scientific research, not because of any doubt as to its value or logic, but because of insidious dangers which are perhaps too obvious to require elaboration. If government financial support should carry with it government control of research programs or research workers, or if it should lead to political influence or lobbying for the distribution of funds, or if any consideration should dictate the administration of funds other than the inherent worth of a project or the capabilities of a scientist, or if the funds should fluctuate considerably in amount with the political fortunes of an administration or the varying ideas of Congress, then government support would probably do more harm than good, for large support by government would tend to discourage the support by private philanthropy which has been the backbone of our scientific progress in the past and which will doubtless continue unless discouraged.

On the other hand, if government support of science were undertaken on an adequate scale and administered with the skill and experience that have already been developed in the handling of minor funds for science, such a program of federal support would certainly be a sound national investment, would be an uplifting intellectual and social influence and might well mean the difference between prosperity and economic catastrophe at no very distant date.

In this address I have raised certain questions which have many aspects and whose proper answer I do not know. They are questions, however, which challenge constructive thought and it may be that their wise solution can be attained.

SCIENTIFIC EVENTS

BRITISH MUSEUM'S EXPEDITION TO EAST AFRICA

THE trustees of the British Museum, according to the London *Times*, have arranged an expedition to British East Africa to study the ecological relations of animal and plant life in different areas of high altitude. It is well known that the combination of a nearly vertical sun, high altitude and copious rain has resulted in extraordinary development of vegetation, plants known in temperate regions of the size of shrubs reaching the size of trees, but no intensive and systematic study has yet been made of these areas. It is intended to ascertain what insects assist in fertilizing the flowers of the giant lobelias and groundsels.

The leaders, Dr. F. W. Edwards, entomologist, and Dr. George Taylor, botanist, from the British Museum (Natural History) sailed from England recently and will be away six months, having about four months for their work. The East African Governments are taking great interest in the expedition. The exploratory work will be almost entirely in Uganda, and the government is helping in many ways by financial aid and the loan of transport, and by allowing certain of their officers interested in either insects or plants to join the expedition for some period of its work. The expedition will also be joined by Mr. P. M. Synge, of the University of Cambridge, as assistant botanist and photographer, and Mr. John Ford, animal ecologist, of the University of Oxford, as assistant animal ecologist; both of them are already in East Africa. Allen Turner, of the Coryndon Memorial Museum, will act as guide and assist in collecting insects in the Aberdare Mountains. Of the Uganda officials, Mr. E. G. Gibbons, of the Medical Service, will be assistant entomologist and act as camp steward for the whole period of the expedition; G. L. R. Hancock, of the Agricultural Service, will assist in the camp organization and in collecting insects and birds on the Ruwenzori Range; A. S. Thomas, of the Agricultural Service, will be assistant botanist during the expedition's work on Mount Ruwenzori, and W. G. Eggeling, of the Forestry Service, will spend about a fortnight with the expedition as assistant botanist. Mr. J. F. Shillito, of the Nyakasura Mission School, Fort Portal, will accompany the expedition as guide and assistant collector on the northern side of the Ruwenzori Range.

The leaders were expected to arrive at Mombasa on October 19, and after completing their arrangements they and the remainder of the party, who were to join the expedition at Nairobi, would spend the last week in October in the Aberdare Mountains in Kenya Colony. Their next objective is the Mufumbiro Range in the Birunga Mountains, where they will stay two or three weeks. In December they will return northwards and stay on the southern side of Mount Ruwenzori until the end of the month. At the beginning of January they will proceed to Fort Portal and stay on the northern side of the Ruwenzori Range until nearly the end of the month. On the way back to the coast they will spend three or four weeks collecting on Mount Elgon, and some of the party will proceed to the isolated peak of Moroto if conditions are favorable. The leaders expect to return from Mombasa to England on March 9.

