

AERONAUTICS-PHYSICS

Radio Enabled Scientists to Aid Stratosphere Flyers

Scientific "Ground Crew" Stood By to Serve as "Cerebral Pliers" in Case Advice Was Needed Above

See Front Cover
SCIENTIFIC experiments performed at world's record altitudes brought smiles to the faces of the scientists gathered at the headquarters of the National Geographic Society during the successful ascension of the balloon Explorer II on Nov. 11 to a new record height of over 74,000 feet.

By radio the scientists not only heard what was going on in the balloon but were able to act as "cerebral screwdrivers or pliers," as one of them put it. Dr. W. F. G. Swann, member of the scientific advisory committee of the flight, who had valuable cosmic ray apparatus automatically working aboard the balloon, so characterized himself in a two-way conversation with Capt. Albert Stevens. Dr. Swann was in New York City and Capt. Stevens was twelve miles up in the stratosphere over the now barren, winter-touched Nebraska countryside.

Nothing went wrong with the cosmic ray equipment, but by radio Dr. Swann with the "cerebral screwdriver" would have been able to offer some emergency advice if it had.

In Washington, Dr. Lyman T. Briggs, chairman of the advisory committee and director of the National Bureau of Standards, talked with Capt. Stevens about the progress of the experiment on measuring the electrical conductivity of the stratosphere. A smile lighted his face when "all's well" came through.

Catch Spores

Both Dr. Briggs and Dr. L. B. Tuckerman, also a member of the committee, leaned forward and cupped their ears when Capt. Stevens told of opening the apparatus for catching spores just after the balloon reached its peak altitude and began the descent. At each whirl of the automatic camera-exposing mechanism they relaxed, for they knew the multi-cameras were taking pictures of the ground below and making permanent records of the invaluable data being registered on scores of equipment dials. What those dials read during the flight will tell many things. How the tempera-

ture varies high in the stratosphere is only one, for example.

Of keen interest to the scientists were Capt. Stevens' observations on the color of the sky at the maximum altitude. Was it black as previously reported, or a normal blue? The answer seemed to be a very dark blue-black, almost a deep violet.

The two balloonists were able to look down upon what is normally considered the sky.

So much of the air and dust particles of the atmosphere lay beneath them that the white or hazy sky, made that color by the scattering of light, was down and not up. The sky above and outward toward the horizon was deep violet, which indicated that the red and green, or longer wavelengths, of light had been captured and dissipated by the lower atmosphere. If Capts. Stevens and Anderson had had ultraviolet-sensitive eyes, the sky above them would have been

brighter, with light shorter in wavelength or, what is the same thing, higher in frequency of vibration.

Capt. Stevens and Anderson were to an extent like men on the moon or on Mars in that they could look upon the earth from outside it. What they saw was very much like what could be seen from the earth's satellite or nearby planets, except they had a magnified view.

The human eyes of the two balloonists could not see through the mistiness of the atmosphere below them as well as the mechanical eyes that their gondola carried in the form of cameras with red and deep red filters. These infra-red photographs when developed will have detail that a mere human eye could not see.

Now It Can Be Told

The success of the flight hung in the balance for an hour and a half during preparations for the take-off.

Press reports merely said, "A rip in the balloon fabric was discovered during the inflation and repaired."

But both men in the balloon and scientist-members of the advisory committee on the ground held their breath every instant the balloon was aloft hoping the great 20-foot-long patch would hold.

It did, and the Army's non-commissioned balloon officers from Scott's Field have won thanks which in war time would merit military citation. Their



READY TO SOAR

Warmly clad for the ascent to unknown heights are Capt. Albert W. Stevens, left, commander of the expedition and Capt. Orvil A. Anderson, pilot. This photograph and the one on the cover were furnished by the National Geographic Society.

names are Master Sergeant J. H. Bishop and Staff Sergeant Olaf Jensen. Working with them were J. F. Cooper and J. R. Kelly of the Goodyear Company, which constructed the balloon bag.

Doing a balloon repair job is one thing when undertaken in a factory on a level work bench and quite something else when made in the midst of acres of fabric sprawled on the ground.

Shortly after midnight, as the inflation was started, the flood lights revealed the 20-foot rip near the equator of the balloon. The repair men measured it quickly, rushed to the nearby gondola house, cut out a suitable patch and came back.

With quick-drying cement so sticky that two pieces of fabric coated with it and once touched together will hold fast, they carefully worked their way around the more than forty feet of edge and overlap. Giant 1,000 watt electric light bulbs nearby provided the heat necessary, for the night was cold.

