

Micraster cor-testudinarium the group-form of *Micraster* is almost wholly absent. Nor are the lithological deviations less noteworthy, for the particular characters of the Chalk vary at different stages, and the same division may be nodular or smooth, and have many or no belts of flints. The value of a detailed palæontological study of our strata is abundantly manifested in this essay, and not the least interesting part of it is in the light it throws on the geographical as well as geological distribution of the fossils.

A most excellent series of plates of cliff-sections, from photographs taken by Prof. H. E. Armstrong, accompany this work. H. B. W.

THE PHYSIOLOGY OF BREEDING.¹

IT is a remarkable fact that the system of organs in the animal body to which they are themselves indebted for their existence is very largely neglected by physiologists; that a number of secretory, vascular and nervous phenomena intimately concerned with fertility, with the power of conception and the ability to bear young are neither understood nor investigated; and that a wide field of research as to the influences of various kinds of food supplied to the mother both on her capacity for breeding and on the growth, constitution, and variation of the embryo is as yet untouched. As a contribution to the subject of "breeding," therefore, this paper is specially welcome, and the author is to be congratulated both upon the careful work he has done and the treatment he has accorded the subject.

The wide variations in the power of breeding which different breeds of sheep and different individuals of the same breed are subject to is shown, and the effect of altitude, climate and food referred to.

The histological changes which take place in the uterus of the sheep during the œstrous cycle are carefully described and figured, and the homology of these changes with those elsewhere described for the bitch and monkey clearly established. A brief *résumé* of the author's work on the same phenomena in the ferret is given, and their essential similarity with that of the bitch shown.

Suggestive information follows on the question of ovulation in sheep and other mammals, on the stimulus necessary to bring about that process under various conditions, on the artificial methods adopted by some flock masters to stimulate breeding in their ewes, and on the effect of these methods on fertility. Here a subject is touched upon which is of vital importance to breeders, and one which requires and deserves careful study. Atresia among the follicles of the sheep's ovary is then studied, and its relation to the proportion of twins and to barrenness examined.

The remainder of the paper is occupied with a description of the formation of the corpus luteum of the sheep and an examination of the views of the most recent writers on that subject. The lutein cells are stated to be the much hypertrophied epithelial cells of the undischarged follicle, while the connective tissue element is supplied by ingrowth from both theca interna and externa.

Finally, the relation between the development of the corpus luteum and the changes which take place in the uterus during pregnancy is touched upon, and the view expressed that, while the functions of ovulation and œstrus do not represent cause and effect, they are primarily connected, inasmuch as each is dependent largely upon the same cause.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE new prospectus of the department of dyeing and tinctorial chemistry of the Yorkshire College, Leeds, shows that special facilities are provided for the study of the chemistry of the colouring matters and for research work upon coal tar products. An effort is being made to combine the standard of scientific teaching of a university with the practical training of a technical school, and to encourage the prosecution of original investigation in what is certainly the most scientific, yet unfortunately, in this country, the

¹ "The Œstrous Cycle and the Formation of the Corpus luteum in the Sheep." By Francis H. A. Marshall. (*Phil. Trans.*, vol. cxcvi., 1903.)

least studied branch of applied chemistry. The dyeing department was built, equipped, and endowed by the Clothworkers' Company, and is provided with lecture-rooms, pattern and diagram rooms, museums, experimental and practical dye-houses, as well as with adequate provision for research work.

THE Great Western Railway Company now offer facilities, in conjunction with the Swindon Education Committee, to their apprentices to enable them to gain technical scientific knowledge. A limited number of selected students may attend day classes at the Technical School. They must have spent at least one year in the factory, and must have regularly attended for at least one session in the preparatory group of evening classes at the Technical School. The number of studentships will be limited to thirty at any one time. For each year's course there will be a competitive examination, successful students passing on from one year's course to the next. The course of study for each year will consist of practical mathematics, practical mechanics, geometrical and machine drawing, heat, electricity, and chemistry. Those attending the classes will have their wages paid as if at work in the factory, and the Great Western Railway Company will pay their school fees. The students attending the day classes will be expected to give some time each evening to private study. Students who distinguish themselves will be allowed to spend part of their last year in the drawing office and chemical laboratory. The whole of the arrangements will at all times be under the direction of the chief mechanical engineer.

THE report on the secondary and higher education of the City of Sheffield, prepared by Prof. Michael E. Sadler, has been published in pamphlet form by the Education Committee of Sheffield. The schools and colleges now in existence in Sheffield are described and their work passed in review. A series of recommendations is then made with a view to equip the city with a complete educational system. Prof. Sadler says that the weakest spot in the educational arrangements of Sheffield is in the secondary education provided for boys. A promising boy ought to have the best educational opportunities within his reach, but at present the equipment of such higher education in Sheffield is very much behind the standard in the progressive cities of Germany and the United States. Dr. Sadler also recommends a development of the work of the Technical College. He remarks, "the work of the Technical College, admirable as it is, would greatly gain in force and depth if it were supported by a strong department of pure science." As the report rightly insists, what is wanted is that a workman should be able to deal with new problems, and in order to do this he must have, as a foundation for his technological skill, a thorough knowledge of the pure science which it is his task to apply to practical problems. The probable additional net annual cost to Sheffield of carrying out Prof. Sadler's chief recommendations is estimated at about 8500*l.*, which would mean a rate of less than three halfpence. It now remains for the Education Committee of Sheffield to put into practice some of the excellent suggestions in the report.

THE volume of "General Reports on Higher Education for 1902," just published by the Board of Education, contains with other information of importance an account of the secondary schools, science classes, art classes, and evening schools of the southern and eastern divisions of England, the former by Mr. Buckmaster and the latter by Dr. Hoffert. Speaking of the evening schools in London, Mr. Buckmaster says "the impression formed in early visits has not been removed on more complete acquaintance, and the School Board, in its laudable anxiety to throw the educational net as wide as possible, has secured quantity at the expense of quality. As missionary agencies the schools abundantly justify their existence, they bring the opportunities for improvement near to all in all parts of the metropolis, but as centres for real solid work they are not so successful, in spite of the best efforts of the teachers, the majority of whom are most enthusiastic and devoted to their work." Several methods for the improvement of these schools are suggested, such as the alteration of the rule that, where the average attendance falls below 25 per teacher, a reduction in the number of teachers should be made; that