extend into the surrounding savannas. To the north they are limited by the 40-in. isohyet which here seems to form the natural boundary of the West African subregion. To the east they extend into the Kakamega forest, and the limit here seems to be an altitudinal one, about 5,500 ft. in the case of one species and about 6,000 ft. in the case of the other. To the south this difference allows one species to spread up on to the Rhodesian plateau, while arresting the other at about 3,500 ft. and confining it to the western subregion. Evidence was brought to show that the effect of rainfall on distribution may be largely indirect, the operative factor being the subsoil water-level which determines the nature of the vegetation, and so of the microclimate. The existence of a West African savanna species with a discontinuous distribution in the coastal area of Natal and Zululand indicates a former much wider extension of the central African forests. The affinities and distribution of the East African Highland fauna were discussed, and attention was directed to the existence of a typical member of the African group of *Stegomyia* in a restricted area of eastern Asia. This was discussed in relation to the origins of the African fauna, and notes were given on geographical variation and the zoogeography of introduced species.

Prof. P. C. C. Garnham, of the London School of Hygiene and Tropical Medicine, then read a paper on the distribution of blood protozoa in Africa. He said that, with the exception of a few groups of special importance, this was practically a virgin field. In addition to the two factors discussed by previous speakers, the organism and its environment, it was necessary to take account of two more, the host and the vector. There could be no zoogeography of the blood protozoa *per se* but for the fact that there occur cases in which the host and the vector are present but the parasite is not. The factor of human interference was of special importance because man could act separately on parasite, host or vector, exterminating or reducing them or increasing their numbers by importation, domestication or transportation to more suitable environments. The best parasites to study would be those whose hosts are static or have a limited range. Unfortunately, data concerning these are scanty. Examples were then given from the malaria parasites, of which the human forms occur throughout Africa, except in deserts and above certain altitudes (about 9,000 ft. in equatorial latitudes), the related Hæmoproteidæ, the hæmogregarines, the trypanosomes and the piroplasms, all of which show interesting examples of discontinuous or restricted distributions.

Dr. W. E. Kershaw, of the Liverpool School of Tropical Medicine, followed with a short paper on the distribution of human filarial parasites in West Africa. He said that the distribution of these parasites could be related in varying degrees to the vegetational zones, though less clearly than in free-living animals. The human parasite *Loa loa* occurs, it is believed, also in monkeys. It is transmitted by biting flies (*Chrysops*), which feed on monkeys in the canopy and on man either on the ground or in houses built on ridges level with the canopy. The parasite is confined to the evergreen forest and disappears as soon as the forest fringe is crossed. *Acanthocheilonema perstans* is also ubiquitous in the forest and absent from the mountain grassland, despite the presence there of one of its vectors (*Culicoides* spp.). It is also abundant, however, in the arid, eroded grasslands of the Bauchi plateau. It seems, therefore, that, in this case, very different vegetational zones can provide suitable conditions for the maintenance of the parasite.

This session concluded with a paper by Dr. E. B. Worthington, of the Conseil Scientifique pour l'Afrique au Sud du Sahara, on the distribution of freshwater organisms. He said that the continent could be divided into ten aquatic regions, but confined his remarks mainly to the eastern and central area comprising six regions, the Nilotic, Victorian, Tanganyikan, Nyasan, Zambesian and East Riverain, pointing out that these were not all coincident with drainage basins because in some cases differences in ecological conditions formed more potent barriers than dry land. Small freshwater organisms and even fish may become airborne at times. Discussing the mode of origin of present-day distributions, he suggested a hypothesis, based on past tectonic and climatic changes, to account for the picture now presented by the great lakes of East Africa. This hypothesis, he said, had first been put forward twenty years ago, but it had stood the test of time and still seemed worth restating. Active work was in progress and details were continually being filled in. Finally, he directed attention to the great interest of studies on such phenomena as the *Haplochromis* species swarms of Lake Victoria for general evolutionary theory and for our understanding of the mechanism of speciation. He said that, despite criticism, he still adhered to his opinion regarding the importance, in this connexion, of the absence of predators. He concluded by referring to the factor of human interference. This had a long history but had recently been intensified by such developments as fish farming and the use of fish in the control of disease. In some cases it was irretrievably altering local conditions before sufficient had been learnt about them.

The whole of the evening session was devoted to an open discussion. Contributions of the principal speakers will be published in full, with a report on the discussion, in the *Proceedings of the Linnean Society*. P. F. MATTINGLY

THE BIRTH OF FLIGHT*

By the RIGHT HON. LORD BRABAZON OF TARA, P.C.

ALTHOUGH from earliest times smoke must have been noticed to arise from fire, it was not until the eighteenth century that the brothers Montgolfier realized the principle of using hot air to make a balloon rise. Yet such a primitive people as the Australian aborigines invented the boomerang, which aerodynamically shows three remarkable characteristics : the lift obtained from a surface which is flat on the underneath but curved on the top ; the recession of the axis of rotation due to a force on one side of the rotating body ; and the auto-rotating effect of a boomerang due to the change of kinetic energy into rotational energy (at the end of its flight the boomerang rotates more violently than when launched).

