of your letter is taken from the printed rules for retirement as formally adopted by the trustees and published in the Fourth Annual Report. There is a misprint, as you point out, in which Rule I. stands instead of Rule II.

The extract printed by President Jordan was taken from the minutes of the annual meeting and contained simply additional instructions of the trustees to the executive committee for their guidance in administering the rules as adopted. These general instructions to the committee directed them that in the administration of Rule II. in its revised form the executive committee was given such discretion as would enable the committee to vote retiring allowances in the cases of those who have shown marked fitness for research, of those whose twenty-five years of service include noteworthy presidential or other administrative work in a college or university, and of those who had made definite preparation for early retirement under the old rule.

I may add that in the past year the committee has had very few applications upon the first mentioned ground. Whenever such applications have been made, the committee has sought to ascertain through the scientific associates of the applicant a fair estimate of his research ability. No applications have as yet been approved by the committee upon the second ground mentioned. A retiring allowance asked upon the third ground has been voted by the committee in each case in which the applicant had actually announced his prospective retirement to the college authorities or had really modified his plans to take advantage of retirement within the next few years. I think this answers fully your enquiry.

Very truly yours,

Henry S. Pritchett

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QUOTATIONS

MEDICAL RESEARCH

In his speech, which we reported yesterday, at the inaugural meeting of the Oxford Branch of the Research Defence Society, Lord Cromer remarked with much truth and point that the mere name of the society in whose behalf he was appealing "carried with it to some extent an implied reproach on the state of public opinion in this country." Medical research needs, or ought to need, no defence. On the other hand, for the sentiment which would impede its progress by discountenancing all experiments on living animals no defence is logically possible, unless those who entertain it are prepared to maintain that no possible advantage to mankind can justify experiments on animals which may cause them pain and often result in their death. It is this thesis which really needs defence, and not the pursuit of medical research even by means of vivisection. Dr. Osler went straight to the point when he said: "The question was this—Were they justified in using animals to gain a knowledge of the cause and cure of disease? A majority of thoughtful people maintained that they had the right, and they must employ vivisection, taking care that the animals suffered a *minimum* of pain." There are doubtless many people who will dispute all these propositions and deny, first, that we are justified in using animals to gain a knowledge of the cause and cure of disease; secondly, that a majority of thoughtful people recognize the existence of any such right; and, thirdly, that the practise of vivisection is necessary to the exercise of that right. Some of them, indeed, would probably go so far as to deny that the pursuit of medical research by means of vivisection has materially increased our knowledge of the cause and cure of disease.

We would speak with due respect of those who entertain these opinions, but we can not pretend to agree with them. Those who hold that we are not justified in using animals to gain a knowledge of the cause and cure of disease must hold, if they are logical and consistent, either that we are not justified in killing animals at all, or that in killing them we must inflict no pain that can be avoided. In the former alternative they must abstain from

all forms of animal food, and in the latter they must eschew and condemn every kind of sport. It follows, too, as Lord Cromer pointed out, that they, as well as all who, without sharing their extreme opinions, object to vivisection on principle, must decline to avail themselves of the knowledge acquired by the bacteriologist whenever they are ill themselves or illness occurs in their families. If all anti-vivisectionists displayed the courage of their opinions to this extent there would, we imagine, be very few anti-vivisectionists left and the Research Defence Society would find its occupation gone. We should regret this result, because we need not hesitate to acknowledge that the practise of vivisection does need regulation, and that the anti-vivisectionists, in spite of their occasional resort to methods and arguments which Lord Cromer did not hesitate to characterize as "in the highest degree unscrupulous," have in some degree helped to define the proper limits of such regulation. But in truth the defence of research and of vivisection, properly regulated, as ancillary and even indispensable to it, is, as Lord Cromer showed, irresistible in its cogency. "Step by step, the microorganism of all the principal diseases—relapsing fever, leprosy, typhoid, tuberculosis, cholera, diphtheria, tetanus, influenza, plague and dysentery—had been tracked to its lair." By this discovery all these diseases have been rendered much more amenable to remedial treatment and preventive control, and in favorable conditions some of them have been, for all practical purposes, extirpated. It is now almost impossible for the cholera or the plague to effect a lodgment in this country; and there need be no serious anxiety about the recent mysterious outbreak at Freston in Suffolk. The case of the plague, on which Lord Cromer dwelt at some length, affords a crucial instance of the value of bacteriological research. Its prevalence in certain districts in India was found to be associated with the prevalence of rats, and, further, the chain of causation was traced through the rat to the particular kind of flea with which the rat was infested. This led by means of experiments on living rats and their fleas to the discovery of the anti-plague vaccine by Mr. Haffkine. When this point was reached after some years of observation the practise of inoculation with the vaccine was gradually introduced. The results were astonishing and should be convincing. "In the Punjab, whose aggregate population was about 827,000, some 187,000 were inoculated four months before the plague appeared, and some 640,000 were not inoculated. Only 314 deaths occurred amongst the inoculated, while no fewer than 29,723 occurred amongst those who had not been inoculated." In other words, about 8,000 lives were saved in consequence of prolonged bacteriological researches conducted by means of experiments on living animals. Would the anti-vivisectionists insist that those 8,000 lives should be sacrificed in order that a few hundred, it may be, of rats or guinea-pigs should be spared the pains that are inseparable from properly regulated vivisection? If not, what are we to think of their far from scrupulous methods and their incessant appeals to popular prejudice and perverted sentiment?

