theology, religion is not a theory about life or about God or about our relation to Him: religion *is* life, it is our relation to God. Philosophy, as has been said, may intellectually satisfy man's yearnings for the infinite, and may attempt to set forth the relation between the truths of science and the truths underlying religion; but let us avoid confusing these purely intellectual endeavors with the living practical reality!

Finally, careful reflection over what has gone before should, it would seem, inevitably impel the reader to the conclusion which led in the first place to the writing of what has been here written, namely, that philosophy and the sciences, far from being enemies, rivals or even strangers, are inextricably interdependent. To science the philosopher must go for the facts he wishes to correlate, interpret and evaluate: no longer can one hope to obtain the data for philosophical investigation from the depths of his own inner consciousness, but at every step the philosopher is dependent on what science has accomplished through the use of its own empirical and analytical methods. Metaphysics *is* dependent on the work of the physicist, the biologist and the psychologist; esthetics, ethics and the philosophy of religion *are* dependent on the investigations of the psychologist and the historian; and so with the other philosophical disciplines. But there is another side to the picture also; for if the scientist contributes the materials for the philosopher to work upon, equally true is it that the philosopher has something to contribute to the scientist which may be to him in his wider-reaching human nature of equal value, namely, breadth of interest and the synoptic spirit. Each science in itself has a narrow range of interest; but under the influence of the great philosophical ideal of the unity of all knowledge and of all truth the work of the scientific investigator may be broadened, deepened and illumined to a degree which will carry him far beyond the confines of any one field, however penetrating his work in that field may be.

JARED SPARKS MOORE

THE JACOBS CAVERN MASTODON AGAIN

IN SCIENCE for October 14, 1921, Mr. J. L. B. Taylor, of Pineville, Mo., announced his discovery, in the well-known Jacobs Cavern located on his farm, of certain perforated and engraved bones. All but one of the eight or nine specimens recovered subsequently disintegrated and this surviving bone carried the incised figure of what appeared to be a mastodon. The discovery was of extreme interest and so, although Jacobs Cavern was excavated in 1903 by Professors Peabody and Moorehead, the American Museum ultimately undertook a reexamination. This was done in part by myself with results that did not warrant extended excavation. I also gave the engraved bone a prolonged examination, and on December 28, 1923, in open meeting of the American Association for the Advancement of Science, declared it as in my opinion a plain fraud.

Last year there was published as Part 6 of Volume 19 of the Anthrop. Papers of the American Museum of Natural History a brief paper entitled "The Antiquity of the Deposits in Jacobs Cavern." The author is Dr. V. C. Allison, Bureau of Mines, Pittsburgh, and his paper purports to be chronologic determinations based on the study of a stalagmite taken from Jacobs Cavern. Such studies are of interest to archeology, but until examined by one or more competent geologists the precise conclusions of this paper can hardly be accepted. Furthermore this paper gives the unfortunate impression of being, incidentally at least, an effort to rehabilitate the abovementioned mastodon engraving.

Space prohibits extended consideration of the subject here, but I must submit the substance of my own findings with respect to this engraved bone. They are as follows: (1) The said carved bones were admittedly found in a heap of loose dirt on the cave floor and their relation to the remaining deposits is therefore indeterminable. (2) It is difficult to understand why seven out of eight bones—unless tampered with—should have completely disintegrated, when the surviving specimen is in a fair state of preservation, as are also 3,000 or more bone fragments collected in the cave in 1923. (3) The cave fauna reveals no extinct species. (4) Archeologists are not familiar with bones and shells perforated after the manner of those under discussion (see illust. p. 593, Natural History, Vol. 21). (5) The perforation of the surviving bone is fresh-looking and shows no evidence of the piece having been suspended for any length of time by a cord. (6) The specimen as a whole shows little, if any, of that wear and polish commonly found on used artifacts. (7) Archeologists are not familiar with the indicated style of art on bone in America. (8) The engravings on the specimen give the appearance of having been fitted into the well-preserved surfaces of the bone. (9) In the case of the mastodon engraving the color of the artificial incision surfaces is quite different from that of the natural bone surface. (10) All incisions show such fresh surfaces and sharp angles as could hardly have been preserved on an ancient specimen. (11) The incised lines are of such depth, regularity and precision as to preclude their having been executed with flint tools.

