SCIENTIFIC BOOKS

THE TSETSE FLIES OF EAST AFRICA

The Tsetse Flies of East Africa. A First Study of their Ecology, with a view to their Control. By C. F. M. SWYNNERTON. With a preface by the Right Hon. W. Ormsby-Gore, M.P. Trans. Royal Entomological Society of London, Vol. 84, pp. xxxvi + 579, frontispiece, 22 pls., 7 folded maps, 33 figs. in text. November, 1936. £5-10-0.

THE recent tragic death of Mr. C. F. M. Swynnerton in an aeroplane accident recalls the fact that he had introduced aerial inspection and photography in his work as director of the Tsetse Research Department of Tanganyika Territory with a view to mapping the forest and plant associations. These ecological associations of the African vegetation play a major part in determining the location, abundance, breeding, feeding and pupation areas of the seven species of tsetse flies which infest this territory. The "fly" in turn plays a dominating role in the human culture here and elsewhere in tropical Africa from Senegal and the Sudan to southern Rhodesia.

In Tanganyika the eight species of tsetse fly, the several species of the blood-parasitizing trypanosomes of which they are in varying host-parasite relations, the insect vectors, men, cattle, the host of African game mammals, birds, crocodiles, snakes, and lizards in whose bloods the trypanosomes are variously multiplied and on whose bloods the fly selectively to some extent and often by reason of hunger feeds, the grasslands and varied bush, forest and jungle, the streams and lakes, and the changing season all combine in an ecological picture of great complexity and ceaseless changes. Man enters the picture as the victim of both the Rhodesian trypanosome and *Trypanosoma gambiense,* causes of the fatal African sleeping sickness. His domesticated animals also fall victims to other trypanosome infections, notably nagana, the fatal disease of cattle. His movements and those of his cattle attract the flies and spread these vectors and the disease-producing flagellates into new territories. He clears the forest, burns the grasslands and changes the habitats of the flies and the wild game whose bloods constitute an unfailing reservoir infected by trypanosomes or ready to be infected at birth or even before birth across the placenta from the infected mother. He abandons fly-infested regions, crowds his herds into narrower confines, and the resulting overgrazing leads to destruction of the plant cover. Soil erosion then permanently ruins the region. In recent years the fly has been steadily advancing into hitherto fly-free regions in Tanganyika with resulting havoc to the native people and their settlements and herds.

It was Swynnerton's task to discover means of practical control of vital factors in this complicated picture or of local parts of it which would save both the livelihood and the lives of these pastoral and agricultural tribes. It was not a swivel chair job for testing out naturalists' haphazard guesses but one of tragic necessity on the one hand and limited knowledge and resources on the other.

This condensed abbreviated report is rightly designated as an ecology. Its object has been to find weak links in the chain of relations between the hosts and the insect vectors of trypanosome infections. To this end the natural history of the eight species of tsetse fly in the region was thoroughly investigated as to the plant communities of its vegetational habitat, the feeding grounds, the rest-haunt and the breeding ground and their respective furnitures. The environmental factors, altitudinal, geological, climatic, soil, humidity, temperature and vegetation were also analyzed and mapped or recorded. The geographical and local habitat distribution was worked out by quantitative and statistical methods based in part on systematic fly catching by trained native boys, trapping with a great variety of traps and baits, and records of sexes, weights in relation to hunger, feeding, age and breeding, and seasonal and other changes in the fly population. Since the female tsetse fly feeds with reference to reproduction and develops only a single egg at a time, depositing this in the pupa stage in damp surroundings, these statistical investigations have a direct bearing on many aspects of the problems studied. The complexity of the situation is increased by the fact that each species has its own distinct pattern of life not transferable by analogy or inference to another species.

The wild game animals play a large role in the tsetse drama. The flies follow moving animals; hence game forms not merely a reservoir of infections but active vehicles in transportation along forest trails and to and from waterholes in the dry season and across natural and artificial barriers. Experimental evidence shows that sight guides flies to their moving hosts and that a road to be safeguarded from flies from the adjacent bush must have at least 200 and preferably 500 yards on either side cleared of fly cover. Scent comes into action at shorter distances. Mammalian glands were effectively used in baiting traps. Scent seems to guide flies to favored species, and sex of host or even to favored individuals. The author places little confidence in game extermination

in fly control, as impracticable because of reinvasion, difficulties in accomplishment and unreliability in a partially settled country.

