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AFRICA AND SCIENCE

AFRICA may, as Darwin suggested, be the "scene of nature's greatest creative effort." This may be proved by future anthropological researches on the once "dark" continent, said Professor Jan A. Hofmeyr, president of the South African Association for the Advancement of Science. He spoke on "Africa and Science" at the opening session of the meeting of the British Association for the Advancement of Science and the South African Association.

"It would seem to be not without significance that Africa possesses in the chimpanzee and the gorilla those primate types which approach most nearly the form and structure of primitive man," he said. "To that must be added that in the Bushman, Pygmy and negroid races Africa has at least two and possibly three early human stocks which are characteristically her own and belong to no other continent. No less striking is the fact that in Gibraltar, in Malta and in Palestine, that is, at each and every one of the three portals into Africa from Europe and Asia in Pleistocene times, there have been discovered evidences of the presence of Neanderthal man. In Africa itself there was found at Broken Hill some nine years ago a skull with the most primitive or bestial facial form yet seen, and so closely akin to the Neanderthal stock as to establish firmly the expectation of finding further compelling evidence of a long-continued Neanderthaloid occupation of the African continent. The discovery at Taungs, on the one hand, which reaches out towards the unknown past, and the finds of Boskop and in the Tsitsikama, on the other, which assist in linking up the period of Rhodesian man with the coming of the Bushfolk, open up to us, in conjunction with the aforementioned facts, a vista of anthropological continuity in Africa such as no other continent can offer. The recent investigations in the Great Rift Valley, near Elementeita in Kenya, and the fossil discoveries on the Springbok Flats, north of Pretoria, have again fixed the attention of the anthropologist on Africa."

"In the African continent," he continued, "there is no lack of opportunity to advance science by physiological inquiries into animal structure, by the isolation of the parasites of human and animal diseases, and by the tracing of the life histories more especially of the minuter forms of animal life. 'Nowadays,' in the words of Professor J. A. Thomson, 'the serpent that bites man's heel is in nine cases out of ten microscopic.' But scarcely less important are the extensive facilities which Africa still offers for the study of the habits and behavior of the larger mammals. The naturalistic study of these animals, not as stuffed museum species, but in the laboratories of their native environment, has received all too scanty attention from the scientist, and this is a reproach which African science, with its rich dowry of mammal and primate material, may confidently be expected to remove."

Though the first extensive astronomical observations in South Africa were made as early as 1750, the Royal Observatory at the Cape was established in 1821 and Sir John Herschel made a famous series of observations between 1833 and 1838, it has been within the last few years that it has become an extensive astronomical center. Comparing the situation in 1905, when the association first met in South Africa, with the present, Professor Hofmeyr stated:

"The two observatories of 1905, our visitors will find, have increased to six, including the Smithsonian Solar Observatory in South-West Africa, and the equipment of these institutions includes four great telescopes, with objectives of 27 inches, 26½ inches, 26 inches and 24 inches, respectively, to which will shortly be added a 24-inch refractor and a 60-inch reflecting telescope—surely a remarkable astronomical equipment for so young a country. The stimulus of the 1905 visit, in which so many prominent European astronomers participated, has indeed borne rich fruit in the advancement of astronomical work in South Africa."

COSMIC CLOUDS

SPACE between the stars is not the empty nothingness that has previously been supposed. Great clouds of calcium and sodium, elements present on the earth in lime and table salt, respectively, are in interstellar space and make their presence known by the way they affect the starlight passing through them.

At the meeting of the section on physics and astronomy of the British Association, Professor A. S. Eddington, of Cambridge University, discussed the problems connected with these cosmic clouds.

When the light from a star enters a telescope and is analyzed by the prisms of a spectroscope, dark bands are obtained that show the elements present in the star. If the star is approaching or receding from the earth, the lines are displaced one way or the other. But sometimes lines of sodium and calcium appear which are in the same position without regard to the star's motion. These are due to clouds of these elements through which the star's light passes on its way to the earth. As these lines may appear in the spectra of all the stars from a certain region of the sky, the extent of the clouds may be gauged. They only appear in connection with the more distant stars, hundreds of light years away, and so the distance of the nearest of them can be roughly determined.

By a theoretical study of such diffuse clouds, Professor Eddington has found that they would absorb enough of even the feeble radiation from the stars to raise them to a temperature nearly as hot as the stars themselves—perhaps 15,000 degrees Centigrade. Professor Eddington has also calculated their probable density and finds them extremely rarefied. A one followed by 24 ciphers represents the number of times that they would have to be condensed to be of the same density as ordinary air, he believes. Such a density would account for spectrum lines of the strength observed.

