

points out that the response to hormones depends not only on dose but also upon the response thresholds, which vary in the different species. Work on ovulation and oestrus in sheep and goats is reviewed by Phillips, Fraps and Frank, who quote many references to recent work, particularly in connexion with the breeding season, optimum time to breed and responses to administration of gonadotrophins. Casida contributes an important paper on the induction of ovulation and subsequent fertility in domestic animals, in which he discusses super-ovulation, and concludes that the potential fertility of the ova that were ovulated by the use of pituitary gonadotrophins was affected markedly by the phase of the reproductive cycle at the time of treatment. Ovulations that were induced during the luteal phase yielded eggs of low fertility. The ovary at the time of ovulation is described by Corner. A review of the hormonal control of ovulation, with extensive references to the literature, is presented by Cole, who concludes that while ovulation can be produced regularly in certain species with several gonadotrophins, the response in primates is a haphazard one.

Pommerenke and Vieregger report observations on the cervical mucus and the menstrual cycle, Simmons discusses the cervix uteri in infertile matings, and Abarbanel gives details concerning spermatozoa and the cervical mucus. In an important paper on the glycolysis, viability and fertility of bovine spermatozoa as influenced by their concentration, Salisbury reports full fertility from dilutions of up to 1:100 stored for a limited period of up to about four days. Macleod discusses the metabolism and motility of human spermatozoa, and Berliner the biology of equine spermatozoa. Chang reports experiments on the fertilizing capacity of rabbit spermatozoa and shows that the large number of ova ovulated by gonadotrophin injection does not require a proportionately larger number of spermatozoa for fertilization.

Methods employed in the artificial insemination of cattle are briefly described by Bartlett, and experiments on the effect of synthetic thyroprotein on sterility in bulls are reported by Reineke.

This book not only provides a good source of information for workers in this field, but also should act as a stimulus to further research work on the problems of fertility.

## GRAMMAR SCHOOL SCIENCE

### The Teaching of Science in Secondary Schools

Compiled by a Joint Committee of the Incorporated Association of Assistant Masters and the Science Masters' Association. Pp. xi+292. (London: John Murray, 1947.) 8s. 6d. net.

AT the outset we must say that this is the most useful book on the practical problems of the teaching of science in grammar and 'public' schools which has yet appeared. It is the work of a committee of the Incorporated Association of Assistant Masters and the Science Masters' Association. About thirty members, for the most part science masters in public and grammar schools, were assisted by two hundred corresponding members. The result is a book which deals honestly and practically with every problem of the teaching of science at this level. It will prove of special value to teachers in grammar schools and in the education departments of the

universities, and much of the book will be of value to those who teach science elsewhere, although the special problems raised by the subject in the secondary modern schools do not receive any attention. In a community the life and prosperity of which can only be sustained by the intelligent and continuous application of the principles of science, and in a civilization which can only continue by a real appreciation of the philosophy and methods of science, it is more than ever necessary that there should be effective teaching of science in all post-primary schools. With the groups of higher intelligence we must ensure that the claims of science, both as a cultural and as a utilitarian subject, are not only understood but also are adequately catered for. Industry and administration attract many well-qualified science graduates who formerly would have entered the teaching profession. The present work does well to deal with the problem of the training of the science teacher in his student days.

The book begins with a succinct account of the history of science teaching in Britain, and its aims and functions. It deals with the problems of school certificate, higher school certificate and university scholarship examinations critically, and comments, "the type of examination imposed often prevents a broad treatment of the subject and tends to reduce science teaching to the memorizing of facts and their reproduction as examination answers". The council of the Incorporated Association of Assistant Masters recently reaffirmed its opinion that in schools with the lower age of entry, the school certificate should normally be taken at the age of sixteen after a five-years course, and it is with this policy in mind that it is considered that the absolute minimum of time which should be allotted to science in the secondary school is two hours per week (three teaching periods) between the ages of ten and twelve, and four and a half hours (six or seven teaching periods) between the ages of twelve plus and sixteen plus. "It cannot be emphasized too strongly that in many instances the apparent failure of science teaching is due to the neglect of this recommendation (made as long ago as 1918) by headmasters and education authorities."

The book deals with laboratories and other science rooms, their equipment and the maintenance of apparatus and supplies. It wisely stresses the value of 'scientific handicrafts' as a part of the equipment of every science teacher. One is impressed by the detailed and comprehensive advice, the result of many years of experience on the part of a large number of practical teachers, in these sections.

The book goes on to give an account of the various methods of science teaching: short and effective sections deal with the project method, group methods, the Dalton plan, class discipline, syllabuses and courses, historical, anecdotal and biographical methods, topic, concentric and unit plans. It has some interesting remarks to make concerning the heuristic method, the psychological development of children in its relation to science teaching. The correlation between the teaching of science and that of other subjects is not forgotten. Other chapters deal with advanced course work, examinations, optical and other aids in teaching, the training of science teachers, first aid in the laboratory and the science teacher and the law. There are useful appendixes on facilities for further instruction in science, examples of 'new type' examination questions and a good bibliography.

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