NOTE ON THE ETIOLOGY OF VERRUGA AS DEDUCED FROM A STUDY OF THE ASEXUAL STAGES OF BARTONELLA

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Dec. 4, 1915, the writer presented before the Biological Society of Washington a paper on the identification of the asexual stages of Bartonella bacilliformis, the causative organism of verruga, which was published in the Dec. 19, 1915, issue of the Journal of the Washington Academy of Sciences.

Jan. 7, 1916, he presented the same subject before Section VIII of the Second Pan-American Scientific Congress, during which presentation he announced certain points additional to those previously announced. This second paper will be published in due course in the Proceedings of the Congress, but it is desirable to place on record at once the additional points announced therein. They are as follows, and should be added to the paper published Dec. 19, 1915:

The toxin resulting from the extensive asexual multiplication of Bartonella in the vascular endothelial cells of the subcutaneous tissues is liberated in quantity into the blood, causing the rise of temperature which marks the fever stage of verruga, the anemia following through hemolysis.

The proliferation of vascular endothelial cells incited by this toxin not only imprisons the toxin itself, thus arresting the hemolysis, but also prevents the erythrocytes from coming into direct contact with endothelial cells containing merozoites of Bartonella, thus cutting short the infection of the erythrocytes. As the natural result, the fever and anemia both subside, and the gametes of Bartonella are no longer to be found in the peripheral blood.

The infected endothelial cell, in situ in the capillary wall, is positively chemotropic for uninfected freshly oxygenated erythrocytes, attracting and holding them in contact with itself until transfer of a certain number of merozoites of Bartonella has been effected, the presence of which reduces the oxygen tension in the substance of the erythrocytes, thereby transforming their tropic qualities, the sufficiently infected erythrocytes being set free through negative chemotropism.

The localized proliferation of vascular cells following verruga eruption-tissue inoculations is not due to any new activity of a living organism or virus. The reason why Drs. Strong et al. were unable to obtain proliferation lesions by injection of a filtrate from these tis-
sues is at once apparent; the proliferated vascular cells can not pass
the filter. Their inoculation of these tissues upon the rabbit’s cornea
produced no lesion because the cornea possesses no vascular cells.
Their attempts to cultivate the supposed virus in these tissues resulted
in failure because the tissues evidently do not contain a living virus.
(The term virus is used in the common acceptation of organisms that
pass the filter.)

Drs. Strong et al. succeeded in demonstrating the presence in ver-
ruga eruption tissues of a hemolysin which is active in relatively high
dilutions, and whose discovery is very much to the point in this par-
ticular connection. This hemolysin is quite certainly the toxic by-prod-
tuct of the reproductive activity of Bartonella in the subcutaneous tis-
sues. It is the specific cause of the anemia of the fever stage of
verruga. Further, it is the agent which directly incites the prolifera-
tion of the vascular cells, thereby causing the eruption lesions. In
other words, this toxin is able to destroy such delicate structures as
the erythrocytes; is able to irritate the more resistant vascular cells
sufficiently to cause them to proliferate; but is unable to produce any
effect on such highly resistant structures as the connective-tissue cells
composing the cornea. Its proliferative action on vascular cells con-
tinues through many successive series of inoculations, but finally
becomes attenuated and no longer effective.

In verruga cases, when the correspondence in intensity of fever and
visible eruption is not well marked, it is practically certain that infection
of the internal organs has become proportionately greater, resulting in
an increased internal eruption.

Notwithstanding all criticisms that may be put forward, the writer
is content to rest his thesis upon the evidence presented, and invites
a comparison of the published figures and descriptions of the vascular
cell inclusions of the fever and eruptive stages of verruga. He has
verified the findings by similar inclusions in his own verruga sections
and smears. There are many additional details apparent at the pre-
sent writing which have not yet been entered into, but they are unneces-
sary to the main demonstration; it is only necessary to say that all the
details fit in perfectly with the identification that has been given of the
asexual stages of Bartonella, thus clinching the interpretation of these
as presented by the writer.