# SCIENCE NEWS

*Science Service, Washington, D. C.*

## THE NEW BRITISH AIRSHIPS

WITH the completion of the rigid airship *R–100*, England now has the two largest airships in the world. Like the *R–101*, which has been in the air for about two months, the new ship has a capacity of 5,000,000 cubic feet, as compared with the 2,600,000 cubic feet of the *Los Angeles* and the 3,708,000 cubic feet of the *Graf Zeppelin*.

The *R–100* was constructed for the British Government by the Airship Guarantee Co. at Howden in Yorkshire, and will soon be turned over to government authorities. It will be flown to the airship station at Cardington, near Bedford, about 50 miles northwest of London, from which test flights will be made. At Cardington are two huge hangars, one for the *R–101*, which was made there, and the other for the new ship, in addition to a mooring mast.

The turning over of the *R–100* to the Air Ministry will mark the completion of one of the main stages of England's airship program commenced in 1924 to determine the practicability of airships in long-distance transport. For the British Empire, with its far-flung dominions, this is a particularly important problem. Besides the construction of two 5,000,000 cubic foot airships, each almost twice the size of any others built up to that time, this program called for careful preliminary experimental work and the development of the necessary ground organization for experimental flights to India by way of Egypt. Completely equipped airship stations have been established at Karachi, India, and Ismailia, Egypt. Another will soon be completed at St. Hubert, Canada, while the site has been surveyed for one at Groutville, near Durban, South Africa.

According to present plans, both ships will be fully tested on flights of gradually increasing duration, until by next spring they will be ready for their long flights. Probably the *R–101* will make the first flight to India, as it is powered with Diesel engines, and supplies of oil will be available. The *R–100* uses gasoline engines, and will probably make the first flight to Canada. It is uncertain whether the ship will visit the United States, as the British stations are all equipped with 200-foot mooring masts, higher than any available in the United States.

Gasoline is carried in tanks within the envelope, which can normally carry fuel for a 5,000-mile flight if necessary. Ordinarily, however, about 30 tons of gasoline will be carried, sufficient to run the ship for 50 hours at a speed of 75 miles per hour, or about 3,750 miles. This would provide for a paying load of 100 passengers, figuring seven to the ton, and ten tons of freight.

In answer to a recent question in the House of Commons, the Under Secretary of State for Air gave some figures on the cost of the new ships. The original estimates of the *R–101* had been £527,000, or $2,600,000, but it was expected that final figures would show this to have been exceeded. The contract price of the *R–100* was set at £350,000, or $1,800,000.

## PROPOSED GIANT AIRPLANES

FOUR seventy-two-ton airplanes, each providing for 206 passengers, with sleeping and eating accommodations, and a crew of 17, will be flying over the United States within a year, if a project announced by Dr. William Whitney Christmas is carried to a successful completion. Dr. Christmas, a pioneer in aviation design, is vice-president and general consultant of the General Development Company, which plans to build the monster planes.

According to Dr. Christmas, the four planes will be completed by the end of 1930, and will be immediately placed in service on long-distance cross-country routes. It is believed that the large size will give much greater safety, as well as more commodious accommodations, than the smaller cabin planes now in use. The planes will cost about $500,000 each.

The preliminary plans are for monoplanes, each ship having a wing span of 262 feet. They will be of the twin tractor type, with two outriggers extending forward from the wing to accommodate the propellers and engines, and aft for the tail surfaces. The overall length will be 138 feet and the height 31.5 feet to the top.

The internal arrangements will not be the same in all the planes, for two will be designed for freight and mail and two for passengers. In the passenger craft the cabins, dining saloon, kitchen and express or mail compartments will be placed in the wing. Other passengers will be carried in the outriggers, with the room and comforts of a Pullman car. The normal passenger capacity will be 160, but 206 can be carried in accordance with the regulations of the department of commerce.

Eight engines, of 1,000 horse-power each, will provide the power. These will be placed in groups of four at the front of each outrigger, each group driving a 34-foot four-bladed propeller. The engines will be inside the outrigger, and walks will permit complete access to them at all times. Chemical cooling will be used. The propellers will be of variable pitch.

The pilot house will be placed in front of the leading edge at the center of the wing, the two pilots occupying positions in the front of the compartment. In back of them are the quarters for the master and radio operator, from which the plane will be controlled.

It is estimated that the plane will be able to climb to 5,000 feet in 6.5 minutes and to 10,000 feet in 16.6 minutes, and will have a service ceiling of 13,500 feet. The most economical flight speed will be obtained with six of the engines, it is believed. Five engines, two in one group and three in the other, will maintain flight, while altitude may be maintained with only one engine in one group and two in the other in service.

## MEASURING SMOKE OR HAZE

CONSTANTLY measuring the smoke and haze in the Holland Tunnel under the Hudson River connecting New York and Jersey City is the latest job for science's magic

lamp, the photoelectric cell that has made television and talking movies practicable.

