SCIENCE NEWS

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HYDROGEN AND OXYGEN GASES FOUND IN THE MILKY WAY

A GLOWING mass of hydrogen and oxygen gases, hitherto undiscovered, envelops large portions of the Milky Way, Drs. Otto Struve and C. T. Elvey, of the University of Chicago's Yerkes Observatory, reported to the American Astronomical Society meeting at Ann Arbor.

These luminous nebulosities, in the constellations of Cygnus and Cepheus, are too faint to be recorded on direct photographs. They were found with the new 150-foot nebular spectrograph of the McDonald Observatory of the University of Texas in the Davis Mountains. Their existence could only be proved by means of spectrograms photographically sensitive to the light of the parts of the spectrum known as the hydrogen line alpha and the forbidden oxygen line 3727.

To an astronomer who could observe our vast Milky Way galaxy from some object far outside it, the spectrum of our galaxy as a whole would have an appearance different from what astronomers supposed it would before the discovery by Drs. Struve and Elvey. It would reveal "a fairly strong emission spectrum superimposed over the integrated spectrum of all the stars." The newly discovered great "clouds" do not shine by their own light, but they appear to derive the required energy of their fluorescence from the general field of stellar radiation in the Milky Way star clouds. They differ from brighter nebulosities in that they are not concentrated toward individual stars.

Drs. Struve and Elvey consider it probable that many other portions of the Milky Way are covered by similar gaseous "clouds," but an investigation of a region in Canis Major shows practically no trace of nebular emission. The emission decreases very rapidly away from the Milky Way and at galactic latitudes of 10 or 20 degrees no emission is found.

A new theory of a circular motion of stars "streaming" at high speeds in our galaxy was presented by Dr. S. Chandrasekhar, of the Yerkes Observatory. Dr. Chandrasekhar's theory visualizes our near-by stars, among them the sun, swinging nearly circular orbits about the center of the galaxy. If the near-by stars are taken as a group, the individual stars seem to be moving at random, with equal numbers of stars moving in opposite directions. But there is a maximum mean speed of the order of 15 kilometers per second (9 miles per second) in one direction. As a whole, however, this group has a nearly circular motion about the distant galactic center, a velocity of about 300 kilometers per second (185 miles per second). The theory explains the dispersion of velocities with respect to the center of the local star group as due to the deviations of the actual orbits from a true circular orbit.

MATHEMATICAL EQUATIONS FOR USE IN FLIGHTS IN STRATOSPHERE

WITH pencil and paper John Sweer, expert of the U. S. Naval Research Laboratory, has completed computations which will aid future stratosphere fliers traveling above 50,000-foot altitudes.

Mr. Sweer's calculations involve the bending experienced by a ray of light as it passes through the earth's atmosphere. This refraction, as it is called, must be determined and corrected for in all aerial navigation where "sights" are taken on the horizon and on a star to determine the latter's angular altitude.

Using a more general formula than previously employed, Mr. Sweer gives methods for computing the corrections for any altitude. In an interview he explained that actually 100,000 feet is about the limit at which aerial navigators will need to worry about the bending. Above 100,000 feet the atmosphere is so rarefied that further increase in altitude does not increase the amount of bending of the light rays.

The corrections which must be applied even at altitudes of 30,000 feet are quite large and amount, for this height, to 27 minutes of arc. Instrumental errors of a good sextant, by comparison, are only a half minute of arc. Mr. Sweer points out that the large corrections must be subtracted from the observations, for the star on which the sight is taken is really lower than it appears to be. The corrections overcome the fact that the earth appears to be flatter than it really is, when observed from great heights.

In 1919 a British scientist, A. R. McLeod, published corrections for altitudes of 50,000 feet. The new work of Mr. Sweer uses a more general formula and extends the correction range to 100,000 feet and above. His report appears in the *Journal* of the Optical Society of America, published recently.

A NEW FORM OF CRYSTAL

AN accidental discovery in a research laboratory at Pittsburgh has led to the discovery of a new crystalline state of boric oxide which promises to change certain commercial glass manufacturing methods.

Leon McCulloch, research engineer of the Westinghouse Electric and Manufacturing Company, recently fused some boric acid in a tin can in an oven, trying to keep the mixture liquid so that it could be used to impregnate electrical coils and insulate them. But the mixture turned white and milky and then pasty. Finally it turned stonelike and about as hard as Portland cement.

Such a mass was useless for insulation purposes, but Mr. McCulloch began to study its properties. On weighing, it was found to have a specific gravity one third greater than the comparable boric oxide glass. Moreover, its crystal structure was revealed by a definite melting point and by x-ray studies. In contrast, its relative boric oxide glass has no fixed melting point and does not exhibit a characteristic crystalline x-ray spectrum. What happened, it now appears, is that the tin can and the hot oven changed the boric acid to a crystalline state just as flavored sugar syrup changes to fudge on boiling.