A single slip in the joining might have produced a wrinkle which could not simply be pulled out smooth. Get-

ting rid of a wrinkle required the application of carbon tetrachloride to dissolve the cement and then a new coating of the rubber cement. Each slip meant valuable minutes slipping by, which cut the time the balloon could be aloft.

While they worked feverishly, yet carefully, thoughts of stresses and strains in the balloon envelope which the patch would develop ran through their heads. The patch was strong enough, for it was heavier material than the fabric at the point of the rip. But its very presence set up stresses at the boundaries that lowered the factor of safety.

Almost impossible to calculate mathematically in exact degree, the factor of safety was lowered roughly by half through the presence of the patch. From 9 or 10 the safety factor was probably lowered to 5 or 6.

Cpts. Anderson and Stevens weighed the ascension pro and con. Pro won, and the flight succeeded. But only because the repair job, made so hurriedly, stood the test.

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ed that it was transmissible to human beings, and also that it might be beneficial for treating paresis. The more complete series of experiments conducted by Drs. van Rooyen and Pile confirm these preliminary findings, and emphasize that the use of the monkey parasite may sometimes be much more convenient and practical than that of the human malarial parasite carried by the *Anopheles mosquito*.

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ZOOLOGY

Black Wolf of Louisiana Takes His Own Photograph

BLACK wolves taking their own photographs at midnight, in the dark of the moon, in thick woods, down South.

It all sounds very spooky, but it really happened, and was nothing more than the carrying out of a carefully planned, scientifically prepared program.

The black wolves live in the Singer Wildlife Refuge, on the banks of the Mississippi in northern Louisiana. Their photographs were taken by flashlight, with cameras set off by cleverly concealed electrical apparatus. The photographs, published in a new bulletin of the Chicago Academy of Sciences, constitute the first known self-portraits of timber wolves made in their natural habitat.

The pictures were secured by Tappan Gregory, Chicago naturalist, with the collaboration of Robert S. Sturgis of Chicago and Stanley Young of the U. S. Biological Survey, and the assistance of a number of other Biological Survey workers.

To obtain an animal self-photograph, a charge of flashlight powder, with an electric fuse to fire it, is set on a post in a paraffined cardboard box. The wires from the fuse run to a device that closes the circuit when the animal brushes against an invisible fine wire or steps on a buried tread. So well concealed are these mechanisms that they do not show in the resulting photographs, and the animals might easily be a thousand miles from the nearest works of man, so far as visible evidence goes. The air-concussion from the explosion of the flashlight powder is used in another mechanism to snap the shutter of the camera, making the whole process automatic.

Making wolves and other beasts of the forest take their own pictures at night, is not as simple as it sounds, however. Mr. Gregory tells of a score of vexations that beset the man who hunts wolves with a camera. Other animals,

MEDICINE

Monkey Malaria Now Used In Treating General Paresis

MONKEY malaria has been successfully used for treating general paresis, the distressing mental illness which is an end-result of syphilis.

For certain cases, at least, this latest method of relieving an age-old scourge may prove to be better than infecting the patients with strains of human malaria, as has been done so widely and usefully since the chance discovery in 1920 of Prof. Wagner von Jauregg in Vienna.

This new method has been developed by Dr. C. E. van Rooyen, Halley Stewart Research Fellow at the University of Edinburgh, and Dr. G. R. Pile, senior assistant medical officer of the Midlothian and Peebles Asylum. (*British Medical Journal*, Oct. 12, 1935.)

One of the chief advantages is that the monkey infection can in some circumstances be kept much nearer to the doctor's hand than the human, since by suitable treatment a monkey can be kept in an infective condition for at least six months and in a laboratory close to centers of population which may be far distant from sufferers from human malaria. Other advantages are the comparatively

short period of incubation with the monkey infection, the gentle onset of fever with this disease, and the particular ease with which the fever can be terminated with quinine.

Parasites of the malaria type occur commonly in the blood of monkeys, but are more or less harmless so long as they are confined to the species of monkey which is accustomed to the particular strain concerned. Not until a few years ago was it discovered that heavy infection of a malarial kind could be produced by inoculating the common Indian monkey with the parasite from another species. The strain of this parasite that has been maintained for some two years at the London School of Hygiene and Tropical Medicine was used by Drs. van Rooyen and Pile for their new attack on paresis.

This strain has been much in demand for experimental researches, and has been transmitted, via blood sent by mail, to a number of centers in Europe, and to New York, successfully withstanding the period of twelve days involved in the last instance. Early experiments with this strain of the monkey parasite show-