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Zimbabwe.

"IT is inconceivable", says Miss Caton-Thompson in a communication dealing with her recent investigations among the ruins of Rhodesia which we print in another part of this issue, "how a theory of Semitic origin [of the Zimbabwe] could ever have originated. Every detail in plan, building, and contents seems African Bantu." This, the latest pronouncement on a problem which has been debated for more than half a century, is an emphatic endorsement of a conclusion at which Dr. Randall-MacIver arrived twenty-four years ago. The spade once more has dealt a final blow at romantic but ill-founded speculation. Yet it is not entirely beyond understanding that an earlier generation should have seen in these massive structures the relics of an alien and advanced civilisation.

Both Miss Caton-Thompson and Dr. Randall-MacIver approached their problem as trained archæologists, without preconception, interested primarily in ascertaining the facts which each site in itself could be made to yield under strict archæological method: earlier observers had not the advantage of the training and the development in the canons of comparative study in archæology which of recent years have been made possible by the prosecution of research in widely separated areas. In fact, when the history of the discovery and the early investigation of the ruins is taken into account, a theory of their Semitic origin seems almost to have been inevitable. At the time when the attention of the learned world was directed to their existence, it was still a common experience in archæological speculation that the interpretation of data should be governed by theory rather than theory formulated by inference from the facts. Just as in Britain all prehistoric remains were once almost automatically referred to the Romans or the Phœnicians, so in Rhodesia, King Solomon, the Queen of Sheba, and the Phœnicians were almost bound to make their appearance. To these views the evidence of extensive gold-working, combined with stories of Punt, of Ophir, and of the wealth of Sofala in early Arab writers, appeared to lend support.

It was already known to the early Portuguese settlers in East Africa, and had long been known to their predecessors the Arabs, that stone-built structures—the palaces and cities of the Emperor Monomotapa, as they phrased it grandiosely—existed in what is now Rhodesia. In passing it may be noted, for what it is worth, that there is nothing in these early accounts to suggest

that the native inhabitants, the Makaranga, in making use of these stone buildings, had usurped a culture not their own. It is far from probable that the accounts of the Zimbabwe and the Makaranga in the early Portuguese writers were the result of first-hand observation. Without any doubt they came from Arab traders. Obvious errors in detail preclude personal knowledge. Later, both missionaries and Portuguese troops penetrated to the interior, and at one time the gold mines were handed over to the Portuguese under a treaty of alliance; but at the end of the seventeenth century the troops were withdrawn. *Monomotapæ Imperium* was recorded in a French map of 1705; but after that it fell into oblivion until the ruins were rediscovered in the middle of the nineteenth century.

Tales of Solomon and the Queen of Sheba and their gold attracted desultory exploration; but the first expedition of any consequence was that of Mauch, the German traveller who explored Great Zimbabwe in 1871. It, however, had already been reached by Adam Renders in 1868. Mauch's wildly speculative theories discounted the importance of his discovery, and it was not until 1890, when E. A. Maund directed attention to the problem of Great Zimbabwe in a paper read before the Royal Geographical Society, that further serious exploration was contemplated. In the following year Theodore Bent was sent out under the auspices of the Royal Geographical Society on his famous expedition of exploration among "the Ruined Cities of Mashonaland". In the course of this journey Bent explored eleven sites, while his colleague R. M. W. Swan made astronomical observations and measured the buildings at Great Zimbabwe. As a result of their observations it was concluded that the purpose of the temple at Zimbabwe was sun-worship, and that the ruins were Semitic in origin, probably dating before the Sabæo-Himyaritic period—a view for which Bent hoped to obtain confirmatory evidence in his subsequent journeys of exploration in North Africa and Arabia. He based his view mainly on the form of the 'temples', the presumed phallic significance of the conical towers, the carved soapstone birds, and the other smaller finds in which he saw a Semitic or Phœnician character.

It would be no advantage to recite here a catalogue of the numerous subsequent explorers of the Zimbabwe ruins, many of them amateurs who have destroyed evidence rather than added to our knowledge. It would be impossible, however, to pass over R. N. Hall and W. G. Neal, to whom Rhodesian

archæology owes an enormous debt. They began their joint explorations in 1895. Working over a long period of years, these two explorers, at first jointly, and after Neal's death Hall alone, examined more than two hundred sites, many of them previously unknown. It was largely owing to the interest aroused by their work, and the controversy which arose out of their views, that the British Association sent out Randall-MacIver in 1905. Hall, who held strongly to the early and non-African origin of the Zimbabwe culture, hazarded the opinion that the earliest ruins might go back so far as 2000 B.C. He was able to look for support almost indifferently to any of the current theories, whether they identified Rhodesia with Ophir, or agreed with Keane, who, in opposition to the theory put forward by Karl Peters after his visit to the country in 1899, that the ruins were the work of the Ancient Egyptians, had suggested that Rhodesia was not Ophir, but Havilah, and the source of the gold of Ophir. Undeterred by Randall-MacIver's adverse conclusion, Hall continued his work after 1905 on its previous lines, now making use of his results to attack both the methods and the conclusions of his opponent. He carried with him a considerable body of opinion in South Africa. Hence it was thought worth while, when the British Association contemplated a visit to South Africa, to send out Miss Caton-Thompson—an experienced archæological explorer whose work in the Fayum had placed her in the first rank of younger archæologists—in the hope that, by clearing up doubtful points upon which question had been raised since 1905, and by once more thoroughly examining the evidence which it would be possible to obtain under the most stringent conditions of archæological method, the question of date and origin might be settled.