Above the main tube of the tunnel, through which traffic passes, is an exhaust duct, a long, cave-like chamber near the New York end. Through this duct is drawn the exhaust air from the tunnel. The duct is at the point where the roadway grade is greatest and where there are the most exhaust gases from the heavy truck traffic. Except for the light admitted through the air openings, the duct is dark.

Here General Electric engineers have installed experimentally a photoelectric device to measure the smoke and haze. A large box contains a lamp and a photoelectric cell, in adjacent light-tight compartments, except for a lens at the front of each. The lens in front of the light makes a narrow beam, which shines on a mirror 150 feet away. Thence it is reflected to a second mirror and back to the box, where the other lens focusses the light on the cell. The current from the cell is amplified by vacuum-tubes and passes over wires to the recording device in the tunnel office a half mile away. Here it controls the movement of a pencil over a moving strip of paper.

When the amount of smoke in the air duct increases, the intensity of the light returning to the photoelectric cell is reduced, and the moving pencil immediately indicates the fact. Then the tunnel engineers can turn on more of the ventilating fans to keep the air clear.

Uses for such a device in homes and business offices are foreseen, where it can be used to detect smoke and act as a fire alarm. For some time the Holland Tunnel has used a somewhat similar device to count traffic, by the interruptions by automobiles of a beam of light across the exit.

## METHOD FOR FINDING CABLE BREAKS

CABLE repair ships now on their way to the region south of Newfoundland to remedy the damage done by the recent earthquake will be able to cruise directly to the point of the breaks. An instrument used in a laboratory experiment in elementary physics courses permits the location of a cable break from the land to within half a mile, no matter whether the break is near shore or in the middle of the ocean.

This instrument is called the "Wheatstone bridge," after its inventor, Sir Charles Wheatstone, British physicist and one of the pioneers in telegraphy. It is used to measure the resistance of a wire to the flow of electricity. This is done by connecting the unknown circuit and one whose resistance is known to a galvanometer, a sensitive current measuring instrument. The connection is so made that no current flows through the galvanometer when the two resistances are equal, and then the needle of the instrument points to zero.

When a cable breaks, the copper conducting wire is exposed to the ocean water, and so there is an electrical circuit from the land end through the cable to the break and back through the salt water. By means of a Wheatstone bridge, the resistance of this circuit is measured. The resistance of the water is high, but it is practically the same for short and long distances. But the longer the cable the greater the resistance of the cable, so that the higher the resistance, the farther the break is from land. As the resistance for any length of cable is accurately known, the distance of the break can easily be determined, to within half a mile. The path of the cable is known, so when that distance is laid off, the place of the break is located.

When the repair ship reaches the point of the break there is still work ahead. First, they must grapple for the ends of the cable, but it is not necessary to pull the broken end of the cable to the surface. In deep water, or when the end is caught, a special grapnel is used which cuts off the broken end and grasps the remainder. This is lifted to the surface, tested to see if the connection is clear to the shore, and then fastened to a buoy so that it may be located again. Then the ship cruises to the other side of the break and picks up the other end of the cable in the same way.

A new piece of cable is then spliced on to this end, and the ship returns to the other end, as marked by the buoy, paying out the new cable as it goes. This end is then spliced to the new piece of cable, the cable dropped over, and the complete cable connection is then restored. In deep water the new piece spliced in is sometimes as long as ten or twelve miles. The water is not very deep off Newfoundland, however, and much shorter lengths will suffice. By allowing plenty of slack in the new piece in making it longer than the parts of the original cable that were cut off, the probability of a future break in the same place is lessened.

## INTELLIGENCE OF INDIAN CHILDREN

WHITE children are brighter than Indian children, not so much because of their racial heredity as because of more favorable home and social conditions, is the conclusion of Dr. Thomas R. Garth, of the University of Denver.

The mixture of white blood in an Indian does little to raise his intellectual standard, Dr. Garth has found. Comparing the average intelligence rating of white children, which is 100, with the intelligence of full-blooded Indians, he found that the average for the Indian child is 70. The average for Indians with one quarter white blood mixed in their heredity is 74. Half bloods rate 75, and those with three fourths white blood rate 77. The increase in intelligence attributable to racial admixture is thus very slight.

Education and opportunity, on the other hand, mean a great deal to the Indian, as they mean a great deal to the Negro. Indian children in the U. S. Indian schools gain more in their ability to make higher ratings on intelligence tests than do the Indians placed in public schools. The Indian schools, which concentrate on the problem of teaching one type of pupil, have done more to develop the abilities and character of the Indian than the public schools have done.

The present policy of the government is to establish no new Indian schools and to absorb the young Indians into the public schools on the theory that they will become adjusted to the white man's point of view and his civili-

zation at an early age, and so will be better equipped to become self-sustaining, self-respecting American citizens.