Boric oxide glass plays an important chemical and industrial rôle because of its high resistance to heat shock.

The new discovery, it is claimed, should prove helpful in commercial glass manufacture, perhaps supplanting boric oxide glass in a number of processes.

The accidental discovery, made in an age when modern research is planned to the last detail, is reminiscent of Goodyear's classic discovery of vulcanization by the dropping of rubber and sulfur on a hot stove.

HEALTH INSURANCE

THE American Medical Association's house of delegates will oppose the National Health Conference's plan for adding health insurance to social security—if it follows action taken three years ago. In 1935 the doctors' parliament was called into extraordinary session and opposed the social security suggestions thereafter enacted into federal law.

On September 16 it convened to formulate authoritative medical opinion on the Federal Government committee's plan for nation-wide health promotion. Included in this plan is a recommendation of a sickness insurance scheme on a nation-wide basis to be supported either by general taxation or special tax assessments, specific insurance contributions from potential beneficiaries, or both. It is a new phase of social security.

In 1935 the American Medical Association reaffirmed "its opposition to all forms of compulsory sickness insurance whether administered by the Federal Government, the governments of the individual states or by any industry, community or similar body." At the 1935 meeting on social security, the association encouraged "local medical organizations to establish plans for the provision of adequate medical service for all of the people, adjusted to present economic conditions, by voluntary budgeting to meet the costs of illness."

It also recognized "the necessity under conditions of emergency for federal aid in meeting basic needs of the indigent." This suggests that the part of the new plan proposing federal aid to the medically indigent will not be opposed, unless the federal subsidies for medical services are administered or controlled by a lay bureau.

Provisions of the national health plan which would extend public health services and hospital services through federal aid will probably not be opposed. Action in pre-Social Security days does not throw much light on the stand of the association on these two points. But extension of public health and hospital service, so long as they do not enter into practice of medicine is likely to be welcomed by most physicians, except those who fear existing hospitals might suffer financially—JANE STAFFORD.

LACTIC ACID FORMATION

NEW light on how our muscles work is reported in a paper read before the Milwaukee meeting of the American Chemical Society by Drs. Eunice V. Flock, D. J. Ingle and J. L. Bollman, of the division of experimental medicine of the Mayo Foundation, Rochester, Minn.

Lactic acid formation in the muscles—which results from the breaking down of glycogen—acts as a "starter mechanism." The formation of lactic acid in muscles from the breakdown of glycogen, an energy-producing substance stored in muscles, when they start their activity, has long been known. For many years it was thought that this chemical reaction gave rise to the energy of contraction. But in 1930 Lundsgaard showed that in muscles poisoned with iodo-acetic acid contractions take place although no lactic acid is produced. His theory was that the energy comes from the breaking down of phosphocreatine into creatine and phosphoric acid.

In the Mayo studies it is shown that the continued working of a muscle can occur without lactic acid accumulation, that the formation of lactic acid from glycogen occurs only at the beginning of exercise and appears to be rather a starter type of reaction. What happens in the working muscles to suspend the formation of lactic acid is not known, but it appears to be a local process in the contracting muscles since, in a test on dogs, it was shown that when one leg was working continuously without lactic acid accumulation the opposite, resting leg will produce a maximal amount of lactic acid under stimulus. After a continued period of work this leg, too, returns to a steady lactic acid content. The authors state that "the reactions involving the breakdown of glycogen and phosphocreatine are the early stages only in working muscles. With continuous work . . . it seems probable that the major energy is derived from substances brought to the exercising muscle by the blood."

SUPPRESSED PATENTS

THE American Chemical Society, through a notice to members under the signature of Dr. Charles L. Parsons, secretary, has asked its members to report to the society any cases of patents suppressed to prevent their further development and commercial exploitation. Referring to recurrent reports of such suppressions, Dr. Parsons points out that "this matter of the suppression of patents is one of great importance to the American people, and if the rumors are true, they should be informed thereof."

Suppression of patents has been repeatedly charged in connection with several recent proposals that the U. S. patent laws be revised to make such a practice impossible and to correct other abuses with which the present patent system is charged.

"Such information," Dr. Parsons states, "to be effective, must of course be accompanied by definite statement in sufficient detail for presentation to any congressional committee on patents before whom a representative of this organization may appear."

Such information as is gained, it is intimated, will be used when the society, in conjunction with a number of other technical groups, appears before the congressional committees on patents to consider basic changes in the law which are expected to be introduced at the next session of Congress.

Sponsored by Representative William D. McFarlane, one bill would limit to five years the absolute monopoly now granted for seventeen years. At the end of five years, if the patent holder has engaged in monopolistic practices or has refused to develop the patent to the stage of commercial application, compulsory licensing would occur. Determination of whether monopolistic practice or of suppression has been resorted to would be in the hands of a Patent Office agency.