These and other objections were duly communicated to both the writer and the editor of the paper, and if they had been cited in full I should not now refer to the subject.

N. C. NELSON

AMERICAN MUSEUM OF
NATURAL HISTORY

THE SEX RATIO OF ADULT TRICHINAE

THROUGHOUT the literature vague and contradictory statements prevail concerning the intestinal phases of the life-history of *Trichinella spiralis*. These relate especially to the sex ratio, and to data relative to the abundance and duration of the adult worms in the intestine of the host. They are due largely to the tedious and imperfect methods which have been employed for collecting the intestinal stages.

While engaged in experimental work on this parasite the writer evolved a simple and effective method of obtaining the adults in large numbers. This consists of stripping the contents of the intestine of the infected animal into a physiological salt solution and screening the adults from the débris with a small-mesh wire screen. By using this method it has been very easy to make exact observations on the intestinal worms.

White rats were fed heavy doses of trichinized flesh and beginning with the third day were killed and examined at short intervals. From one specimen, opened at the beginning of the third day, 2,176 worms were recovered; of these 1,196 were females and 980 were males. At the end of the third day 73 adults, of which 36 were males, were found in the intestine. The next rat, opened at the end of four days, had 12 adults, of which 8 were females and 4 were males, which would indicate a very light infection. At the end of six days 51 males and 63 females were found. The condition was about the same at the end of eleven days, when 73 males and 81 females were taken from the intestine. Thirteen days after feeding one of the rats contained 451 adult worms, of which 324 were females. At this time there seems to be a dropping off in the numbers of both sexes, for at the end of sixteen days only 4 adults were found, one of which was a living male. One of the females was dead and found in the feces. The diaphragm was well filled with the migrating larvae, indicating a very heavy infection. Subsequent examinations made at the end of eighteen, nineteen, twenty, twenty-one and thirty-four days did not yield any adults, while in each instance the migrating larvae or the encysted larvae (encystment beginning at the twentieth day) were found to verify the infection.

These data indicate that at the outset the males and the females are equal in numbers. There is a gradual decline in the proportions of the males up to the thirteenth day, and at this point the worms of both sexes begin to leave the intestine rapidly. This continues until the sixteenth day, when very few of either sex were found. The males and the females were both found in the intestine as late as the sixteenth day, which seems to be about the normal duration of the adults in the intestine.

REED O. CHRISTENSON

DEPARTMENT OF ZOOLOGY,
UNIVERSITY OF MINNESOTA

A NEW LOCALITY IN CHINA FOR LYTTONIA RICHTHOFENI KAYSER

DURING the years (1909–1915) that the undersigned, now of the Fifth Avenue High School, Pittsburgh, Pennsylvania, was stationed at the University of Nanking, China, as head of the department of biology and geology, he did much collecting from the Chihsia Limestone at Chihsia Shan. A representative collection of the material thus obtained was sent to the Carnegie Museum, Pittsburgh, where it has been studied. In November of 1926, Dr. Ichiro Hayasaka, head of the department of geology of the Japanese Imperial University of Formosa, visited the museum and went over this material with the undersigned. At that time it was discovered that two or three specimens of a brachiopod, tentatively identified as *Oldhamina decipiens* Waagen, were really small specimens of *Lyttonia richthofeni* Kayser.

Considerable interest attaches to this discovery because the finding of this diagnostic Permian fossil in the Chihsia limestone indicates that this limestone can no longer be classed as Dinantian, as placed by Dr. A. W. Grabau, of the Chinese Geological Survey of Peking, but instead must be regarded as Permian.

WILLIAM MILLWARD

RENNERDALE, PENNSYLVANIA

PHOTOMETRY

MR. IRWIN G. PRIEST has been good enough to send me a copy of his letter to you, dated June 21, concerning the description in my recent book "Photometry," of the instrument developed by him for heterochromatic photometry (pp. 244–5).

While agreeing, of course, that his instrument is in no wise identical, either in principle or in use with Helmholtz's "Leucoscope" it still appears to me that "Leucoscope Photometer" is a not inappropriate description of the instrument which is, in essence, a photometer in which a color match is obtained by means of the rotatory dispersion of quartz, and a brightness match by means of polarization prisms. Nevertheless it is clear that as Mr. Priest is the in-