

offering a five-dollar reward for its safe return.

Dr. J. Bjerknes, prominent Norwegian meteorologist who is now visiting the Massachusetts Institute of Technology, will cooperate at Cambridge with Dr. Hurd C. Willett of the Institute staff in making the forecasts upon which the release of the balloons will depend. A mid-continent location was chosen for the experiments so that the balloons will not be lost over the ocean.

The daily stratosphere soundings are being made from Omaha, Nebr., by the U. S. Weather Bureau in cooperation with the International Upper Air Commission. Data gathered by all countries engaged in the research are to be published by the Commission so that the results may be readily studied by meteorologists everywhere, L. T. Samuels of the Aerological Division of the Weather Bureau explained.

The barograph used by the Weather Bureau descends to the earth slowly beneath a parachute that opens after the balloon bursts. The balloons usually rise about eleven miles or more, and have been known to reach an altitude of twenty miles. Most of the returned instruments are found within fifty miles of the take-off, though some have been sent in from distances of several hundred miles.

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ASTRONOMY

Stellar Looking-Glass Slowly Cooling

A HUGE looking-glass for the stars which will eventually serve science in the 80-inch reflecting telescope of the new McDonald Observatory, in Texas, is now slowly cooling in the Corning Glass Works, Corning, N. Y.

Its temperature is dropping two to four degrees a day from the high heat that the molten glass had when it was poured. In about three months the huge disc, a foot thick, nearly seven feet in diameter, weight 5,600 pounds, will be ready for shipment to Cleveland where experts of Warner & Swasey Co. will spend from one to two years grinding its face into a very precise concave optical shape.

McDonald Observatory, whose chief telescope will have this 80-inch mirror, is being erected on Mt. Locke in the Davis Mountains of Texas. It will be operated jointly by the University of Texas and the University of Chicago.

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AVIATION

Superiority Predicted For Rotating Wing Aircraft

Research Will Make Autogiro and Gyroplane Faster Than Conventional Airplane, N. A. C. A. Engineer Believes

FLYING machines with rotating wings will be superior to the conventional airplane as soon as their possibilities for high speed are practically developed, John B. Wheatley, aeronautical engineer of the National Advisory Committee for Aeronautics, predicted to the Society of Automotive Engineers.

The autogiro and the gyroplane are the two types of rotating-wing aircraft which, according to Mr. Wheatley's analysis, have the possibilities of becoming superior to the conventional type of fixed wing airplane now widely used. The reason for the pronounced possibility of the autogiro and the gyroplane is the inherent ability of their rotors or moving wings to attain their maximum lift-drag ratio at any desired forward speed.

The novel cyclogiro, with the paddle-wheel wings, is rated by Mr. Wheatley as being approximately equal in merit to the airplane, while the helicopter is definitely inferior.

The autogiro is the best known of all rotating-wing aircraft. It was invented by Juan de la Cierva, and the American version of the autogiro which has been flown extensively in this country was produced by Harold F. Pitcairn, working with the Spanish inventor.

Gyroplane

The gyroplane is sponsored by E. Burke Wilford of Philadelphia. The autogiro and the gyroplane present a very similar appearance with blades that rotate freely under the action of air forces about a vertical axis, replacing to a large extent the conventional wings of the airplane. Mr. Wheatley explains that the aerodynamical principles of the autogiro and gyroplane are practically identical and that their differences are largely structural.

"The low-speed control is superior to that of the airplane," Mr. Wheatley said in reference to the autogiro and the gyroplane. "The reliability is equivalent to that of an airplane, and emergency landing will be easier. The low-

speed performance is superior to that of an airplane. Airplane high speeds will probably be exceeded. Control system is as simple and easy to use as that of the airplane. First cost will be slightly higher, but maintenance and operating costs will be equivalent to that of airplane."

The rotating-wing type of machine is likely to be used by the private flyer and the unskilled pilot because of its increased safety and the smaller landing field required for it, Mr. Wheatley emphasized. Almost all the hazards encountered in flying an airplane are connected with the phenomenon of a gradual weakening of control as the flying speed approaches its minimum, he explained. As minimum speeds range from 50 to 75 m.p.h. an undesirable premium is placed upon piloting technic during landings and take-offs. A rotating-wing aircraft suffers very slightly from these handicaps because the relative velocity of the lifting surfaces to the air is independent of the translatory velocity of the machine and is always large, so that the angle of attack of the lifting surfaces is well below the burble point. The resultant performance of rotating-wing aircraft thus materially extends downward the low-speed phase of flight, lessening the piloting skill required for emergency landings and take-offs, and making the pilot more independent of meteorological conditions because at low speed a shorter visibility is required for the same safety.

