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THE ATMOSPHERES OF DISTANT STARS

DR. OTTO STRUVE, director of Yerkes Observatory, uses the terms "reversing layers," "chromosphere" and "corona," in describing the outer portions of stars which appear to have shells of gas surrounding them, although their atmospheres are probably not exactly the same as the sun's.

The picture of a star as a spherical mass of gas with an opaque surface radiating most of its light is no longer one which tells the whole story. During the past two years, Dr. P. Swings and Dr. Struve have secured a large number of peculiar stellar spectra at the new McDonald Observatory in Texas. These, and observations from Mount Wilson and Victoria, formed the basis for Dr. Struve's recent discussion before the American Astronomical Society.

There are two groups of extended atmospheres. The first kind remain at rest with respect to the star itself, while the second expand, with more or less rapid motion. Novae, or new stars, are characterized by expanding shells which are eventually observed visually as well as spectroscopically, and appear to form what are called "planetary" nebulae.

Dr. Struve advances the hypothesis that fundamentally all stars which exhibit shells are alike, and that the tendency of a star to produce a shell results either from rapid rotation of the reversing layer (portion of its atmosphere which produces the dark lines in the star's spectrum) or from a tendency of the star to become double. This latter case is observed in the star Beta Lyrae, which is shaped like an hour-glass, and has a tail of matter streaming from it and forming a shell around it.

In stars with shells, three layers are distinguished. The first is the stationary reversing layer, but it is in rapid rotation; then comes an inner stationary shell which shows little or no rotation, and which Dr. Struve calls the chromosphere; finally the outer, expanding shell, which he calls the corona. In some stars the outer shells are one or the other or both opaque, while in others they are transparent, and these differences produce important observed differences in their spectra. However, Dr. Struve pointed out that there are stars which are known to be in rapid axial rotation, but which show no shells around them. No explanation for this is given at present.

Closely related to Dr. Struve's researches are those of Dr. Paul W. Murrill, of Mount Wilson Observatory. He classifies the lines observed in a star's spectrum into three groups: "stellar" lines are produced in the reversing layers of the stars themselves; "semi-detached" lines come from extended stellar atmospheres or shells, and from the so-called planetary nebulae; "interstellar" lines originate in clouds of sodium, calcium and other elements in the tremendous spaces between the stars. The interstellar lines are recognized because they do not shift their positions according to the star's motion, as do stellar lines. The semi-detached lines show similar characteristics, but do not increase in intensity with increasing distance of the stars.

ARTHRITIC PAIN

THAT relief for the arthritic stiffness and soreness that plagues many men and women past forty years of age can be given by treatment directed toward a newly discovered cause of the condition, is reported by Dr. Charles S. Capp and Dr. Stacy R. Mettier, of the University of California Medical School.

Pain and muscular stiffness of neck and shoulder that make it impossible for the patient to comb his own hair, reach behind his back, or that even prevent the use of hands in fine movements such as sewing or writing, were formerly laid to two causes: an injury or pressure of a rib on the brachial plexus, a great nerve in the neck; or a cancerous or bacterial attack that destroys neck vertebrae. But it was found that many patients past their fortieth birthday suffered the symptoms when these causes were not present. Some physicians put the blame in such cases on an inflammation of a spinal nerve.

Dr. Capp and Dr. Mettier, using a new method of diagnosis, found that x-ray pictures of thirty patients showed bony growths which projected into the canals connecting the vertebrae in the spine. These bony obstructions usually occurred between the fifth and sixth and sixth and seventh cervical vertebrae, near the large bone projecting at the back of the neck, limiting the space allowed for passage of spinal cord and nerves. This resulted in the crippling pain to neck and arm and often affected chest muscles.

Heat applied over the affected neck vertebrae, with massage, traction and manipulation relieved the majority of patients of pain.

MOTTLED ENAMEL OF TEETH

FLUORIDES, the cause of the disfiguring "mottled enamel" of teeth, can be removed from the drinking water by two simple methods designed for use in homes or small institutions having their own water supplies. The methods were devised and patented by Dr. Elias Elvove, chemist of the U. S. Public Health Service, who assigned his patent rights to the United States Government.

How many American children have the ugly, irremovable brown spots on their teeth, result of drinking water and eating food cooked in water containing fluorides during the tooth calcification ages, is not definitely known. The condition, also called "black tooth," according to one estimate, afflicts 5,000,000 people in 31 states.

Community water supplies can be freed of fluorides by a relatively cheap method now commercially available. The latest method for individual home or small institution use patented by Dr. Elvove is to shake up two gallons of water with half a pound of tricalcium phosphate, finely powdered, for half an hour; or for shorter periods totaling half an hour. The mixture is then allowed to settle

and is filtered through a suitable filter. Ordinary commercial tricalcium phosphate is suitable.

