

and its more obvious triumphs are known to all. The earth is not the centre of the universe; its age must be measured by hundreds of millions of years; man upon it is the derivative of lower forms of life. No orthodox theologian, in classical or medieval times, held or would have dared to assert such facts. Henceforth they must find their place in any dogmatic scheme of faith.

The indirect influence of scientific method, its patient induction, its readiness to admit divergent conceptual representations of observed facts, its absence of exaggeration, its hostility to evasive language, and, above all, its abhorrence of argument which pretends to be free but is pledged to reach assigned conclusions—this influence has not yet made itself fully felt. Theological thought, which claims to be scientific and is still widely accepted, preserves bad traditions. The work of the best contemporary theologians is free from blame. But to any one familiar with the scrupulous honesty of modern scientific research the dogmatic inconsequence of much current religious apologetic is painful. For this reason young men and women, who have had a scientific training at our universities, often complain bitterly that they cannot get adequate religious teaching. They have no more desire for undogmatic religion than for hazy science. But they demand that religious dogmas shall be taught with the same frankness, the same readiness to admit progress through change, the same absence of elaborate and unnecessary complication as they are accustomed to get in scientific instruction. Especially do they resent the use of archaic language, which they suspect, not always unjustly, to be used as a cloak beneath which awkward problems are concealed. As the influence of the methods of scientific investigation increases, the dissatisfaction to which I have alluded will spread. There is only one way in which accredited religious teachers can overcome it. They must use scientific method. They must avoid, whatever the cost, the snare of obscurantism.

At the present time we suffer from what I feel forced to regard as an unfortunate development in the religious history of England. A century ago the dominant type of English religion was evangelical. The language used had at times the over-emphasis which is common in devotional literature; but men spoke

of realities which they had experienced. That their convictions were genuine, their good works abundantly showed. Their faith was a power. Unfortunately it was joined to a cosmology which was fated to be destroyed by the progress of science. The ravages made in their scheme by geology were already ominous in the year 1823. The faith, it was felt, was in danger. Wisdom pointed to the acceptance of new scientific truths. But it is given to few to "greet the unseen with a cheer." So the Tractarians, the religious reformers who then arose, men of piety and ability, turned to the past for safety. The system which they embraced not only contained the cosmology now repudiated by educated men, but was also a synthesis of religious ideas of pagan origin combined with philosophic concepts now obsolete. English religion is still struggling with this burden: and, as I see the matter, no healthy reconciliation between science and organised Christianity is possible until it is cast aside.

Men of science can do much to help the community during the period of transition through which we are now passing. Their reverence for truth can be made an inspiration of especial value to pious souls. Among men of science there is the moral austerity without which the finest intellectual work is seldom, if ever, achieved. During the last generation, moreover, they have shown a steadily increasing sympathy with religion, an enhanced appreciation of the unique power of Christianity, at its best, to serve the human race, to foster spiritual progress while preserving spiritual freedom. I would urge all men of science whom my words may reach to take every opportunity to set forth their religious ideals, to show how, in their own minds, Christianity and science interact. Personally I think it unreasonable to demand that their language should be orthodox. The great master to my thinking is Hort, the only theologian of the nineteenth century who began with a thorough scientific training; and Hort said progress in theology must come "by perilous use and perilous reform." A faith worth having needs no artificial protection. Individually each one of us may make mistakes: in the end truth will prevail through honest argument. The religious sincerity of able men with trained minds is of value in itself; and, I am convinced, the essentials of Christianity will survive by their own inherent strength.

### The Swiss National Park.<sup>1</sup>

By Prof. C. SCHRÖTER, Federal Technical High School, Zürich.

**S**ELDOME has a movement of a purely idealistic character spread so rapidly and victoriously through the world as the movement to protect Nature against the civilisation which threatens to overwhelm it. Everywhere is heard the cry, "save, what may yet be saved, of the original face of mother earth."

Many are the tasks of those engaged in this movement: the preservation of natural geological monuments and prehistoric sites, the protection of rare plants, fine old trees, interesting plant-communities (*e.g.* those of

moorland, steppes, or dunes), and the prevention of the extermination of animals. But most effective and profitable of all is the creation of Nature reserves where landscape, plants, and animals alike being protected from the encroachment of man, the sway of Nature is paramount. Such areas may be called "Complete Nature Reserves" or, to borrow an American term, "National Parks."