CHEMISTRY AS AN AID TO BIOLOGY

THE chemist has been of much assistance to the biologist in the past, and can be of even greater assistance in the future if the two sciences are brought into closer cooperation, is the opinion of Professor George Barger, of the University of Cambridge, who spoke at Cape Town at the meeting of the British Association.

In the past, the resources of chemistry have been applied largely first to questions of the construction of organic substances and then, as more delicate methods of analysis have been evolved, to an attempt to study the mechanism of the living organism at work. In the first field success has been so great that vast industries are now founded on the applications of organic chemistry; in the second, the battle is still going forward.

Professor Barger suggested that if botanists would become chemists they might find some problems in supposedly non-chemical parts of botany easier of solution. Up to the present, no one has attempted to determine the species of a difficult flower, but some specialists in the lowly lichens have found chemical methods handy. Bacteriologists also regularly find the chemistry of their microscopic organisms useful in determining identity. But methods for determining what a higher plant is by putting a bit of it into a test-tube have still to be worked out.

PREHISTORIC RELICS OF SOUTH AFRICA

HENRY BALFOUR, of the University of Oxford, stated at the British Association meeting at Johannesburg that he considered South Africa's unlimited wealth in prehistoric relics an asset of great value, worthy to be ranked with its famous wealth in gold and diamonds.

The quantity of prehistoric material deposited in the vast African area south of Zambesi is probably due to the successive waves of immigrants who arrived in early times from the north, he pointed out. South Africa was a *cul de sac,* which arrested any further southward dispersal; so here they stayed. Contacts and clashes between groups tended to result not only in fusion, but also in confusion, and to bring about complex hybrid conditions which local archeologists must now struggle to unravel.

Failure of scientists to study the Bushmen of South Africa before they dwindled and before their striking culture traits became obscured was deplored by the speaker, who said that these Africans were literally Stone Age men who survived into modern times and who might have made clear many of the obscure points as to the life of the prehistoric Old Stone Age.

The functions of the old implements used by Stone Age men in Europe have been diagnosed as far as possible, and the stone objects are known as axes, scrapers, gravers, and by other terms that indicate their presumed uses. But this is largely guesswork. Had the living users of identical types of tools been closely studied we might know more certainly the uses and details of manufacture employed in prehistoric times.

Paintings left on the rocks by Bushmen artists could perhaps have been observed in the making and their true meaning understood if science had been sooner alert to the significance of this art. As it is, experts can only pore over the grotesque paintings of men and animals and attempt to interpret the art ideas of primitive man.

PROSPERITY AND THE SURVIVAL OF SPECIES

PROSPERITY, easy living, no need to struggle very hard, have been cited as the underlying causes of the decay and downfall of historic civilizations like Rome and Persia, and are being regarded with some anxiety for modern parallels by modern philosophers. Comparable conditions hold in the natural world, according to Professor Othniel Abel, of the University of Vienna, who spoke at Cape Town before the meeting of the British Association.

The early stages of the evolution of a species, he said, are apt to be marked by signs of a battle with a hard and unfavorable environment, which will let the fittest survive, but will ruthlessly scrape off the less fit. But after the species has conquered its place in the sun, or if the climate or other environmental factors themselves become changed for the better, second-rate individuals survive along with the strong and fit, and by crossing with them perpetuate their own defects and drag down the general level of the whole race.

Professor Abel found a striking example of his thesis in the bones of a certain extinct species of cave bear, found by thousands in an Austrian cavern. The fossils in the lower layers, marking the early days of the species, were all strong, healthy, vigorous animals; but among the bones farther up in the deposit, laid down during the days of fat living for cave bears, there were bones indicating that even crippled, diseased and dwarfed bears were able to make a living. And finally there were no bear bones left in the cave at all—the species had degenerated and become extinct.

THE TRANSFER OF SKILL AND THE EMOTIONS

IF you have played tennis for years and set out to learn golf, will your tennis skill aid or hinder? Popular views on this question of transfer of skill are varied and conflicting, but experiments and analyses of bodily motion have produced some facts to go on, according to Professor T. H. Pear, of the University of Manchester, given in a report to the British Association.

The mental attitude and the emotions of the learner play an important rôle in his ability to make use of past experience. If he enjoyed the old skill and felt confidence in his powers, for example, this mental attitude may be transferred to the new task with favorable results.

"The attitude of analyzing movements, of demanding to know the reasons for them, the sentiments and ideals formed in connection with a particular teacher, or his method of regarding a certain skill, are probably the most powerful vehicles of transfer," Professor Pear said.

Experiments have indicated that the transfer of skill from one sport or task to another is very much less than might have been naïvely supposed. The world's best exponents of any complex skill are usually very careful to

be specialists. There are even good grounds for feeling that if an expert in one sport learns a new complex sport he may interfere with his old skill.