Magnesium oxide is used instead of the tricalcium phosphate in the earlier method devised by Dr. Elvove. This has the advantage, he points out, of also sterilizing the water and of being cheaper. The chief disadvantage is that it makes the water more alkaline, though this can be counteracted by adding a suitable amount of acid. It is suggested that for home use, vinegar might be used. Any one planning to remove the fluorides from his home water supply should seek the advice of the health department chemist in order to be sure of carrying out the procedure correctly.

GESTURES AND RACIAL DESCENT

YOUR gestures with hand or head as you talk are not inherited from your dead ancestors. Gestures are picked up from people around you, and living in a different land you might be a different person, so far as gesture mannerisms go, is concluded by Dr. David Efron, of Sarah Lawrence College, in a study of New Yorkers, entitled "Gesture and Environment," published at Columbia University by the King's Crown Press.

Dr. Efron has analyzed gestures of two sample groups —southern Italians and eastern Jews in this city. Each group has distinct mannerisms which disappear as an individual becomes assimilated into American life. The more complete the assimilation, the fewer arm-sweeping Italian gestures or hand-waving Jewish gestures an individual will use. In fact, as Americanization advances, these types use fewer gestures. Like people with two languages, they may acquire hybrid gestures, part American and part foreign. They also take on Americanisms, which run to such mannerisms as emphatic fist movements and slicing.

To study these New Yorkers, Dr. Efron observed gestures in homes, restaurants, at race tracks, in summer resorts and schools. The claim by "the high priests of political anthropology in the Third Reich" that the amount and manner of gesticulating of an individual are determined by racial descent is not upheld by scientific analytic study. Stating that these authors have nothing to go on but vague impressions and a few "selected" photographs, Dr. Efron says emphatically: "Their theories of 'race' are plagued with conceptual fictions that have no place in scientific reasoning."

ELECTROPLATING WITH IRON

PLATING a nobler metal with iron may seem like plating a gold watch with brass. Yet there are uses for just such a process. Although the commercial uses of iron plating are minor in character, they are sufficient in number and importance to justify further study of the subject, in the opinion of C. T. Thomas, technical aide of the U. S. Bureau of Engraving and Printing, expressed in a paper presented at the Chicago meeting of the Electrochemical Society.

The most active interest in iron plating centers around its use in electroforming molds for rubber, glass and plastics, as perfected in the laboratories of the United States Rubber Company. The iron is electro-deposited on a pattern, thus forming a strong mold for the materials mentioned. Another recent use is the production of electrolytic iron powder for plastic metals—developed at the Mellon Institute—which can be molded and compressed into shape and then become a solid mass like any other plastic.

Iron is cheap and abundant and has strength. It can be plated on the back of a finer metal to give it strength. This process has been used for making the plates for printing government currency and bonds. A nickel face is first deposited electrically on the mold, taking all its delicate detail. This is then backed by a heavy deposit of electrolytic iron.

Electrically deposited iron is very pure, resists rust and has unusual magnetic properties. Iron plating has been used for more than a hundred years, but most of these uses are now obsolete.

THE SUPPLY OF STEEL

A SHORTAGE of steel even for defense needs in 1941 and for the next few years is foreseen by Dr. Matthew A. Hunter, professor of metallurgy at Rensselaer Polytechnic Institute in Troy, speaking on the General Electric Science Forum.

Even our scrap iron bin is practically empty, he declared. For years we sent large quantities of our scrap iron to a belligerent eastern nation. Now we have reason to regret this action. This year the steel industry will produce about 90,000,000 tons of steel. But this is 8,000,000 tons short of our requirements. Next year the shortage will be 27,000,000 tons. By the construction of new plants, the steel industry expects to increase its capacity by 10,000,000 tons. But this still leaves a shortage of 17,000,000 tons which can only be made up by civilian conservation.

Already the Office of Production Management has indicated that a 50 per cent. cut in automobile manufacture in 1942 will be necessary in order to save some 4½ million tons for defense. Further restrictions will be necessary but can not entirely make up the deficiency. Dr. Hunter thinks, however, the situation is not altogether hopeless. He points out that some 14,000,000 tons of aluminum utensils have been contributed by American householders. He believes that every American household could contribute twenty pounds of scrap iron. They can do with fewer refrigerators, washing machines, ranges, and other articles containing iron. Also there are untapped sources of scrap iron. He pointed to the automobile graveyards that dot the country-side. Iron fences, grills and other useless structures can be removed.

FURTHER PAPERS READ AT THE CELEBRATION OF THE UNIVERSITY OF CHICAGO

PROFESSOR EVARTS GRAHAM, of Washington University, St. Louis, stated that far too many patients with bronchial cancer are now denied the benefit of effective treatment and allowed to die "because no steps are taken even to arrive at a diagnosis until the condition is hopeless." Bronchial cancer constitutes about 10 per cent. of all cancers. Among patients coming to Barnes Hospital in

St. Louis, 88 per cent. were in such an advanced stage of the disease that they could not be operated on. Yet in 75 or 80 per cent. of cases a bronchoscopic examination and biopsy will establish the diagnosis even in early cases. The only treatment known to be effective for this condition is complete surgical removal of the cancer, which usually means complete removal of the lung.