In 1906 a movement arose in the Schweizerische Naturforschende Gesellschaft, which resulted in the formation of a Commission for Nature Protection, with Dr. Paul Sarasin, of Basel, as president. This

<sup>1</sup> For the translation of the original manuscript the author is much indebted to Prof. R. H. Yapp, University of Birmingham.



declared protected areas. The chief work of the Commission, however, has been the creation of a Swiss National Park. After many attempts an area of about 140 sq. kilometres in the Ofen district of the

region. In the National Park there is, therefore, a mingling of eastern and western forms, many eastern species occurring, so far as Switzerland is concerned, only in this district. Animal life, too, is abundant, chamois, marmots, deer, foxes, black game, golden eagles, etc., enlivening the landscape.

The greater part of the National Park is leased by the State from the owners of the land for a period of ninety-nine years, the State alone having the power to terminate the contract. The State has further pledged itself to contribute a sum not exceeding 30,000 francs per annum for the rent of the Park. Human interference is absolutely excluded from the whole region. Hunting, fishing, manuring, grazing, mowing and wood-cutting are entirely prohibited. No flower or twig may be plucked, no animal killed and no stone removed; even the fallen trees must remain untouched. In this way absolute protection is secured for scenery,



FIG. 3.—Timber line at Munt la Schera. (Larch and *Pinus cembra*.)

Lower Engadine was secured (between the years 1909 and 1914) as a Complete Nature Reserve.

This district is peculiarly suitable for the purpose for the following reasons: Its mean elevation above sea-level is considerable, in consequence of which the snow line lies as high as 3000 metres and the alpine tree limit at 2300 metres. Alpine life, therefore, can be widely distributed within the area. In wildness and naturalness, as in loneliness and seclusion, it is scarcely surpassed anywhere in Switzerland. It is very sparsely populated, so that the prohibition of forestry and grazing operations involve but little hardship for its human inhabitants. It possesses extensive forests, of which the 2600 hectares of dense forest of the erect mountain pine (*Pinus montana*, var. *arborea*) deserve special mention. There are also magnificent forests of *Pinus cembra*, mixed woods of spruce and larch (*Picea excelsa* and *Larix europaea*), a peculiar mountain race of Scotch fir (*Pinus sylvestris*, var. *engadinensis*), and extensive areas occupied by the creeping mountain pine (*Pinus montana*, var. *prostrata*). In addition to the great abundance of conifers there is also a rich herbaceous flora, the great variety of geological substrata rendering possible the existence of both calcicole and calcifuge plants. The dividing line between the floras of the western and eastern alps passes through the

plants, and animals; Nature alone is dominant. Any one may visit the Park, but only simple alpine shelter huts are provided—no hotels are allowed to be erected. Camping and the lighting of fires are prohibited. The custodianship of the Park is entrusted to four resident keepers.



FIG. 4.—Alp la Schera with Munt la Schera (2588 m. above sea-level).

The Schweizerische Naturforschende Gesellschaft has undertaken to carry out a thorough scientific investigation of the National Park, and its Scientific Park Committee is now engaged on this work. The initial task is the preparation of complete lists of species inhabiting the reserve. Further, by means of exact surveys of selected areas, repeated from time to time, it is hoped to study—as the previous influence of man



and his domestic animals becomes more remote—the gradual restoration of the original flora and fauna, the re-conquest of pasture by forest, and so on. By the work of successive generations of investigators, it will be possible to follow the truly natural successions and changes occurring within the area, and to study in detail the natural relations between soil, climate, and organisms. The safeguarding from interference by man and beast will also be utilised to study the slow secular changes of land and water. In this unique laboratory, the naturalists of Switzerland will find themselves united in a common work. Maintenance expenses, such as the wages of the four park keepers and the upkeep of roads and huts, as well as the cost of the scientific investigations, are provided by the Schweizerische Bund für Naturschutz, an association which at

the present time numbers more than 30,000 members.<sup>2</sup> Thus the Swiss National Park is a commonwealth in which alpine Nature can recover and develop undisturbed: a refuge, a sanctuary for plant and animal life. It is an island of primeval Nature, unaffected by the devastating waves of human civilisation which break about its shores. During visits to this Nature reserve one cannot fail to be impressed by the grandeur of the scenery and the wealth of plant and animal life. But still deeper is the feeling of patriotic pride that a whole nation is pledged to preserve this fragment of primitive Helvetia, unexploited for purposes of material gain, as a heritage for generations yet unborn. It is a piece of idealism especially valuable in this materialistic world.

