The building (Fig. 1) is in the style of the English Renaissance, thus agreeing with the Bute Medical Buildings to which it is attached, and which were erected by Lord Bute, the same architects having prepared the plans. The main door faces the west and Queen's Gardens, and there are two stories. At each end of the roof is an open stonework canopy, the monogram of Prof. Pettigrew and his widow being engraved beneath.

The sunk floor contains long passages and spaces for storage and ventilation, and gives access to pipes and wires. The ground floor (Fig. 2) covers an area of about 130 feet by 75 feet, the entrance, already noted, being at the north-west corner, and leading to a vestibule, shut off by swinging and partially glazed doors, and a hall 65 feet long by 17 feet broad, with a spacious bow-window in the centre commanding views of the ancient halls of St. Mary's College and the principal's house, as well as the fine new Carnegie Library. At the eastern end of the hall are blank spaces which indicate where doors will in future open into a large lecture-theatre (not yet built). The ethnological collections will probably be placed in this hall. A stair leads from the north-western end of the hall to the upper floor, and in the spaces of the projecting tower are sinks and lavatories. The west front is devoted to teaching and administration, and is

— Ground Floor Plan —

FIG. 2.—For scale see Fig. 3.

separated by a long corridor from the main hall of the museum. It contains from north to south a curator's room, a class-room for practical zoology, 62 feet by 17 feet, a research-room, and a professor's room; near which is a turret-stair leading to the upper floor and to the roof. A corridor about 50 feet long and 17 feet broad extends along the southern face, with a spacious bow-window as in the north corridor; and, as the botanical department adjoins and communicates with its eastern end, it is probable that this area will be devoted to the botanical collections.

The main hall of the museum on this floor is 90 feet long by 40 feet broad, and it passes upward to the roof, so that large skeletons, such as those of cetaceans, may be suspended in mid-air, rings and hooks being fixed to the beams, whilst a belt of wood below the cornice gives facilities for hanging pictures. The roof is doubly glazed, the inner layer being formed of muranese glass for diffusing the light, which is northern throughout, except at the lateral windows of the corridors. The floor is handsomely paved with marble mosaic, a special gift of Mrs. Pettigrew. This large hall will probably suffice for the mammals and birds, and, it may be, for the reptiles.

The upper floor (Fig. 3) has the same general area as the ground floor; but, since the great hall goes to the roof, only the western, northern, and southern galleries are available for cases. The spacious western gallery is about 122 feet long by 28 feet broad, and

the inner borders of both it and the adjoining galleries are flanked by a series of Roman Doric columns, the effect of which is agreeable from all points of view. The entire upper floor is fireproof, being composed of iron and concrete with solid interlocked maple blocks. The north and south galleries are each about 70 feet long by 17 feet wide, a large bow-window occurring in the centre of each.

The extensive series of spirit preparations of the marine invertebrates (chiefly British), the collection of fishes and their eggs and early stages, will find space on the main part of this floor and along the northern corridor, but wall-cases are still required. Table-cases now in the old museum will occupy much of the floor. The southern corridor, which communicates by a door with the Bute Medical Buildings and is on a level with the department of geology, will probably contain the larger part of the geological and mineralogical specimens.

The munificence of Mrs. Pettigrew has thus solved the long-continued problem of museum accommodation, while at the same time it has produced a lasting memorial to a valued colleague, whose early researches on the muscular fibres and nerves of the mammalian heart, of the muscular fibres of the stomach and of the bladder, and whose ingenious ex-

— First Floor Plan —

FIG. 3.

periments on flight and animal locomotion are worthy of all praise. Indeed, as regards flight, it needed but a modern petrol engine to have raised Prof. Pettigrew's marvellous apparatus in the air, instead of flapping along the ground under the weight of a heavy steam-engine.

W. C. M.

THE PRESERVATION OF THE AFRICAN FAUNA AND ITS RELATION TO TROPICAL DISEASES.¹

WHEN educated opinion in Europe, especially in England, could take stock of the ravages of British and Boer hunters who were exterminating the wonderful mammalian fauna of South Africa, a movement set in in the opposite direction for pleading with the British, German, French, and Belgian Governments to discourage or prohibit the destruction of wild life in their African territories. This desire to preserve the fascinating aspects of wild nature began to take a more acute shape in the last decade of the nineteenth century, and various African administrators, who were naturalists as well as sportsmen, induced their Governments to allow them to proclaim certain areas in Africa to be game reserves in which more or less complete protection was afforded to beasts, birds, and reptiles. The British

¹ "Further Correspondence Relating to the Preservation of Wild Animals in Africa." [Cd. 5775.] (H.M. Stationery Office.) Price 3½d.

Foreign Office took up the matter in the early nineties, and through Sir Clement Hill and others made arrangements with European nations for the institution of game regulations throughout Africa which might check the devastating raids of sportsmen. The movement was accentuated by a revelation of the wonders of the equatorial East African fauna, which really rivalled those of Cape Colony and Natal in the days of Roualeyn Gordon Cumming.

