

SCIENCE

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THE ENDOWMENT OF RESEARCH.

Is investigation in the physical sciences now limited by the lack of men or money ? In other words, is it limited by the insufficient number of investigators capable and ready to do work of the highest grade, or are they unable to secure the means needed to carry on such work ? The income of several funds is available for aiding such investigation. In 1797, Count Rumford gave to the American Academy the sum of \$5,000, for awarding gold and silver medals for discoveries in light and heat. Until recently, so little use has been made of its income that this fund now amounts to \$58,000. The annual income, which exceeds \$2,500, may be used for researches in light and heat. The Elizabeth Thompson fund, amounting to \$26,000, according to the last circular issued, may be used for investigations in all departments of science. Seventy-one grants have been made from the income of this fund, generally in sums not exceeding \$300. Several funds, held in trust by the National Academy of Sciences, show unexpended balances equal to the income of several years. Thus, at the beginning of the present year, the Henry Draper fund of \$6,000 had an unexpended balance of more than \$2,000 available for investigations in astronomical physics, and no applications had been received for it. In 1886, the writer attempted to secure the sum of \$100,000, the income to be used for

aiding astronomers of all countries in their work. Miss Bruce, in 1890, besides her numerous other gifts to astronomy, gave the sum of \$6,000 to be distributed in this way. The 15 donations are described in a circular issued in 1891. Many investigations require such large sums of money that they could not be provided for by such funds as these. On the other hand, a small sum judiciously expended sometimes leads to much larger gifts, and may furnish an observer with an instrument, an assistant, or means for publication. A small gift may thus render available, resources of vastly greater value which would otherwise lead to no useful result. For instance, the writer in 1882 received an appropriation of \$500 from the Rumford fund, for an investigation in astronomical photography. Presenting the results of this work to the trustees of the Bache fund, he received an appropriation of \$3,000, with which an 8-inch photographic telescope was constructed. Twenty-six thousand photographs have since been taken with this instrument which for many years has been used throughout every clear night at the Arequipa Station of the Harvard College Observatory. The early results were presented to Mrs. Henry Draper, who accordingly had a similar 8-inch telescope constructed. This instrument is used here throughout every clear night, on the northern stars, thus supplementing the work of the Bache telescope. With this instrument, also, 26,000 photographs have been obtained. The early results of the Henry Draper Memorial led to the transfer of the Boyden fund, exceeding \$200,000, to the Harvard College Observatory, and also to the gift of \$50,000 by Miss C. W. Bruce, with which a 24-inch telescope, now successfully at work in Arequipa, was constructed. The results attained by each gift thus helped to secure the next. Again, an appropriation of \$500 from the Rumford fund, in 1899, enabled

the Directors of the Yerkes, Lick, McCormick and Harvard observatories to cooperate, so that telescopes of 40, 36, 26, 15, and 12 inches aperture are now being used in the same research on the light of very faint stars. The value of the plant utilized in this research exceeds a million dollars. It is hoped that similar cooperation can be secured in continuous observations of the variable stars of long period. In many cases an award of a small sum to an observatory will assure its friends of the value of the work and thus encourage them to contribute liberally. It is believed by the writer that the real difficulty lies in the lack of knowledge of what funds are available, diffidence in presenting applications, and in some cases objection to the restrictions under which the grants may be made. Could these difficulties be remedied by a permanent committee, and if so, how should it be appointed? In no country have such sums of money been given to science as in the United States; in fact, the success so far attained and our future prospects for research depend largely upon such gifts. It is believed that in many cases wealthy men and women would gladly aid scientific investigation if they could be sure that their gifts would be judiciously and economically expended. It is, therefore, of the greatest importance to all scientific men, not only to secure aid for important researches, but to prevent, if possible, the unwise or wasteful expenditure of such money. The writer desires to learn the views of others on this matter, either through the columns of *SCIENCE*, or by personal correspondence.

EDWARD C. PICKERING.

CAMBRIDGE, MASS., January 25, 1901.

*RESEARCH WORK FOR PHYSICS TEACHERS.**

THE teaching of physics is in itself a delightful thing, but to be thoroughly enjoyed

* An abstract of a paper read before the Physics Club of New York, December, 1900.