ical stage formed an integral part of the instrument. Now we find a "built in" mechanical stage in the best Continental microscopes, and they, as instruments of precision, are of a higher order than is obtained in the English models.

The fine adjustments in the Continental models are made in a variety of patterns, but in their best form we have as yet nothing in this country to compare in quality of mechanism and slowness of motion.

The mechanical draw-tube is provided in only a few Continental models, a feature more common in the English. Instead of this adjustment the Continental makers provide the objective with correction collars to allow of adjustment for varying thicknesses in cover glasses, and this is considered more accurate than the mechanical draw-tube.

It is often claimed by English makers that one of the advantages in possessing an English microscope is that certain fittings are made to the Royal Microscopical Society's standard measurements. As regards objectives and eyepieces there is little or no difficulty in getting the products of all reputable makers interchangeable, whether English or foreign; but a different state of affairs prevails in respect to substage sleeves, for it is generally found that not only does one English maker's condenser refuse to fit into the substage of another, but it is a common fault to find substage sleeves of English microscopes varying so much in diameter that the ideal of R.M.S. standardisation has yet to be reached.

Neither the society nor the makers have met the needs of English microscopists in this respect, so it may be left to the National Physical Laboratory to step in and fill the gap, which is a wide one.

Sprung fittings is another feature claimed for certain English models, yet a curious contrast is shown respecting the durability of these adjustments as compared with the Continental.

The screwdriver is a tool frequently used by owners of the former class of instrument, while the leading Continental instruments require adjustments only once in many years of daily usage.

Accordingly it would appear that fewer sprung fittings add to the durability of the instrument.

When choosing a microscope to embody the greatest possible facilities for the present-day needs of the serious worker, it will be found to be a product of one of the best German houses.

SLEEPING SICKNESS AND BIG GAME.

IN spite of the fact that a commission has been sent out to Nyasaland to investigate the problem of the relations of the big game to the spread of sleeping sickness, under the direction of Sir David Bruce, the most eminent authority on this subject in this or any other country, persistent efforts continue to be made to force the Colonial Office to prejudice the issue and to cause the game to be exterminated before its relation to the disease has been determined accurately. The latest of these efforts was made in the House of Commons on December 13, by Dr. Chapple, member for Stirlingshire, who urged the Secretary for the Colonies to relax the severity of the game laws so as "to permit of the natives hunting *game known to harbour the trypanosome in their blood* in order that both the *game and the infecting fly which invariably accompanied it* might be driven off from the populous centres." We have italicised two statements in Dr. Chapple's speech, as reported in *The Times* of December 14, in order to direct attention to points in which scientific knowledge at the present time does not confirm, or is at variance with, the grounds on which he bases his plea for extermination. His

argument is but another instance of the lamentable ignorance of our legislators in scientific matters.

The question under consideration has been discussed at some length in the last three numbers of *NATURE*, and it will be sufficient here to summarise briefly the present position of the problem. The extermination of the game is urged by its advocates on the following grounds:—(1) That antelopes and other wild animals harbour *Trypanosoma gambiense* in their blood, and are therefore dangerous as a source of infection; (2) that the tsetse-flies instrumental in the transmission of sleeping sickness are dependent upon, and accompany, the big game, and would disappear if the game were destroyed.

With regard to the first point, it has never yet been shown that the big game, in a natural state, harbours the trypanosome in its blood, but only that antelopes can be infected with *T. gambiense* in the laboratory; and this has been shown also for *practically all the common domestic animals*. It may be left to common sense to judge whether, in a region in which the tsetse-flies abound, the domestic animals surrounding the villages and homesteads, or the shy and timid antelopes keeping their distance in the jungles, are likely to be the greater danger to human beings as a source of infection.

With regard to the second point, those who are acquainted with the tsetse-fly in its native haunts are by no means agreed that it is dependent on big game, or that it necessarily accompanies it; on the contrary, many instances have been adduced of tsetse-flies swarming in places where there is no big game of any kind. If, however, it were admitted for the sake of argument that the flies follow the big game, what effect is likely to be produced by the destruction of their natural food? Is it to be supposed that the flies would sit down and die helplessly of starvation? Is it not far more likely that they would be attracted by the food supply offered by the domestic animals surrounding the homesteads, animals which almost without exception are potential hosts of the trypanosome just as much as the big game? If such an effect were produced, the danger to human life might be increased tenfold.

