

SHORTER NOTICES.

Die neuzeitliche Entwicklung des mathematischen Unterrichts an den höheren Mädchenschulen Deutschlands insbesondere Norddeutschlands. Von Prof. Dr. J. SCHRÖDER. (Abhandlungen über den mathematischen Unterricht in Deutschland veranlasst durch die internationale mathematische Unterrichtskommission, herausgegeben von F. KLEIN. Band 1, Heft 5.) Leipzig, Teubner, 1913. xii + 183 pp.

THE publications of the international commission on the teaching of mathematics are especially significant at the present time when some persons are challenging the right of mathematics and other so-called disciplinary studies to continue to hold their time-honored positions in our curricula. As Germany is one of the strongholds of experimental psychology and as many of the experiments relating to "transference" of power from one subject to another have been made by Germans, it is especially interesting to see what effect all these discussions have had upon the amount and kind of mathematics in the courses of study of the schools of that country. The German subcommittee have planned five large volumes of "Abhandlungen." Two of these deal with their higher schools; the other three treat of separate questions in the instruction in higher mathematics, of mathematics in the technical schools, and of elementary and normal school mathematics. There will be almost forty separate pamphlets, written by men who are authorities in their several lines. The editor-in-chief is Professor Klein, who is undoubtedly better fitted than any one else to fill this responsible position.

The book under review is the fifth and last part of the first volume of the series. Of the three sections into which it is divided, the first two deal with the development and present conditions in "northern" Germany and the third takes up the present status in other parts of the country. The first section gives, in a concise form, a picture of the very primitive conditions in women's education that prevailed until recently, and it traces out the principal influences which have contributed to an amelioration of these conditions. The reader's attention is held by the stirring accounts of the long and hard struggle against ignorance and prejudice waged at first by a

few far-seeing and brave pioneers and later by bands of men and women associated together for the purpose of establishing adequate schools for girls. The ordinance of May 31, 1894, was a great victory in many ways, but it left much to be desired. This was particularly true from a mathematical point of view, for substantially all mathematical instruction except practical arithmetical calculations were explicitly excluded from the curriculum. The defects in these regulations seemed to stimulate the friends of the education of girls to a renewal of their efforts.

Fourteen years later the Prussian government issued new regulations putting the girls' schools on practically the same basis as the boys' schools as regards the governing boards and the training and rank of the teaching staff. The length of the course was increased and the curriculum was strengthened. The work in mathematics was, briefly, as follows: In the Lyzeum (which the girl entered at the age of six for a ten years' course) the requirements were (1) a very thorough drill in arithmetic, especially in mental arithmetic and in the arithmetical calculations of every day life; (2) algebra to quadratic equations with one unknown; (3) plane geometry to the theory of the circle; (4) calculations of the surfaces and volumes of the simple solids. Those who wished to prepare for elementary teaching entered the Oberlyzeum, where the mathematics for the first three years consisted of (1) arithmetic and algebra to the theory of complex numbers and equations of the second degree in two unknowns (with the binomial theorem for positive integral exponents); (2) plane geometry to the theory of harmonic points and lines; (3) plane trigonometry; (4) stereometry with regard to the principles of projective drawing; (5) the elements of plane analytic geometry. The last year was given to "practical work." Those who took the two years' course in the Frauenschule discontinued the study of mathematics after leaving the Lyzeum. Those who wished to prepare for university study could enter any one of the three kinds of Studienanstalten, leaving the Lyzeum at the end of the eighth or seventh year according to whether they went to an Oberrealschule or a Realgymnasium or a Gymnasium. In each of these institutions the course in mathematics was more extensive than that offered in the first three years of the Oberlyzeum. The maximum amount was offered in the Oberrealschule,

where, in addition to the work given in the thirteen years of the Lyzeums, there were (1) equations of the third degree, (2) the most important infinite series, (3) analytic and synthetic treatment of conics, (4) sufficient spherical trigonometry for an understanding of mathematical geography.

As compared with the order of 1894, this was a wonderful gain for mathematics. But even yet this subject is not up to the standard for the corresponding schools for boys. An increase in the number of hours given to mathematics in the Lyzeum and the introduction of at least the elements of the calculus into the Studienanstalten are amongst the changes strongly urged. But in view of the rapidity of development in the last two decades, it is probably only a question of a few years until the work in mathematics in the girls' schools is equivalent to that in the corresponding institutions for boys.

In the third section of the book, the Prussian conditions are compared with those in the various other German states. For one who is not a German the questions taken up here are not so vital as those which preceded.

It must be noted that the discussions in this book are confined to the mathematics in schools below university grade. The "Study of Mathematics in the German Universities since 1870" is the subject of a separate pamphlet in the third volume of this series. The author's genuine sympathy with the movement for equality of educational opportunities for girls and boys is evident on almost every page. All persons interested in the education of girls, whether from a mathematical point of view or not, are indebted to Professor Schröder for this valuable book, with its extensive list of references to monographs, journals, and government publications.

Of the present attitude of the governing bodies towards mathematics in schools for girls, he says in his conclusion: "All the German states are convinced of the necessity of proper mathematical instruction in the higher schools for girls. In all the recent regulations there are definite directions that, through participation in mathematical instruction, the girls shall be taught to think more clearly and to express their thoughts in a simple and direct manner."

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