

The method has, no doubt, been tried. The Roman Inquisition tried it with Galileo. Is that an encouraging precedent?

R. R. MARETT, D.Sc.,

Fellow, Tutor, and Dean of Exeter College, Oxford.

I AM sure that, without help from me, the citizens of the United States are quite capable of suppressing their own obscurantists. There is not the country to go back on the principle of the freedom of thought. Hence I would excuse myself from testifying to the doctrine of organic evolution, and incidentally from having to consider which particular version of it I am prepared to support at the present moment. Rather

I would remind my scientific brethren over the water, lest they take the matter too seriously, and hold themselves to be shamed in the face of the world, that there are plenty of worthy folk over here just as narrow in their outlook. I have myself been invited to lecture on anthropology to a denominational congress—held, I am glad to say, not in the British Isles but in a neighbouring country—on condition that nothing should be said about evolution. For the rest, I have had to do at Oxford with Rhodes scholars coming from the obscurantist States, and have found them apparently as well educated as the rest; whence it is perhaps to be inferred that the rising generation will not limit the circuit of their musings to suit the antiquated prejudices of their elders.

Obituary.

PROF. B. GRASSI.

THE death of Prof. B. Grassi, at Rome, on May 4, robs zoology of an ardent devotee and Italy of her most famous zoologist.

Giovanni Battista Grassi was born at Rovellasca (Province of Como, in Northern Italy) on March 27, 1854. He received his early education at a private school, and then entered the University of Pavia as a medical student. But after qualifying in medicine he threw himself whole-heartedly, for the rest of his seventy-one years of life, into the study of zoology—a subject for which he had evinced, even at an early age, a singular aptitude. (He always called himself—and posterity will endorse his definition—*zoologo*, and not *medico*.) He studied first at Messina (with Kleinenberg) and afterwards in Germany—at Heidelberg (with Bütschli and Gegenbaur) and at Würzburg (with Semper). In 1883 he was appointed professor of zoology in the University of Catania (Sicily), where he remained until 1895, when he was promoted to the chair of comparative anatomy in the University of Rome. In 1897 he was elected a national fellow of the Royal Society of Italy (R. Accademia dei Lincei), and in 1908 he was made a Senator of the Realm: until the day of his death he was—scientifically—one of the most productive members of the University, the Academy, and the Senate. Our own Royal Society bestowed the Darwin Medal upon him in 1896, but never elected him a foreign member.

Grassi's contributions to zoology are so many, so varied, and so great, that they cannot be adequately reviewed in a few words. He began his researches while still a student, and continued them unremittingly until the end of his life—despite his multifarious cares of office. (He could boast, but a year ago, that he had always given more lectures every year than the University required, and had never once missed a sitting of the Senate.) Though a man of apparently feeble physique, and handicapped from childhood by defective eyesight, he was possessed of immense energy and ardour: and he never spared himself. He used to say that mankind is composed of those who work, those who pretend to work, and those who do neither; and there can be no doubt that he himself belonged to the first class. An accomplished field naturalist, with expert morphological and systematic knowledge

of many groups of animals, he was also an accurate and original observer and an indefatigable experimenter—and one, moreover, who was always master of the literature of his subject. Consequently, his best works already rank among the zoological classics.

Many of Grassi's outstanding researches were done in collaboration with pupils and colleagues, among whom may be particularly mentioned Bastianelli, Bignami, Calandruccio, Feletti, Anna Foà, Noè, Rovelli, Sandias, and Topi. Since many of the problems which he successfully attacked—either alone or with the help of others—are not only of great zoological, but also of great medical and economic importance, and therefore bound up with various vested interests, it is scarcely surprising that his own restless research and unquenchable thirst for knowledge sometimes brought him into sharp conflict with opponents and rivals, and occasionally even with his fellow-workers: and unhappily the controversies aroused by some of his investigations have gained wide publicity, and have even tended—in certain quarters—to obscure the indisputably great merits of these investigations themselves. He recently remarked, publicly, that he "would have led a tranquil life if he had not engaged in the study of malaria and other burning questions which have a practical application." This is pathetically true, though one may be permitted to question it.

Of Grassi's works there is space to mention only some of the greatest. His earliest studies of the life-histories of intestinal worms and protozoa—begun in 1876 and continued for some dozen years—are familiar to all specialists, and contain many important observations and discoveries. He gave, for example, the first accurate account of *Giardia* (Lambliæ), and was the first to ascertain (partly by experiment upon himself) the method by which *Entamoeba coli* and *Ascaris lumbricoides* are transmitted from man to man; and he was also the first to show that the cestode *Hymenolepis* completes its development without passing through an intermediate host. Curiously enough, it is only within recent years that these and others of his early observations have been verified and finally accepted.

