# A NEW *SALMONELLA* TYPE: *SALMONELLA KENTUCKY*[1]

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In March 1937, a chick affected with coccidiosis was presented for diagnosis. The flock from which the bird was derived suffered a mortality of approximately 50%. In addition to the lesions ordinarily present in birds affected with coccidiosis, there were several ulcerated areas approximately 0·5 cm. in diameter in the small intestine and caeca. Perforation of the serosa had occurred at the site of one of the ulcers, resulting in the production of peritonitis and adhesions. Brilliant green plates inoculated with material taken from the ulcerated areas yielded numerous colonies of an organism belonging to the *Salmonella* group. Since this organism is an antigenically independent strain, it will be referred to as *S. kentucky*.

The organism fermented glucose, maltose, rhamnose, trehalose, arabinose, dulcitol, sorbitol and inositol with the production of acid and gas. Lactose and sucrose were not attacked. Hydrogen sulphide was formed and tartrate agar was promptly acidified. The rhamnose test of Bitter, Wiegmann and Habs was positive.

When examined serologically, alcohol-treated suspensions of the organism were agglutinated by *S. newport* serum but were affected little if at all by serums of organisms of other somatic groups. The bacilli were agglutinated to the somatic titre of *S. newport* serum. Absorption of *S. newport* serum by *S. kentucky* left agglutinins for *S. newport* and *S. suipestifer* in the serum. *S. kentucky* was not agglutinated by *S. suipestifer* serum, and absorption of this serum with *S. kentucky* left the agglutinins for *S. suipestifer* and *S. newport* unaffected. Absorption of *S. newport* serum with *S. suipestifer* did not remove the agglutinins for *S. newport* and *S. kentucky* from the serum. These results indicate that *S. kentucky* possesses factor VIII but not factor VI of the Kauffmann-White classification.

Formalinized broth cultures of *S. kentucky* failed to flocculate with antiserum derived from the non-specific phases of *S. typhi-murium*, *S. suipestifer*, *S. anatum* and *S. new brunswick*. This indicated that the organism possessed no non-specific phase. When formalinized broth cultures of *S. kentucky* were titrated against antisera derived from the specific phases of the various

[1] The investigation reported in this paper is in connexion with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director.

*Salmonella* types, it was flocculated to 20% of the titre of *S. typhi-murium* antiserum but was not affected by any other serum.

An agglutinating serum was prepared from *S. kentucky*. This serum agglutinated alcohol-treated suspensions of *S. newport* to the somatic titre of the serum but acted upon representative strains of the other somatic groups only in very low dilution or not at all. Absorption of *S. kentucky* serum with *S. newport* left a well-defined residue of somatic agglutinins for *S. kentucky* but freed the serum of all somatic agglutinins for other groups. It is obvious that *S. kentucky* possesses two antigenic factors, one of which is antigen VIII of *S. newport*, the other an antigen differing from any of those previously described. To this antigen the symbol XX is assigned.[1]

Agglutination tests were performed using the serum of *S. kentucky* and formalinized broth cultures representing all the specific factors of the Kauffmann-White classification. The specific phase of *S. typhi-murium* was agglutinated to 20% of the titre of the serum. The antigens which represented the other specific factors were not flocculated in the lowest dilution of the serum.

The flocculation of *S. kentucky* by specific *S. typhi-murium* serum and the flocculation of the specific phase of *S. typhi-murium* by *S. kentucky* serum indicated the presence of the specific factor i of *S. typhi-murium* in *S. kentucky*. The failure of each serum to agglutinate the antigen of the other type to more than 20% of the titre of the respective serums further indicated that *S. kentucky* contained additional specific factors. To test the validity of this assumption *S. kentucky* was plated and individual colonies examined by slide agglutination. In the examination two serums were used, a suitably diluted specific *S. typhi-murium* serum and an appropriate dilution of *S. kentucky* serum which had been exhausted of agglutinins for the specific phase of *S. typhi-murium*.

The colonies were easily divisible into two types: those that were agglutinated by specific *S. typhi-murium* antiserum and those that were agglutinated by *S. kentucky* serum which had been freed of agglutinins for *S. typhi-murium*. Of 100 colonies tested all were agglutinated by one of the serums, none by both. Evidently *S. kentucky* possessed two specific factors and exhibited the *alpha-beta* phase variation of Kauffmann & Mitsui (1930).

To establish further the identity of the *alpha* phase of *S. kentucky* with the specific phase of *S. typhi-murium*, absorption tests were performed. It was found that the *alpha* phase of *S. kentucky* was able to absorb all flocculating agglutinins for the specific phase of *S. typhi-murium* from specific *S. typhi-murium* antiserum. Likewise the specific phase of *S. typhi-murium* affected a complete exhaustion of flocculating agglutinins for the *alpha* phase of *S. kentucky* from *S. kentucky* antiserum but left the agglutinins for the *beta* phase unaffected. *S. kentucky* possessed two specific antigens, one of which is identical

[1] The writer is indebted to Dr Harry Schütze and Dr F. Kauffmann for advice concerning the symbols used to designate the hitherto undescribed antigens found in this work.

with the specific factor i of *S. typhi-murium*, the other related to none of the specific factors of the Kauffmann-White schema. To the second specific factor of *S. kentucky* the designation z6 is applied.

The antigenic formula of *S. kentucky* is VIII XX: i–z6:–.

SUMMARY

A new *Salmonella* type, *S. kentucky*, is described. It was isolated from the intestinal tract of a chick affected with coccidiosis and ulcerative enteritis. The organism possesses two hitherto undescribed antigens, one somatic, the other flagellar. It exhibits *alpha-beta* phase variation and the *alpha* phase is identical with the specific phase of *S. typhi-murium*. The antigenic formula of *S. kentucky* is VIII XX: i–z6:–.

REFERENCE

KAUFFMANN, F. & MITSUI, C. (1930). Zwei neue Paratyphustypen mit bisher unbekannten Phasenwechsel. *Z. Hyg. InfektKr.* **111**, 740–745.

(*MS. received for publication* 30. x. 37.—Ed.)