sperm of a selected male is artificially introduced into the female, the greater degree of control over the process makes it possible to employ much smaller quantities than Nature provides, and the number of offspring which can be obtained from a single male may therefore be multiplied some hundreds of times. This makes it possible to ensure that only the very best animals are used as fathers and the constitution of poor stock may thus be quite rapidly improved. The method has already been tested out on quite a wide scale and it has been found possible to send the sperm of desirable males for very considerable distances by air. The method has a very great part to play in the immediate post-war world when we are confronted with the problem of restoring the scorched earth of eastern Europe.

A development of the technique of artificial insemination which seems likely in the next ten or twenty years is the artificial determination of sex by the separation of male- and female-determining sperm. Such a possibility is, of course, a favourite theme of all kinds of charlatany and pseudo-science. But some recent work, particularly in the U.S.S.R., indicates a serious possibility that the problem will be solved by the method of electrophoresis, that is to say the passage of an electric current through a suspension of sperm, causing an accumulation of the female-determining sperm at the anode and of male-determining at the cathode. There are still many technical details to be worked out, such as the most favourable salt solutions, temperature, etc., but it would be a bold man who denied the possibility of a fairly early solution of the problem. The importance of such a method for the dairy and poultry industries would be profound, but its application to human affairs obviously presents aspects of great difficulty.

It would be in the highest degree desirable to bring about a similar increase in the reproductive capacities of the females of domestic animals. This may be too difficult a task, but some increase can already be envisaged. The administration of suitable hormone preparations, for example, can bring a female into the breeding condition at a time of year when she would normally not be ready to receive the male. Some success has already been achieved in obtaining in this way two crops of lambs a year instead of one. Again, when a female is ready to breed the number of ova produced, and thus the number of young born, is rather restricted in many of our domestic animals, and treatments are being worked out which should make it possible to cause the formation of more ova. This will, in the first instance, enable us to cause a regular production of twins by our beasts. For particular purposes of breeding from exceptionally favourable females it may prove possible, by a technique which has already been used in rabbits, to increase the number of ova many times and to transplant some of them to the uteri of other females, which would then act as foster-mothers from the very earliest stages of the animal's development.

The control over developmental processes given us by the use of hormones may play a part in several other ways. We are beginning to have some understanding of the role of such substances in lactation. We know there are hormones which control the initial development of the mammary glands as well as the intensity of their secretion, and again it has proved possible to influence to a significant degree the content of milk in several important constituents. All these investigations, still essentially laboratory matters, are likely fairly soon to reach the point

where we can begin to apply them in practice, when they may open up great possibilities of control over our milk supply, particularly in the difficult winter months.

A somewhat more speculative possibility is the employment of hormones for the control of size. In some animals at least, for example, the rat, it has been possible to obtain considerably increased growth by suitable hormone injections. Further, the embryo of a mammal is in a somewhat similar position as regards its mother as the plant grafts mentioned earlier; an effect exerted primarily on the mother may, by influencing the early development of the foetus, produce an alteration which will affect the development of the next generation of young and thus be transmitted potentially for ever. That such an influence of the mother on her offspring of the first generation is a possibility is known from crosses between large and small breeds of horse, in which the size of the mother has a great effect on the size of the foal. An effect in more remote generations has been suggested by some workers using extracts of the thymus gland on rats. The matter is still very uncertain, but if it can be put on a firm basis very important results might be obtained. A further and still more speculative possibility may perhaps be worth mentioning; it has been claimed that the very early administration of growth-promoting extracts has a differential effect on those organs which develop most rapidly at early stages, particularly the brain. It is not clear whether the swollen-headed rats so produced were any cleverer than usual, but the possibility of such an effect may be worth considering, if only as a day-dream to solace the despair to which most educators are from time to time reduced. Let us hope, however, that man is already intelligent enough to use, for his benefit and not only for his destruction, the gifts which science offers, without waiting for a hormonally induced enlargement of his brain.

OBITUARIES

Sir Francis Younghusband, K.C.S.I., K.C.I.E.

SIR FRANCIS YOUNGHUSBAND, whose death occurred on July 31, was an outstanding example of that rather rare combination—a philosopher and a man of action. A passionate admirer of the beauties of Nature he had, almost from childhood, pondered and studied the mystery of living things—their origin, their evolution and their spiritual significance—and during his later years he embodied his thoughts and his philosophy in a number of books and papers.

His more practical activities as a man of action found their chief outlet shortly after he arrived in India as a young officer of cavalry. His first journey, in 1886, at the age of twenty-three, was made in company with Mr. H. E. M. James of the Bombay Civil Service, and Mr. H. Fulford of the Chinese Consular Service, when they travelled through large areas of Manchuria and explored in particular the range known as the Long White Mountain. An account of this journey was given by Mr. James in his book of that name, in which he pays tribute to the energy and ability of his young companion, who made himself invaluable in a variety of activities—surveying, the collection of entomological and botanical specimens, sketching, and so on. These wanderings

extended over a period of eight–nine months, and were immediately followed by Younghusband's famous journey across Central Asia from Peking to India, culminating in the crossing of the hitherto unknown Mustagh Pass into Baltistan. This journey is described in his own book "The Heart of a Continent", one of the classics of Asiatic (or indeed of any) travel, admirable alike both for the intrinsic interest of the journey itself and for the style in which the book is written. The publication of this book at once placed Younghusband in the foremost ranks of contemporary travellers and writers.

