Throughout the chapter and also in later chapters we are given clearly to understand that the enemy submarine campaign was the gravest peril which ever threatened Great Britain.

Chapter III. tells of Anti-Submarine Operations; and while the volume lacks a dramatic climax, like Jutland, the reader whose blood runs faster because of heroic deeds, can find in this chapter stirring records of courage and defiance to the end, by the officers and men on decoy ships, drifters, trawlers and minesweepers.

Chapter IV. describes the Introduction of the Convoy System. There were not enough destroyers to give adequate protection. Requests for protection came from every quarter, but "the vessels wanted did not exist." At the end of February, 1917, the enemy had 130 submarines of all types in home waters and 20 in the Mediterranean.

A very serious situation followed the sinking of so many tankers or fuel oil ships. These vessels of great length and slow speed presented the easiest of targets for a torpedo from a submerged submarine. The reserve of oil became so perilously low that directions were issued limiting the speed of warships burning oil.

Other chapters describe the effect of the entry of the United States, the Patrol Craft and Minesweeping, Production at the Admiralty—and the Future.

The impression left on the reader is that the big fleets, big guns and big ships were to a certain degree side-tracked; and that the smaller units did most of the work and were the effective factors in winning the war. The Admiral clearly indicates this in an eloquent passage on page 188.

> I regret very deeply that in spite of a strong desire to undertake the task, I have neither the information nor the literary ability to do justice to the many deeds of individual gallantry, self-sacrifice and resource performed by the splendid officers and men who manned the small craft. No words of mine can adequately convey the intense admiration which I felt and which I know was shared by the whole Navy for the manner in which their arduous and perilous work was carried out. These fine seamen though quite strange to the hazardous work which they were called upon to undertake quickly accustomed themselves to their new duties; and the Nation should ever be full of gratitude that it bred such a race of hardy, skilful and courageous men as these who took so great a part in defeating the greatest menace with which the Empire has ever been faced.

The references to the American Navy, and in particular to Admiral Sims, are most complimentary. The laying of the mine barrage from Scotland to Norway indicates how far modern warfare at sea has changed since the days when Captain Mahan wrote his treatise on "Sea Power."

In the future, the seaplane, greatly developed of course from its present stage, will be the effective unit, both in offense and defense. With perhaps more truth the words of the Admiral regarding specialized training will hold for officers of the Air Service.

Alexander McAdie

Diseases of Economic Plants. By F. L. Stevens. New York, The Macmillan Company.

This is a revised edition of a former work under the same title by Stevens and Hall. It will be welcomed not only by the professional botanists, but also by a very large number of teachers, county farm demonstrators and others who are finding plant pathology a subject of increasing interest and importance. The importance of plant diseases and the very rapid progress of plant pathology makes frequent revision of a work of this kind imperative. The general plan of the work is very similar to the original edition but is somewhat enlarged and has been brought up to date. The author pays a pleasing tribute to our American workers by inserting the pictures of Farlow, Burrill, Halsted, Bessey, Atkinson and E. F. Smith, who are so well known to all students of mycology and plant pathology.

The discussions are arranged with reference to the crops on which the diseases occur. The diseases are grouped mostly with reference to

the crops on which they occur and are subdivided into diseases of major and minor importance. This arrangement is especially serviceable to those who are not specialists on plant diseases. The descriptions of the symptoms are brief, clear and very readable. There is no attempt whatever to discuss the organisms which are the causes of these diseases but references are given to some of the more important publications. Each disease is designated by its common name; the scientific name for both the imperfect and the perfect stages, where known, are placed in parenthesis. The book also contains chapters on the history of the subject, damages due to plant diseases, prevention and cure, general diseases which attack a large number of crops, fungicides and soil disinfection. The chapter on cost of spraying which was in the first edition is very properly omitted since this is a varying factor dependent on cost of materials and labor.

The work is intended primarily as a textbook and it will prove of great service to all teachers of plant pathology. Possibly its greatest value lies in the brief, clear descriptions which are of such great importance in making diagnoses of diseases in the field. The student of mycology will also find it an important supplement for his work on economic forms. The horticulturists, nurserymen, county farm demonstrators, progressive farmers and in fact all others who are interested in the applications of agriculture will find it an extremely useful reference book.

The mechanical make-up of the work is good except for the crowded arrangement of the bibliography which would lead any one who uses it to fear that the supply of paper is exhausted.

MEL T. COOK

NEW JERSEY AGRICULTURAL EXPERIMENT STATION

SPECIAL ARTICLES

THE Y-CHROMOSOME IN MAMMALS

THE majority of workers on mammalian spermatogenesis have described the sex-chromosome as being of the X-O type but recent investigations in this field by the author indicate that the X-Y type of chromosome may be more common than is generally thought.

In the opossum,[1] an animal for which the X-O type of sex-chromosome has been described, the writer finds a typical X-Y sex-chromosome complex. Both the X and Y components may be recognized in spermatogonial and somatic divisions because of their distinctive size. In the first maturation division the X and Y elements segregate apart to opposite poles of the cell, and in the second maturation division both divide equationally. Hence half of the sperm carry an X and half carry a Y chromosome.

The diploid chromosome number for both the male and female opossum is 22, and not 17 or 24 as concluded by previous investigators.

In the testes of both the white man and the negro I have found in the first spermatocytes a chromosome pair which is similar in appearance and behavior to the X-Y chromosome of the opossum. The two members of this pair, in the human, representing the X and Y components, are unequal in size; they segregate apart in the first maturation division just as in the case of the opossum.

It will be of general interest to biologists to know that the diploid number of chromosomes for man is very close to the number (47) given by Winiwarter.[2] In my own material the counts range from 45 to 48 apparent chromosomes, although in the clearest equatorial plates so far studied only 46 chromosomes have been found. Before a final conclusion is made on the exact number it is desired to make a careful study of a large number of division plates. There can be absolutely no question, however, but that the diploid number of chromosomes for both the white man and the negro falls between 45 and 48. With the X-Y type of sex-chromosome we

[1] The writer's work now in press.

[2] Winiwarter, H. von, 1912, *Arch. de Biol.*, Vol. 27.