If a learner recognizes and analyzes common habits in the old and new sport he may be able to transfer these habits effectively to the new situation, but if the habits must be reversed, the old skill may become a handicap.

"For example, while a figure-skater learns always to lean towards the direction of his turns, a ski-runner may have to lean either towards or away from the direction. An expert skater would find this very difficult to unlearn, while a novice at both sports would find less difficulty. Similarly, the oral learning of two foreign languages in the same year may cause interference."

ITEMS

MODERN belief in witchcraft and witches, such as brought about the famous "Hex" trials in Pennsylvania not long ago, is really an attenuated survival of what was once the serious religion of Europe, according to a report by Miss M. A. Murray, of University College, London, read before the British Association for the Advancement of Science. The ancient pagan religions of Europe all seem to have been cut out of pretty much the same cloth. The central figure was a great, shadowy mother-goddess, who is apparently embodied in such varied mythical personalities as Ceres, Demeter, Cybele, Juno and the northern Fricka. Associated with her was a corresponding male figure, frequently represented as horned. In the early sacrificial rites, human victims were common. Later, animal substitutes were permitted, but the idea of at least a vicarious sacrifice of a human being persisted. Hence the insistence in present-day witchcraft of obtaining a lock of hair, an article of clothing, or at least a picture of the person whom the ceremony is supposed to affect for good or ill.

PLANTS need comparatively minute amounts—often mere traces—of certain elements such as boron, zinc, copper and manganese, in addition to the larger quantities of the more familiar things such as phosphorus, potassium and calcium. The quantities of these "trace minerals" that will benefit any given plant seem to be governed by the intensity of the sunlight under which it is growing, according to Dr. Winifred E. Brenchley, of the British agricultural laboratory at Rothamsted, speaking before the meeting of the British Association. Too bright sunlight appears to increase the harm done by the absence of some of these lesser elements, Dr. Brenchley said. One somewhat puzzling practical aspect of the problem has been that the benefits of copper applications to peat soils in Florida, a treatment much used in the truck-farming regions, can not be duplicated by similar treatment of peat soils in England.

THE brain of an Egyptian mummy, dating from about 500 A. D., has been examined by chemists and found to contain ergosterol, the parent substance of vitamin D, according to Drs. H. King, Otto Rosenheim and T. A. Webster, working at the National Institute for Medical Research, London. They find that ergosterol is remarkably stable in animal tissues (brain, gallstones, blood, skin, eggs, etc.) although it is very unstable when separated from other substances. In the animal tissues it is protected by a closely related substance called cholesterol, which was originally thought to be pro-vitamin D. The brain was of Coptic origin, and was removed from one of the bodies found in tombs in Antinoe, Upper Egypt. No embalming process had been used, and the organs of the body were preserved in their original positions, but of course shrunk and mummified under the influence of the dry atmosphere of Egypt. Vitamin D was prepared by irradiating the ergosterol mixed with cholesterol from the mummy brain, and it was found that it had the same power of preventing rickets in rats as vitamin D from the ergosterol of fresh brain.

DEAD or alive? That is the question thousands of agricultural laboratories in all parts of the world have to answer when testing seeds and grains. If the seed is dead, it will not germinate when sown. A new test devised by a Russian botanist, Dr. D. N. Nelubov, of Leningrad, will answer this important question in a few hours, instead of several days required by the ordinary methods. Aniline dyes are used by Dr. Nelubov to tell apart seeds that are dead and alive. The seeds are steeped in a weak dye solution for three to four hours. Those able to germinate are not affected at all by the treatment, while the "dead" ones give themselves away by getting deeply colored. If seeds have hard husks they must be first broken, to enable the dye to penetrate to the embryo. Not all aniline dyes are suitable for this work. Dr. Nelubov finds that the best results are obtained with indigo-carmine. About one fifth of an ounce of the dye is required per one gallon of water.

MAYAN INDIANS who lived in Central America more than 1,000 years ago practiced dentistry and knew something about the technique of drilling holes in teeth and filling up the cavity with metal. Two teeth containing circular holes filled with iron pyrites are among the discoveries reported by J. Eric Thompson, leader of the Captain Marshall Field Archeological Expedition to British Honduras, which has recently returned to the Field Museum of Natural History. The teeth were found in a vaulted burial chamber in the ruins of the Mayan city of Tzimin Cax, which means "Mountain Cow." A good collection of Mayan painted pottery was found in the chamber. Other burial chambers yielded skeletons and pottery types hitherto unknown in the Mayan art, also jade ear-plugs and apple-green jade beads. While digging in a large mound in the ruins of the city, the expedition made the first authenticated find of a mirror from a site of the Old Empire of the Mayan tribes, that is, from the period between 400 and 800 A. D.