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## THE ANOPHELES MOSQUITOES OF INDIA.

*A Monograph of the Anopheles Mosquitoes of India.*

By S. P. James and Dr. W. G. Liston. Pp. 132 and plates. (Calcutta and London: Thacker and Co.) Price 24s. net.

THERE is one feature in which this book far surpasses any other devoted to mosquitoes, viz. the coloured plates. The authors and their artist, Dr. Turkhud, are to be congratulated on the excellence of these pictures. It will be now possible to compare an Indian Anopheline with a plate, and with practical certainty to be sure of its identity. The same could not be said of any representations of mosquitoes hitherto produced. These plates are beautifully executed, and depict faithfully the bands on the palpi, the spots on the wings, and the leg markings. It is a pity that some few Anophelines are not represented, but of these we have, of course, the systematic description.

The book is divided into two parts: (1) general, (2) systematic. The first chapter gives a general account of mosquitoes, egg, larva, nymph, and external anatomy of the imago. The description is clear and adequate for medical men, for whom the book is primarily written. We think perhaps a short account of the internal anatomy might have been added, as a knowledge of this is so important. The chapter ends with a short account of Theobald's classification of mosquitoes, which the authors are unable to accept. Instead of dividing the subfamily Anophelina into twelve genera as Theobald has done, they place them all (at least the Indian ones) in the old genus *Anopheles*. We cannot help thinking that this, in spite of some of the difficulties of Mr. Theobald's classification which they point out, is a retrograde step. The authors deal with a total of twenty-four Indian species; the total number of Anophelines, however, now amounts to nearly a hundred, and, to say the least, it would be very inconvenient, if not impossible, to deal with these if we placed them all in a single genus. In some of these, e.g. *Lophoscelomyia*, *Christya*, the difference in scale structure is so marked from, for example, a typical *Myzomyia* that we prefer to follow Mr. Theobald and put them in separate genera. Again, we do not know whether the authors would propose, ignoring scale structure, to arrange the rest of the Culicidæ in a single genus, *Culex*, and take no notice of the obvious differences in scale structure, e.g. between *Mucidus* and *Culex*, or between *Stegomyia* and *Culex*. We think, to be logical, they should do so, and try to classify them by palpal bands and leg markings; but this would be well-nigh impossible. We think the authors would have made their position more secure if they had been content with placing in the same genus only those in which they failed to recognise the differences in scale structure defined by Mr. Theobald. It may be granted that doubts sometimes arise, but we cannot regard

this as an excuse for merging into a single genus those in which the differences are well marked and easily appreciable.

The second chapter contains a synoptic table of the Indian species of Anophelines, based upon the author's classification according to palpal bandings, wing spots, and leg markings; the chapter concludes with a description of the method of identifying Anopheline larvæ. The essential points are very clearly set forth, and there follows a classification—a modification of that originally constructed by Stephens and Christophers. One point noticeable as showing that even all the Indian Anopheline larvæ are as yet unknown is that the table only contains eighteen species, whereas the table of imagines contains twenty-four. This table should be of great assistance in helping actual workers in identifying their catch of larvæ from any source.

The third chapter is devoted to the habits of Anophelines. These most interesting questions are, as the authors admit, only beginning to be studied, and now that a book of this kind enables observers to identify their mosquitoes, we may expect much light on these questions—questions of vital importance, but to which many pay no attention. One of the most interesting problems is the distance of flight of Anophelines. Christophers and myself found in Africa instances which proved conclusively that normally the flight of Anophelines was quite a restricted one, to be counted in yards and not in miles, as was not uncommonly stated. A striking example of this we found in the central portion of Freetown, Sierra Leone. Although we lived there for several months during the dry and rainy seasons, we never discovered Anophelines in our rooms, yet a quarter of a mile away they existed in myriads in the native huts; and many other similar instances were observed by us. Yet in Mian Mir observations are quoted to show that *P. fuliginosus* will on occasions fly two and a quarter miles, and *M. rossii* three-quarters of a mile. But, of course, the conditions at Mian Mir are very different—in one case an open plain, in the other a crowded town. Closely bound up with this problem is the question of dispersal of Anophelines. Two of the most important means are (1) by flight, (2) “by a gradual spreading, by short stages, from areas in which they are abundant.” This latter method is, it seems to us, one of the most important and overlooked by those who have no intimate knowledge of mosquito habits, but who readily draw up schemes for their wholesale destruction. We agree with the authors when they state, “observers who consider that *Anopheles* can be materially reduced in numbers by the obliteration of all breeding places in the immediate vicinity of dwellings, rely chiefly upon the suppositions that the range of flight of these insects is very limited and that they do not disperse any considerable distance from their breeding grounds. It would appear from the observations just recorded that such suppositions are incorrect, and if this is so, the task of materially reducing the number of *Anopheles* in any place will undoubtedly be one of great magnitude.”

