is evidently far from exhausted—the loose ends have indeed been manifest—but this should render it more interesting. It furnishes also an instance, not so familiar as some, of the way in which speculations which appear remote from common interests may ultimately have an important influence on the progress of science. It is true that the secular investigations into the form of the earth's surface have an importance in relation to geodesy, but certainly no one at the time of Laplace's work on this matter would have guessed that he was unwittingly laying the foundation of the whole mathematical theory of electricity. The history of science is indeed full of examples where one branch of science has profited by another in unexpected ways. I would take leave just to mention two, which happen to have specially interested me. It is, I think, not generally understood what an important part the theory of elasticity played in Rayleigh's classical determinations of the relative weights of the gases, where it supplied an important and indeed essential correction. Again, the mathematical theory of hydrodynamics, in spite of some notable successes, has often been classed as a piece of pure mathematics dealing with an ideal and impossible fluid, elegant indeed, but helpless to account for such an every-day matter as the turbulent flow of water through a pipe. Recently, however, at the hands of Prandtl, it has yielded the best available scheme of the forces on an aeroplane, and is even being appealed to to explain the still perplexing problem of the screw-propeller.

To promote this interaction between different branches of science is one of the most important functions of our association, and differentiates it from the various sectional congresses which have from time to time been arranged. We may hope that this meeting, equally with former ones, may contribute to this desirable end.

Let me close with a local reference. The last fifty years have seen the institution of local universities and university colleges in many parts of this country and of the Empire at large. Through these agencies the delights of literature, the discipline of science, have been brought within the reach of thousands whose horizons have been enlarged and their whole outlook on life transformed. They have become centers, too, from which valuable original work in scholarship, history and science has radiated. The University College of Southampton is now contemplating an increased activity and a fuller development. In this ambition it has, I am sure, the best wishes of us all.

HORACE LAMB

SCIENCE AND SOCIAL ETHICS[1]

PRIMITIVE man, with his rudimentary knowledge of good and evil, could not attain a level of existence much above that of the brutes, in spite of the superiority of his brain. Even to-day, men live almost as wild animals in the tropical forests of South America. The remains of Paleolithic man in Europe show us that he had a brain as large as ours, and his art proves his capacity for understanding; yet he lived in what we consider a barbaric state. Gradually, by slow and painful steps, he acquired knowledge and with its aid developed skill and undertook what we call, with boastful exaggeration, the conquest of nature. In reality, he learned to play a game with nature, increasingly complex and productive of results as he learned more and more of the rules. This game, as we now find it, is what we call civilization, and it needs little argument to prove that for its maintenance we require all the knowledge we can obtain, organized into what we call science. We can not even remain where we are; we are compelled by the logic of events to go forward or backward, and progress depends on knowledge. Good intentions are of little avail without it, and the ignorant are like poor players who, doing the best they can, ruin the music of an orchestra. Thus it is impossible to be good without being wise, if we understand the word good in a pragmatic sense, as meaning good for something. Yet we must agree that science alone can not adequately minister to human needs. If a human being is nothing more than a temporary arrangement of atoms of carbon, hydrogen, oxygen, nitrogen and some other elements, our whole conception of human values seems to have little basis in reality. Or rather, is what reality it possesses unstable, evanescent, insignificant in relation to the universe? Is human life a tragedy because a comedy, a thing so ridiculous with its serious poses and heroic gestures that the gods, if there be such, must be convulsed with laughter? Well, we do not believe that for a moment; we could not believe it and be sane. Huxley was perhaps the most typical exponent of modern science, yet his great friend Michael Foster had this to say of him:

> Great as he felt science to be, he was well aware that science could never lay its hand, could never touch even with the tip of its finger, that dream with which our little life is rounded; and that unknown dream was a power as dominant over him as was the might of known science; he carried about with him every day that which he did not know as his guide of life no less to be minded than that which he did know.

[1] Read at the symposium held by the Southwestern Division of the American Association for the Advancement of Science, Boulder, June 8, 1925.

