

cites the museum numbers of many of the specimens studied.

This is a work for the snake specialists, people who traditionally study a small number of characters, most of them external, and are loath to widen their horizons. I hope that they will consider this work, for I believe that it can contribute to the eventual writing of a history of snakes of general biological interest.

GARTH UNDERWOOD

## MEIOSIS AND RADIATION

### Effects of Radiation on Meiotic Systems

(Report of a Study Group organized by the International Atomic Energy Agency and held in Vienna, 8–11 May, 1967. Panel Proceedings Series.) Pp. 223. (International Atomic Energy Agency: Vienna; HM Stationery Office: London, 1968.) 117 schillings; 37s. 6d.; \$4.50.

In order that a species can remain in existence its members must reproduce themselves and bring forth a new generation. The continuation of the species is ensured by the ability of the adult individuals of the new generation to produce gametes like those of their parents which will unite at fertilization and initiate another cycle of reproduction. Meiosis is an essential part of gametogenesis, consisting of two nuclear divisions during which the chromosomes divide only once. In sexually reproducing species meiosis is a very important event for two reasons: it maintains the characteristic chromosome constitution of the species by reducing the chromosome number in the gametes, and it brings about the final mixing of the parental hereditary material by the exchange of parts between the homologous chromosomes. Molecular biology clarified our views about the structural organization of the chromosome, but we are still ignorant about the fundamental mechanism of meiosis, particularly chromosome pairing and genetic recombination. Irradiation provides a useful technique for investigating the nature of the recombination event. The symposium, sponsored by the International Atomic Energy Agency, brought together a small group of experts who are studying the effects of irradiation on meiosis in diverse systems. The proceedings and discussion of the meeting covered a very wide spectrum of topics ranging from mammalian gametogenesis to electron microscope studies of meiotic stages of fungi and genetic recombination in algae. Many of these topics should interest not only specialists but also those who are interested in general biological phenomena.

One of the contributors demonstrated that the different stages of meiosis in male and female gametogenesis exhibit great variation in radiation sensitivity; it led the participants to speculate on the possible mechanism involved. Another contributor dealt with the differentiation of the primordial germ cells in the two sexes and attributed the variable radiation sensitivity to the long duration of the arrested diplotene stage which characterizes the mammalian oocyte. Another report discussed the very low incidence of mutations obtained in female mice when exposed to neutron radiation. The present data, however, are not sufficient to conclude that the low incidence of genetic damage is a result of a very efficient repair process which might operate in the immature oocyte. Evidence was brought forward by another contributor that hormones can modify radiation effects by eliminating damaged oocytes from the ovary of rats. After exposing the alga *Chlamydomonas* to gamma radiation and comparing the effects on genetic recombination and lethality with those appearing after ultraviolet radiation, one contributor found a different pattern of response and suggested that there are metabolic processes in common between recombination and the repair of radiation induced lethal damage. Much discussion was devoted to the synaptonemal complex

which develops during chromosome pairing and its relation to chiasma formation and crossing over. Several participants argued that DNA synthesis is already completed before synapsis of chromosomes and that the high radiation sensitivity of the post-synaptic stage is attributable to the lack of repair process in the absence of DNA synthesis.

The aim of the conference was to identify the factors responsible for the difference in radiation sensitivity of the various meiotic stages; the observations presented and discussed, however, showed clearly that the nature of these factors is complex and difficult to interpret at present. The meeting has drawn attention to particular problems, which require further research. There is no doubt that by reading the report geneticists will be stimulated, because the numerous contributions of the symposium show how valuable information may be obtained from the study of chromosome behaviour during meiosis. P. C. KOLLER

## SHEEP AND "THE PILL"

### The Control of the Ovarian Cycle in the Sheep

Edited by T. J. Robinson. Pp. xviii + 258 + 11 plates. (Methuen: London; University Press: Sydney, 1967.) A\$8.50; 68s.

THIS book, comprising introduction, fifteen original papers, conclusion and bibliography, is concerned with the treatment of sheep with substances which might be expected to alter ovarian activity. It does not deal with the endogenous control of ovarian function. To regulate at will the time of ovulation and heat could increase the efficiency of sheep husbandry. This might be translated into better incomes for farmers and lower wool and meat prices for consumers. The Sydney University Press has with this volume been as liberal with space as the Australian sheep industry has been with animals for the investigations. Indeed at least one of the field trials is of epic dimensions, involving 9,552 Merino ewes on farms ranging from Western Australia to New South Wales. To supervise experiments, say, in the vicinity of Moscow from a laboratory in London would geographically be no more difficult.

The investigations deal with the search for synthetic progestagens which will block ovulation most efficiently, and with attempts to define the circumstances in which, following cessation of progestagen treatment, ewes will in synchrony ovulate and return to heat. The ability to predict accurately when ovulation will occur is a crucial aspect of the general problem, although no more important than the maintenance of at least reasonable fertility following cessation of the progestagen treatment. Professor Robinson and his colleagues have made extensive use of an ingenious method of progestagen administration, namely polyurethane sponges impregnated with progestagen and placed in the ewe's vagina. So long as such a sponge is present ovulation will not take place. But removal of the sponge, simply by pulling on a protruding string, permits ovulation and heat within 24 to 48 hours. The fertility of animals treated in this way is a little low and, as other results suggest, this may be related to alteration in sperm transport. There is a second heat, well synchronized within flocks, 18 to 19 days after the first. Besides identifying the most effective progestagen (SC 9880), the authors have defined the desirable characteristics of the sponge and the quantity of progestagen each should contain in order that sufficient hormone may be absorbed from it. They look on the sponge as a readily removed artificial corpus luteum.

The book is not easily read, at least in part because of a formidable array of tables presenting details of the somewhat involved statistical analyses which the experiments required. Medicine and agriculture are the two halves of the world population problem and in a special way these