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## MAGGOTS IN THE TREATMENT OF WOUND AND BONE INFECTIONS\*

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A careful study of the works of Ambroise Paré<sup>1</sup> (1509–1590) and the translation by Theodore Johnson from the Latin discloses the fact that Paré was aware of the occurrence of live maggots in wounds and their beneficial effect. He states, in reference to bad skull wounds with bone infection: "But mark, after some months space, a great number of *worms* came forth by the holes of the rotten bones from underneath the putrefied skull; which moved me to hasten the separation and falling away of the putrid bones. . . . I observed three cavities of the largeness of one's thumb filled with *worms* about the bigness of a points tag. . . . The bone which nature separated was of the bigness of the palm of one's hand. The patient recovered beyond all men's expectation". And again he states: "And the corruption was such, that if any (wounds) chanced to be undrest for one day, . . . the next day the wound would be full of *worms*".

Paré<sup>1</sup> speaking of the Battle of St. Quentin, 1557, says: "the wounds of the hurt people were greatly stincking, and full of *wormes* with gangrene and putrifaction".

D. Hieronymus Fabricius<sup>2</sup> states: "*Generantur inter dutem carnem, in auribus, in dentibus, putridis ulceribus, in thorace, renibus, utero, vesica, et ut. nonnullis placet, etiam in iecore et cerebro; intestina tamen principem locum obtinent, de quo omnes consentiunt*".

Zachmann<sup>3</sup> (1704) makes an attempt to describe the origin of maggots in wounds rather than the effects on such injuries or wounds.

Baron D. J. Larrey<sup>4</sup> (1766–1842) says: "There is one more remarkable species of foreign bodies which we cannot pass over in silence, and which we have had an opportunity to notice with the majority of our wounded in Syria, during the expedition in Egypt. While the process of suppuration of their wounds was going on, the wounded were much annoyed by the *worms or larvae of the blue fly*, peculiar to that climate. These insects, hatched in a few hours, developed themselves with such rapidity that, from one day to the next, they grew to the size of a small goose-quill, which greatly terrified our soldiers, whatever we might say for their encouragement to the contrary notwithstanding. Nothing short of experience could convince them that these insects, so far from being injurious to their wounds, *promoted rather their cicatrization, by cutting short the process of nature*, and by causing the separation of the cellular eschars which they devoured. These larvae are, indeed, *greedy only after putrefying substances*,

\*NOTE: The author of this article has given in detail a historical review of the opinions on this subject by several early observers who are mentioned in the previous article. This paper is particularly interesting in connection with the work of Dr. Baer who carried this idea to a practical conclusion. — *Editor*.

and never touch the parts which are endowed with life; under these circumstances also, we have never seen hemorrhage occur, whatever might have been the depth to which, according to the extent of the injury, these insects had found their way. Lotions of a strong decoction of garlic, of rue, or common sage, prepared at every time of dressing, were sufficient to cause their destruction; but soon after they were reproduced, owing to the insufficiency of the proper means to guard against the approach of the flies and to prevent the incubation of their eggs. But this may be readily accomplished by soaking the first compress of the dressing in a solution of camphor or any other antiseptic fluid."

Shafer (Camden) tells me he noted the clean healthy condition of leg ulcers that were infested with maggots, while an intern at the local hospital (1908-1909). This was also observed at Old Blockley, Philadelphia.

Crile, speaking before the Clinical Congress of Surgeons of North America ("War Session", October 23, 1917), said: "In the wounded who lie out in 'No Man's Land' for two or five or ten days, it has been found that the wounds that have done best are those that contain *maggots*. The reason for this is that there is devitalized tissue; the *maggots* live on this devitalized tissue, and if they destroy that tissue they do in time what the surgical operation does".

Dr. Edward Martin of Philadelphia, formerly Professor of Surgery of the University of Pennsylvania, said before the same session of the Clinical Congress of Surgeons of North America, that they had "been advised by one eminent member of the profession to take all the antiseptics and throw them into the sea, and another had advised them to raise a brood of *tame maggots to take care of the wounds*".

W. W. Keen of Philadelphia (1918), says: "During the Civil War *maggots* were very common in the summer . . . the resulting *maggots* were certainly disgusting, but, so far as I ever observed, they did no harm. Crile (1917) now says that, on the contrary, they actually do good. This would probably be especially true in cases of infection from bacillus of gas gangrene."

The late William S. Baer<sup>5</sup> of Baltimore, Maryland, during 1929 and 1930 advocated the use of live maggots in the treatment of cases of osteomyelitis.

Whether this unique and ancient remedy ("viable antiseptic") will become popular in America remains to be seen.

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