This report is itself a summary, and a review must be wholly inadequate in presenting the riches of experiment in laboratory and field, and the extraordinarily diverse aspects of the problems discovered and attacked. Certain practical results are enumerated and lines of endeavor in control tested and judged in the light of results. A few of the significant conclusions are as follows: Each species of fly and each biotic area must be studied in detail before control measures should be undertaken. In studying the problems each suggestion arising from observations in the field was examined as to its feasibility, practicability, difficulties, cost and effectiveness, tested in the laboratory and on a small scale in the field, and then on a control basis. As a results of such studies recommendations are made for cessation of annual burning of the bush by the cattle-grazing natives, the building up of fly barriers by native bush, preferably evergreen, which are traversed slowly if at all by the fly, clearness of infested fly territory by native settlement, control of plant associations and methodical trapping of flies of certain species in certain territories till they are so reduced in numbers that human occupation can continue. Roads through fly country can be made safe by clearing, and fly concentrations can be isolated in like manner. In general the author favors policies of control by knowledge of the ecological factors most accessible to economical change and most potent in each ecologic niche in reducing the mass of the tsetse menace below the level of human disaster. Extermination is out of the question. Even then the enormousness of the task for tropical Africa is appalling.

As an example of practical ecological investigation and resulting control measures this investigation is outstanding in its magnitude, scope and accomplishments. It is a far-sighted, wide-visioned and skilfully operated attack upon one of the most tragic, complex, intricate and perplexing problems in parasitic ecology facing human civilization in a great continent.

One encouraging feature is the tribute paid to native helpers for their industry, faithfulness and inventiveness in attacking these problems.

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TELEVISION

Electron Optics in Television. By I. G. MALOFF and D. W. EPSTEIN. McGraw-Hill Book Company.

WHEREAS it might seem that electron optics in television was a rather specialized subject, of interest to communication engineers rather than to physicists, the book is of somewhat broader scope than is indicated by its title.

In the first 40 pages of introduction, the authors give a good review of current cathode ray television technique, with particular emphasis on various scanning and viewing devices. They then develop the subject of electron optics. First they consider the emission of electrons from various sources. The treatment is clear, and this portion of the book might form a useful text for teaching. The next subject to be considered is the analogy between electron optics and light. There follows a detailed treatment of electron optics, covering the trajectories of electrons in fields of various geometries. Electrostatic lenses and the defects and aberrations which these show are discussed at some length, as well as the techniques used to overcome these errors.

Then, deflection of electrons in magnetic fields and various types of magnetostatic lenses and focussing are described. This discussion of electron optics is unusually complete, and will, no doubt, be of value to all physicists dealing with electronic or molecular beams, be they in mass spectrographs, cyclotrons or Van de Graaf generators.

The second portion of the book deals with the television cathode ray tube itself. First, the electron gun is described, and the deflection of the beam, the types of luminescent screens and various ratings and classes of tubes. Finally various accessories are explained, most of which are circuits for special purposes, such as relaxation oscillators, impulse generators, multivibrators and driving circuits. The final chapter will seem to many physicists to be a rather elementary discussion of vacuum technique. The second portion of the book is more specialized and perhaps not of as great interest to physicists generally as the first. Throughout, the figures are clear, and the book will make a useful addition to a physics library.

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REPORTS

THE RESEARCH COUNCIL ON PROBLEMS OF ALCOHOL[1]

THE American Association for the Advancement of Science, through its permanent secretary, Dr. F. R. Moulton, made on October 3 the first public announcement of a new approach to the liquor problem through the launching of an associated organization known as the Research Council on Problems of Alcohol, the present membership of which includes nearly 100 distinguished scientists and educators from various sections of the country, as well as a group of citizens prominent in public and industrial life. The plan of the council,

[1] Press release from the office of the permanent secretary of the American Association for the Advancement of Science.