TREASURE ISLAND, SAN FRANCISCO, AS A LAND AND SEA AIR BASE

PARALLELING the development of the North Beach Airport, New York, as a great combined land and sea air terminal, Treasure Island, the site of the Golden Gate International Exposition of 1939, will probably become a terminal for domestic landlines as well as for Pan-American Airways' transpacific division, following close of the World's Fair of the West, it was learned.

Airline operators look with favorable interest upon the proposal to develop the man-made fair site into an airport because it will mean a single stop in the San Francisco Bay area in place of the two now made on most flights. Domestic planes now stop both at Oakland, in the East Bay area, and at Mills Field, San Francisco. Cutting out one of the stops will mean 10 or 15 minutes less flying time. In addition, the island is within a very few minutes of downtown San Francisco *via* the Bay Bridge. Mills Field is three quarters of an hour from the Golden Gate city's hotel district.

The San Francisco Bay Bridge, which crosses the bay near one end of Treasure Island, is not a hazard in clear weather, in the operators' opinion, because of the fact that the prevailing wind parallels the bridge.

At times when instrument landings (which should be standard bad weather practice by the time the airport is ready) are required, the Oakland Airport will be used. This should be necessary at most 15 per cent. of the time.

Approval of such a move is, of course, up to the Civil Aeronautics Authority which, when the time comes, will have to pass upon the suitability of the port as a site. Unanimous support for the change is not expected, for sponsors of airports rarely welcome a change in location.

Pan-American Airways has already made arrangements to use Treasure Island in place of its Alameda base from the time the fair opens. The twice-a-week clipper departures to New Zealand and the Philippines, a schedule expected to be in operation by that time, will provide the most prominent part of the Pan-American Airways exhibit.—LEONARD H. ENGEL.

ITEMS

A SUBMERGED volcano, in water two miles deep off the coast of California about 150 miles southwest of Catalina, has been discovered by an expedition of the U. S. Coast and Geodetic Survey. Professor W. F. Shepard, of the University of Illinois, at present working at the University of California's Scripps Institution of Oceanography, determined the nature of the submarine mountain, which has two craters. Whether or not it is active has not yet been learned.

LIFE as it was lived millions of years ago on the San Francisco Fair site will be shown on a great diorama now being painted, which will be finished in time for the opening of the fair. What is now Treasure Island was then a great marsh, whose soggy soil trapped great lumbering long-jawed mastodons and swallowed up the saber-tooth tigers that leaped upon them when they were down and helpless. The painting will also show the primitive camels and little horses of the era. Other dioramas of ancient life under preparation for the fair include scenes at the La Brea asphalt pits in Los Angeles, the San Joaquin Valley, the St. John's area in Arizona and the Craddock bone beds in Texas.

GIANT pandas from Asiatic mountains, now attracting much attention in zoological circles, are only returning to their ancestral homeland when they come to America, according to Paul McGrew, paleontologist at the Field Museum of Natural History. Both the giant and the smaller "ordinary" pandas descended from a long-extinct, rather small mammal known as Cynarctoides, that lived in North America about twelve million years ago, during early Pliocene times. Descendants of the same ancestral stock that stayed at home became the familiar raccoons of American woods.

WITH suitable equipment placed in regions of the earth where mountain-building is still going on, scientists may some day learn the secret of strange variations in the earth's speed of rotation. This is suggested in the annual report of the Smithsonian Institution, by the late Dr. Ernest W. Brown, professor of astronomy at Yale University. Checking movements of the sun against movements of the earth for the last 150 years, Professor Brown found that there is little reason to doubt that real changes in the earth's rate of rotation do occur. His calculations indicate changes about the year 1790, again in 1897 and also in 1917. The 1897 change altered the apparent length of the earth's year by one second. Professor Brown's own suggestion for the cause of such a change is that in the earth there is a layer, near the surface, which has the ability to undergo relatively great volume changes for small temperature changes. Thus a small change in the earth's internal condition might make a sizable volume change in the earth. A change of only five inches in the earth's radius could produce a one-second difference in the length of the earth's year. A test of this hypothesis, he adds, could be made by studying bulges in the earth and the most likely place to look for them would be in regions in which mountains are still rising.

THE world's longest direct telephone and telegraph line, to link Moscow with strategic Khabarovsk in far-off eastern Siberia is now being built by the People's Commissariat of Communications, Tass, Soviet telegraphic agency, reports. The new line will be 8,678 kilometers (about 5,100 miles), almost 1,300 miles longer than the Halifax-Vancouver line, hitherto the world's longest. The equipment to be used will enable simultaneous transmission of three telephone conversations, 19 telegrams and one facsimile reproduction over a single pair of wires. Whether the line is being built along a railroad or along which railroad, if it is, was not stated, but it is believed the line will follow for part of the way the new Balkai-Amur railway, being rushed to completion 800 miles north of the Trans-Siberian Railway. Both are among the most strategic railways in the world.