

is unquestionably the result of "ordered knowledge of natural phenomena and the relation between them," is only one example, if perhaps the most marked one, in our experience. A somewhat similar record could, however, be written on locomotive tyres and other matters.

I think I have shown adequately the debt which transport, as well as other branches of our profession, owes to the study of "ordered knowledge." That in

the future this will be even more marked than at present, one can say without fear of contradiction. Not only so, but there must be more and more interdependence between science and engineering. More and more as we advance in the knowledge of natural phenomena will the necessity of the practical application of this knowledge on a large scale become necessary, to confirm it and to bring out fresh features.

The Influence of Science on Christianity.¹

By Canon E. W. BARNES, F.R.S.

IT is a commonplace that all religions, even though their formularies and sacred books seem to guarantee absence of change, are constantly modified. Unless religion is moribund it is dynamic and not static. It is a living process within the spirit of man; and, as such, it is profoundly affected by the ideas and emotions of the community in which it exists. Religious thought and feeling alike are influenced, for good or ill, by contemporary political, social, and intellectual movements. During the last century there has been a movement of human thought as influential and as valuable as that of Renaissance humanism. The assumptions and methods of science have affected the whole outlook of educated men. In particular, those branches of science which are concerned with the domains of physics and biology have radically changed our conceptions both of the structure of the visible universe and of the development of life upon this earth.

The effect of the scientific movement, alike on organised religion and on private faith, has been prodigious. In any circumstances it would have been far-reaching. But unfortunately, representative Christian leaders, with the eager support of their communions, opposed the new scientific conceptions as they appeared. Science was then compelled to fight for autonomy on its own territory; and, as Dr. Hobson says in his recently published Gifford lectures, the result has been a prolonged struggle "in which theology has lost every battle." As a consequence it is now widely believed by the populace that Christianity itself has been worsted.

At least a generation must pass before it is generally recognised that, with regard to religion, science is neutral. Educated men know that the traditional presentation of the Christian faith must be shorn of what have become mythological accretions. But Christianity resembles a biological organism with a racial future. In the struggle for existence it gains strength and power by utilising its environment. It seeks both freedom from old limitations and increased mastery of hostile forces. Amid all change its essential character is preserved, for it rests on historical facts combined with permanent intuitions and continually repeated experiences of the human spirit. The great pioneers, whether in science or religion, are few. Men usually accept both scientific and religious truth at second-hand. The expert speaks with the accent of what seems to us to be unmistakable authority. We

make such imperfect tests as we are able to apply to his teaching; and perforce rest content.

We must never forget that all human activity, and not merely those aspects which we call science and religion, rests upon unproved and unprovable assumptions. The existence of such assumptions is often ignored. They are there, none the less. Often lazily and hazily we conceal them under the term "common-sense." Faith, however, is a necessity of existence. Zealots sometimes have contended and still contend that there is a moral value in blind faith. But the modern world, so far as it has fallen under the sway of scientific method, demands that faith shall be reasonable and not blind.

In science we build upon the assumption that the processes of Nature can be represented by schemes that are, to us, rational. There is, we postulate, a unity between Nature's processes and the working of the human mind. The address given this year by the president of the British Association shows how extraordinarily fruitful this assumption has proved to be. But, when we consider the vast domains of science which still remain to be explored, we must grant that the rationality of the universe remains a postulate of reasonable faith. As we pass from science to philosophy and religion, we have to assume the existence of a universal Mind in order to bind together the sequences of phenomena which science observes and describes. Then, as the basis of religious faith, we further assume that the values, which we instinctively deem supreme, express the quality of this Mind to whom all natural process is due. We thus assert that goodness, beauty, and truth are not private values of humanity, but attributes of God.

The different processes of the human mind, thought, will, and feeling, cannot be decisively sundered. As a consequence, the search for truth made by men of science has in our own time profoundly affected our religious outlook. Science has not merely created a new cosmogony against which, as a background, religion must be set. But, as the character of its postulates and the extent of its limitations have become more clear, science has given us a new conception of what we mean by reasonable faith. In so doing, it has strikingly altered the way in which we approach religion. Some old modes of argument and their attendant dogmas have rapidly become obsolete. A great gulf has opened between constructive and merely defensive types of theology. Among religious communions there is, in consequence, much confusion, some bitterness, fear of change combined with recognition of its necessity. The direct influence of science

¹ From a sermon preached in the Lady Chapel of Liverpool Cathedral on Sunday morning, September 16, in connexion with the visit of the British Association to the city.

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.¹

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

SELDOM 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

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