From this on his active life, both as an officer of the Indian Foreign and Political Department and as a traveller, continued almost without a pause until his retirement on pension in 1910. During the years 1888–91 he made a series of journeys through the wild areas of Central Asia, the Pamirs, Kashgaria, and certain hitherto unexplored tracts lying to the north of the Karakoram and Mustagh ranges. These journeys had a political as well as a geographical interest and importance. Later he served in Chitral, and travelled in South Africa as *The Times* correspondent just prior to the outbreak of the Boer War.

Younghusband was thus a well-known figure with a world-wide reputation when, early in 1903, he was appointed by the Viceroy, Lord Curzon, as commissioner in charge of the projected mission to Tibet, then in process of preparation on the Darjeeling frontier.

It was here that I first met him, and in the capacity of secretary and interpreter to the mission I was constantly by his side until he returned to India some sixteen months later on the conclusion of his task, and I was thus able to get to know him intimately and to appreciate his character and his capabilities. A man's character may often, I think, be estimated not so much from his conduct on the great occasions and crises of his life as from his reactions to the petty affairs of everyday and the small worries and mishaps inevitable during travel or a military expedition. Of these we had our full share during the mission—cold, fatigue, boredom, and at times danger and excitement. During all these critical months, when the chief responsibility for success or failure rested on his shoulders, I never once saw him, even for a moment, in the slightest degree flurried, impatient, cross, or in any way perturbed. He remained always cheerful and good-humoured, and apparently indifferent to the small matters which affect ordinary mortals. This was not a pose. It was an attitude of mind based upon his essential equanimity. He knew very well what he wanted and how he proposed to get it, and having thought all this out carefully he was able to relegate all minor considerations to their proper place. But at the same time when any major difficulty or danger, or difference of opinion arose which seemed likely to interfere with his plans or the progress of the mission, he was persistent, inflexible and courageous to a degree.

It was, in fact, greatly due to this combination of qualities—on one hand infinite patience where patience and conciliation appeared advisable, and on the other readiness to fight and to accept risks and responsibilities at critical moments—that our mission succeeded as it did.

It is an old story now and has often been told, but it should be remembered that it was not an easy business. The Tibetans were obstinate and pugnacious; and the dispatch of a mission with a small

military escort into the depths of Asia, hundreds of miles beyond the Himalayas, and separated from its base by several lofty mountain passes and (when at Lhasa) by a great unbridged river, resembled more the adventures of Cortes or Pizarro than modern military and diplomatic procedure. There were occasions when failure seemed imminent and inevitable. But, as I have remarked above, it was the combined tact and firmness of the Commissioner which always overcame the crisis, and which eventually secured not merely a favourable treaty with the Tibetans but also the goodwill and friendship which have lasted from that day to this.

I have dwelt at some length on this Tibetan affair, partly because it is the culminating point in Younghusband's career as a man of action, and partly because it presented such an opportunity for the exercise of his peculiar qualities. He retired from the service a few years later, and during the remainder of his life devoted himself to work with the Royal Geographical Society, the organization of the Mount Everest expeditions, and to writing.

During these latter years he published a number of volumes dealing with his favourite subjects: the beauties of Nature, Indian aspirations, and philosophical musings and conclusions. Of these latter the volume which perhaps summarizes most fully the general trend of his mind is "The Living Universe", published in 1933. In this book he traces the genesis and development of this planet from fiery vapour to the present day, and he outlines his conclusions on the vexed and oft-debated question of the origin and evolution of life and intelligence from apparently dead matter. Space does not permit of any attempt to follow him in this thesis, but a perusal of the book will give a good general conception of his attitude towards such questions and the evolution of higher types of beings on this and possibly on other planets; and in some most interesting passages he reveals certain mystical experiences which have come to him.

It was during these latter years, too, that Younghusband organized the World Congress of Faiths, representing all the world's chief religions. The catholicity of his views, and the wide respect which these views commanded, were well illustrated in the memorial service held at St. Martin-in-the-Fields on August 10 when, besides the customary Christian prayers and hymns, extracts from the Hindu, Jewish, Buddhist and Moslem scriptures were read by representatives of each of these faiths.

Such a character is rare, and when his achievements as a soldier, explorer and diplomat are borne in mind, perhaps unique. His friends will always remember him with affection for his patience, tolerance, good humour, simplicity and utter sincerity.

FREDERICK O'CONNOR.

Mr. D. B. Mair

DAVID BEVERIDGE MAIR, who died at Galashiels on July 21, was well known as a mathematician and was a distinguished member of the Civil Service. He was born in Canada on March 24, 1868. His father, who was a Presbyterian minister, of an Aberdeen family, died young. David Mair was at school at Dollar Academy. At the age of sixteen he entered the University of Edinburgh and obtained first class honours in mathematics and in natural philosophy. He went to Cambridge as a scholar of Christ's, and was second wrangler in 1891. In 1893 he was awarded a