SCIENCE NEWS

A TELESCOPE FOR SOUTH AFRICA

Science Service

PROFESSOR WILLIAM J. HUSSEY, director of the University of Michigan observatory, at present in Africa, has found a location near Johannesburg for the new 27-inch telescope made possible largely through the gift of Robert P. Lamont, of Chicago.

The expedition to Africa marks the end of a 20-year search by Professor Hussey of the southern hemisphere to discover the best site for the telescope with which to carry on his work on double stars. Australia was visited in 1903 and South America in 1911. While on the latter trip Professor Hussey spent several years in Argentina, where he was director of La Plata Observatory.

Africa was the only continent left on which to find a site for the telescope. He has picked out one of the battle fields of the Boer war as a site for the new telescope.

In 1911 Mr. Lamont donated to the university sufficient funds to purchase a lens for the observatory. The order for the objective was placed with a firm in the east which has made the lenses for the Lick and Yerkes observatories. However, it was found that they could not secure suitable glass for the work, so a European firm was given the order.

With the world war coming on, this firm refused to take the risk of shipping the huge glass to this country and the contract was let to an American firm. But in 1921 the order was again cancelled and given to a European\dealer, who was able to obtain the needed materials. The discs arrived in America a year ago and the work of polishing them began.

It is hoped that the new telescope will be ready by next fall. The lens probably will be ready by that time, and only the lower end of the tube and the other sections remain to be finished. This can be completed in a very short time.

Work on the lens was threatened for a time last fall when J. B. McDowell, who was putting the finishing touches to it at his factory in Pittsburgh, committed suicide. It is thought that the extreme nervous strain of the work proved too severe for McDowell, as he had reached the point where he alternately polished for three minutes and waited 60 minutes for the temperature of the glass raised by the friction of polishing to go down to normal. An associate of McDowell has taken charge of completing the work.

Professor Hussey is considered a leader in the field of astronomy which deals with double stars. So far about 1,500 of these stars have been discovered, but the heavens have not yet been covered, and it is expected that many new ones will be found by the aid of the new telescope.

A LABORATORY FOR COLLOID CHEMISTRY

Science Service

THE prevention of tuberculosis, the development of hardy winter wheats and the prevention of settling of concrete roads on clay soil may all be aided by investigations at a National Research Laboratory for Colloid Chemistry, the preliminary idea of which was announced here to-day by Professor J. Howard Mathews, head of the department of chemistry of the University of Wisconsin.

Dr. Mathews explained that the proposal of such an institute has been given great impetus by the support recently accorded it through the unanimous approval of the project by the colloid committee of the National Research Council, under the chairmanship of Dr. Harry N. Holmes, professor of chemistry, Oberlin College, Oberlin, Ohio.

Any solid so finely subdivided that it does not settle out of solution readily or behave as ordinary solid particles do is regarded as existing in the colloidal state. Many forms of living tissue are suspensions or solutions of this sort. Gelatin, glue and other gummy substances are also in a colloidal condition. The constituents of the hides which permit them to be tanned into leather are colloids.

If it were not for the colloids in clay that make it plastic, it would be impossible to mold many forms of pottery, brick and other clay products. It is this very plasticity of clay which makes it such a poor foundation on which to build the modern concrete roads.

AN AIRPLANE CAMERA

Science Service

THE surveyor by taking to the air will be able to make more accurate contour maps with greater speed than now possible, Professor H. L. Cooke, of Princeton University, indicated in a recent address before the Franklin Institute when he announced the development of a new method of taking and interpreting airplane photographs for map making.

Wide-angle lenses that photograph ten square miles of territory from 10,000 feet in the air, a new method of making time exposures from speeding airplanes, a new optical method of locating the airplane in space, and stereoscopic projections of the photographs contribute to Professor Cooke's improved method of surveying.

"A rapid and accurate method of producing contoured maps from airplane photographs is urgently required in practically all the civilized countries of the world," Professor Cooke explained. "In this country there are still about two million square miles which have not been covered by contour maps, and the need of maps is felt daily by large industrial interests. At the present rate of progress it will require more than forty years to complete this work, but now that the problem of airplane surveying has been solved it is certain that within a quarter of a century this country will be completely mapped.

"Photographs made from airplanes by present methods are not sufficiently accurate for use in the making of government maps. In the near future it will be possible to run aerial traverses between geodetic control points

at intervals of twenty to thirty miles and thereby eliminate the enormous cost of secondary and tertiary triangulation.''

