AN INVESTIGATION ABOUT „ANTICOAGULASE”,
A FERMENT SAID TO BE PRODUCED
BY STAPHYLOCOCCI

by

M. BRUINING and H. H. COHEN
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I. INTRODUCTION.

In medical literature we find the following about the so-called „anticoagulase”.

NEITER (3) wrote that anticoagulase was produced by staphylococci in media containing carbohydrates. If anticoagulase is present, there is an absence of plasma-coagulation with either Ca-ions or staphylo-coagulase. It acts at once, so without any previous lag of action. Normal liquor and normal serum neutralize the action. Where there is coagulase or anticoagulase in an undiluted or in a slightly diluted culture medium the anticoagulase dominates, so that there is no coagulation; if the culture medium is further diluted the coagulase-action dominates, so that there is coagulation.

There are other bacteria (pneumococci, streptococci, coli bacteria etc.) that also excrete an anticoagulase in media containing carbohydrates. According to NEITER the anticoagulase is possibly a derivative of the fermented carbohydrates. Finally he thinks of the possibility that the pH of the glucose-broth plays a part, although he does not think it very probable.

BIRCH-HIRSCHFELD (1) found anticoagulase in filtrates of staphylococcus cultures in ordinary broth and in filtrates which she prepared by cultivating staphylococci on cellophane-agar. She proved the presence of anticoagulase by letting the filtrate of the culture act on citrate-plasma for 12 hours at 37°.C. in a „CO₂ atmosphere”.
It is effective against the coagulation by thrombine, Ca-ions and staphylo-coagulase. The anticoagulase is resistent against a pH of 4.4 and 8.6 during 24 hours at 37° C., in contrast to coagulase. It is thermolabile and is absorbed by kaolin. BIRCH-HIRSCHFELD affirmed the discovery of NETER, that the anticoagulase-action takes place in the undiluted as well as in the weakly diluted filtrate, whilst, on the contrary, coagulase-action is produced in stronger dilutions. A filtrate containing anticoagulase would make fibrinogen and casein-solutions more stable against flocculation-substances (NaCl and acetic acid).

TILLETT (4) studied the appearance of anticoagulase in glucose broth cultures of haemolytic streptococci, Streptococcus viridans and pneumococci. He concluded that if the pH of the cultures was lower than 5, plasma coagulation was prevented. Acidified sterile broth was also able to prevent plasma coagulation.

TUNNICLIFF and HAMMOND (6) had noticed that smooth growing strains of Streptococcus viridans cultivated in glucose broth, prevented plasma coagulation, whilst rough growing strains did not show this phenomenon. On closer investigation as to the cause, they found that the pH of the glucose broth cultures of the smooth growing streptococci was much lower than that of the rough growing variety.

II. OWN INVESTIGATIONS.

With reference to the afore mentioned observations we investigated as to how far the prevention of plasma coagulation, which could be obtained by the aid of a glucose broth culture of a staphylococcus strain, could be ascribed to a decrease of the pH.

We repeated some of NETERs experiments and also found that there was an anticoagulase action in glucose broth cultures of staphylococci which could be stopped by serum and liquor.

After these experiments we continued our investigations, thinking that the pH might have something to do with the phenomenon. We tried to ascertain in how far an increasing pH did stimulate coagulation.

For our first experiment we used as coagulation factors:
1. A solution of 0.5 % CaCl₂ in 0.85 % NaCl.
2. A thrombine solution made according to the specifications of TILLETT and GARNER (5).

The experiments were carried out as follows. To 8 test tubes,