

croton oil and metallic quicksilver, applied so as to exclude apparently the access of bacteria, still caused suppuration. This latter objection has now been met. G. Klemperer of Berlin recently, by prolonged exposure of the irritants to heat and then application subcutaneously under stringent aseptic (not antiseptic) precautions, injected these irritating bodies in a series of over one hundred experiments without causing any suppuration, thus completing this portion of the evidence. The exudation was always serous or fibrinous, never purulent.

The significance of the absence of bacteria in an abscess is explained by the study of abscess formation. The organisms must have been present, as at an earlier stage the purulent exudation is largely a conservation process, having as its object the annihilation and absorption of the bacteria by the exuded leucocytes. At the same time the question has been studied from another aspect—What bacteria cause suppuration and under what conditions can they bring it about? Modern bacterial methods have given a mathematical precision to these researches. In thousands of abscesses now examined, only about ten species of bacteria have been observed. These are chiefly micrococci, and of these, five species alone cause about nine-tenths of all occurring abscesses. The remaining thousands of bacteria existing in certain parts of the body and in its surroundings are not pyogenic.

With regard to the conditions necessary to enable these few bacteria to cause suppuration, the conditions vary widely; some suffice by their mere presence to set it up, in others a weakened condition of the tissue is necessary. Injected into the blood, for instance, these would be harmless unless the system is injured or irritated at any point, as by the injection of the already mentioned chemical irritants, say into the peritoneum or the seat of a fractured bone. In the first case, a purulent peritonitis (Grawitz), in the latter a suppurative osteomyelitis (Ogston), is the result.

Other local conditions may affect the result, subcutaneously or in the peritoneum the direct injection of pyogenic cocci will cause neither peritonitis nor abscess unless injected in such numbers or diluted to such bulk as to preclude their rapid absorption and assure a prolonged contact with the tissues. This

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