Some ground surveying will still be necessary with the new method, and detailed information not given by the photographs will be obtained by surveyors travelling around in small cars with enlarged prints of airplane photographs on which missing information will be sketched to be forwarded to the drafting room.

The accurate determination of the position of the airplane in space is effected by the projection of the photograph upon a glass screen upon which three known points of the landscape pictured are placed in correct relative position. If the relative position of the photographic plate and the projection lens is the same as when the picture was taken and if the fixed points on the screen and in the picture be made to coincide, the distances from the lens to the fixed points on the glass screen bear exact relations to the distances of the fixed points in the landscape which was photographed, and what is most important, to the height of the airplane above the ground when the picture was taken.

With the height of the airplane known, cross-bearings may be taken of all points of the landscape, and by means of stereoscopic projection, the landscape may be shown in relief, and contour lines quickly mapped.

Professor Cooke attached great importance to the production of a camera capable of taking wide-angle pictures of relatively long exposures while moving at high speed. He has been at work for several years on the production of such an instrument, and said it was now possible to take photographs showing sharp definition while travelling 90 miles an hour and using an exposure of one second. The effect of the vibration of the airplane and the drift of the landscape are compensated for by suitable devices.

METALS IN ASTRONOMIC SPACE

Science Service

THROUGHOUT the vast supposed ''emptiness'' of space there are clouds of extremely rare vapors of the metals, calcium and sodium. This new theory has been presented to astronomers by Dr. J. S. Plaskett, director of the Dominion Astrophysical Observatory, Victoria, B. C., who recently announced his conclusions and offered his data to the Royal Astronomical Society in London.

For a long time it has been known that some of the very hottest stars, when their light was analyzed in the spectroscope, showed the presence of calcium, that did not belong to the stars themselves. For the spectroscope revealed the fact that while the stars often had considerable velocities, the calcium seemed to be almost at rest. Moreover, this calcium persisted in appearing in just those stars where theories of stellar composition indicate it should not.

In explanation, some astronomers suggested that the stars are surrounded by an envelope of calcium gas belonging to the stars themselves. Others proposed that the calcium clouds were lying between us and the stars. The observations, however, were so meager and contradictory that no definite conclusions could be arrived at.

Dr. Plaskett's observations indicate that although extremely rare clouds of calcium and sodium vapor are lying around in space everywhere, they are only noticed in the neighborhood of stars. This is because, surrounding these stars completely, they intercept some of their light. The clouds appear to be perfectly at rest in space, acting as a sort of misty envelope of the stars, a space-fog, which possibly can condense in spots and give rise to those peculiar dark nebulae which have long puzzled astronomers.

WATER POWER AND COAL

R. S. McBride, Science Service

THE power being developed by the government at Muscle Shoals promises to be among the cheapest of great water power developments in the United States. There is no wonder, therefore, that the government is receiving several important offers for the privilege of leasing this power development. Several power companies of the southeastern states have associated themselves together for one offer; Mr. Ford nearly two years ago made another offer; and lately a third proposal has come from electrochemical interests who desire to operate the property for the government. Many political as well as economic factors affect the consideration of these proposals. But the engineering facts which determine the probable cost of Muscle Shoals power are not subject to dispute.

The power generated from a waterfall costs more or less according to the investment required for dam, power house and electric equipment. The cost of operation of any such hydro-electric power station is small, so that the cost to the user of current is almost altogether dependent upon the cost of building the plant, for example, whether it requires $150, $200 or $250 per kilowatt of installed power capacity. At Muscle Shoals the power promises to be very cheap because the investment cost there is relatively low and the quantity of power which will be developed is very great, amounting at the maximum capacity of the power station now under construction to 250,000 horsepower.

It is very important to compare such big water power plants with installations of similar capacity which might generate power from steam made by burning coal. The initial investment required for such steam electric station would be relatively much less, but the cost of operating would be several times greater than in the hydro-electric station, just how much greater being determined principally by the cost of coal.

If coal costs $4 per ton at the steam power station, and a hydro-electric plant could be built for $150 per kilowatt of capacity, about $112 per horsepower, then there would be little choice between the two. In other words, with low investment for hydro-electric station and low fuel cost for steam-electric, it makes little difference to the power user which way his current is generated. But let the cost of labor and of concrete for building the dam increase by 33 per cent. so that the installation would cost $200 per kilowatt of capacity installed and then the steam-electric station could afford to pay $6 for its coal supply or perhaps even more than that.

In any case the cost of recovering the energy from the waterfalls to light our cities and to run the motors of industry may be greater than the cost of making this electric current by burning coal under a boiler. Every new installation requires careful study of local conditions to determine the relative costs. But in the case of Muscle Shoals water power plant there is no doubt that whoever leases the property will be securing power about as cheap as it is possible to make it anywhere on the American continent.