The whole question is one beset with dangers and difficulties, calling for full investigation of the complex factors of the case and for the utmost caution before proceeding to take action. To carry out the extermination of the game in the present state of our knowledge would be simply a leap in the dark, an experiment which, so far as can be foreseen, would lead to no amelioration of the conditions, but might, on the contrary, be fraught with disastrous results. The Colonial Secretary must be commended for having refused, so far, to allow his hand to be forced in the matter. The wisest course in the circumstances is surely to "wait and see" what are the conclusions reached by Sir David Bruce's Commission.

EXPLORATION IN THE DEPARTMENT OF PETEN, GUATEMALA.¹

THE ruins of Tikal, completely hidden in the forest in the northern part of Guatemala, distant about thirty miles from the Lake of Peten, and forty miles from the nearest habitation, are among the most important and interesting in Central America.

Since my second visit to these ruins in 1882, I have been anxiously awaiting the result of further explorations on this attractive site, and at last it has come in a handsome volume published by the Peabody

¹ *Memoirs of the Peabody Museum of American Archaeology and Ethnology*, Harvard University. Vol. v., Nos. 1 and 2:—"Explorations in the Department of Peten, Guatemala: Tikal," by Teobert Maler; "Preliminary Study of the Ruins of Tikal, Guatemala," by A. M. Tozzer. Pp. 135+28 plates+2 maps. (Cambridge, U.S.A.: The Museum, 1911.)

Museum of Harvard University, under the auspices of which the explorations were undertaken. The first and

much work can be accomplished within a specified time.

FIG. 1.—View from Temple No. 1 looking west.

second of these expeditions were conducted by that veteran explorer, Mr. Teobert Maler, and the third by one of the most prominent of the younger generation of Americanists, Dr. Alfred M. Tozzer. Owing to some unfortunate friction between Mr. Maler and the Peabody Museum, Mr. Maler's plan of the ruins and some of the detail plans of the buildings he describes were not obtained for this volume, and it is therefore difficult to do full justice to his share of the work.

During Mr. Maler's preliminary expedition (1895) he remained only eight days at the ruins. On his next expedition (1904) he was camped there for four months, from August to November. As these are the rainy months, he certainly avoided the great difficulty attending a residence at Tikal during the dry season, which is the scarcity of water; on the other hand, four months' camping in a tropical forest during the rains must have entailed great hardship, and it must often have been very difficult to carry on any work at all.

It is to be regretted that Dr. Tozzer's report is not accompanied, as is Mr. Maler's, by a personal narrative; moreover, he gives no indication of the length of his stay at the ruins. Personal narrative may be of no particular scientific interest to the archæologist, but it is of the greatest value to future explorers to know what difficulties have to be overcome and how

cludes all the buildings described in the reports, measures less than $1 \times 1\frac{1}{4}$ kilometres. Isolated

Mr. Maler discovered a considerable number of hitherto unknown sculptured stelæ, and both his report and Dr. Tozzer's are furnished with many detailed plans of buildings.

Dr. Tozzer was accompanied by Mr. Merwin, who observed the azimuths of the front and back walls of the five principal temples with a transit instrument, but the sketch plan printed in this volume does not show the buildings plotted according to these bearings, and although it shows much that was previously unrecorded, a more accurate survey of the site is to be desired; in fact, although the work accomplished by Mr. Maler and Dr. Tozzer adds considerably to our knowledge, much yet remains to be done at Tikal.

Dr. Tozzer does not say whether he made paper squeezes of the carvings and inscriptions, but it is to be hoped that moulds were made, for, excellent as Mr. Maler's photographs are, photographs alone do not suffice for a careful study of the carving, and plaster casts are absolutely necessary.

Mr. Maler says that Tikal covered an area of four to five kilometres square, but surely this requires verification by further measurements.

Dr. Tozzer's sketch map, which in-

FIG. 2.—Circular Stone Altar at Tikal.

buildings may be found at a distance of two kilometres from the centre of the city, but this does

not prove that the city proper covered such a great area as Mr. Maler states.

To those who have not studied American archaeology, it is a surprise to learn that the remains of a city covering nearly a square mile, with five great stone-built temples, raised on pyramidal foundations, the highest reaching an elevation of nearly two hundred feet from the ground, as well as many smaller temples of similar form, and well-built stone houses containing numerous small, stone-roofed chambers, are to be found hidden away in the depths of a tropical forest in America. However, American archaeology is still in its infancy, and may have some strange developments in store for us; it is a vast field, and as the interest in it is rapidly increasing, there is every hope that the rising enthusiasm of students and explorers will result in dispelling much of the mist which obscures the curious civilisations, some of which developed and waned many hundreds of years before the first Spaniard set foot on the American continent. Mr. Maler probably closes a long career of exploration in the forests of Guatemala and Yucatan with his last journey to Tikal, but from Dr. Tozzer one can happily look for useful and conscientious work, both in the field and in the study for many years to come.