<sup>2</sup> The annual membership subscription is 2 francs, life membership 50 francs. Foreign members are welcomed; any one wishing to join is invited to communicate with Dr. St. Brunies, Sekretär des Naturschutzbundes, Basel, Oberalpstrasse 11.

### Obituary.

DR. E. F. BASHFORD, O.B.E.

AN outstanding figure in cancer research has been removed by the death, from heart failure, of Dr. Ernest Francis Bashford. After a most distinguished medical career at the University of Edinburgh, he pursued laboratory investigations in Germany, especially under Ehrlich, and became assistant to Sir Thomas Fraser in pharmacology. Even in the short time he spent in that laboratory, he enriched pharmacology by a memorable contribution on the antagonism of atropine and morphine.

When the organisation now known as the Imperial Cancer Research Fund was started in 1902, the committee appointed Bashford as general superintendent and director of the laboratories. So well was the confidence of the committee justified that in a few years his researches were known all over the world, and the laboratory, housed originally in the upper floors of the College of Surgeons' hall on Victoria Embankment, was recognised by all as the leading institute in the world for the experimental study of cancer. The position achieved was the outcome of intense work by a brilliant staff of colleagues inspired and directed by a forceful, imaginative, and tireless personality. The memorandum of proposed research submitted to the committee by Bashford at the commencement is still on record and demonstrates how surprisingly he, a young man with little previous acquaintance with the problems and quite inexperienced in the responsibilities of an institute, had grasped the essential fact that cancer must be studied as a problem in comparative biology. The exact statistical investigations of cancer in human beings in Great Britain and the collection of reports of its occurrence in civilised and uncivilised races early occupied his attention, and his writings proved convincingly that the incidence of the disease could not be correlated with many of the factors that impressed, and still impress, the imagination of the uninitiated. When there was added to this the study of the zoological distribution of cancer, the insistence on the breadth of the problem became obvious.

The first real advance in the biological study originated from the discovery by Jensen of the transplantability of a mouse carcinoma. The avenues thus opened up

were enthusiastically explored, and there followed in rapid succession contributions dealing with the cytology of malignant new growths, the source of their cellular constituents, the specific reactions of the host, the induction of artificial resistance to growths, the study of refractoriness or susceptibility, the demonstration of the essential similarity of malignant neoplasms throughout the animal kingdom, biochemical investigations of great importance, and a host of other observations over the whole field which may be found in the first five Scientific Reports of the Imperial Cancer Research Fund published under Bashford's direction. Ill-health compelled him to resign his appointment in 1914. During the War he served in the Army in France as a pathologist, and was at the time of his death adviser in pathology to the British Forces on the Rhine. His work marks the beginning of the era of the scientific study of cancer in Great Britain.

ARCHIBALD LEITCH.

LORD MORLEY, O.M., F.R.S.

LORD MORLEY, whose death on September 23, at eighty-four years of age, we regret to record, was a great statesman and intellectual leader, the memory of whose work and noble character will long be cherished. As a writer on literary, historical, and biographical subjects, he covered a wide field in a style at once delightful and stimulating, and in the field of public life he preserved the best traditions of sincerity and truth. Though Lord Morley was not directly concerned with scientific research, he was sympathetic towards it, and was elected a fellow of the Royal Society in 1892 under the rule which permits the Council to nominate for election persons who "either have rendered conspicuous service to the cause of science, or are such that their election would be of signal benefit to the Society." He was a trustee of the British Museum, 1894-1921, chancellor of the University of Manchester from 1908 until last March, and one of the first members of the Order of Merit created by King Edward VII. in 1902. Lord Morley was made an honorary LL.D. of the Universities of Glasgow, 1879, Cambridge, 1892, St. Andrews, 1902, and Edinburgh, 1904, and an honorary D.C.L. of Oxford in 1896.