THE AUDIBILITY OF CONSONANTS

Science Service

A SYLLABLE ending in "ng" is the most difficult speech-sound for the ordinary ear to grasp, according to data recently secured by Dr. V. O. Knudsen, physicist in the University of California, Southern Branch. "S," "W" and "Y," on the other hand, are easy to grasp and score high in a hearing test.

A large audience was tested in an acoustically poor auditorium. An announcer called out at intervals a succession of meaningless syllables while several hundred auditors recorded what they thought they heard. Only 48 per cent. of the audience caught such expressions as "ting" and "bong," but 90 to 100 per cent. were right on sounds like "wis" or "yox." The sounds "d," "b" and "th" made a poor score. Changes made in the choice of auditorium and announcing personnel did not alter the results markedly.

These experiments are part of a research program to reduce the present vague principles of acoustics to a mathematical basis. Results so far obtained show that an audience must attain on the average at least 65 per cent. accuracy on all speech-sounds, in every part of an auditorium, if the acoustics are to be judged satisfactory. Telephone engineers, using these methods, require 75 per cent. accuracy before a talking circuit is pronounced adequate. The telephone listener is at a disadvantage because he can not see the speaker's lips, and thus must be able to hear a larger part of incoming syllables before he can safely guess the rest.

Following somewhat similar lines, the Southern California Telephone Company has recently abandoned many word-prefixes of Los Angeles telephone numbers, and has adopted a new series promising higher accuracy. Such words as "Capitol," "Drexel" and "Metropolitan" are accurately heard by operators, and at the same time carry the proper lettering to suit new switching machinery.

DEATHS IN 1923

Science Service

THE year 1923 was one of the best years from the standpoint of public health ever recorded in the United States and Canada. This conclusion is based on the record for the year among the 15 million industrial policyholders of the Metropolitan Life Insurance Company, which was made public to-night by Dr. Louis I. Dublin, statistician. A slight increase in the death rate over 1922 is due wholly to an increase among the two million negro policyholders. The rate for the whole group of individuals was 8.9 per 1,000 as compared with 8.8 in 1922. The rate in 1911 was 12.5.

Several new health records were established last year. The death rate for the third quarter was the lowest ever recorded for any three months among this group of risks, while the rates for the last six and the last three months of the year were the lowest ever recorded for those respective periods.

Practically all the more important group of infectious diseases showed decreases for the year. This was particularly true of tuberculosis, which showed a decline of 3.2 per cent. from 1922. Ten years ago the rate was nearly double what it is to-day and in 1911 more than twice as many people proportionately of this selected group of persons died of this disease than died last year. The death rate for typhoid fever has declined further, and shows a total decline of 77 per cent. since 1911.

Organic heart disease was the leading cause of death for the year and showed in increased rate over the previous year. Deaths from accidents, and homicides also, increased while those from cancer, Bright's disease, and cerebral hemorrhage were approximately the same as for 1922.

The increase in deaths from automobile accidents and from homicides are called "disquieting." The homicide rate is now 7.3 per 100,000 or more than 12 times that of England. Much of this is said to be due to the homicidal propensities of negroes.

Automobile accidents are now a major cause of death, showing a rate of 15 per 100,000 for the year. This is an increase of 50 per cent. as compared with five years ago and of 300 per cent. over the figures for 1913. The total automobile fatalities for the year throughout the United States are estimated at close to 15,000.

ITEMS

Science Service

EXPOSURE to cold has been found to slow up the heart but to make it beat stronger, says J. Barcroft, of the physiological laboratory of Cambridge University, in a report to the Department of Scientific and Industrial Research. The pulse rate is lowered by cold, but the volume of blood passing through the heart in any given time is increased. This is stated in the report to be the first time the pulse rate and the volume output of the heart have been observed to vary in opposite directions.

IF their menu card contains both codliver oil and eggs, babies will select eggs. For this reason Dr. Alfred F. Hess, of New York City, believes that the yolk of eggs will be a welcome therapeutic agent in the treatment of infantile rickets. Egg yolk has been found to be a preventive and cure of rickets similarly to codliver oil, although it is not as potent, and he recommends it as a supplement to the dietary, comparable to orange juice used to protect against infantile scurvy. The yolk of a raw egg added to the sweetened milk and water of infants' food brought up their weight and improved their health. Egg yolk contains a vitamin that cures rickets, but it may not be vitamin A.