Again, granted that Anophelines have been diminished in numbers in a certain area, it by no means follows that the malaria will be diminished. We could furnish many instances observed by us in Africa where Anophelines were extremely scanty (but present) yet the malarial index was high. In fact, it is not *always* possible to trace any relation between the number of Anophelines and the value of the malarial index, although on the contrary it often is so. Finally, we may point out that we have at our disposal an accurate and easily applied method of determining whether anti-mosquito measures have diminished malaria. It is now universally accepted by medical men, but not generally known to the layman, that the great source of malaria in the tropics lies in the native children, who to the outward eye show no signs of ill-health, though they contain in their blood malarial parasites. The malarial index or endemicity is the percentage of children under ten years of age that harbour parasites. It is not uncommonly 100 per cent.

If, then, the anti-malarial measures have reduced malaria, this figure must decrease. If malaria has been abolished it must be zero. (It is hardly necessary to state that, in determining this index, children of the same age must be selected for comparison, and the comparison must be made at the same time of the year before and after operations; such precautions are obvious, and are, of course, always taken by those engaged in such observations.) To sum up, no facts are convincing where this proof is not adduced. If the malarial endemicity is reduced to zero, then anti-mosquito measures have been completely successful—but not until then.

Let us return, however, to the book. We think it would have been advantageous, considering the great importance of the subject, if the authors had compiled a tabular statement of those species that are known to transmit malaria *in nature*, though the data on this point can be found by search. At present, then, out of twenty-four Indian Anophelinæ it has only been shown that three convey malaria in nature, viz.:—*M. culicifacies*, by Stephens, Christophers, and James; *M. listoni*, by Stephens, Christophers, and James; *P. fuliginosus*, by Adie; and we know with practical certainty that *M. rossii* does not. The third chapter contains many interesting details of larval life, but it is to be hoped that many observers, using this book as their guide, will study the subject further and fill up the many lacunæ.

Chapter iv. is devoted again to the vexed question of classification. Then follows part ii., containing the systematic description of each species. The descriptions are excellently done, clear, and sufficient, and not overloaded with details which terrify the already overburdened medical man in the tropics. In fact, this book admirably fulfils the object of enabling "medical men engaged in tracing the connection between mosquitoes and human disease to identify and speak with precision of the species implicated." These words are attributed to Prof. Ray Lankester, and if they represent his words we cannot but think that the elaborate monograph of the Culicidæ, excel-

lent as it is, issued by the museum authorities has not had this result. The majority of medical men in the tropics can ill afford the time or inclination to read these detailed descriptions. We think if the museum authorities would issue concise but adequate accounts of, say, the Anophelinæ only, medical men would be greatly helped. For a few shillings the United States authorities publish excellent bulletins on various subjects, e.g. the ticks, the flukes, and so forth, but if a medical man in British possessions wants to identify the species of tsetse-fly he is working with he must buy a monograph issued by the museum costing fifteen shillings. If he wants to know anything about ticks, the museum leaves him in the dark. Seeing what medical men have done recently in elucidating malaria, sleeping sickness, and, most recently of all, tick fever, we think they might reasonably expect some help in return. We would point out finally one small matter which might be corrected in a future edition. In the list of illustrations only i-x are mentioned, though these number xv at least. The arrangement of the plates is erratic, e.g. v, xi, vi, xiv, vii, &c., so that they are very difficult to find. The proofs have evidently been carefully read, and we have detected no error of any importance.

The authors have had the great advantage of describing species caught on the spot and studied under their natural surroundings. We trust somebody will be found in Africa to write an equally good text-book of African Anophelines.

We think that all medical men in India will feel grateful to the authors for this excellent work.

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#### EXERCISES IN PHYSICS.

*Notes and Questions in Physics.* By Prof. John S. Shearer. Pp. vii+284; illustrated. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1904.) Price 7s. 6d. net.

THE present volume has been written to take the place of a similar book prepared several years ago by Prof. C. P. Matthews and the author. Actual experience in the class-room indicated the desirability of certain extensions and changes in the text, and also of many explanatory notes and solutions.

The book is, in reality, a collection of problems—many of which have been selected from examination papers—together with occasional hints with regard to solving them, and very brief introductory paragraphs to each section which explain the principal technical terms referred to therein. It will be easily understood, therefore, that the book is not intended to take the place of regular text-books, lectures, or of laboratory practice. It is designed, indeed, to accompany these. The supply of problems in many text-books is exceedingly scanty—the present volume amplifies the supply. It will be found of great service to the teacher in suggesting problems to set as class work. As no answers are given, there will be less temptation to the teacher merely to quote the selected problems; anyone who is alive in his subject will modify them to suit his