STUDIES by x-ray of more than forty thousand persons indicated that the most reliable and desirable of the body's defenses against tuberculosis is calcification, or turning the infected region into bone, was reported by Dr. Robert G. Bloch, associate professor of medicine at the University of Chicago. Although it has been believed that calcification is merely a secondary process following complete healing of the disease, the development of bony matter from the infected area actually should be investigated as one of the most promising methods of cure. "The necrotic process, the forerunner of calcification in the adult, is the all-important epidemiologic problem in tuberculosis. Small as it may be, as a potential excavation which will discharge its infectious content, it remains the ever-dangerous redistributor of the infection to the same individual and to others. The possible fostering of the process of calcification, therefore, seems a worthy goal of investigation."

WHEN tuberculosis germs are present in the body, the blood makes chemical signals. The first readings of these were presented by Professor Florence B. Seibert, of the Henry Phipps Institute, Philadelphia. A recently developed, highly accurate method of electrical separation has shown that there are four proteins in blood serum. One of these is an albumin; the other three are globulins, designated respectively as alpha, beta and gamma globulins. In rabbits inoculated with tuberculosis bacteria, the albumin always decreases. It is always lower than the lowest figure for a normal animal. The globulins, on the other hand, show increases. The alpha form usually shows the first and most pronounced increases, but the gamma globulin also frequently becomes higher in animals in which the disease has not yet become very serious. But when beta globulin increases, death usually follows.

FATAL pneumonia often starts with a chill. This was explained by Professor Oswald H. Robertson, of the University of Chicago. Chilling of the body surface causes a slight contraction of the epiglottis, the lid-like valve that closes the upper end of the windpipe during swallowing. With this vital valve reduced to a poor fit, fluids from the nose, mouth and upper part of the throat can get down into the lungs, carrying with them accumulated pneumonia germs. If there is an irritated condition in the lungs, as from a cough already started, pneumonia is likely to follow.

ITEMS

THE comet whose discovery was recently reported by the Soviet astronomer Neujmin has been identified by L. E. Cunningham, of Harvard Observatory, as the Schwassmann-Wachmann I comet discovered by the two German astronomers in 1927. This comet was picked up last month on two photographic plates at the Boyden Station of Harvard University at Bloemfontein in South Africa and reported at that time.

DISCOVERY of a new vitamin, the eighth in the large group of B vitamins, was announced by Dr. Roger J. Williams, of the University of Texas, at the vitamin symposium at the University of Chicago. The new vitamin is folic acid, taking its name from the Latin word for leaf because it is found in great abundance in leaves. Like the other B vitamins, folic acid is universally present in all animal tissues examined as well as leaves, Dr. Williams said.

IRAQ'S earliest known inhabitants, the Sumerians, were fond of pork. They also ate a good deal of mutton and beef, and smaller quantities of game and fish. These facts are brought out in a study of animal bones found in buried city ruins at Tell Asmar, a site near the Tigris River a few miles from Bagdad. The study was made for the Oriental Institute of the University of Chicago by Dr. Max Hilzheimer, the German zoologist. Groupings of the bones found in the ruins of houses, palaces and temples, indicated 14 or 16 pigs, 10 gazelles, 6 sheep or goats, 5 wild asses or onagers, 4 or 5 cattle, 3 deer and 2 dogs, besides a number of bones of unidentifiable species of birds and fish.

WHAT one university has done in the way of "prehabilitating" its students, in advance of their possible call to military duty, is told by Dr. Ruth E. Boynton and Dr. Harold S. Diehl, of Minneapolis, in a recent issue of the *Journal* of the American Medical Association, published in Chicago. The University of Minnesota undertook to find out what proportion of its students of draft age were already fit for service, and what could be done for those who fell below standard. Naturally, in the undergraduate group there were many below draft age (nearly three fourths in the College of Arts and Sciences) whereas in the graduate school 92 per cent. were already registered. Of the entire group registered, one third were put in the "defective" classes 1–B and 4. One striking fact was the relatively low percentage of deferments for bad teeth, and the relatively high proportion of those with defective eyesight. This reverses the situation found in the general population. Seven per cent. of the group were rejected for general underdevelopment. These can be put into good condition by a proper program of diet, rest and exercise.

THE last paragraph under "Items," page 11, of Science Supplement of September 19 says "Since a pound of potatoes in powdered form equals ten pounds of spuds in the round, the saving which can be effected in transportation space is very large." Professor G. Bohstedt, professor of animal and dairy husbandry at the College of Agriculture of the University of Wisconsin, writes: "On page 970 of the 20th edition of 'Feeds and Feeding' by Morrison, the average of 471 analyses of potato tubers gives 21.2 per cent. as the dry matter content. Allowing 4 or 5 per cent. moisture content even in powdered potatoes, these could at most equal only 4.5 times spuds in the round."