who later find their way to college or university. No better groundwork could be found for college or technical school physics than the ability, on the part of the student, to apply the science to his every-day problems.

The volume is one of the series which appears under the title "The Teachers Professional Library," edited by Nicholas Murray Butler. The Macmillan Company is to be commended for the attractive and substantial form which the book has been given.

F. E. KESTER

Thick Lens Optics. An elementary treatise for the student and the amateur. By ARTHUR LATHAM BAKER, Ph.D., Manual Training High School, Brooklyn, N. Y. D. Van Nostrand Co. 1912. Pp. ix + 131. $1.50 net.

University texts on optics, as a rule, treat first order lens theory but incompletely and the aberrations of the third and higher order scarcely at all. The average university instructor in physics regards geometrical optics as an alien subject properly disposed of in high school. Reference texts of lens theory, on the other hand, deal largely with the third order theory and fail to give an elementary comprehensive treatment of first order theory.

Baker's little lens primer well fills this gap between the university text and the special treatise and will be heartily welcomed by oculists and by manufacturers and users of spectacles and other low-power lenses. It is confined strictly to first order theory, giving a simple and able treatment of image formation and focal power of combinations of thin and thick lenses. Diagrams are plentiful and good. A great many numerical examples are given and one chapter is devoted to the experimental determination of the optical constants of lens combinations with simple apparatus. When the book is revised it would be well to adopt a less formal style and perhaps either add a chapter on the special problems of spectacle lenses or mould the whole into an introduction to advanced lens theory.

P. G. NUTTING

Prisms. Their Use and Equivalents. By JAMES THORINGTON, A.M., M.D., Ophthalmic Surgeon, Professor of Diseases of the Eye in the Philadelphia Polyclinic. P. Blakiston's Son & Co. 1913. Pp. 144.

This little book is based on its author's course of lectures on this subject delivered each winter at the Philadelphia Polyclinic. It deals with the use of prismatic spectacle glasses in correcting muscular defects of the eye. Methods of evaluating prisms combined with spherical and cylindrical lenses are described and a number of useful tables given. The diagnosis and measurement of imperfect muscular balance (*heterophoria*) and of deviation from parallelism (*heterotropia*) of the eyes are discussed at some length. The book is well written and well illustrated and bears evidence on every page of the author's grasp and first-hand knowledge of the subject.

P. G. NUTTING

SPECIAL ARTICLES

A PARASITE OF THE CHINCH BUG EGG

IN the experiments conducted this year to determine the time of the first appearance of young chinch bugs and the mortality of the eggs, a large number of eggs were collected in the field for examination. The eggs which were collected at different intervals and in different localities were examined daily. While thus examining the eggs it was noticed that some of them became dark in color instead of assuming the usual red coloring. These eggs were isolated and on May 19 there emerged from them three parasites. With these three parasites as a basis, the life history was carried through four generations, running up to July 5. Since this was the time between the two broods of the chinch bugs, it became impossible to obtain additional chinch bug eggs with which to continue the work. From July 5 to July 23 only an occasional parasitized egg was found in the field, but beginning with the latter date, parasitized eggs were found in large numbers in the corn fields and the second generation was obtained by August 10. Up to the present date

this year over 325 individual parasites have been bred out. The length of the life cycle has been found to vary from ten to eighteen days, depending on the climatic conditions.

The parasite has been found in every wheat and corn field examined around Manhattan. Of 3,101 eggs collected between April 28 and June 10, the average per cent. of parasitism was 20.8, and of 116 eggs collected at Crawford (central Kansas) the per cent. of parasitism was 16.3. The insect has also been taken at Dodge City (southwestern Kansas).

The work is still under way and a full description of the parasite together with notes on its life history and efficiency will be published later.

Mr. A. B. Gahan, entomological assistant of the Bureau of Entomology, U. S. Dept. of Agric., to whom specimens of the parasite were sent for determination, says:

> I have made a partial examination of these parasites and find them to belong to the family *Proctotrypidæ*, and they probably fall close to the genus *Telenomus*. It will require further study for me to determine definitely regarding them. It seems probable that they represent not only a new species, but possibly a new genus.

In a more recent letter Mr. Gahan writes:

> After exhausting every effort to determine the parasites of the chinch bug which you sent me and failing to find any such species described, I turned the specimens over to Mr. J. C. Crawford, of the United States National Museum, to see what he could do with them. He informed me yesterday that he had arrived at the same conclusion as myself, namely, that the species would require a new genus.

James W. McColloch
Kansas State Agricultural College
and Experiment Station

Some Observations on the Sexuality of Spirogyra

The gametes of *Spirogyra* are described in the text-books of botany as being morphologically alike. A few workers have claimed that the female gametes in certain species are larger than the male. Aside from these observations the writer knows of no published accounts of attempts to point out other differences between the male and female gametes of *Spirogyra*. A large number of measurements of the conjugating cells have been made by the writer, but no constant difference in their size has been found. Several examples were observed where the transverse diameter of the filaments producing male gametes was slightly less than that of those in which the females were formed. The male cells may be longer or shorter than or equal the length of the females. The cells of any one filament vary in length. It is, therefore, quite evident that the gametes of some *Spirogyras* can not be distinguished as male and female on the basis of their relative size.

The writer observed a few years ago that the chloroplasts of the female gametes of *Spirogyra crassa*, just after the formation of the conjugating tubes, contained a much larger amount of starch and more pyrenoids than those of the male. The pyrenoids of the male gametes were larger and the amount of starch surrounding each pyrenoid was considerably less than in the females. Practically the same kind of differences seen in the gametes of *Spirogyra crassa* were observed in three other undetermined species of *Spirogyra*. By careful fixation of material of these unidentified species, taken just before or immediately after conjugation had begun and staining in iron-hemotoxylin and erythrosin, the cytoplasm of the majority of the female gametes stained a little more darkly than that of the males. The density of the staining of the female gametes was so marked in some filaments that they could easily be distinguished from the male even when the two were not in close proximity. No examples of conjugating cells were found where the male gamete stained more darkly or in which there were more starch and pyrenoids than in the female. Every year during the past seven years, the writer has examined several hundred filaments of *Spirogyra* in which conjugation was occurring or had just taken place, and in every example, the gamete with less starch and pyrenoids was passing over to or had just united with the gamete possessing a greater amount of starch and pyrenoids. The protoplasts of any one filament