THE MALARIAL FEVERS, HEMOGLOBINURIC FEVER, AND THE BLOOD PROTOZOA OF MAN. By CHARLES F. CRAIG, M.D., Captain, Medical Corps, U. S. Army. Pp. 477; 4 colored plates, 25 clinical charts, and 28 photomicrographs and drawings. New York: William Wood & Company, 1909.

THE discovery of the true cause of malaria by Laveran gave renewed impetus to the study of this infection. As a result, there has grown up during the past thirty years an extensive literature upon all phases of malaria. However important much of this literature may be, a large part of it is of necessity inaccessible to the majority of practitioners, especially to most English speaking ones. Yet, as our invasion of the tropics goes steadily forward year by year, the ever-increasing importance of the malarial infections makes it essential that the facts discovered by so many able workers in this field should be squarely placed before the entire medical profession. To review critically the work of others and to set forth clearly our modern conception of malaria is an undertaking only to be assumed by one conversant with the literature and at the same time familiar with the clinical aspect of the subject through wide personal experience. It is fortunate, therefore, that this difficult task has been undertaken by so painstaking a student of malaria as Dr. Craig, whose experience in dealing with over 5000 cases of malaria of all forms in various parts of the world has rendered him competent to write with authority upon the malarial fevers.

Craig divides the malarial plasmodia into four distinct species: (1) Plasmodium malariæ (quartan parasite); (2) Plasmodium vivax (tertian parasite); (3) Plasmodium falciparum (tertian estivo-autumnal parasite); and (4) Plasmodium falciparum quotidianum (quotidian estivo-autumnal parasite). In view of the controversy and confusion which exists as to the classification of the malarial parasite, it is interesting to note that Craig unhesitatingly states that there are two distinct species of estivo-autumnal plasmodia, the tertian and quotidian.

He devotes the first part of the book to the general question of etiology, but more particularly to a consideration of the morphology and development of the plasmodia within man and the mosquito. The detail with which he enters into the differentiating characteristics of the various species of malarial organisms when found in human blood should make it possible for even the inexperienced student to recognize the different forms of infection. Unlike some observers, he holds that the sporogenic forms of the plasmodia, the gametes, are not introduced as such by the infected mosquito, but arise within the human blood after the asexual forms have sporulated for some time. He refutes and dismisses as worthless all evidence which attempts to show that malaria is transmitted

to man in any way save by the bite of infected mosquitoes. Further, he denies the existence of congenital malaria, and states that infection of the fœtal portion of the placenta by malarial parasites does not occur.

After devoting several chapters to a careful review of the pathology of malaria, he enters upon the discussion of the clinical aspects of the subject. He opposes the usual clinical classification of the malarial fevers into intermittent, remittent, and continuous, on the ground that any variety of malarial infection may exhibit any one of these three types of fever. He prefers to divide malaria clinically according to the variety of the infecting parasite, thereby doing away with much confusion by bringing into accord the clinical and etiological classifications of malaria.

In speaking of pernicious malaria Craig follows the usual custom of designating the various forms according to the symptoms which preponderate. He makes it clear, however, that pernicious malaria is not a separate disease due to any particular species of plasmodium. He emphasizes the fact that any of the forms of malarial parasites which are capable of causing the mildest types of infection, may, under favorable conditions, give rise to the rapidly fatal pernicious forms of malaria. The frequency of latent malaria, a form of infection in which some type of the plasmodium is found in the blood of individuals who exhibit no symptoms of the disease, is shown by the author's experience. He found that out of 1297 cases of malaria in Americans, 307, or nearly 24 per cent., were latent infections. The importance of recognizing such cases from the standpoint of prophylaxis becomes at once apparent.

It is well known that primary malarial infections are prone to recur. How these recurrences are brought about, in the absence of any reinfection, has occasioned considerable controversy. As a result of careful study, Craig has made some interesting observations upon this point. He has been led to conclude that within the blood of man malarial infections are perpetuated and hence tend to recur, through a process which he terms intracorpuscular conjugation. Briefly, this consists in "the complete and permanent union of two unpigmented plasmodia within the red blood corpuscles." The process is similar to conjugation as observed at some period in the life cycle of nearly all protozoa, the purpose of which is the restoration of the property of reproduction in an exhausted organism.

The chapters dealing with prophylaxis and treatment, although carefully prepared and well written, contain little that is not already well known. The personal observations of the author upon the changes induced by quinine in the different species of malarial plasmodia are noteworthy. Throughout the discussion of treatment his dictum is that success in treating malaria depends more upon the manner in which quinine is given than upon the quantity of the drug administered. He strongly advocates the prolonged

administration of quinine in divided doses rather than the method of giving a single massive dose before the expected paroxysm.

The closing section of the book is devoted to a consideration of the blood protozoa in man other than the plasmodium of Laveran, and of hemoglobinuric fever. In regard to the latter disease the author is emphatically opposed to the theory that it is due either to malaria or to quinine. He looks upon hemoglobinuric fever as "a disease *sui generis*, caused by a hitherto undiscovered organism, probably of protozoal nature."

Throughout the book one is impressed by the fact that the author's large experience with the disease has enabled him to form an individual opinion upon nearly all questions of importance. Whenever his observations are at variance with those of other workers he has the courage uncompromisingly to state his position. The work contains only the typographical errors to be expected in a first edition. Some of those noted occur on pages 93, 102, 218, 223, and 231. The value of the book as a work of reference is greatly increased by the bibliographies appended to each chapter. There is no question that an enormous amount of painstaking labor has been expended in gathering the material which forms the basis for most of the author's statements. Dr. Craig has furnished the profession with an extremely useful and at the same time interesting book upon a subject of increasing importance. If his efforts meet with the widespread recognition which is his due, it is safe to predict that many of the vague uncertain conceptions of the malarial fevers still held by some persons will be radically altered, much to the benefit of many communities.

G. M. P.