By a fortunate, though undesigned, coincidence we printed yesterday in our *South American Supplement* a statistical statement by the chief sanitary officer of the Isthmian Canal Commission of the results of recent sanitary effort in the Isthmian region. Bacteriological research has demonstrated that many of the diseases incidental to a tropical region like this are caused, not by the tropical climate, nor by any emanations from the soil or waters, but by the introduction into the human system of specific microorganisms by means of the bites of insects—just as the plague is conveyed in India by means of the bites of the rat flea. Here, again, science having ascertained the cause has been enabled very largely to mitigate and control the effect. It was in 1905, when the Canal Zone came under the sanitary control of the United States, that sustained efforts were initiated to mitigate the devastating scourge of these tropical diseases. There has been no case of either plague or yellow fever on the Isthmus since

1905. In that year the death-rate for the city of Panama was 65.82 per 1,000; its population had risen from 21,984 in 1905 to 40,801 in 1909, but the death-rate had fallen to 25.44 per 1,000. In the Canal Zone, including the cities of Colon and Panama, the population has risen from 56,624 in 1905 to 135,180 in 1909, but the death-rate has fallen from 49.94 to 18.19 per 1,000. Among the employees, who numbered 16,511 in 1905 and 47,167 in 1909, the death-rate has fallen from 25.86 to 10.64 per 1,000. In 1905 the number of patients admitted to the hospitals for malaria alone was 514 for every 1,000 employees, and in 1906 it rose to 821; but in 1909 it had fallen to 215 for each thousand employees. These astonishing results reflect infinite credit on the sanitary department of the Isthmian Canal Commission, and they also point to the almost incalculable benefits, actual and potential, derived by mankind from sustained bacteriological research. It is true that they have involved the extirpation, not perhaps always by painless methods, of countless myriads of mosquitoes and other small deer—some of them possibly vertebrate; and for all we know this may be, as it logically ought to be, a source of infinite pain to the more extreme of the anti-vivisectionists. But after all we may ask them with the distinguished American quoted by Lord Cromer, "At how many rabbits or guinea pigs do you value your wife, your husband or your child?" That, as Lord Cromer said, puts the case in a nutshell. For without experiments on living animals there can be very little advance in bacteriology.—*The London Times.*

SCIENTIFIC BOOKS

Experiments on the Generation of Insects. By Francesco Redi. Translated from the Italian edition of 1688 by Mab Bigelow. 8vo, pp. 160, illustrated. Chicago, The Open Court Publishing Co. 1909.

The appearance in 1668 of Redi's "Esperienze Intorno alla Generazione Degl' Insetti" was a notable scientific event. This book embraced the first published results of experiments to determine the truth or falsity of an old scientific dogma, and it remains as a milestone on the highway of biological progress. By supplying an attractive edition of this biological classic the translator (Mab Bigelow) has rendered a service to biologists and to others with intellectual interests in the progress of human thought. The translation is from the fifth Italian edition of 1688 and contains photographic reproductions of the title page and of all the illustrations. These consist of twenty-nine plates, and twelve other cuts in the form of text-figures and full-page illustrations, in some cases, with several figures to one cut. The pictures are *facsimile* except as to size—most of them having undergone some reduction to fit the dimensions of the volume—and it is a satisfaction to have the entire work so well reproduced.

In Redi's time the belief that living forms arise spontaneously from lifeless matter through the action of natural forces was of long standing. This was according to the teachings of Aristotle and it had scarcely been questioned before the experimental tests of Redi. At the time of the publication of the first edition of his book the microscopic organisms were unknown and the doctrine of spontaneous generation of life was held for relatively large animals as frogs, mice, insects, etc. As one of the writers of the period said, "To question this is to question reason, sense and experience." The great service of Redi was to replace this belief in abiogenesis by that of biogenesis, or life only from previously existing life.

Redi's book is a long letter addressed to Carlo Dati, in which he pleads for the experimental method, and, after a review of the opinion of earlier writers, with many modest protestations, he describes his experiments and conclusions. He says (p. 33):

> Belief would be vain without the confirmation of experiment; hence in the middle of July I put a snake, some fish, some eels of the Amo and a slice of milk-fed veal in four large, wide-mouthed flasks; having well closed and sealed them [*con carte e spagi*, as another edition says], I then filled the same number of flasks in the same way, only leaving these open. . . .

Maggots appeared in the open flasks to