ALFRED P. MAUDSLAY.

THE ECOLOGY OF DESERT PLANTS.

IN a publication of the Carnegie Institution of Washington, entitled "The Water-Balance of Succulent Plants," Mrs. E. S. Spalding adds to the statistics that she had previously given concerning the reversible

FIG. 1.—*Cereus giganteus* having a dead trunk and living branches which bore flowers one year after the death of the trunk.

changes in dimensions and form of *Cereus giganteus*, the massive stem of which acts as an expanding and contracting water-reservoir. Her observations on the rate of growth of this "giant cactus" lead to the conclusion that it requires a hundred years to attain a height of ten metres. Mrs. Spalding shows that analogous reversible change in volume takes place in *Echinocactus Wislizeni*, and *Opuntia* spp., and gives the interesting information that the former, at first spherical in form, becomes irregularly columnar, lop-sided, and top-heavy, so that it readily topples over or is uprooted by the wind. She suggests that the inefficiency of the root-system thus revealed represents a case of incomplete adaptation, which

accounts for the "sparse occurrence" of the plant.

By the somewhat cryptic and certainly inelegant expression "water-balance," Mrs. Spalding and her co-author, Prof. D. T. Macdougall, mean the amount of water stored in the plant. The latter author's contribution to the work includes statistics as to the rate and amount of loss of water of certain succulent

plants, including the three species mentioned above; for instance, he concludes that individuals of *Cereus giganteus* "12 to 20 metres in height would contain from 2000 to 3000 litres of water," and that "such individuals might lose from 1000 to 1600 litres of water . . . and still survive." As an excellent example of the power of endurance displayed by this species under net loss of water, Prof. Macdougall mentions that branches may remain alive and even bear flowers many months after the death of the main trunk. A number of successful photographs illustrate the work, and one of these is reproduced here.

SIR JOSEPH DALTON HOOKER, O.M., G.C.S.I., F.R.S.

THE most distinguished son of a very distinguished father, Joseph Dalton Hooker was born at Halesworth, in Suffolk, on June 30, 1817. Early in 1820 his father was appointed by the Crown to fill the chair of botany in the University of Glasgow, a post which he held until, in 1841, he became director of the Royal Gardens at Kew. As a consequence Hooker was educated in Glasgow, passing through the High School to the University, from which he obtained the degree of M.D. in 1839. Devoted as a lad to the reading of works of travel, we learn from Hooker himself that he was especially impressed by Turner's description of the Himalayan peak of Chumhari, and by the account of the Antarctic island of Kerguelen contained in Cook's voyages. An opportunity of investigating the latter came to him very early in his career. When he completed his medical studies, Hooker entered the Royal Navy as an assistant surgeon, and was gazetted to the *Erebus*, then about to start, along with the *Terror*, on the famous Antarctic expedition led by the eminent navigator Sir James Clark Ross. Throughout this expedition the young assistant surgeon held the post of botanist, and during its three years' cruise in the southern seas he was able to visit New Zealand, Australia, Tasmania, Kerguelen, Tierra del Fuego, and the Falkland Islands, amassing large collections and acquiring a vast amount of botanical information.

Shortly after the close of this expedition, Hooker, in 1843, became assistant to Graham, then professor of botany in the University of Edinburgh, and in 1845, when Graham was succeeded by the elder Balfour, Hooker was appointed botanist to the Geological Survey of Great Britain. Much of his time during this period was devoted to the preparation for publication of the results obtained during the course of his Antarctic voyages. But in 1847 this work was temporarily suspended, and his appointment on the Geological Survey was relinquished, in order that Hooker might add, by further travel, to his first-hand knowledge of the vegetation of sub-Antarctic and temperate regions, a corresponding acquaintance with the botany of tropical countries. The region selected was north-eastern India, then a practically unexplored tract. The undertaking, originally designed as a private enterprise, through a series of happy accidents received official recognition, and the expenses involved were to a partial extent met from public funds. Hooker left England in November, 1847, reaching India in January, 1848. After some three months spent in the Gangetic Plain and Behar, during which he ascended the sacred hill of Parasnath, Hooker made his way to the Himalayas, reaching Darjeeling in Sikkim in the middle of April. The next two years were devoted to the botanical exploration and topographical survey of the Himalayan state of Sikkim and of a number of the passes which lead from that