VARIATIONS IN VIBRIO STRAINS.

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This part deals with variations in some vibrio strains. Dissociation of these strains was brought about in artificial media, giving rise to colonies of extremely rough and rugose type. The derived strains had a chemical composition different from that of the parent ones.

A probable hypothesis for these variations has been advanced in the discussion hereinafter.

El Tor Dissociants.—Linton, Mitra and Shrivastava (1934) have shown that El Tor strains fall into a distinct group, which is Group IV of the chemical classification. With a view to bringing about dissociation in El Tor I and El Tor II (Nos. 3657 and 3658 of the National Type collection, London), a number of media was tried, including 10% peptone water, 10% NaCl agar, 5% NaCl agar, gentian violet agar 1 : 50,000 and 1 : 100,000 and phenol agar 1 : 500 and 1 : 800. A certain amount of dissociation took place with all these media, and the best results were obtained from the 10% peptone water. El Tor I and El Tor II (Nos. 3657 and 3658 of the National Type Collection, London), were grown in 10% peptone water over a prolonged period with infrequent subcultures and platings, and from both strains 'medusa-head' colonies were eventually obtained. These were of extremely dry, rugose and poorly growing type. Chemical analysis showed that both variants had altered in structure.

Carrier strain 10405.—This strain, originally isolated from a carrier, was found to belong to Group III. It has shown marked variability in the laboratory and has given rise to three dissociants of different chemical structure to the parent strain. By repeated passages of the original 10405 through mice, Taylor and Ahuja (1935) obtained an agglutinating strain which they designated 10405 T. This strain was found to fall into groups II and III, possessing Protein I and Carbohydrates II and III. It has accordingly mutated in respect to both protein and carbohydrate.

TABLE I.

Strain from	Strain to	Protein from	Protein to	Carbohydrate from	Carbohydrate to	Group from	Group to	Colony from	Colony to
El Tor I	El Tor I R	II	II	I	III	IV	V	Smooth	'Medusa-head'
El Tor II	El Tor II R	II	II	I	III	IV	V	,,	,,
10405	10405 T	II	I	II	II & III	III	II & VI	Slight rough	Smooth
10405	10405 Agg.	II	I	II	III	III	VI	,,	,,
10405	10405 D	II	II	II	III	III	V	,,	'Medusa head'

From the original 10405 two further variants were obtained. The first, 10405 Agg., was derived by repeated subcultures of 10405 in 0·5% glucose broth. After twenty day's continuous subculturing the strain was streaked, a smooth colony picked and found

agglutinable at 1:100. The subculturing was then continued for a further period of about two months when a smooth colony was finally obtained which agglutinated at 1:12,800, and on analysis was found to fall into Group VI.

The second variant, designated 10405 D, was derived, as in the case of the two El Tor variants, from long continued growth in 10% peptone water. In contrast to the smooth agglutinable form just described, it was of the dry rugose type, with 'medusa-head' colonies, and belonged to Group V.

Table I summarises the results obtained.

Discussion.

The changes which have been found in the chemical structures of the vibrios, as outlined above, could result either from the presence in a given strain of all the various components which dissociation reveals, or from actual shifts in the molecular structure of the vibrios.

The first of these hypotheses, namely that many vibrio strains are of mixed character in that they contain organisms of more than one chemical constitution, is the simplest. Subculturing, in this view, is a process whereby one component of a strain is permitted to outgrow the other or others, and which allows the chosen component to be obtained in a condition approaching or reaching purity.

It is possible, however, that even in the instance where complete change of chemical components occurs rapidly, the variation may be due to a change in the fundamental synthetic powers of the organisms.

References.

Linton, R. W. and Mitra, B. N. and Shrivastava, D. L. (1934). Analyses of Vibrio Proteins: Racemization. *Ind. Jour. Med. Res.*, **21**, 749.

Taylor, J. and Ahuja, M. L. (1935). Serological Relationships of certain Vibrios isolated from non-cholera sources in India. *Ibid.*, **23**, 95–119.