APPLICATIONS for grants from the Cyrus M. Warren Fund of the American Academy of Arts and Sciences should be received by the chairman of the committee, Professor Frederick G. Keyes, Massachusetts Institute of Technology, Cambridge 39, Mass., not later than April 16. Grants are made in aid of chemical research—generally for apparatus or supplies or for the construction of special facilities needed for research in chemistry or in fields closely related to chemistry. Grants are not awarded for salaries, and, on account of limited resources, the amount to an individual is seldom in excess of $300. Application blanks may be obtained from the chairman upon request.

SIX fellowships for graduate students, each calling for a stipend of $1,200 annually, have been established at the University of Chicago in honor of William Rainey Harper, its founding president. The fellowships are open to any student with a master's degree or its equivalent, who wishes to work for the degree of doctor of philosophy, either at the University of Chicago or elsewhere.

THE Canadian National Research Council has installed the latest type of electron microscope in its laboratories at Ottawa. This instrument and one developed in the department of physics of the University of Toronto are the first electron microscopes to be used in Canada. A third microscope will be installed at McGill University. The council plans to make the microscope as widely available as possible to all government laboratories and to those industries having suitable problems. The Electron Microscope Society of America has been formed to aid in the exchange of information on microscope techniques and experimental results.

THE Seventh Addendum to the British Pharmacopoeia, 1932, was published under the direction of the General Council of Medical Education and Registration of the United Kingdom on January 30, and became official from that date.

DATA for maps, secretly moved from Manila to Corregidor and then picked up by a submarine for delivery to an American base, were used in the preparation of the new map of the Philippines of the National Geographic Society, which will be a supplement to the March issue of the *National Geographic Magazine*. Printed in seven colors, the map shows most of the 7,083 islands and isles. Three thousand seven hundred and eighty-seven places are named, and railroads, highways, mountain heights and swamplands are indicated.

MRS. MARY-RUSSELL F. COLTON, one of the trustees of the Museum of Northern Arizona, on the occasion of the seventeenth annual meeting, presented the institution with about ten acres of land on which are a number of masonry and frame buildings. The gift adjoins other property owned by the museum and brings the total holdings to seventy acres. When the new buildings are remodelled, they will provide greatly increased space for research. The Museum of Northern Arizona is situated three miles north of Flagstaff, at the base of the San Francisco Peaks (altitude 12,640 feet). In the past the museum has provided, each summer, research facilities for a few advanced students in geology, anthropology and biology. In the post-war period it is hoped that this service may be greatly increased.

ACCORDING to the daily press, Washington University, St. Louis, will receive under a decision of the Appellate Court $1,250,000 for a geophysical technological institute from the estate of Henry E. Sever, Chicago publisher. The decision reverses a ruling by Judge Joseph A. Graber, of the Cook County Superior Court, that the money should go to St. Louis University.

THE University of Rochester plans to expand its program for engineering students under a newly established Division of Engineering in the College of Arts and Science. The new division is a development of the Department of Engineering and will have much of the freedom of action usually associated with a separate school. It is being set up in anticipation of a greatly increased demand for engineering training after the war, as well as to meet present needs. A new four-year course in electrical engineering is planned in addition to the present accredited programs in chemical and mechanical engineering.

DISCUSSION

THE TORQUE OR ROTATING ACTION IN A BEAM OF LIGHT

RECENTLY before the American Physical Society in New York, Felix Ehrenhaft gave a paper in which he claimed that he had proved that a beam of natural (unpolarized) light produces a rotating action on matter on which it falls; that the idea was entirely new, never before entertained by physicists and never demonstrated. As he regarded himself to be a lone pioneer in this topic he naturally gave no historical references.

Here are some facts connected with this topic. In my text, "An Elementary Survey of Modern Physics" (Macmillan, 1936), pages 57, 424, 425, I have dis-

cussed the torque in a beam of *circularly polarized* light. There it is pointed out that Professor Poynting of Birmingham in 1909, basing his ideas on the wave theory, worked out the torque T to be expected for a circularly polarized beam of one square centimeter as $T = M\lambda/2\pi$ where M is the energy density, therefore the pressure, and λ is the wave-length. I then present the argument based on the idea of photons and arrive at the same result.