In 1883 Grassi published his classical Naples Monograph on the Chætognatha, a peculiar group of marine animals: and ten years later (1893) he published (with

Sandias) his famous observations on "The Constitution and Development of the Society of Termites"—one of the finest entomological works ever written. In the course of this work he was led to make a detailed study of the peculiar protozoa with which many termites are infested; and these studies—begun in 1885, and ending with his extensive and beautifully illustrated memoir of 1917—are scarcely less important than those which he has published on the termites themselves.

In 1887 he began (with Calandruccio) a very different investigation which ultimately yielded results no less remarkable—his study of the life-history of the eels. The development of the eel is a problem which had puzzled biologists from the time of Aristotle; but in 1896 Grassi was able to announce that he had solved it, in its general terms, though full details of his work were not made known until 1913, when his magnificent monograph on "The Metamorphosis of the Murænoïds" appeared.

From about 1890 until 1892 Grassi was also occupied (with Feletti) in studying the malarial parasites. In 1898 he returned to this subject with renewed energy, and succeeded in 1898 and 1899—with the collaboration of Bignami and Bastianelli—in solving once for all the problem of the mode of transmission of human malaria. He was then able to demonstrate that certain mosquitoes (*Anopheles*), and these mosquitoes only, convey malaria from man to man; and he worked out, for the first time, the entire life-history of the human malarial parasites in these insects. The importance of these discoveries needs neither emphasis nor advertisement. His great monograph—"Studies of a Zoologist on Malaria"—was published in 1900. It is still unsurpassed, and is universally acknowledged by protozoologists as one of the classics of their science.

About 1905 Grassi turned his attention to another organism of vast economic importance—*Phylloxera*, an insect which has done incalculable damage to the vineyards of Europe since its accidental introduction from America some sixty years ago. With various collaborators (Foà, Topi, and others) he continued to labour

at the biology and control of this insect until the end of his life. His most important publication on the subject—issued by the Italian Ministry of Agriculture in 1912—has recently been described by a distinguished entomologist as "a milestone in the history of entomology."

Another important entomological work by Grassi is his memoir on the sand-fly (*Phlebotomus*). In this he gave (1907) the first good account of the structure and life-history of an insect which has recently attracted much medical notice, owing to the part which it appears to play in the dissemination of more than one human disease. During the last few years of his life Grassi returned again to the study of malaria and its prevention, and published—among other works—a series of most interesting papers on the biology of mosquitoes.

These are some of the works for which the name of Battista Grassi will ever remain famous in zoology—both pure and applied—and in medicine. Severally his contributions to helminthology, to entomology, to protozoology, or to ichthyology, would be sufficient to establish the reputation of a lesser man in any one of these sciences: taken together, as the work of a single individual and his assistants, they constitute a record of achievement almost unparalleled in the history of zoology.

CLIFFORD DOBELL.

WE regret to announce the following deaths:

Commendatore Giacomo Boni, director of the excavations in the Forum, Rome, and on the Palatine, where he made important archæological discoveries in the Temple of Vesta and on the site of Domitian's Palace, respectively, on July 7, aged sixty-six years.

Dr. Charles Forbes Harford, a founder and the first Principal of Livingstone College, Leyton, on July 4, aged sixty years.

Dr. Felix Klein, For. Mem. R.S. and Copley medallist of the Society, professor of mathematics in the University of Göttingen, who has added to our knowledge of non-Euclidean and carried out researches in the theory of functions, on June 22, aged seventy-six years.

Current Topics and Events.

IN 1915 a new chapter was opened up in the cancer mystery by the discovery of Yamagiwa and Ichikawa that cancer can be successfully induced in rabbits by the prolonged application of gas works' tar. This result was soon confirmed, and during the last ten years a large number of tumours have been produced in mice, rabbits, and even in fowls. In addition to cancer in the strict sense, other malignant tumours have developed as a result of the application of tar products. There is no longer any doubt that the induced tumours are true blastomata. They possess every attribute which has been associated with the idea of malignancy. Tar is, of course, not the only chemical irritant which produces tumours, but it is the one that most readily does so under experimental conditions. It is also known that different tars vary greatly in their cancerogenic properties. The actual agent in the tar has been sought, and although not yet completely identified, a large body of knowledge has

already grown up on the subject. Apparently the acids and bases of tar can be removed while the cancerogenic agent remains.

A SHORT time ago, E. L. Kennaway, of the Cancer Hospital Research Institute, London, obtained results which pointed to the conclusion that isoprene compounds prepared at about 820° C. are more active than the original coal tar from which they are obtained. In a more recent paper (*Brit. Med. Journ.*, 1925, ii. p. 1, July 4) Kennaway has made a further important contribution to the cancerogenic properties of "tars," by showing that acetylene heated to 800°-900° C. is capable of producing tumours. A Californian petroleum, in itself apparently incapable of producing cancer, became so when heated to 800° C. in a current of hydrogen. More extraordinary still, he found that human skin or yeast dried and heated to 920° C. produced malignant tumours in mice. Although these products, up to the present, can only be produced at