be in some way dependent on the fact that any variety of sulphur increases in conductivity with rise of temperature. Unless it is suggested that we did not know one temperature from another, I fail to understand this criticism. RICHARD THRELFALL.

University, Sydney, N.S.W.

I SEE no reason to recall what I have said regarding the general attitude of chemists and physicists on the question of the influence of minute traces of impurity; and when I come across the remark in Messrs. Threlfall, Brearley and Allen's paper in the *Phil. Trans.*, that "it is not too much to say that the electrical action of most bodies in a pure state is entirely unknown at present," I feel there is not much difference of opinion between us.

Then, as to my being guilty of that unpardonable crime—pedantry—it has always seemed to me that those of us who undertake scientific work should also strive to be scientific, *i.e.* exact, in their use of language. Those who had the great good fortune to be present a year or so ago at the NATURE dinner, and to hear Huxley's marvellous speech—almost, if not the last he delivered—will recollect how strongly he insisted on the importance of greater care being taken in the writing of papers describing scientific inquiries. In a conversation I had with him afterwards, he greatly lamented the careless manner in which such work was too frequently done.

Now if *pure* mean "free from mixture," a pure substance must, as I have said, ever remain an ideal conception; the purist must ever regard all things as impure. Prof. Threlfall tells us that "the word pure has no significance except with respect to a definite state of the art of chemistry." I would rather accept the meaning which is to be found in the dictionary, *pace* Stas even; and would prefer to assert that the word too frequently has no significance except with reference to an indefinite state of the mind of the person—chemist or physicist—using it. To my mind, there can only be degrees of impurity—not of purity.

Whatever time Prof. Threlfall and his colleagues may have spent in seeking to purify sulphur, the fact remains that their experiments were made with sulphur which they obtained by chance, and that the only method of purifying it they adopted was to distil it several times in vacuo, after filtering it while molten through glass wool and platinum gauze, and then to fuse it in vacuo—in order, they tell us, to get rid of gases (probably water vapour, they say) given off even from the purest samples. But distillation in vacuo, even when followed by fusion in vacuo, can scarcely be regarded as a process which "exhausts the resources of physics, including chemistry."

"Chance" sulphur is prepared by burning sulphuretted hydrogen. It is probably impossible to burn sulphur without producing some sulphuric acid. Messrs. Threlfall, Brearley and Allen, however, do not even refer to the possibility of its presence, and apparently took no precaution whatever to eliminate it, if present.

They tell us that on breaking up such sulphur after it had been strained while molten through glass wool and platinum gauze, it emitted a horrible smell of gas-lime, "which shows that it requires to be distilled if sure results are to be obtained." I imagine, therefore, that the sulphur they used initially was by no means so remarkably "pure"; as they also state that gases were given off even from the purest samples when fused in vacuo after distillation, it may well be doubted whether so simple a process as mere fusion could suffice to effect the necessary final purification.

Prof. Threlfall's statement that conducting "mixtures" were caused to become non-conducting by annealing, is apparently a good answer to my criticism; but by no means finally disposes of it. The structure of the two materials may have been very different, and such in the one case as to allow an impurity to act, which in the other case might be inoperative. By my reference to the conductivity of sulphur at temperatures above its melting point, I meant to imply that the behaviour described afforded indication of the presence of impurity; for I do not believe that even molten sulphur is a conductor. Of course, at present, this is but an opinion, but it may not be inappropriate to direct attention to the recent most remarkable observations of Dewar and Fleming on bismuth, showing that an amount of impurity altogether beyond detection by chemical means may entirely alter electrical properties.

I still, therefore, regretfully retain my opinion, and fear that, notwithstanding the great care lavished on the work of Prof. Threlfall and his colleagues, it will be necessary to repeat it, perhaps over and over again—a possibility which they apparently themselves foresee in the introduction to their paper—before so remarkable a conclusion as that they have arrived at can be regarded as established.

H. E. ARMSTRONG.

Increasing the Efficiency of Röntgen Ray Tubes.

MR. J. C. PORTER, in a letter in NATURE of June 18, describes a method of increasing the efficiency of a Crookes' tube. I have for some weeks used another very simple method to obtain the same result. This consists in placing the flame of a small glass spirit-lamp in the angle formed by the Crookes' tube and the wire passing to the kathode, and allowing a series of small sparks to pass to the flame from the wire.

Burnley, June 29. T. G. CRUMP.

THE POSITION OF SCIENCE AT OXFORD.

WHILST the study of natural science has been progressing rapidly in other universities and colleges during the last ten or fifteen years, it is a matter of common knowledge that it has progressed very slowly indeed in the University of Oxford. It would be incorrect to say that it has not progressed, for there has been during the last few years a steady, though very gradual, increase in the numbers of men reading for honours in the final school of natural science. In 1885 twenty-two men obtained honours in sciencce, in 1895 there were forty-three names in the class list, and a rather larger number in 1894. The school has just doubled itself in ten years, but for all that the numbers are still small, and out of all proportion to the provision that has long existed for science teaching in the University. It must be understood at the outset that the University, considered as a body separate from the colleges which compose it, has not dealt ungenerously with science. The staff of professors, and the emoluments attached to their chairs, compare favourably with those of any other university in Great Britain; and Oxford actually set the example, at great cost to itself, of building a museum and equipping laboratories for educational purposes. Moreover, the opportunities of scientific study in Oxford are greatly enhanced by the existence within the precincts of the museum of a first-rate scientific library, such as is not possessed by any other college or university in the kingdom. It is a strange thing that when it has so many advantages, Oxford has allowed itself to be completely outstripped in this particular path of intellectual progress.

It is the purpose of the present article to discuss the possible causes of comparative failure of the science school at Oxford. A complete failure it is not, for, however poor its numerical results may be, it has long been recognised that the attainments of the limited number of scientific men which it turns out compare well with those of men who have been educated in other places.

It is commonly supposed that the prime cause of the insignificant numerical result is the small encouragement given to scientific study in the shape of fellowships and scholarships; and those who hold this opinion believe that if the colleges were to do what is conceived to be their duty in this respect, the science school would progress by leaps and bounds.

With respect to scholarships and exhibitions, it is apparent, from an analysis of the figures, that science does not get what may rightly be held to be its due. The *University Calendar* for 1896 shows that there are in Oxford some 500 scholarships of an annual value of £80 a-piece, and in addition some 225 exhibitions, the annual value of each of which may be placed at £40, These figures apply only to college scholarships and exhibitions, and so it appears that the colleges, apart