

of view of the Erlanger Programm is not merely adequate, but the best. The pupil will want to extend his ideas of geometry at a later stage; but this should be left until he gets into the hands of the geometry specialist.

The other direction in which geometrical thought has developed beyond the limits of the Erlanger Programm is in the conception of the space in which the transformations are effected, even in the case when we do not go beyond projective geometry. Klein begins his survey from the study of ordinary (real) Euclidean geometry, then introduces the "improper elements"—elements at infinity, imaginary points, and so on. So he goes on until he reaches the conception of the geometries under consideration as the invariant theories of groups of transformations in his generalized space, the projective group containing the others as sub-groups. Then, in the last part of the book he considers the foundations of geometry, starting with the propositions of incidence. It is at this point that we feel that Klein would, if he were writing to-day, modify his work most extensively. By using the ideas of continuity, order, etc., he

limits the space with which he is concerned until it is, effectively, the projective space in which the co-ordinates are ordinary numbers, complex if we make use of von Staudt's theory of imaginaries. But, how much of what is involved in this is really required? It is known that if a projective space is defined by means of the propositions of incidence and Pappus' theorem, we can introduce co-ordinates which are elements of a uniquely defined algebraic field, and this gives us nearly all that we want. It is true that in elementary geometry it is usually assumed that the field is of characteristic zero and is algebraically closed. The first condition is easily stated in geometrical form; with regard to the second, it would probably be enough in an elementary account to state as an additional defining condition that the field is algebraically closed, giving examples to show what this implies. We believe that Klein, who repeatedly expresses the desirability of connecting geometry with other branches of mathematics, might well have favoured this modern algebraic method of laying the foundations of geometry, and by his genius have provided the best possible exposition of it.

CROP HUSBANDRY

An Outline of British Crop Husbandry

By Dr. H. G. Sanders. Pp. viii + 348 + 6 plates. (Cambridge: At the University Press, 1939.) 15s. net.

THIS is a book which all agricultural students will find instructive. It is set out in a form which can be understood by everybody possessing an elementary knowledge of agriculture, and the enumeration of the reasons and advantages of the methods of procedure discussed will help the student to memorize them. The student will also find the bibliography at the end of each chapter extremely useful. The author has not merely given a list of books of reference, but also mentions papers from journals dealing with the subject. Only an author well acquainted with current literature could have covered so large a field.

Practical farmers will think that the book rather smacks of the lecture room, but they will find it interesting in that their attention is directed to the reasons underlying the various operations that they know from experience are advantageous. The chapter dealing with the choice and treatment of seed should be of interest to them, for at present insufficient attention is given to these important points.

Certain chapters of the book are rather unnecessarily long, and contain too many examples of rotations and dates of cultivation; in practice, rotations are usually broken, and dates of cultivations depend to a large extent upon uncontrollable factors. Evidence is also beginning to accumulate which at present tends to show that perhaps time and money is being wasted by over-cultivating the land.

The chapters on manuring and cleaning the ground will be useful to farmers. The general effects of the different kinds of manures are well set out, with an indication of the type of manure most suitable for the different crops. Fortunately, tables giving results of experiments are not included. The principles underlying the various operations on a fallow are explained; if these were more widely known to farmers, we should not see so many green fallows as we do.

The latter part of the book deals largely with matters about which the modern farmer has little to learn, but which are extremely useful to the agricultural student.

On the whole, it is an interesting and useful book, which will be of far more use to the student than the farmer, though all practical men would learn something from it.

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