Cyclogiro

The cyclogiro, which Mr. Wheatley rates as being approximately equal in merit to the airplane, is of such recent origin that it has not yet been demonstrated at full scale. It consists of a fuselage of conventional form, supported in the air by power-driven paddle-wheel wings, one on each side. The paddle-wheel rotors perform the functions of both the wings and the propeller of the conventional airplane.

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TWIN TO AUTOGIRO

This is the gyroplane, which is very similar to the better known autogiro in both appearance and behavior. Intensive research on this type of aircraft is being conducted by the National Advisory Committee for Aeronautics at its Langley Field laboratories. The autogiro has already been given considerable attention by the N. A. C. A.

ARCHAEOLOGY

Man Made Tools in Dim Age "At Present Unspecified"

J. REID MOIR, British archaeological pioneer who has worked tirelessly to unearth the dawn age of man's life on earth, has sprung a new surprise.

Twenty-five years ago Mr. Moir startled conservative scientists by showing some queer-shaped flints he had dug up near his home in Suffolk, southeast England. He called these stone objects the handiwork of men living in the Pliocene period of world history. If true, that would mean that man was using his hands and brain intelligently, to make tools, earlier than had been demonstrated.

Gradually, scientific incredulity changed to scientific cooperation. Mr. Moir's flint objects, which he continued to unearth in East Anglia, have been widely accepted as works of man. Examples of these old, old stone implements are among the exhibits of early man in the American Museum of Natural History in New York, the Field Museum in Chicago, and the British Museum in London.

So, Mr. Moir has proceeded to the next stage in his task, and doubtless to a new controversy. He attempted to sort out these very ancient relics of man in England, with a view to learning more definitely how old they are.

In a report to *Nature*, he now announces "certain unexpected and far-reaching conclusions."

The scientific bombshell is that among these rows of flint pieces, which would have little to distinguish them in the eye of a layman, Mr. Moir sorts out "four distinct and different groups of implements."

What of it? Simply that the progress from one to another of those four kinds of stone tools may be measured in tens, perhaps hundreds, of thousands of years. The men who made the four kinds represent possibly several hundred thousand years of man's history and "progress."

The age ends in the Late Pliocene which is a time variously estimated to be several hundred thousand to a million years ago. But it is the beginnings that are more dramatic. Mr. Moir assigns one well-made curved implement, of the kind called an "eagle-beak," to an age older than the Lower Pliocene stratum of the site. And this eagle-beak is still not so old as the implements Mr. Moir considers the earliest.

There, Mr. Moir leaves his problem, having pushed his old weapon-makers back into an age which he calls "at present unspecified."

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VETERINARY MEDICINE

Water Snakes in Zoo Had Amebic Dysentery Epidemic

DURING the past summer and fall, while the medical profession and public health officials were much disturbed by the outbreak of amebic dysentery among visitors to the Chicago fair, the water snakes and other reptiles in the Philadelphia Zoological Garden were suffering from a similar ailment.

In describing this condition of snakes in *Science*, Dr. Herbert L. Ratcliffe and Quentin M. Geiman of the University of Pennsylvania and the Laboratory of Comparative Pathology of the Zoological Society of Philadelphia state that although reptiles have long been known to be parasitized by amebae similar to those which cause dysentery in man, these protozoa have not been recognized heretofore as causing disease.

The infection in the water snakes amounted to an epidemic but there were isolated cases among other reptilian species also. The source of infection has not been determined. So far, no symptoms of the disease have been noted and infections have not been recognized until after death. As in amebic dysentery of man, disease changes consisted of ulcers in the large intestine and abscesses in the liver. In two instances, however, the amebae also caused gastric ulcers, which of course is not true in man.

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GEOGRAPHY

Huge Photographic Map of Indian Lands to be Made

A HUGE airplane photographic map, 40 by 24 feet, of the Navajo and Zuni Indian lands in New Mexico, Arizona and Utah, has been contracted for by the Department of the Interior. It is to be used as a basis for the better regulation of grazing practices, which have already gone to severely damaging excess in many small and a few large areas.

Airplanes making the photographs will fly at an altitude of over 20,000 feet, taking more than 4,500 individual photographs with a special four-lens camera. The separate pictures will be fitted together into a single mosaic map.

Total cost of the work will be about \$77,000; but if the work were done by ground parties it would cost more than \$500,000.

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