belin came to the conclusion that the expected solution of this problem was very near at hand.

ITEMS

Science Service

THE band-tailed pigeon, the wild pigeon of the Pacific coast, is increasing in numbers as a result of the ten-year closed season imposed upon hunters of the bird by the federal government. Formerly abundant, said Dr. Walter P. Taylor, of the U. S. Biological Survey, at a recent meeting in Los Angeles, the number of band-tailed pigeons was greatly reduced by over-shooting, especially during 1912, when it is estimated 30,000 birds were killed in Santa Barbara County. Now there is an increase in their number, and sentiment is being expressed for an open season.

ACCORDING to a recent census of big game in the National Forests, deer exceed the total number of all other animals. Their number is given as 440,000. There are 48,000 elk, 12,000 mountain sheep, 8,600 mountain goats, 4,600 moose and 3,000 antelope. The number of buffalo is second only to the deer, being 149,000. Conservation of buffalo is no longer an issue. There will never be sufficient range for them to be hunted for sport, and they are in no danger of extermination because they may readily be bred in captivity.

DURING the past five years, California has produced on the average over 8,000,000 boxes of navel oranges a year. All this golden harvest of fruit was started with less than twenty trees which the Department of Agriculture brought to this country from Brazil. That scientific experiment was made in 1870, and two of those original trees are still alive. One is in Washington, D. C., and the other in California.