British chemists have now a clearing house for their ideas and discoveries, whilst the Government knows that it has the expert chemical advice of the country at its immediate disposal.

It is not going too far to say that practically without exception the services of the scientific laboratories of the universities, university colleges, and technical colleges have been offered to the Government. Very many—perhaps all—of these laboratories have done, and are doing, important public work relating to the war and the industries of the country. In this connection the Royal Society War Committee has done good work in organising special chemical work of an urgent character in the above-mentioned laboratories, and in obtaining from them competent young men to assist in the carrying on of the special chemical manufactures required at the present time.

The Institute of Chemistry has done excellent work in various directions. Particularly deserving of mention is the splendid public work done by the Glass Research Committee. The important scientific results obtained by this Committee have been made public (see *NATURE*, April 15, p. 192) and are therefore at the disposal of every manufacturer.

There is not a scientific society, scientific laboratory, or scientific man in the country that is not anxious and willing to help. Much good work has been already done. But there is undoubtedly a feeling that with better organisation and knowledge a vastly greater amount could be done. Speaking in the House of Lords on Friday last, Viscount Bryce urged that—

Every possible effort should be made to utilise the services of scientific men. They all knew to how great an extent the German Government had turned the services of scientific men and establishments for investigation and research to account for military purposes. We possessed in this country a body of scientific men not, indeed, so numerous, but fully equal in competence and fully equal, he need hardly say, in earnestness and zeal to serve their country. He understood that there had been during the past months a certain amount of regret among scientific men that they had not heard from the Government how they could help. Any efforts which the Government made to give them a chance of coming in, and enabling them to turn their scientific knowledge, whether in chemistry or engineering, to the common purpose we all had at heart would, he was certain, be welcomed by them. The universities, in which there were so many scientific men, would gladly drop all their work in order to assist.

It is to be hoped that these wise words will be taken well to heart.

Science is standing Germany in good stead at present. It is known that the Badische Works, employing the process initiated by the scientific researches of Prof. Haber, had arranged for an enormous output of synthetic ammonia during the present year. About twelve years ago Prof. Ostwald, foreseeing (as he has himself publicly stated) a nitric acid famine in Germany during a period of war, investigated the conditions for the economical oxidation of ammonia to nitric acid. This process has been worked for several years at

a factory near Vilvorde in Belgium. It is rumoured that Prof. Haber and the Badische Works have greatly improved the process, and that in conjunction with the synthetic ammonia process it now provides a large part of the nitric acid required by Germany for the manufacture of her explosives. *Ohne Phosphor kein Gedanke* said the materialist once upon a time. So might he now say, "No nitric acid, no war." Interesting notices have appeared from time to time in the *Chemiker Zeitung* relating to the activity of organised German science during the past twelve months. A new industry of zinc extraction has been developed, and it is reported that means have been found to replace the French bauxite required for the production of aluminium.

The shortage of copper has been discounted by the use of special alloys. It is also stated that processes have been developed for the manufacture of gasoline and lamp oil. Alcohol is being largely used in internal combustion engines.

We may feel sure that not only the universities and technical high schools, but also the splendid special laboratories of the *Kaiser Wilhelm Forschungsgesellschaft* are working at high pressure in the service of their State.

It is necessary—urgently necessary—that we should do as much, if not more. Let Britain call, British science is ready. It is straining at the leash. All that is wanted on the part of our leaders are imagination and sympathy. A little more of these, and the good that has been done can be magnified a thousandfold.

F. G. DONNAN.

MAMMALS OF EASTERN EQUATORIAL AFRICA.¹

MR. ROOSEVELT'S second book dealing with his East African experiences will probably be more valued by naturalists than his first, though some portions of it may leave the naturalist cold where they excite to frenzy the man of primitive instincts, who still thinks

Cet animal est très méchant,
Quand on l'attaque il se défend.

To the mammalogist *Homo sapiens*, even in his Caucasian variety and English or Anglo-American race, is not more interesting than *Felis leo* or *Loxodon africanus*; and he is just as shocked and pained at the death agonies of the latter as of the sportsman who fails to kill dead at the first shot and is afterwards eaten up or trampled under foot. In fact, I for one, when I read in a newspaper some ten years ago that a German hunter who had frequently evaded my inquiries in East Africa as to big-game regulations and had at last—thank goodness!—been killed by a rhinoceros after having needlessly slain about seventy-three rhinoceroses for no purpose whatever but sheer love of killing, could not resist an expression of delight.

¹ "Life-Histories of African Game Animals." By Theodore Roosevelt and E. Heller. Vol. i., pp. xxviii+420. Vol. ii., pp. x+421-798. (London: John Murray, 1915.) Price 42s. net. Two vols.

However, the whole purport of Mr. Roosevelt's expedition, which for the most part has received unqualified approval on the part of serious-minded naturalists, was to enrich science with necessary specimens of beasts and birds for American and British museums, and above all to study the life habits of all interesting creatures in East Africa. There was no indiscriminate slaughter and good use was made of everything killed.

All persons who are worth anything in intellectual valuation have their special *tic*, some detail or some subject about which they worry unnecessarily, and in regard to which they would unhesitatingly send to the stake all who differed from them. The subject over which Mr. Roosevelt frets—I think unduly—is the coloration of mammals—perhaps also that of birds, reptiles, insects. He is angered by the extremes to which

lead to the betterment of the species or the well-being of the individual. Just as the *summum bonum* of daily fare on British steamers used to be governed by the steward's ideal of what he liked best in his humble home at Liverpool or Southampton, so the markings and outward aspect of this and that species of mammal, bird, and insect in some cases evince nothing of "divine" foreknowledge in the pattern, but seem rather to be the expression of some low, and possibly stupid, "intelligence": an ideal formed in the continuous mind of the species which passes on from individual to individual. Yet in most cases this ideal in colour and markings has unquestionably served a purpose, if a base one.

