ess. There are definite changes in the electrical activity of different regions, Prof. Adrian pointed out, when we direct our attention from the visual field to the auditory, and vice versa. These are not beyond analysis and ten or even twenty years from now Prof. Adrian believes scientists will know much more about the nerve changes that take place during certain mental processes. The nerve mechanism of consciousness itself, however, will perhaps never be discovered.

Science News Letter, September 12, 1936

ASTRONOMY

Dr. Otto Struve— New Red Nebula

THE great cloud-like patches of light, so spectacular in astronomical photographs and known as diffuse nebulae, are really dust clouds that mirror the light of nearby stars, an astronomical team from Yerkes Observatory, consisting of Drs. Otto Struve, C. T. Elvey and F. E. Roach, has discovered.

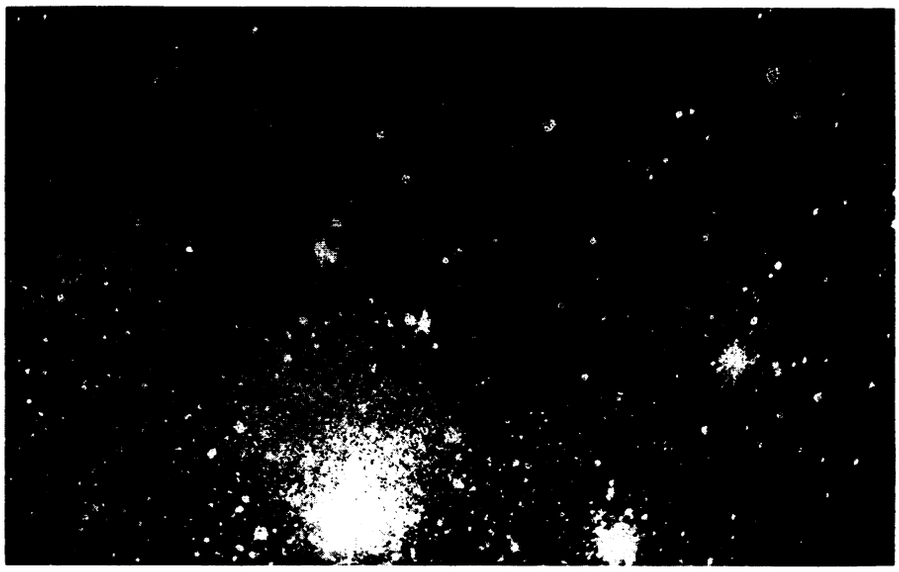
Dr. Struve told the scientists at the Tercentenary meeting how he had proved that these nebulae within our own stellar system, the Milky Way, shine by reflected light and consist not of gases but of relatively large aggregates, cosmic dust particles of about one thousand atoms each.

These diffuse nebulae reflect the red light of nearby red stars without change, much as sunlight is often reflected beautifully on a fleecy cloud in another part of the sky. If, instead of a red star, there is a blue star nearby, the mirror-like nebula sends out blue light. This is proof that the particles in the nebula are not small like the gas particles in the earth's atmosphere. On the earth the sky is blue because the layers of atmosphere scatter the blue in the sun's light more effectively than the red wavelengths.

First Result

Dr. Struve's explanation of one of the puzzles of the sky comes as the first result from McDonald Observatory on Mt. Locke, Texas, which is operated jointly by the University of Texas and the University of Chicago. Dr. Struve is director of both Yerkes and McDonald Observatories.

The big telescope for McDonald Observatory is not yet ready for use but this investigation was conducted with a sort of "candid camera" of the sky; the Schmidt camera telescope which has a wide field and very great light-gathering power that allows short exposures.



THE RED NEBULA

A cloud of cosmic dust, reflecting the red light of its neighbor star Antares, is this diffuse nebula (lower center) as photographed by the "photovisual" process at McDonald Observatory. The extent to which the process with its yellow filter brings out the red light of this nebula is realized when comparison is made with a photograph by the ordinary process shown on the facing page.

Because the Schmidt camera is so new in America, Dr. Struve was unable to interest professional lens makers in its construction. The instrument used at McDonald Observatory was the work of the Chicago amateur astronomer, C. H. Nicholson, who now operates the new state police radio station WQPD at Duquoin, Ill.

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ASTRONOMY

Prof. Arthur Haas— Source of Star Energy

A PERPETUAL interchange of energy between light rays everywhere racing through the universe and the shining stars may account for the seemingly endless store of energy in the latter, it was suggested before the gathered scientists at Harvard University's Tercentenary celebration by Prof. Arthur Haas, noted Viennese physicist now at Notre Dame University.

Each photon of light in space, Prof. Haas indicated, loses a "primordial energy-element during each oscillation or in travelling one wave-length."

The loss in radiant energy in the universe, Prof. Haas showed by calculation, is almost identical with the energy production by stars and star-systems. He said: "The energy which is given off in the form of primordial energy-element might therefore be compensated by the energy production of the stars. Perhaps we might consider the energy which is liberated in the form of primordial energy-elements as the source of the radiation of the star-systems."

The important concept of "primordial energy-element" which is basic in Prof. Haas' statement is one of four "subatomic" constants whose theoretical origin was shown. Declared Prof. Haas:

"The elementary quantum of action may be represented, as is well known, either as a product of energy and time or as a product of length and momentum. If we therefore divide the elementary quantum of action by cosmic constants of the dimensions of time, energy, length and momentum respectively, we obtain four 'subatomic' constants, one for energy, one for time, one for length, and one for momentum. The subatomic energy constant might be called the primordial energy-element."

Also in his discussion, Prof. Haas computed roughly the total mass of all the matter in the universe based on the estimated density of matter in the observable part. The upper limit of mass for a sphere of the observed density would be 10^{57} grams. Thus the matter in the universe weighs in tons approximately the figure 10 with 51 zeros after it. Expressed in terms of the sun's mass, the universe weighs approximately 10 with 24 zeros following.

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