Nature provides a varied selection of methods of flight. Thus there are the gliding seeds, of which a number among the conifers give remarkably long glides, and auto-gyration in Nature is illustrated by

* Substance of a Friday Evening Discourse delivered at the Royal Institution on February 20.

the fall of an ash seed which, with but one wing, rotates at a high speed and can be carried a long way by the wind. The flapping wing is the most obvious mechanism of flight observed in the animal world ; but the position occupied by birds both in normal flight and in landing clearly shows the impossibility of designing a machine along these lines by an engineer.

Mr. R. T. Parham, of the Society of Model Aeronautical Engineers, has built two remarkable flying models (demonstrated during the Discourse) : one a helicopter which remains almost stationary in mid-air, and another of the flapping wing type, weighing complete less than $\frac{1}{4}$ oz., which performs most creditably.

It is curious that nobody seems to have studied the gliding of birds with wings of high aspect ratio (that is, long and narrow), such as the gull or albatross, which can achieve a gliding angle of about 1 in 12 (though modern gliders can now exceed this, the limit being about 1 in 42) ; had this type of gliding in Nature been studied earlier, there is nothing that our ancestors could not have constructed along these lines, even with the materials available two thousand years ago.

Sir George Cayley (1774–1857) was a pioneer who should be remembered, for not only did he invent the hot-air engine and the tension-spoke wheel, but he also made very remarkable model gliders. Cayley had correspondence with Stringfellow regarding the building of a big machine with steam engines, and a quotation from one of his letters—"We must go slow, I assure you before flight is safe a hundred necks will be broken"—is a classical understatement in prophecy.

The Royal Aeronautical Society was born in 1866 ; but it was not until 1896 that Lilienthal, a very great man, started his series of glides which may be looked upon as the basic beginning of modern flying. Chanute biplanes with movable surfaces were the inspiration of the experiments in gliding made by the Wright brothers, and in 1902 they made more than a thousand glides, some as long as 600 ft. in winds up to 36 m.p.h.

Putting to one side the flights of Santos Dumont with powered airships early this century, the history of power flight is marked by the experiments in 1894 of Sir Hiram Maxim and by the machine which S. P. Langley built in the United States. After efforts had failed to launch the Langley machine from the air off a scaffolding instead of along the ground, the experiments were abandoned on December 8, 1903, and nine days later, on December 17, the Wright brothers made their first flight ; whether Langley's machine would or would not have flown is problematical, but if it had been launched another way it certainly should have risen.

Remarkable developments in the construction of engines were made by the French with their rotary radial engine and the V-type *Antoinette*. The great *Antoinette* machine flown by Latham only just failed to cross the English Channel on two occasions, and this feat was achieved by the Blériot machine in 1909 with its three-cylinder air-cooled engine. Although the Americans and French would appear to have dominated the early stages of power flight, yet the British achievements with machines flown by Cody, Roe, Moore-Brabazon and others should not be overlooked, and remarkable work was done by Edward Busk at the Royal Aircraft Establishment well before the First World War.

PARLIAMENTARY AND SCIENTIFIC COMMITTEE

ANNUAL REPORT FOR 1952

THE annual report of the Parliamentary and Scientific Committee for 1952* lists addresses and discussions at meetings of the general committee during the year. Included among these addresses are that by Lord Woolton on government organizations concerned with research and technology, by Dr. J. B. Conant on Anglo-American scientific relations, by Mr. T. M. Herbert on "The Present Scope of the Railway Research Programme" and by Sir Andrew McCance on "Application of Research in the Steel Industry". Addresses were also given on "Management and the Better Use of Science and Technology in Industry", and, followed by discussions, on "Foot-and-Mouth Disease" and the "Shortage of Science Teachers and its Consequences".

The report records the motion tabled on December 5 by Mr. Austen Albu but not debated ; this motion, after recording the necessity for a great expansion in exports—particularly of those goods which require for their design and manufacture a high degree of research, technological development and scientific organization of production—urged the Government to take all possible steps to accelerate the more intensive application of the results of research and scientific discovery. For that purpose, it recommended that particular attention should be paid to the importance of ensuring : (1) adequate and long-term arrangements for financing industrial and agricultural research, whether by individual firms, research associations, government establishments or other means, and all consequential action necessary to ensure the fullest appreciation and application of the results of that research ; (2) the use of the capital investment programme to encourage more rapid and effective applications of the results of scientific research in the agricultural, industrial and Colonial fields, with adjustments of taxation to assist small businesses engaged on work of scientific development ; (3) the provision of the best possible scientific advice at high levels in connexion with all policy decisions relating to capital investment, industrial re-organization and controls concerned with the use of man-power and materials ; and (4) an increase both absolute and relative in the number of scientific workers and technologists in all industries and accordingly the most rapid possible expansion of the facilities for their education in the universities, technical colleges and other educational establishments by the provision of sufficient money and materials and by steps to improve the supply of science teachers for the schools.

As a result of further meetings of the Colonial Sub-Committee, a memorandum dealing with questions relating to education, agriculture and fisheries, health, forestry and the future of the Colonial Development and Welfare Fund was prepared, and approved by the General Committee on December 16. In connexion with the last-named Fund, the memorandum included the following statement.

"All plans for the effective application of science and technology in the Colonial territories depend to a large extent on the availability of funds from this source, and as most of these plans are inevitably of a long-term nature it appears desirable that the

* Annual Report of the Parliamentary and Scientific Committee. Pp. 24. (31 Palace Street, London, S.W.1.)