characteristic which is necessary for the production of the alternating current.

From a 6-ampere arc in helium at approximately atmospheric pressure and with a centimeter gap, 50 watts or more of alternating current at 1,000 cycles may readily be obtained.

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SCIENTIFIC BOOKS

Collected Studies on the Pathology of War Gas Poisoning, from the Department of Bacteriology and Pathology, Medical Science Section, Chemical Warfare Service, under the direction of M. C. WINTERNITZ, major, M. C., U. S. A. Yale University Press, New Haven, Conn. Cloth, 165 pages, 41 color plates, 83 black and white illustrations, $20.00.

The study of the pathological lesions produced by the war gases upon animals under controlled experimental conditions was of eminent practical importance during the war, and quite justly enlisted the interest and services of many of the foremost pathologists, both here and abroad. Without such control, it would have been difficult and, in many cases, impossible, to draw conclusions as to the comparative effectiveness of different types of gas used in offense; and to estimate the protection afforded by various defensive measures. Equally important was the desirability of defining, so far as this was possible, the effects of the various gases used by the enemy against our troops, and to afford criteria to the pathologists in the field by which they might be recognized.

The studies of Winternitz and his coworkers, which were available to the Chemical Warfare Service during the war, have now been made generally accessible in a comprehensive and beautifully illustrated monograph from the Yale University Press. On the basis of a very large experimental material, the gross and microscopic changes following exposure to chlorine, phosgene, chlorpicrin, trichloromethyl-chloroformate (diphosgene, superpalite), dichloroethylsulphide (mustard gas), cyanogen chloride and bromide, arsine, and several organic arsine-halogen compounds are minutely described. Unlike most of the reports which have previously appeared, the study includes a consideration of late residual lesions as well as the acuter changes, and this phase of the work will prove of particular interest to those who still are seeking an anatomical explanation for the chronic invalidism which afflicts so many of the soldiers gassed in the war. The writers find quite regularly in the lungs after recovery from phosgene, persistent emphysema and atelectasis, associated with obliterating bronchiolitis, and with tubercle-like peribronchial nodules. On the other hand, it is stated that "chronic changes in the lungs after mustard gas inhalation were infrequent and were confined to minute areas of organization occurring in isolated bronchioles or in the alveolar tissue near the margin of the lungs. In no case was any large bronchus found organized or occluded." In a few dogs, localized ulceration or cicatricial stenosis was found in the trachea. This rarity of permanent lesions after gassing with mustard in dogs does not accord with our own experience in the human cases. Without entering into details, it may be confidently stated that the inhalation of mustard gas in man is frequently followed by chronic changes in the entire respiratory tract. These differ, of course, in their extent and severity, but in many cases there results a destruction and deformity comparable to that of chronic pulmonary tuberculosis.

In this connection, it is perhaps proper to emphasize the limitations of these and similar experimental studies on the war gases, in their application to human pathology. Whereas the experimental worker with animals was informed as to the kind of gas used, its concentration and the duration of exposure, none of these data were available to the pathologist in the field. Frequently, it happened that the same soldier was exposed to several varieties of gas within a short period; frequently, also, there were complicating traumatic injuries. Most disturbing of all were the supervening

bacterial infections, and particularly the epidemic influenzal pneumonia which swept through our troops during the period when gas casualties were most numerous. Because of these complexities, many of the human cases presented a difficult problem for the pathologist, and it was not very easy for him to apply fully the knowledge gained from animal experimentation. For example, although blue cross shells containing diphenylchlorarsine were used in profusion against our troops in the later months of the war, and although animal experiments had shown this and related arsine compounds to possess a high degree of toxicity, not a single casualty amongst 576 recorded autopsies could be referred to organic arsine-halogen compounds alone, nor was it possible to differentiate the lesions from those of other vesicant and irritant gases in common use.

Such considerations should not detract from the value of the work. These studies, and the equally painstaking and complete experimental work of Warthin and Weller on Mustard Gas, are fundamental contributions to the pathology of the toxic gases used in the war.

Appended to the purely descriptive studies of gas lesions of various types, is an interesting chapter given to the subject of intratracheal therapy. It was found that dogs will tolerate intrapulmonary irrigation with physiological salt solution in amounts up to three liters, or more, when the fluid is introduced over a period of thirty minutes. Resorption from the lungs takes place very rapidly as could be shown by the elimination of phenolsulphonthalein in the urine; and no serious functional or anatomical disturbances are produced. This raises the question as to how far the œdema itself is responsible for the fatal outcome in cases of acute poisoning with the suffocant gases, and suggests that other factors, such as the increased viscosity of the blood, the obstruction to the pulmonary circulation, and the resultant cardiac weakness, may be of greater moment than the mere accumulation of fluid in the air spaces.

The demonstration that inert granular material and even bacteria can in great measure be washed out of the lungs, opens new possibilities of experimental research along therapeutic lines.

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SPECIAL ARTICLES

THE TAKE-ALL DISEASE OF WHEAT IN NEW YORK STATE

For nearly two decades plant pathologists have been interested in the possible introduction of the take-all disease of wheat into America. A detailed historical and bibliographic treatment of this and some related diseases of wheat has recently been published by Stevens.[1] Conditions, believed to be due to take-all, have been reported from Oregon in 1902 and more recently (1919) from Illinois and from Virginia. However, the fungus *Ophiobolus graminis* Sacc. has not yet been reported from these localities in the papers which have come to the writers' notice. If the name of "take-all" be restricted to the disease with which *Ophiobolus graminis* is associated, there remains some doubt as to the reported occurrence of the true take-all in this country.

Early in July, 1920, the attention of Mr. R. G. Palmer, field assistant of the Department of Plant Pathology, was attracted to a small spot in a field of soft red winter wheat at East Rochester, New York. The plants within an area eight to ten feet in diameter were badly dwarfed and prematurely dead. In many cases secondary culms had been killed soon after their formation. On July 15 the diseased spot was brought to the attention of Dr. M. F. Barrus who brought specimens into the laboratory for examination. The roots of the plants were rotted and usually broken near the base of the culm when the plants were uprooted. The lower internodes were dark or entirely blackened and enveloped by a dense sheath-like plate of thick-walled brown mycelium. This plate of mycelium was formed between the leaf sheath and culm, as

[1] "Foot-rot Disease of Wheat—Historical and Bibliographic," Natural History Survey, Ill. Dept. Registration and Education, Vol. 13, Art. 9, 1919.