Recently, having occasion to write an article in commemoration of the hundredth anniversary of Huxley's birth, I tried to imagine what his counsel would be, were he among us. I fancied that it might be somewhat as follows:

> You can not have successful democracy without moral sense, and that must show itself equally in tenderness of heart and honesty of purpose. It is not enough to mean well; you must do well, cooperating with the universe in which you live. The honest man faces the facts of existence and governs his conduct accordingly; he throws aside all sham and pretense, as soon as it is ascertained to be such. These are not mere pleasing generalities, but stern precepts in a land where ignorance is often enthroned, and masses of people pretend to believe that which in their hearts they know to be false. Power without wisdom, action without knowledge, must lead to catastrophe, no matter how excellent the political system, how worthy the traditions of the past.[2]

There was a splendid integrity about some of the prophets of old, who offered eternal wisdom in the setting of the knowledge of their day. Yet the parable of the new wine in old bottles shows that our modern dilemma is of very respectable antiquity. It is not difficult to perceive what Jesus Christ would have to say about it, were he once more a man among men. Just as we have made over our lives to suit modern invention and discovery, so must we make over our philosophy to suit modern knowledge. But in essence both the lives and the philosophy remain the same, or at least retain eternal elements. Are we to perish like some butterfly which, having attained the winged state, should insist upon trying to eat cabbage leaves, instead of sucking the nectar of flowers? The matter is of enormous importance, and we must concede this virtue to the enemies of science, that they perceive it to be such. Unquestionably, the progress of the modern world, in its varied aspects, severely taxes the stability and even the sanity of the modern mind. Since we can not go back to barbarism, and all agree on that, it only remains to make readjustments which shall create harmony rather than discord, wholesomeness rather than a chaos of disconnected and irreconcilable fragments. What does this actually involve? It seems to me that it involves on the one hand the possession of what William James called over beliefs, transcendental conceptions of value and virtue which find their main justification outside the field of science; and, on the other, a frank and full acceptance of the testimony of the human senses, not as rigid orthodoxy, but as something dynamic, ever converting reality into truth. The modern man, possessed with these ideas, is bound to reject the mass of ancient miracles, some as apparently pure inventions, others as misinterpretations of facts actually observed. He may still often use metaphor, because our language is full of it, and perhaps the more freely because he knows what he is trying to express. He will not lose the sense of mystery or the feeling of awe, as he contemplates the world about him. Rather, these feelings will be deepened and broadened, as he perceives that truth is ten thousand times more wonderful than any fiction.

What can he say to those who fear that the loss of faith in the images of the past will imperil the essential verities? He can not, he must not, treat the matter lightly, as a thing of no account. The danger is real, and the problem has to be met. But Christ long ago pointed out the futility of trying to meet it in a half-hearted way. The new wine would burst the old bottles, and everything would be lost. This we can not endure, any of us, and those who would insist on confining the growing, living science and religion of the day within the boundaries of ancient tradition are themselves the wasters of that which they hold most precious.

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[2] *Nature*, May 9, 1925, p. 750.

SCIENTIFIC EVENTS

RUSSIAN SCIENTIFIC EXPEDITIONS

ACCORDING to the New York Bureau of the Russian Telegraph Agency an expedition is being sent into the provinces of Saratov and Ulyanovsk (formerly Simbirsk) to study the vicissitudes of culture during the prehistoric period on the Volga river, the main waterway of the East European plain.

An expedition is leaving for Daghestan and the surrounding territories to study the languages, monuments, architecture, art and antiquities of Daghestan.

A four-months' excursion is being organized to Krasnokokshaisk, Penza, Kazan and Sarapul to study the language and culture of the Finnish races in those districts, particularly of the Mari, Votiaks and Mordvans.

A series of scientific expeditions is being organized to Central Asia. The first expedition will leave for the lake of Issik-Kul to investigate the possibilities of establishing large fisheries which may prove of great economic importance. Another expedition will be sent to the mountainous region of Turkmenistan to gather materials on the flora and fauna of that region. An expedition is being organized to Kazakistan (Kirghiz Republic) to gather valuable fossils of animals and plants contained in the slate deposits of the marine period. Other expeditions were sent to the Pamire and Tadjighistan.