European opinion in Africa became sharply divided into two classes. There were the officials and some of the missionaries who, backed by the men of science of Europe, thought quite as much of the natural wonders of these African States, and regarded them as being an asset of equal importance with the profits which might be derived by the opening up of the country under the energy of European planters or capitalists. To some of us the lion, the elephant, the giraffe, the eland, kudu, sable antelope, and oryx were quite as important subjects of the new protectorates, and as deserving of reasonable protection, as the human inhabitants, and from an æsthetic point of view this argument was reasonable. On the other hand, the European immigrants and most of the natives clamoured for the right to destroy the wild game when and as they pleased. The Europeans, indeed, were seized by a kind of lust for blood which distracted them a good deal from the coffee, cotton, sugar cane, rubber, and tobacco planting which should have occupied most of their energies. They could not let an elephant or a buffalo, a rhinoceros or a giraffe, live within thirty miles of their station. The natives, forbidden to kill one another any longer, and unable to fight with the European, wished to devote their warlike enterprise to the destruction of big game, especially as the products of the chase were so marketable.

On the whole, the wishes of the official element, supported by the home Governments, prevailed. Game reserves were instituted, and to a great extent made valid by the application of laws. Highly-priced licences checked indiscriminate shooting on the part of Europeans, while the natives were seldom able to obtain arms of precision necessary to the rapid slaughter of game. So it was hoped in time a balance might be struck, and all the European possessions in Africa be studded with beautiful Government parks and paradises, in which would be preserved from extinction the wonderful fauna and the interesting flora of the most backward of the continents. In East Africa it seemed as if this policy of game preservation was a good one, even from a commercial point of view. The marvellous natural zoological gardens which it produced along the track of the Uganda railway brought every winter hundreds of well-to-do tourists, who spent much money in the country and amongst the natives. Then also it was thought that the African elephant might after all be harnessed to our industries, or allowed to breed as a provider of ivory; we might domesticate the eland and the bush-buck, and even do for the African buffalo what the European colonists of tropical Asia did for that of India several thousand years ago.

But at this stage—about three years ago—a new factor entered into the consideration of the problem. It was suspected that in many parts of Africa the existence of big game was actually prejudicial, and even dangerous, to the coexistence of the human race, black, white, or yellow. It seemed as though other creatures than man and monkeys must act as reservoirs of micro-organisms, especially trypanosomes, provocative of disease. Consequently, so long as they coexisted with man, the various species of tsetse-fly, of tick, and flea, would, even if infected

human beings were isolated, have always the means of renewing their supplies of disease germs. In this way, epidemics of disease might be constantly renewed amongst man in Africa and his domestic animals. Certain game reserves, such as the elephant marsh in the southern part of Nyasaland, became peculiarly obnoxious to the European settlers round about. They stated that the herds of buffalo and other game that had increased and multiplied within this reserve were sources from which the tsetse-fly obtained at once its livelihood and its means of doing harm.

As regards the question of the relations between the tsetse-fly and the big game, it has been pointed out in a very authoritative manner by Sir Alfred Sharpe and other deservedly recognised authorities in the field that there are numerous districts in Africa almost entirely without big game which, nevertheless, swarm with tsetse-fly to such an extent that they are practically uninhabitable by man. In other words, that the existence of buffaloes, kudus, elands, zebras, &c., is *not* necessary to the perpetuation of the tsetse-fly, which apparently finds some other creature than these large mammals to supply it with the blood nutriment it requires or desires. Consequently, this argument does not hold as a justification for the extirpation of big game. Moreover, in many parts of West Africa where disease-conveying species of tsetse (*Glossina*) exist, there is very little big game. But within the last twelve months or so it has been proved conclusively by the biologists at work in Uganda that the large antelopes of that country are the hosts of dangerous trypanosomes, amongst others, of the trypanosome which causes sleeping sickness; and that if this terrible malady is to be extirpated from the Uganda Protectorate, practically all the larger antelopes must go; or at any rate, that their extirpation must be carried out rigorously in those well-wooded regions close to water inhabited by the dangerous *Glossina palpalis*.

Such discoveries, of course, have given great encouragement to that party among us specially represented by pioneers and colonists on the spot, eager for the unlimited destruction of wild life. There is, indeed, need for a wise administration of the law in this respect, and for the Colonial Office to obtain and to act on the most careful scientific advice. The same people that wish no check to be put on their blood-lust in regard to the destruction of rhinoceroses, of giraffes, of buffaloes and elephants, are equally eager to shoot all striking or beautiful birds, especially the various forms of white heron (egret) and crane—notably the crowned crane. Now it has been shown that certain forms of heron, especially the white ones, live almost entirely on insects and ticks, pursuing them by the waterside and attaching themselves to herds of domestic cattle or wild game, whom they relieve of their parasites and of the infesting flies. Similarly, crowned cranes, besides being very beautiful, are in every way the friend of man. They live chiefly on grasshoppers and locusts, they eat nothing that is of any value to man, and they are constantly at work destroying his enemies. In many regions of Africa the giraffe, the oryx, the elephant, rhinoceros, zebra, &c., are not in a position to be harbourers of trypanosomes, or if they are, these regions are entirely free from tsetse-flies.

The whole question is so important to the world in general, both for the extirpation of disease and the preservation of beauty and interest in fauna and flora, that it would be well to hold a Brussels Conference once in five years to discuss these questions, in regard to the destruction of harmful insects and the preservation or destruction of birds and beasts.

H. H. JOHNSTON.