Wild creatures are far less conspicuous—unless they desire to advertise themselves—in their natural habitat than are the domestic animals of

Roosevelt Sable: adult male. From Shimba Hills, British East Africa. From "Life-Histories of African Game Animals."

the theory of protective or assimilative coloration has been carried by some writers who have probably wrenched facts to suit far-fetched conclusions; and seemingly he would go to the opposite pole and, apart from the flagrant cases which no one denies—of bold advertisement coloration—would almost refuse to admit that there is any purpose in coloration at all.

Those who have seen much of beasts, birds, and insects in the tropics or in the wild regions of the temperate zone still adhere to the general theory that the coloration of living things has been gradually developed to serve a purpose useful in the main for the preservation and prosperity of the species. Yet the direction of this mental reflex on corporeal matter by no means seems all-wise from the point of view of the human critic. It does not—as Mr. Roosevelt points out—always

man's creation and protection. I remember once on the borders of Ovampoland, when I was comparatively new to Tropical Africa, gazing from a hillock over a vast swampy plain to see if there was any big game to be shot. My eye at once noted the great herds of native cattle—red, brown, black, black and white—distinguishable from their surroundings with the utmost ease. I decided there was no game in sight, but my native guides pointed excitedly in another direction. At first I could detach nothing from the shrubs, the ant-hills, the sedges, and the thorns, until at length, by the mere fact that they moved, I made out the forms of buffaloes and antelopes. The creature's mind action of which was subordinated to ours, and which cared nothing for concealment, were at once visible to the eye, detached from their surroundings, and there, as elsewhere, an

easy prey to the Carnivora. But the wild fauna of the country was most difficult to detect by the eye; and other facts which have come to my notice have shown me that many of the great Herbivora actually escape notice by lions, leopards, chitas, hunting-dogs, and so forth, unless the wind turns against them and their presence is detected by a sense of smell. However, I do not wish to cross lances with Mr. Roosevelt, whose own theories in the main tally with the facts, but who always seems to me to get unnecessarily contentious about what he has in indirect ways himself to admit—that there is a purpose, even if it be at times a paltry one, running

Diagram of the family Bovidae showing relationships of the sub-families.
From "Life-Histories of African Game Animals."

through the coloration of all the living creatures of this planet.

I, too, have my *tic*: and that is the classification, the phylogeny, of the Bovidae. Probably it is Mr. Heller with whom I am about to fall out, and not Mr. Roosevelt. But one or other has introduced into the work under review theories and diagrams as to the descent and interrelationships of the antelopes and other bovids which are not only a perpetuation of nineteenth-century errors and misconceptions, but do not square with the facts of the comparative anatomy of the bovids, as set forth even as far back as the early 'eighties by the late Prof. A. H. Garrod; and in a very lucid and remarkable manner in our own day by Mr. R. I. Pocock, of the Zoological Society,

as well as by the authorities of the British Museum (including the late Mr. Lydekker). Nor do they agree with what may be deduced from the most recent palæontological discoveries in Europe and North America.

In Mr. Roosevelt's book sufficient emphasis is not laid on the marked distinction existing between the tragelaphs and the antelopes. The mistakes in classification, which have travelled so far from Sclater and Thomas's otherwise admirable book of antelopes, have infected the ideas of either Mr. Roosevelt or Mr. Heller. These ideas include an unnatural isolation of the hartebeests and gnus, a misconception of the position of the oryx sub-family, and of the relations in general between the true antelopes with annulated horns, the goats, sheep, and capricorns (likewise with annulated horns where they retain primitive features), the oxen (with a trace of annulation on the horns of the most primitive types of Congo buffalo and anoa), and the tragelaphs (eland, bongo, kudu, bushbuck, and nilghai) without annulations.

This last sub-family has a few more primitive features in its skeleton and anatomy than the other divisions of the Bovidae, though the ancestors of the oxen may have been not unlike the nilghai in appearance and anatomy, and in some way link the ancestral tragelaphs with the other groups. Notable among these "primitive" features are the ancient ungulate white spots and stripes, prevalent in some perissodactyls, in swine, tragelids, deer, tragelaphines, and Asiatic buffaloes; but absent from antelopes, sheep, and goats. Probably the most primitive of the existing tragelaphs is the four-horned antelope of India. Its existence there, and that of the nilghai, conveys an idea that the tragelaphines originated in Asia, spreading thence to South-eastern Europe and Africa, on the one hand, and even to North America on the other. Amongst the true antelopes themselves, the duykers and neotragines are obviously the most primitive of existing forms, and apparently first developed from the basal stock of the bovids in France or Southern Europe. From them arose the gazelles, or gazelle-like forms, which have "proliferated" in course of time into pallas, topis (*Damaliscus*), hartebeests, and gnus. The pallas have specialised in some points, such as reduction of the mammae, but they are very suggestive in others of the vanished link between gazelles and hartebeests. The neotragines, possibly, were ancestral to the *Cobus* group; and the primitive Cobine stock seems to have given birth to the remarkable oryginine sub-family (addax, hippotragus, and oryx).

Mr. Roosevelt's book throws a good deal of light on the problem of the origin and descent of the Bovidae, even though his or Mr. Heller's theories are not in all points acceptable—at any rate to this reviewer of his book.

The book is most effectively illustrated by photographs, drawings, maps, and diagrams.

H. H. JOHNSTON.