INTERNATIONAL BULLETIN
OF
BACTERIOLOGICAL NOMENCLATURE
AND
TAXONOMY

Volume 11

January 15, 1961

No. 1

OF THE NAMING OF SALMONELLAS,
IS THERE NO END?

T. Velaudapillai*

Bacteriology Department
University of Sheffield

SUMMARY: When phage P22 propagated on Salmonella chester and on S. budapest was allowed to act on a non-motile strain of S. paratyphi B, 11 serologically different strains resulted. Five were named serotypes (2 motile S. paratyphi B; 2 S. st. paul; one S. budapest). The remaining 6 were unnamed serotypes. Seven of these transductions were done in chick embryos and 4 in mice. It would seem likely that transductions can occur naturally in man and other animals and may, at least in part, be responsible for the 50 or so new salmonellae reported each year. It is therefore suggested that the recommendation of the Enterobacteriaceae Subcommittee of 1954 for the classification by antigenic formula rather than by name of Salmonellae isolated in future be preferred to the reverse recommendation of the same Subcommittee in 1955.

METHODS

The methods and materials used are described in separate papers (Velaudapillai, 1960a, b).

RESULTS

When phage P22 propagated on S. chester (4, 5, 12:e, h:

*Present address: Medical Research Institute, Colombo, Ceylon.

e, n, x) was allowed to act on a non-motile strain of S. paratyphi B, organisms with eight different antigenic formulae were produced (Table 1).

Table 1. Transductants obtained with phage P22 propagated on S. chester (4, 5, 12:e, h:e, n, x) and a non-motile strain of S. paratyphi B (4, 12:-:-).

Recipient	Resultant
4, 12:-:-	1, 4, 5, 12:b:1, 2 (<u>S. paratyphi</u> B)
4, 12:-:-	1, 4, 12:b:1, 2 (<u>S. paratyphi</u> B)
4, 12:-:-	1, 4, 5, 12:e, h:1, 2 (<u>S. st. paul</u>)
4, 12:-:-	1, 4, 12:e, h:1, 2 (<u>S. st. paul</u>)
4, 12:-:-	1, 4, 5, 12:-:- (<u>S. ?</u>)
4, 12:-:-	4, 5, 12:-:- (<u>S. ?</u>)
4, 12:-:-	1, 4, 12:-:- (<u>S. ?</u>)
4, 12:-:-	4, 12:e, h:12 (<u>S. ?</u>)

The first seven transductants were isolated from embryonated eggs and the last *in vitro*. The first two transductants 1, 4, 5, 12:b:1, 2 and 1, 4, 12:b:1, 2 were S. paratyphi B, the second two 1, 4, 5, 12:e, h:1, 2 and 1, 4, 12:e, h:1, 2 were S. saint-paul and the remaining four were unnamed serotypes. It will be noted that four of the transductants had somatic antigen 5 although the recipient lacked it.

When phage P22 grown on S. budapest (1, 4, 12:g, t:-) acted on the same non-motile strain of S. paratyphi B, transductants with four different antigenic formulae were isolated (Table 2).

Table 2. Transductants obtained with phage P22 grown on S. budapest (1, 4, 12:g, t:-) and a non-motile strain of S. paratyphi B (4, 12:-:-)

Recipient	Resultant
4, 12:-:-	1, 4, 12:b:1, 2 (<u>S. paratyphi</u> B)
4, 12:-:-	1, 4, 12:g, t:- (<u>S. budapest</u>)
4, 12:-:-	1, 4, 12:g, t:1, 2 (<u>S. ?</u>)
4, 12:-:-	4, 12:g, t:- (<u>S. ?</u>)

BACTERIOLOGICAL NOMENCLATURE AND TAXONOMY

The transductions were done in mice. The first resultant organism (1, 4, 12:b:1, 2) was S. paratyphi B, the second (1, 4, 12:g, t:-) was S. budapest and the remaining two organisms 1, 4, 12:g, t:1, 2 and 4, 12:g, t:- were unnamed serotypes.

