CONTENTS

SUMMARY

1. Laboratory stock strains of Cl. welchii type A and Cl. septicum were used. These strains were isolated locally from materials received for diagnosis of gas gangrene infections. They were tested for their production of toxins and enzymes; (lecithinase, hyaluronidase, haemagglutinin and haemolysin.

2. Laboratory animals (guinea pigs) were experimentally infected with Cl. welchii type A and Cl. septicum, and different fractions; serum, urine, infected muscles and fluid oedema were obtained for the detection of lecithinase, hyaluronidase, haemagglutinin and haemolysin at different periods of infection starting two hours up to thirty-six hours after infection. Attempts were also made to demonstrate these organisms microscopically in the infected muscles and oedema fluid at different stages of infection.

3. In these experiments, simplified methods for the detection of different toxins and enzymes were described, which can be used in the field with only very few

equipments.

4. Lecithinase was detected two hours after infection with Cl. welchii type A in the infected muscles and urine but after six hours in the circulating blood and fluid oedema. Concerning Cl. septicum infection, lecithinase was not produced by this organism. From this character we can differentiate between Cl. welchii type A and Cl. septicum gas gangrene infection.

5. Hyaluronidase activity gave more promissing results with Cl. septicum than with Cl. welchii type A infection. Two hours after infection with Cl. septicum, the enzyme was detected in the circulating blood, infected muscles and urine; and six hours after infection in the oedema fluid. It is the serum which gave very interesting and stable results as the enzyme activity could be detected immediately in two hours after infection up to thirty-six hours. The urine also gave an interesting results starting two hours after infection. On the other hand, it is only the muscle extract and oedema fluid which showed hyaluronidase activity in more than two hours after infection with Cl. welchii type A.

6. In experimental infection due to Cl. septicum, haemagglutinin was detected in the infected muscles and urine two hours after infection and in the oedema fluid and the circulating blood after that. With Cl. welchii type A, haemagglutinin was a nondependable product as it is not produced by freshly isolated strains. Thus, it is another character by which the two organisms, as a cause of gas gangrene, can be differentiated.

7. The results obtained concerning the haemolytic activity of different fractions from guinea pigs infected with both Cl. welchii type A and Cl. septicum were identical except the urine which gave different results as the urine from animals infected with Cl. welchii type A did not show this haemolytic activity while that from Cl. septicum infected guinea pigs gave positive findings.

8. From the results obtained it is concluded that diagnosis of gas gangrene infection with Cl. welchii and Cl. septicum is far much better by using lecithinase, hyaluronidase and haemagglutinin activities but not haemolysin, for differential diagnosis.

9. Gangrene may be due to bacterial infection (Cl. welchii type A and Cl. septicum) or due to toxicological cases (iodoform, lead arsenate, methyl chloride, carbon monoxide, ergot, subacute lead poisoning, chronic lysol and phenol poisoning). Thus differential diagnosis can be done on the basis of detecting the toxins and enzymes produced by these organisms (lecithinase, hyaluronidase, haemagglutinin and haemolysin) while toxicological cases can be diagnosed by finding the causative agents by chemical tests as in lead arsenate poisoning or by alkaloidal tests as in ergot poisoning.