## MOTOR CARAVAN TO TRAVERSE THE KALAHARI DESERT

A MOTOR caravan of scientists will soon attack the Kalahari desert, rated as the world's worst dry spot. Although not as extensive as the Sahara, it is more arid, and its borders are haunted by untamed native tribes hostile to all strangers. But the Vernay-Lang expedition of the Field Museum of Natural History expects to traverse it, and to explore the neighboring lands along the Botletle River, the Chobe swamps and the British protectorate of Bechuanaland.

The plans for the expedition were announced by Stephen C. Simms, director of the Field Museum. Arthur S. Vernay, an experienced big-game hunter, will sail for England on December 28. He will leave Southampton for Capetown on January 31. From there he will proceed to Francistown in the interior, where he will be joined by Herbert Lang, a former New Yorker who has become one of the best known of South African explorers. At Francistown the personnel of the expedition will be assembled and the party will fare forth into the desert.

Their principal object will be to seek new and rare species of animals and birds, to add to the world's stock of zoological knowledge. Two of the known but scarce species sought are the giant sable antelope, one of the rarest of hoofed mammals, and the honey bird.

The honey bird is a creature of almost mythical behavior. African travelers state that when one of them sees a human being it whistles to attract attention and then leads the way to a tree where wild bees have hived. It sits by while its human friends chop down the tree and take their fill of honey and then proceeds to feast on the comb that is left, and especially on the young bee grubs.

After leaving the desert the party will pass through the country of the Barotse, one of the most interesting of African tribes. Among them spitting is not "bad form" but good religion, being the best method of warding off evil spirits. This tribe also shuns contact with undesirable denizens of the other world by decking their heads with hares' tails, ducks' feet and ostrich plumes.

## ITEMS

GREAT increase in the number of cases "cured" of bone cancer in recent years was attributed by Dr. Joseph Colt Bloodgood, of Baltimore, to X-rays and to popular education in their value. Dr. Bloodgood addressed the Radiological Society of North America meeting at Toronto on December 5. Dr. Bloodgood and Dr. Russell L. Haden, of Kansas City, will receive the society's gold medal for their work with X-rays. "Before the discovery of the X-rays there was rarely if ever a verified cancer of bone cured by amputation. Since the discovery of the X-rays and up to 1921 the actual cures of cancer of bone, in the records of the Johns Hopkins Hospital Surgical Pathological Laboratory, were four per cent. To-day, now that more people know the importance of an immediate examination after the slightest warning or injury to a bone, the cures have increased to thirty-five per cent.

A NORMAL human lung rids itself of foreign material by means of a peculiar rhythmic motion of the bronchial tubes, Dr. H. A. Jarre, of Detroit, told members of the Radiological Society. This discovery was made with the aid of a new X-ray motion picture camera. "The pictures we take are slow-motion because the organic movement in the body will only tolerate a limited amount of X-ray energy," said Dr. Jarre in explaining the new machine, which is to be called the Cin-Ex Camera. The pictures are taken at the rate of one to four seconds, while the regular picture camera takes sixteen exposures per second.

IT seems probable that the Mayas who built the great pyramids and temples whose ruins are now the wonder of the world, followed the strange, and to us barbarous, custom of artificially deforming the skulls of their children, to give them what was doubtless considered an elegant and pleasing shape. That this art, followed by many primitive peoples and especially frequent among certain Amerind tribes, had its devotees at least among the Maya aristocracy is attested by two well-preserved skulls found in a tomb near Progreso, on the northern coast of Yucatan. The two skulls showed the same type of deformity. They had had boards bound against top and back in infancy, when the bones were soft, so that the headform assumed a startling and unnatural length.

WORDS, the most elusive and perishable of all scientific specimens, are being collected from representatives of a vanishing primitive race, the black natives of Australia, by Gerhardt Laves, graduate student in anthropology at the University of Chicago. Mr. Laves, who recently arrived in Australia, has just sent his first report to Professor Fay-Cooper Cole, of Chicago, who is spending the year in Washington as chairman of the division of anthropology and psychology of the National Research Council. Mr. Laves has located himself in a little town in the cane-farming district of northern New South Wales, not far from the coast. Here there are many of the natives, who work as field hands.

PHYSICIANS and pharmacists all over the country have been sent score sheets on which to record the popularity of various drugs and remedies which will be considered for admission to the new U. S. Pharmacopoeia, to be issued shortly. The U. S. Pharmacopoeia is the collection of formulas for drugs and remedies recognized as standard by doctors and pharmacists of the United States. It is official but has no connection with the federal government, being published by authority of the United States Pharmacopoeial Convention, a body composed of delegates from national or state associations of physicians and pharmacists, schools of medicine and pharmacy, and by certain government services. The convention, meeting once every ten years, selects a Committee of Revision to make desired changes in the Pharmacopoeia then in force and to issue a new one. It is to aid this committee, to be selected by the convention which will meet in Washington next May, that the present questionnaire has been sent out.