RADIO ECHOES

THE *Technical News Bulletin* of the National Bureau of Standards reports that special signals are being transmitted from two European radio stations for the study of long-delay echoes. The signals and

the whole undertaking are adapted to the participation of persons all over the world who have high-frequency receiving sets, no technical training being required. Long-delay echoes are a most surprising and baffling phenomenon. J. Hals was listening in Norway, one day in 1927, to telegraphic signals from station PCJJ in Holland on a frequency of about 9,600 kc/s. Some of the signals were followed, after about 3 seconds, by a faint echo or reproduction. Echo signals occurring one seventh of a second after an emitted signal had been well known, being due to the reception of waves that had traveled all the way around the earth. But the discovery of echoes after a materially greater interval than a seventh of a second immediately raised the puzzling question of where such an echo could come from.

The phenomenon has been verified in a few scattered observations by Dutch, British and French engineers. Echoes have been heard from 1 to 30 seconds after the emitted signal. Not enough is known, however, to determine what causes the echo signals nor how they are propagated. Two theories have been proposed. One, by Dr. C. Størmer, of Norway, is based on the assumption that there are streams of electrons in space some hundreds of thousands of miles out from the earth's equator, converging in a vast toroid upon the magnetic poles of the earth, and accounting for the aurora borealis or northern lights. Dr. Stormer supposes that the signals are reflected from these electron streams in space. According to the other theory, advanced by Dr. B. Van der Pol and Professor E. V. Appleton, these echoes are due to a slowing up and reflection of the waves by a peculiar distribution of ionization in the very high levels of the ionosphere (that portion of the atmosphere 65 miles and more above the surface of the earth which is responsible for all long-distance radio transmission).

The British Broadcasting Corporation through its magazine, *World-Radio,* and with the aid of Professor Appleton, has inaugurated a worldwide endeavor to learn more about these long-delay echoes. Special emissions are provided from two high-power, high-frequency stations to facilitate observations by anyone who cares to listen with a high-frequency receiving set. Listeners in all parts of the world have been enrolled in the endeavor, over 10,000 of them in Great Britain. It seems likely that information of unique value to science will result, and an orderly explanation of the curious phenomenon developed, when definite data are secured on the frequencies and the times of day and season at which these echoes occur, their intensities, the area over which a given echo is heard, their relation to magnetic storms, sunspots, etc.

Dr. J. H. Dellinger, chief of the radio section of the National Bureau of Standards, would be very glad to have any successful reception of long-delay echoes in the United States reported to him, and will relay the information to the British authorities who are coordinating the investigation for the world as a whole. Observers should give the identifying letter of the signal observed, the time to the nearest second at which the direct signal was heard, the time to the nearest second at which the echo was heard, an estimate of the relative intensities of direct signal and echo, a description of the sharpness or apparent shape of the echo, and any pertinent information on interference, fading of signals, or other conditions of the observations.

Dr. Dellinger would be interested also in receiving reports on reception of long-delay echoes on any other stations, especially high-frequency stations in the United States. It may, on the other hand, be difficult to be certain of any echoes observed because of the lack of silent periods as in the special signals from the two European stations.

LOCAL HEALTH SERVICE IN RURAL AREAS

IMPROVED rural health standards, which are summarized in the Boston *Evening Transcript,* will be sought by the public health service in using a $1,000,000 grant allotted from the Federal Emergency Relief funds. Surgeon-General Cumming has issued regulations governing participation of the public health service in the establishment or maintenance of permanent local health services in rural areas.

The service will give financial aid through state health departments toward maintaining existing county or district health units when local funds available are insufficient. Also it will undertake establishment of new full-time rural health units, where needed, when local funds available are insufficient to meet the entire cost. It will not contribute to any project in which less than fifty per cent. of the cost is borne by state or local authorities, and where state or local authorities can meet more than fifty per cent. of the total cost of a project they will be expected to do so. The Federal service will not contribute to any project in which less than twenty-five per cent. of the total cost is borne by local authorities.

Under the regulations, the allocations for rural health maintenance will be made only where the county or district unit is under direction of a whole-time medical health officer whose training meets the requirements recommended by the joint committee on qualifications of county health officers and adopted by the conference of state and territorial health officers. The personnel of the unit must consist of not less than a