

a crime. There is not a single technical teaching institute in the whole of India. In the universities and Government colleges there is very meagre provision for research work. The universities are just trying to emerge from mere examining bodies into centres of education, and the demand for State aid for founding chairs in experimental and industrial subjects is very great. In Bengal, the most advanced province in India, there are, technically speaking, no endowed chairs at all (except one or two founded by the generosity of patriotic citizens). Altogether we have five or six high posts in the Government colleges, but the occupiers of these posts are required only to teach, and not to do any research work. The number of research scholarships is only three or four. But the man who has done good original work, and has the good fortune to be taken into the Service, has no better prospects before him than the man who has nothing to his credit except his original degree in the university; for under the Service system promotion is by favour and seniority, not by work and efficiency.

It appears to me that the most pressing needs for India at the present moment are: (1) The foundation by the Government of a number of chairs in various branches of pure and applied chemistry in the universities, and also a large number of readerships, assistant professorships, and research scholarships. (2) The establishment of a number of technical institutes and the strengthening of the laboratories and scientific libraries. (3) The organisation of the posts so created and of the posts already existent on a professional rather than on a Service basis. (4) The replacement of the director by boards of recruitment composed chiefly of university professors, one official, and one or two non-official representatives of the public. (5) The encouragement of the foundation of scientific societies.

There should be no watertight separation between those who are engaged in special types of work in Government research institutes and those working in the university laboratories. The officials in the research institutes should be asked to maintain a life-long connection with the university in some shape or other; and the researchers in the universities may be invited, when an occasion arises, to avail themselves of the opportunities afforded in the research institutes.

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#### The Cost of Scientific Publications.

IN the timely leading article in NATURE of May 6 on the cost of scientific publications a note is struck which goes deep to the heart of many scientific workers—editors, secretaries, and members of councils on one hand, struggling to make inadequate funds meet the greatly increased expenses, and on the other the young investigators whose papers on the results of research are being held up by the impossibility of paying for publication. It is difficult to see the remedy at the moment. Most of us will, I think, agree with you that increased subscriptions to the publishing societies, on any adequate scale, would be a hardship to many, and probably defeat the end in view by choking off members. My experience as an officer of the British Association and of several scientific societies has shown me that it is difficult enough for our younger scientific workers, such as the demonstrator class at the universities, to afford the necessary expense of joining such societies and attending the meetings. Recognising the great pleasure and advantage that one enjoyed in seeing and hearing the

senior men in the subject at the first scientific meetings one attended (British Association and Linnean Society), it would be deplorable that anything should be done to render it still more difficult than it is for the younger men of to-day to attend and take part in such gatherings.

You suggest that we may have been unduly extravagant in the past in the production of our scientific publications. This may have been so to some slight extent in a few cases, but I am by no means convinced that it is general, or material, and I would deprecate any drastic change. A judicious and kindly editor, secretary, referee, or communicator of a paper may usefully do something to moderate the exuberance of a youthful author and to keep note-book details within reasonable bounds; but the scientific value of a paper may be spoiled by ruthless excision. It is not enough, in many cases, to give end-results unless conclusions are to be accepted uncritically like text-book statements. To be of value to workers on the subject in the future, the details of experiments and the statistics of observations are essential. I see therefore no remedy except the provision of considerably increased funds for publication, not from the members of the publishing societies, but from outside sources—either private benefactors or the State.

We already have certain endowments and certain annual grants for the promotion of scientific research, but I would urge the emphatic opinion that adequate publication is an essential part—the necessary completion—of any important and successful research. Some administrators of scientific funds—for example, the trustees of the Percy Sladen Memorial Fund—have acted on that view, and so far as their limited resources allow they try to see through to complete publication the researches which they have supported; but, of course, this limits to some extent their activities in subsidising further research.

The provision of a considerable endowment from which grants might be given in aid of the publication of worthy papers by the principal scientific societies would be a noble benefaction which would doubtless have an effect upon the advancement of knowledge second only to the endowment of the research itself.

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The University, Liverpool, May 9.

I HEARTILY agree with the opinion expressed in the leading article in NATURE of May 6 that a Government subsidy is necessary at the present time to lessen the sudden shock of war conditions to our scientific societies, especially in the matter of printing. The case was well put by Sir Joseph Larmor in a letter to the *Times* some months ago: the blow strikes at the very roots of scientific advance, and the risk of vital damage is thus the greater because roots are apt to be buried out of sight. If the mischief be not remedied in time, it will become clearly manifest only when the fruits begin to fail.

In societies with which I am connected, and especially in the British Association, anxious study has been made of all possible economies in printing, and anything which could be regarded as a luxury is being rigidly excluded; but the printing bill will still be heavy—much heavier than before—and the excess will inevitably be subtracted from funds formerly devoted to research. Moreover, we cannot be quite easy about the omission of the items regarded as luxuries. It is a common experience that life-long influences may hang on trifles, and the natural accretions which gather round an old-established association like the British Association are peculiarly liable to contain just