INFLAMMATION

or, in larger quantities or greater intensity; to bring about a state in which the death of the tissue elements is far in excess of the subsequent repair. Thus then, according to the above-mentioned ratio, inflammation in a tissue may vary by insensible gradations from a mere hyperæmia up to a spreading suppurative or gangrenous process; and from a purely local manifestation to the development of what may be termed an inflammation of the whole organism.

D. The Nature of the Irritant. - It is clear, then, that it is impossible to base a classification upon the nature of the irritant: the attempt to mark off sharply the inflammations caused by mechanical and chemical noxæ from those produced by bacteria and their products must be given up. Hüter's proposition that suppuration can only be induced by microbes has been repeatedly shown to be erroneous. Thanks more especially to the researches of Councilman, Leber, Grawitz and de Bary and Straus (many more names might be mentioned in this connection), we now know that many chemical substances are capable of causing pus formation.¹ Among these may be mentioned turpentine, croton oil, mercury, copper and silver nitrate. On the other hand, although this pyogenetic property is not confined to microbes and their products, yet among microbes it is not the common property of all. Some, like the bacillus of tetanus, never in themselves induce pus formation: others, like the bacillus of tubereulosis, lead characteristically to tissue growth and the formation of inflammatory neoplasms rather than to pus formation. Even among those which, like the micrococci, are highly pyogenetic, the formation of abseesses only occurs when there is a definite relationship between the virulence of the microbe and the resistance of the organism. The reverse is equally true, that numerous microbes, not specially pyogenetic, produce pus under peculiar conditions. Thus, the bacillus of enteric fever, when it multiplies in the middle ear, induces a suppurative otitis, and, as Dr. C. F. Martin has shown, it is further capable of originating a suppurative arthritis.

In fact, under varying conditions the same microbe can induce very various forms of inflammation. Thus, Charrin has shown that the B. pyoeyaneus and its products are capable of inducing in one organ — the kidney — pathological conditions so diverse as acute, chronic, parenchymatous, interstitial and thrombotic nephritis, with, in addition, cyst formation and amyloid degeneration.² This same microbe can induce acute suppuration in the anterior chamber of the cyc; and when inoculated into the blood cause a hæmorrhagic inflammation of the serous surfaces. Hence we can proceed further and state that no strict classification of inflammation can be made according to the nature of the

¹ While this is so, it must be borne in mind that under ordinary conditions these substances very rarely act upon the organism in a state of sufficient concentration to be pyogenic. Thus, while it is impossible to make a sharp line of demarcation between bacterial and chemical irritants, it holds true in the main for man that suppurative disease is an indication of the presence and growth of microbes.

² These changes are comparable with the diverse conditions of the kidney in the human being brought about by the scarlatinal virus.

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