

Letters to the Editor.

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Einstein's Shift of Spectral Lines.

REFERRING to my suggestion from Gullane on p. 280 in NATURE of October 28, Lord Rayleigh has recalled my attention to Prof. Eddington's admirable report on "The Relativity Theory of Gravitation," whereby I have been reminded that the predicted shift depends not on gravitational intensity, but on gravitational potential. This makes my revolving disc quite inefficient; it would seem that bodies of astronomical size are necessary for the test.

But since the shift is proportional to the square of peripheral velocity, instead of to the acceleration, it occurs to Lord Rayleigh that the high speed of positive rays curved in a magnetic field might facilitate its detection; for, as he points out, if their speed were 10^8 c.g.s., their radiation shift would be comparable to a fortieth of an Ångström unit.

But this same proportionality to u^2/c^2 raises the question whether, after all, the shift expected is anything more than the natural consequence of self-inductive increase of inertia due to speed. If a satellite suddenly gained a spurious inertia not subject to attractive force, its orbit would enlarge and its period lengthen. So it may be with electrons in a violently projected Bohr atom.

I appreciate Dr. Chree's friendly experimental caution in your issue of November 11.

November 12.

OLIVER LODGE.

The British Association.

WE have been asked by the executive of the National Union of Scientific Workers to send a contribution to the discussion in NATURE on the cause of "the apathy of local people of the educated classes to the presence of the Association" in the centres where it meets.

The majority of those who have taken part in the discussion appear to assume that this apathy is due to the failure of the Association to interest the general public in the utilitarian applications of science and their contributions to the material benefits of civilised life. Only one or two writers seem to have attempted to follow up the lead given in your editorial of September 16, which attributes the public apathy to "the neglect of national bodies like the British Association to adjust themselves to changing national needs. . . . The Association makes little endeavour to show the bearing of scientific methods and principles upon most subjects of vital importance in national polity and industrial affairs."

Prof. Soddy strikes the same note in NATURE of September 23, where he says "the vast body of the general public, disillusioned by the war, looks to them [scientific men] to provide a way of escape from the evils that threaten our civilisation." He points out that "scientific synthesis and the direction of the unique mental attitude, induced only by the actual discovery of new knowledge, to the conduct of public affairs are the real and peculiar functions of the Association if it is to regain its national position."

The executive of the union would like to endorse these views, and to suggest that it is not necessary to invoke the outstanding genius of Huxley and his contemporaries and to hold them up in invidious com-

parison with the men of the present day in order to explain the apathy of the public. The explanation lies rather in the message which Huxley and his contemporaries had to give to the lay public. Their appeal was not based upon holding up to public admiration the utilitarian benefits offered by science, important as these undoubtedly are. Their message appealed to the deep-seated complex of ideas, experiences, beliefs, and emotions which conditions every man's outlook on life. It challenged the static view of man's relation to his environment which was the heritage of dogmatic theology, and offered in its place a dynamic view, which revealed man as himself a part of the great stream of natural causation. As such it tore old prejudices up by the roots, roused fierce resentment in those who could not free themselves from such prejudices, and an equally fierce exultation in others who were smarting under repressions imposed by the authority of theological dogma.

Science (or, we should rather say, the bulk of the institutions and men who claim to represent science) has no such message at the present day. As is shown by the Rev. A. L. Cortie in his letter in NATURE of September 30, the sections which discussed questions such as the constitution of the atom and relativity drew good and numerous attendances; we suggest this was because these subjects touch on ideas of the nature of matter, space, and time—ideas which find a place, however vague, in the philosophy of life of a large number of people.

We believe that if the British Association and other bodies representing organised science are to regain the place in the public estimation which they held in the latter half of last century they will have to come out with a new message which, like that of Huxley and his contemporaries, challenges old-established points of view. Where the Association is to find a field ripe for such a message is suggested in your editorial and amplified by Prof. Soddy. While Huxley's message forced people to revise their old-established ideas and prejudices as to man in his relations to his natural environment, the public is now ripe for a lead from science in the direction of a fundamental revision of that part of its outlook on life which concerns the relations of man to the social and economic environment which he has created.

JOHN W. EVANS,
President.

H. LYSTER JAMESON,
Member of Executive.

A. G. CHURCH,
Secretary.

National Union of Scientific Workers,
25 Victoria Street, Westminster,
London, S.W.1, November 12.

FROM the correspondence that has recently appeared in NATURE it is evident that there is a healthy determination on the part of scientific men in Great Britain that the British Association shall not be allowed to stagnate, but must exhibit progressive evolution as well as the solid dignity implied in its full title. One point that I have recently noticed in your columns with great satisfaction is that in future representatives from similar associations in other countries will be invited to attend each meeting. We who work in parts of the British Empire remote from its centre, and are content to do so, although perhaps our scientific atmosphere is not so rarefied as some maintain, are undoubtedly apt to get out of touch, if not out of sympathy, with the work of our colleagues at home, while they are equally apt to view our en-

deavours as something distinct from their own, on a different, if not precisely a lower, plane, or—shall I say?—on a stage such as that on which the dogs danced for Dr. Johnson's admiration. Such misconceptions are good for no one. They ignore two fundamental facts: that science is universal, and that, nevertheless, scientific work may be undertaken on different lines, and even in a somewhat different spirit, under different conditions.