DISCUSSION

It so happens that three of the transductants isolated from embryonated eggs and mice are known to occur naturally and hence are called S. paratyphi B, S. saint-paul and S. budapest. The two motile organisms with antigenic formulae 1, 4, 12:g, t:1, 2 and 4, 12:g, t:-, although isolated from mice, must be classified as unknown serotypes as these organisms have not been found under natural conditions.

Lederberg and Edwards (1953) and Edwards, Davis and Cherry (1955) by performing transduction in vitro isolated several unknown serotypes. They suggested that phages might be responsible for the appearance of new serotypes. The transductants obtained by the writer were isolated in vivo and therefore give more support to the idea that phages can effect serological changes under natural conditions. It is hard to believe that the seven different salmonellae isolated by Juenker (1957) from one man were all originally swallowed by him. May not phage action, at least in part, be responsible for the fifty or thereby new salmonellae added each year to a genus which even now numbers some 700 types? Where is this to end? Taking into consideration the somatic and flagellar antigens so far described there is opportunity, by permutation and combination for over 10,000 types. Would it not be better to adhere to the recommendation of the Enterobacteriaceae Subcommittee (Report, 1954) and to identify all new serological types by formulae only? The only additional suggestion would be that figures should be substituted for letters in denoting the groups in order to avoid running out of alphabet. Kauffmann (1958) subdivided salmonellae according to the somatic antigens. After group Z, the groups were numbered 49, 50.... S. typhi Vi 11 phages are also numbered partly with capital letters and partly with arabic numerals. It would be more convenient to use arabic numerals than two sets of systems.

Commonly occurring salmonellae, such as S. typhi, S. paratyphi B and S. typhimurium, should keep their names, for they appear to have stability and the names give some

information to the clinician, but names such as S. thomasville (once isolated from the rectum of a healthy dog) had better be forgotten. They are of no use to the clinician and the antigenic formula gives the epidemiologist the information he wants. Under the proposed scheme an organism with antigenic formula 1, 4, 5, 12:b:1, 2 would be reported as S. paratyphi B, one with formula 4, 12:e, h:1, 2 as S. group 2 (4, 12:e, h:1, 2). An organism with antigenic formula (3), (15), 34:y:1, 5 (S. thomasville) would be reported simply as S. group 5((3), (15), 34:y:1, 5).

It may be objected that names are easier to remember than antigenic formulae. But the Kauffmann-White list is likely to contain far too many names, many of salmonellae rarely isolated. For clinical, as opposed to epidemiological purposes, the group number would suffice; and for the latter the antigenic formula is essential.

I acknowledge with great pleasure the valuable help Prof. C.P. Beattie gave during the time the transduction experiments were done in vivo.

REFERENCES

- Edwards, P.R., B.R. Davis and W.B. Cherry. 1955. Transfer of antigens by phage lysates with particular reference to the 1, w antigens of salmonella. J. Bact. 70:279.
- Juenker, A.P. 1957. Infections with multiple types of salmonellae. Amer. J. Clin. Path. 27:646.
- Kauffmann, F. 1958. On the biochemical behaviour of new salmonella types. Acta. Path. Microbiol. Scand. 43:175.
- Lederberg, J. and P.R. Edwards. 1953. Serotypic recombination in salmonella. J. Immunol. 71:232.
- Report. 1954. Report by Enterobacteriaceae Subcommittee. Internl. Bull. Bact. Nomen. and Taxon. 4:73.
- Report. 1955. Report by Enterobacteriaceae Subcommittee. Internl. Bull. Bact. Nomen. and Taxon. 5:105.
- Velaudapillai, T. 1960a. Transduction in vivo. Zeit. Hyg. Infektionskrankh. 146:470.
- _____. 1960b. Phage mediated appearance of somatic antigen 5. Ibid. 146:548.