These views had been presented to my classes for some years before the publication of my text in 1936. But I did not know that A. Sadowsky in Russia had derived a similar result, basing his work on Maxwell's theory.[1]

Now the pressure of light on an absorbing surface in the experiments performed by E. F. Nichols and myself was of the order of 10^{-7} gram per cm^2. Hence theory gives for the torque in a beam of 1 cm^2 cross section an amount of about 5×10^{-12} gm cm or 0.000,000,000,005 (the last digit is of no significance except to show its approximate decimal position) gm cm. This almost infinitesimal amount however is for an intense beam, one square centimeter in cross section of *circularly polarized light.* For a beam of natural or plane polarized light the torque would be exactly zero on either theory. For a beam of light of two one hundredths of a centimeter in diameter of such an intensity that it could be observed in a microscope, the torque, even in the case of circularly polarized light, would be about one millionth of the amount given above or 0.000,000,000,000,000,005 gm cm. For natural light it would be zero.

But though the torque to be looked for in a beam of circularly polarized light (for elliptically it would be less, for plane polarized or natural it would be zero) is extremely small, it can and it has been detected. In my book, page 425, I outlined the experimental method. The experiment, independently devised, was performed by Richard A. Beth[2] in Princeton. He showed extraordinary courage in attempting to measure this minute quantity. The experiment called for prolonged and intense labor and was carried out with excellent technique. He obtained a result of the right order of magnitude as given by the theory. Beth's experiment was not of the show-off kind. He didn't call in the villagers to see the phenomenon "that was going to revolutionize our ideas of the universe." His work and the work of the theoretical physicists who have considered this matter show that the rotating action in a beam of circularly polarized light is exceedingly small and in a beam of natural light nothing whatever.

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[1] A. Sadowsky, *Acta et Commentationes Imp. Universitatis Jurievensis,* 7: No. 1–3, 1899; 8: No. 1–2, 1900.

[2] *Phys. Rev.,* 48: 471, 1935; 49: 411, 1936; 50: 115, 1936.

TEMPERATURE INDUCED STERILITY AND EVOLUTION

IN an over-simplified form the following discussion presents an analysis of a few possibilities that seem to be inherent in a thermal sensitivity of male germ-plasm.

All terrestrial animals that have been investigated with respect to temperature tolerance of the male germ-plasm have shown that applications of heat will produce some degree of infertility. The effects range from lowered fertility to complete sterility. It is notable that in some instances normal body temperatures of warm-blooded animals will cause sterility and that somewhat comparable conditions exist in the cold-blooded animals.

The process of evolution from amphibia to the mammals and birds, the latter having the highest known vertebrate temperatures, displays the progressive adoption of ever-higher temperatures, and it is therefore remarkable that in no known instance are the mammalian testes invulnerable to exposure to high temperature. It would seem inevitable that in the long course of a history of rising temperature, the warm-blooded animals would have established testicular temperature tolerances compatible with their somatic requirements. There does not yet seem to be any known case of a balanced body-germ-plasm temperature harmony in any group of the vertebrates, although it is logical to expect that there would have been some such perfection. The absence of such information may, of course, result from the fact that there has as yet been no search for such an adjustment.

The entire picture seems to be one of a steady somatic advance in utilization of high temperatures with failure of the spermatogenic mechanism to keep up with advance. It is as though the body paced the advance while the germ-plasm acted as a retarding influence.

It also seems clear to me that any failure of the germ-plasm to maintain at least a reasonable tolerance to an advance in the body temperature would endanger the entire complex of the fecundity-mortality balance. A diminution in the reproductive capacity, resulting from heat exposure following such a dislocation, could result in catastrophe to the gene complex allowing the dislocation.

That the scrotal mammals have circumvented this disaster by the purely fortuitous acquisition of a novel, essential, thermoregulatory device is definitely established, as is the fact that non-scrotal forms appear to detour their dilemma by various expedients such as a retention of a poikilothermous temperature fluctuation during spermatogenesis, or by not having acquired the high temperature of the more specialized mammals. It seems possible that the opportunist type of expedient, namely, intermittent spermatogenesis