I am convinced that the British Association might do a great deal to dispel the mirage by making a feature of discussions (of course, on quite general lines) on overseas work in different branches. There are always members present at the meetings from many parts of the Empire as well as from various foreign countries, but they are too often silent members from whom expression of opinion is neither encouraged nor invited. In zoology, at any rate, what we want nowadays is not so much isolated fragments of research, however accurate the observation may be, as syntheses of results. Zoology, indeed, and perhaps other branches of biology also, are in danger of destruction by the toxins produced in their own vital processes, such, for example, as nomenclature and purely museum taxonomy. Yet comparatively few of the subjects discussed at meetings of the British Association, to judge from reports, rise much above this level. What is wanted, so far as the scientific man from overseas is concerned, is more informal discussion on fundamental subjects, more expression of reasoned opinion and well-thought-out aims as opposed to details of observation, and less of the specialist atmosphere. At any rate, that is what I want on the rare occasions on which I am able to attend a meeting of the British Association.

N. ANNANDALE.

Indian Museum, Calcutta, October 19.

Chemical Warfare and Scientific Workers.

PROF. SODDY has directed the attention of readers of *NATURE* (November 4, p. 310) to the issue on the part of the War Office of a letter in which the active co-operation of men of science is invited towards the intensive development of chemical warfare. The list of ordinary associate members embraces more than sixty names of chemists, physicists, and medical men—a list apparently drawn up without consultation with the various members concerned. On receipt of the letter referred to, I replied at once with the request that my name should be removed from the list of associate members, and in this refusal to serve I was actuated by the following considerations:

The use of poisonous gases in warfare was a nefarious novelty introduced by the Germans in violation of the conventions prescribed for civilised belligerents, and the Entente Powers had no option but to undertake methods of retaliation. During the later period of the war I acted as an associate member of the Chemical Warfare Committee, and, like many other chemists, did all in my power to assist by scientific investigation the progress of gas warfare on the offensive side. At that time my services were given most willingly. But the position has entirely altered now that the war is over. My present point of view is that I do not think it right that men of science should, two years after the armistice, be approached with the request to undertake work on a method of conducting warfare which has not yet been recognised as legitimate.

If gas warfare is to be adopted in the future, one result follows of necessity: every nation will be compelled in self-defence to cultivate this form of devilry. Yet we have just listened to the earnest appeal of the

Prime Minister for more goodwill amongst nations, amongst people, amongst the classes! The recognition of chemical warfare even on the basis of a peace organisation must certainly engender an atmosphere of suspicion. It will, however, be the hope of many that if nations will by mutual consent unite in the abolition of an instrument which adds so much to the horrors of war, they will also have the strength and the determination to make their decision effective.

The successful development of chemical warfare will obviously be dependent on scientific work, and it is easily understood that the authorities should look to the universities to give them some assistance in its prosecution. University teachers should be on their guard before they bind themselves to a policy in the framing of which their opinion as a body has never been taken. Surely the universities ought to have been asked their views. Why should a professor of chemistry by joining the Chemical Warfare Committee pledge his university to a course of action of which the university may not approve?

ALEX. MCKENZIE.

PROF. SODDY (*NATURE*, November 4, p. 310) seems to have overlooked some arguments. Lack of preparation for war is no guarantee against an aggressive policy. Recent British history shows a close correlation between Jingoism and military inefficiency. In this country Jingoism is seldom intelligent enough to provide against the risks they incur.

Again, the more scientific war becomes, the more difficult it will be to wage it without the consent of scientific workers. If they really desire a saner state of international relations, scientific workers should seek so to develop the engines of war that they alone can use them.

Lastly, if Prof. Soddy really wishes to stop the application of science to warlike purposes, he should surely welcome with open arms the War Office Committee. Can he suggest any means for discouraging the application of scientific study to war (or to any other problem) so entirely efficient as the placing of the matter in the hands of a large Governmental Committee composed exclusively of eminent persons?

NORMAN R. CAMPBELL.

November 9.

British Laboratory and Scientific Glassware.

PROF. BAYLISS in his letter published in *NATURE* of November 4 appears to attribute the breakage of British laboratory glassware, when exposed to changes of temperature, to inadequate annealing, citing table glassware as an example of a commercially well-annealed article.

I have at different times examined many hundreds of pieces of table glass under the polariscope, and have never yet found one entirely free from strain. On the other hand, I have often found laboratory beakers, taken at random from average samples, in which no strain whatever can be detected. When strain does occur in beakers and flasks it is generally at the lip, and is caused by the flanging operation. In this connection it is interesting to note that beakers which contain bad striæ, and are, consequently, in a state of strain which cannot be removed by annealing, give figures for thermal endurance as high as those obtained from beakers free from striæ.

The difference in thermal endurance between German and English laboratory glassware is inherent in the composition of the glasses selected for their manufacture. The predominant factor controlling the variations in thermal endurance is the coefficient of expansion of the glass, since this property changes