

# OUTLINES OF MEDICAL ZOÖLOGY

*With special reference to laboratory  
and field diagnosis*

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# OUTLINES OF MEDICAL ZOÖLOGY

## PREFACE

Due to the favorable reception accorded the bulletin published in 1921, entitled "Diagnosis of Protozoa and Worms Parasitic in Man," the authors have felt impelled to revise and in some cases entirely rewrite some of the topics with the idea of furnishing a brief textbook or Outlines of Medical Zoölogy for the use of public health officers, students and physicians (especially those practicing in tropical or semi-tropical countries). In attempting to accomplish this aim, new material has been added; as, for example, a section on arthropods.

As in the first edition no attempt has been made to include in the keys and descriptions all of the species that are now known. On the contrary, species that have been recorded only once or a very few times have usually been purposely omitted to avoid confusion.

The information contained in this textbook is based on the personal experiences of the writers or selected from original articles in periodicals, and from reference books and textbooks wherever available. Credit for the use of figures is given in every case in the descriptions of the figures. A few of the more important books and articles relating to the parasites and arthropods described are listed at the end of the

account of each group. Other lists will be found in the bibliographies contained in most of these books and articles. So far as possible we have verified statements regarding the organisms described, but errors are almost certain to creep into such a compilation, and we will welcome corrections. We will also be glad to accept any suggestions for the improvement of the textbook which may be incorporated in a second edition if called for.

The methods employed by various workers for the diagnosis of animals of medical importance are very numerous and only a few could be described in this textbook. These have been selected on the basis of simplicity and effectiveness. It seems to us desirable that methods applicable to field conditions and requiring the minimum of apparatus and reagents should be emphasized. Modifications of these methods may be devised to fit the circumstances encountered in the field.

## GENERAL LITERATURE LIST

This general list contains titles of only a few books and periodicals selected on the basis of helpfulness and accessibility. Special lists will be found at the end of each section of the textbook.

### GENERAL REFERENCE BOOKS ON ANIMAL PARASITES OF MAN

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**PART I**

**PROTOZOA PARASITIC IN MAN**



# PART I

## PROTOZOA PARASITIC IN MAN \*

BY  
ROBERT W. HEGNER

### 1. INTRODUCTION TO THE PROTOZOA

THE Protozoa may be defined as unicellular animal organisms usually microscopic in size, but nevertheless exhibiting many activities similar to those of the higher animals, though in a simpler form. They are generally separated into four classes according to the presence or absence of locomotor organs and the character of these when present. The class Sporozoa contains only parasitic species, but the other three classes comprise both free living and parasitic forms. Species parasitic in man occur in all four classes. The following is a brief classification of the Protozoa, with examples of human parasites:

*Class 1. Sarcodina. With pseudopodia. Endamæba histolytica, E. coli, Endolimax nana.*

*Class 2. Mastigophora. With flagella. Giardia lamblia, Trichomonas hominis, Trypanosoma gambiense, Leishmania donovani.*

*Class 3. Sporozoa. Without locomotor organs in adult stage: sporulation occurs. Plasmodium vivax, Isospora hominis.*

*Class 4. Infusoria. With cilia. Balantidium coli.*

\* The writer is indebted to his colleague Dr. W. H. Taliaferro for valuable assistance in preparing the sections devoted to hemoflagellates, amœbæ, and fecal diagnosis.



## 4 OUTLINES OF MEDICAL ZOÖLOGY

### 2. BLOOD-INHABITING PROTOZOA OF MAN

#### A. *Organisms that Cause Malaria in Man*

1. *Classification.* The organisms that cause malaria in man belong to the class Sporozoa, subclass Telosporidia, order Hemosporidia and family Plasmodiæ.

The members of the class Sporozoa are parasitic Protozoa without locomotor organs and are further characterized by the method of reproduction known as sporulation. In the subclass Telosporidia the vegetative (trophic) stage precedes and is separate from the sporulation stage. The members of the order Hemosporidia are intracellular in the trophozoite stage, have no resistant spores and undergo an alternation of schizogony in a vertebrate and sporogony in a blood-sucking invertebrate (e.g., mosquito). To the family Plasmodiæ belong the genera *Hæmocystidium* which occurs in reptiles, and *Plasmodium* which includes the malarial organisms. Three species of *Plasmodium* are known from man, (1) *P. vivax*, the organism of tertian malaria, (2) *P. malaria*, the organism of quartan malaria, and (3) *P. falciparum*, the organism of estivo-autumnal malaria. Malarial parasites also inhabit lower animals, such as *P. danilewskyi* in birds, *P. kochi* in chimpanzees, *P. bovis* in cattle, *P. canis* in dogs, *P. equi* in horses and *P. diploglossi* in lizards. In the accompanying table (p. 17) the distinguishing features of the three species of *Plasmodium* occurring in man are contrasted as an aid in identification.