Miss Caton-Thompson's work calls for little comment here. In the contribution which we print she has set out clearly the position in which investigation stood as the result of Dr. Randall-MacIver's work, and the point to which she herself has carried it. It gives the essentials of her methods and results with a perspicuous clarity of exposition which can be appreciated by anyone with the merest elementary knowledge of archæological argument. The earliest possible date and the origin of the Zimbabwe culture are ascertained by excavation carried down to bed-rock. Apart from imported objects of significance for questions of date only, nothing has been revealed which cannot be referred to a Bantu culture. Typically Bantu pottery is contemporaneous with the lowest

cultural horizon. It is significant that Miss Caton-Thompson points out that in the Great Zimbabwe conical tower the workmanship by no means attains the perfection which has sometimes been attributed to it.

It is apparent from the account of the meeting of the British Association at Johannesburg at which Miss Caton-Thompson's report was presented, that the verdict was received by some of her hearers with disappointment. It may appear more credible—it may even appeal more to the imagination of some—that these ruined stone buildings, remarkably planned, with their labyrinthine passages and communicating chambers, and their impressive size, scattered literally in hundreds through an area more than six hundred miles square, should be the work of one of the great peoples who were the agents of civilisation in early days. But the interest of the problem has not vanished if our attention is turned to Africa. What were the causes which contributed to this unique efflorescence of Bantu culture? Was it wealth? According to one estimate, not less than £75,000,000 worth of gold was taken from the mines. The Makaranga became a degenerate race, broken and overrun by a virile conquering people; but the impression given by the early Portuguese records is that of a vigorous people ruled by chiefs of character and strong personality. Miss Caton-Thompson emphasises the qualities which must have come into play in building up the Zimbabwe culture. It is, in fact, but another example of the force of character and genius for administration and organisation which an African people has shown on more than one occasion, but of which the significance is usually overlooked.

Munitions of War.

Textbook of Ordnance and Gunnery. By Lieut.-Col. Earl McFarland. Pp. x + 625. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1929.) 32s. 6d. net.

THE peace-time problem of preparing for war, remote though we hope war may be, is a task which has to be attacked by the few scientific workers who are specially engaged by their governments. It is a problem which becomes more difficult as reduction in armaments becomes more drastic, and ultimately resolves itself into one of pure research. This follows three broad lines: improvement of existing material, improvement in manufacture, and improvement in method of use. The results of laboratory research are tried out on

proving grounds and in arsenals; the latter are maintained as nuclei, ready for expansion, and provide munitions for the peace establishment of the nations' fighting forces.

The dissemination of knowledge so gained is effected primarily by means of text-books and generally through the naval and military scientific journals of the nations concerned. As research progresses, text-books become out-of-date and require renewal; the work under review is such a renewal, replacing the 1917 text-book on the same subject by Col. Tschappat. It is intended to provide cadets at the Military Academy (West Point), in particular, and the line officer generally, with a statement of the fundamental theory of ordnance design and a description of the more important material of the American army. It provides, in addition, an account of research undertaken during the past ten years, and an outline of the most recent manufacturing methods.

Dealing first with explosives, we are given an interesting account of post-War progress towards the production of a smokeless, flashless, and non-hygroscopic propellant. Success in this direction has been remarkable, more especially in reducing the flash. The brilliant flame of nitro-cellulose and nitro-glycerine propellants has been reduced to a dull-red glow, which is invisible at a short distance and cannot be photographed with ordinary plates or films. This result is obtained by a combination of two methods. By incorporating in the propellant relatively inert substances, which absorb heat, the temperature of the gases is reduced; this process has the disadvantage, however, of increasing the smoke. By reducing the size of the pieces of propellant the charge is consumed earlier; more work is then done by the powder gases, and they become relatively cooler. By a judicious combination of size of piece and percentage of cooling agent, the muzzle flash is eliminated without greatly increasing the volume of smoke.

The Picatinny Arsenal method of manufacturing such a propellant, which is a blend of guncotton and pyro-cotton, is given in some detail. There follows an account of high explosives used in the American services, and a brief outline of the theory of explosives; an interesting chapter on nitrogen fixation concludes with the statement that the United States should, within a few years, be independent of outside sources for its fixed nitrogen.

The treatment of the subject of internal ballistics, which deals with the motion of the projectile in the bore, is based on approximations. This we think is unfortunate, since an outline of the theory