

climates, filled with living germs, may cause irritation within the system, or other agents of microscopic minuteness, entering the body through other avenues, may become sufficient to produce tetanus. If this be so it may be found that, philosophically considered, so-called spontaneous tetanus is as truly traumatic as that which proceeds from an apparent and well-marked wound. The causes of tetanus, according to the orthodox view, are divided into intrinsic and extrinsic; the former comprising such forces as operate from within, and is made to include the action of poisons, like strychnia, brucia, thebaia, cicuta, maculata, etc., as well as unhealthy conditions of system which may generate the *materies morbi* within it.

Extrinsic causes include all wounds and external injuries apparent to the senses. And it is remarkable how slight an injury will at times be followed by tetanus; the prick of a needle, the sting of a bee, the peck of a bird, too close paring of the nails, piercing the ears, extracting a tooth, the scratch of a cat, or bite of a mouse, venesection, small cuts, especially in tendinous parts, bruises, dislocations of small joints, etc. It does occur, also, after large and well-conducted operations, when some nerve trunk becomes irritated by implication of its branches in such a manner as to injure them. Dependent as tetanus is on an exaltation of the reflex functions of the spinal cord, any irritation conveyed to this by an injured nerve may set up such a morbid action in it that the efferent nerves may convey its influence to, and induce the spasmodic contractions of tetanus in, the muscles which they supply. Nicolaier-Rosenbach, Tizzoni, and Cattani, claim that they have discovered a tetanus bacillus which, after having been obtained by pure culture of the spores, in proper media, produced tetanus in mice inoculated with it; and they hold that this bacillus is the real cause of tetanus.

Of the pathology of tetanus, Mr. Timothy Holmes, of London, Eng., says that "nothing really is known." Others state that "changes are found in various parts of the cord; but chiefly in the medulla oblongata, the lumbar region, the gray substance, around the central canal and in the anterior horns. Very considerable dilatation of the vessels is always found. Exudation of a semi-fluid colloid substance,

hyperplasia of the neuroglia, and abundant nuclear proliferation in the gray matter, have been observed in recent microscopical investigations." J. McCarthy, in Heath's Dictionary of Practical Surgery, allows that certain poisons, generated in the system by unhealthy surroundings, may play a part in the causation of tetanus; acting by producing lesions of the brain and spinal cord.

The great question, however, to be solved is, how many of the changes, observed in those who die from tetanus are, *ante-mortem*, and how many *post-mortem*, and if any of them observed are sufficiently constant to warrant us in saying, "This is the undoubted pathology of tetanus." All the literature which I have consulted on the subject leaves us quite in the dark on this point. The recent notion advanced, that tetanus depends on bacterial lesions is, to say the least of it, to my mind, "not proven." And why, we may ask, need either environment or schizomycetes be called in to answer for the causation of tetanus? Have we not the injured nerves to account for it? And do we not have it occurring where neither of the foregoing factors could be suspected of playing a part? In the ward where my patient suffered tetanus, last winter, as many as seventy-five surgical operations are performed every winter, and his was the first case which, to my knowledge, for fifteen years, occurred in that ward! The operation upon him was performed in the same amphitheatre, and with the same antiseptic precautions which are in constant use for all my surgical cases, so that his surroundings could have had nothing to do with the development of the tetanus. Moreover, after the disease showed itself, he was not isolated, only placed in the quietest corner of the ward, and surrounded by a screen; and not one of the various surgical cases that were treated in the same ward during his illness showed the least sign of anything like tetanus. I am, therefore, not prepared to accept infection or micro-organisms as the chief factors in the etiology of tetanus. When reflex nerve irritation has been set up by any injury there is no doubt that unhygienic surroundings, or the multiplication of bacteria in a lowered vital condition of system, may have much to do with increasing and perpetuating the disease. This, it seems to me, is as far as I can go, in admitting the influ-