# TRANSITION OF ANTIBODY TITERS IN SWINE INAPPARENTLY INFECTED WITH WEAK β-HEMOLYTIC SPIROHCETES

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The causative agent of swine dysentery, *Treponema hyodysenteriae*, shows the β-hemolysis on the blood agar plate, while weak β-hemolytic spirochetes without enteropathogenicity are isolated from apparently healthy swine. Recently, it was reported that these two kinds of spirochetes were different from each other in the antigenic properties and that even the weak β-hemolytic organisms induced the syndrome similar to swine dysentery.

This report is firstly to discuss the antigenic properties of the two Japanese strains, *viz.*, a β-hemolytic and a weak β-hemolytic ones, and secondly to describe the bacteriological and serological features of the weak β-hemolytic spirochetes isolated from a piggery where swine dysentery had never been recorded for these ten years.

Strains and culture. β-hemolytic strains S73/2 (kindly supplied by Dr. D.J.Taylor, University of Glasgow) and DJ70, and weak β-hemolytic strain NS8 were anaerobically grown on trypticase soy agar (BBL) containing 5% sheep blood and used for experiments.

Biochemical tests. The fermentation of carbohydrates and hydrolysis of esculin by spirochetes were tested according to the method of Lemcke and Burrows (1981).

Rabbit immune sera. The immune sera were prepared by the method described by Adachi et al. (1979).

Complement-fixing (CF) antigens. Cells harvested from 3-5 days culture were once washed with veronal buffer, adjusted to 0.65 absorption at 625nm on the spectrophotometer, and sonicated for 10 min by sonicator, PG450, MSE. After centrifugation at 2,000x*g* for 30 min, the supernatant was used as CF antigen. The antigens were stored at -80C.

Agglutination and CF tests. Agglutination and CF tests were carried out according to the methods of Kashiwazaki et al. (1980) and Kraft and Melnik (1950), respectively.

Absorption of CF antibody. Rabbit immune serum was absorbed with CF antigen dried by evaporation after dialysis against distilled water for about 18h. The absorption was carried out for 2h at 37C, and then for 18h at 5C. After the absorption, the mixture was centrifuged at 10,000x*g* for 30 min and the supernatant was used for CF tests.

Immunodiffusion test. Gel immunodiffusion test was carried out by the method described by Yanagawa et al. (1974).

## RESULTS

The CF antigens of the three strains, S73/2, DJ70 and NS8, cross-reacted with respective rabbit immune sera, and the homologous reactions gave higher titers than the heterologous ones. The CF reactions after antibody-absorption demonstrated the difference of the antigenic properties among the three strains, and the finding was consistent with the result of agglutination tests. In part the three strains possessed the common antigenicity which was proved by immunodiffusion test as well.

The four isolates of weak β-hemolytic spirochetes originated from swine in a farm under observation were similar to two of the three strains (S73/2 and DJ70) in morphological and biological properties. The organisms hydrolyzed esculin, and fermented glucose, lactose, maltose, sucrose and trehalose, but not mannitol, rhamnose, nor xylose.

As for the antigenic properties, the four isolates except one were found to be identical (Table 1).

The swine were proved positive in CF antibodies to every strain and isolate concerned for 8 weeks of the observation. In the CF reactions, the highest titers were obtained with the antigens prepared from the four isolates, and the lowest with DJ70 and NS8 antigens.

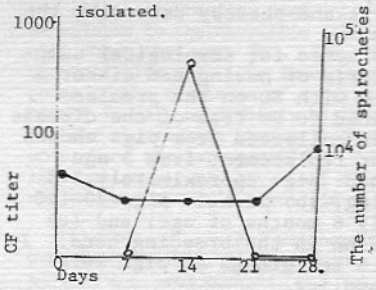
As illustrated in Figs. 1 and 2, an increased number of organisms were isolated only from swine with low antibody titer, and a high antibody titer was obtained in swine only when the number of isolated organisms was small.

Table 1. Complement-fixation (CF) titers of immune serum against one of the isolates, S55/64, before and after absorption

| Absorption | CF titer with antigen: S73/2 | DJ70 | NS8 | S55/60 | S55/64 | S55/66 | S55/71 |
|---|---|---|---|---|---|---|---|
| Unabsorbed | 512 | 256 | 512 | 1024 | 1024 | 1024 | 1024 |
| Absorbed with | | | | | | | |
| S73/2 | - | 128 | 512 | 128 | 1024 | 512 | 512 |
| DJ70 | 128 | - | 256 | 128 | 512 | 512 | 512 |
| NS8 | - | - | - | - | 512 | 512 | 512 |
| S55/60 | 128 | - | 128 | - | 512 | 512 | 512 |
| S55/64 | - | - | - | - | - | - | - |
| S55/66 | - | - | - | - | - | - | - |
| S55/71 | - | - | - | - | - | - | - |

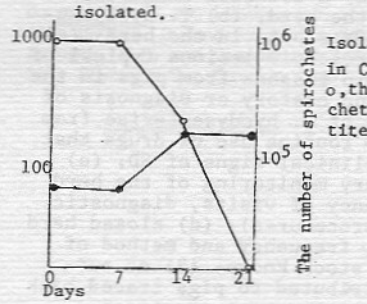
-, negative reaction at 1:64.

Fig.1. Transition of CF titers to weak β-hemolytic spirochetes and the number of organisms isolated.




Isolate S55/60 was used in CF test. Symbols:o, the number of spirochetes;o,antibody titers.

Fig.2. Transition of CF titers to weak β-hemolytic spirochetes and the number of organisms isolated.




Isolate S55/45 was used in CF test. Symbols: o,the number of spirochetes;o,antibody titers.

## CONCLUSION

The antigens prepared from the three strains were antigenically different from one another. So far as the weak β-hemolytic spirochetes were concerned, the number of organisms isolated from swine was subjet to influence of the CF antibody titers demonstrated in the animals.

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