DEAMINATION OF AMINO ACIDS BY *VIBRIO CHOLERAE*

STUDY of the enzymic make-up and metabolism of vibrios may throw some light on the pathogenecity of *Vibrio cholerœ* and also the interrelationship, if any, among the various types of vibrios. Very little attention seems to have been paid so far to this aspect. A systematic study of the endo- and exo-cellular enzymes of *Vibrio cholerœ* has therefore been undertaken. Since deamination[1] is the normal metabolic process by which micro-organisms growing in an alkaline environment utilise the amino acids of the medium, the deaminases have been studied first.

Deamination by cholera vibrios was studied by the technique of Stephenson and Gale.[2] Twenty-four-hour growth of the organism on agar slopes (pH 8·0) was harvested with 0·85% sodium chloride solution and, after centrifuging, washed once with saline and re-centrifuged. The residue was suspended in saline and adjusted to a turbidity equivalent of 40% transmission in a Lumetron Model 'A' Photoelectric colorimeter, using Red filter 650 mμ. 1 ml. of suspension was shaken for one hour at 38° C. with 1 ml. of 3 M/250 amino acid and 1 ml. of phosphate buffer of appropriate pH value. The ammonia liberated into the reaction mixture was estimated by direct nesslerization, keeping adequate controls for the turbidity produced by the cells. Results of some typical experiments on a few amino acids are reported as Q_N in the following Table :

TABLE I

Deaminase activity of different strains of vibrios. Activity expressed as Q_N for 1 ml. suspension.*

No.	Organism		Amino acid				
			Aspartic acid pH 8·0	Glycine pH 7·5	Glutamic acid pH 7·5	Lysine pH 7·0	Serine pH 7·0
1	49514	Ogawa	27·2	4·0	..	..	7·3
2	123	,,	16·0	8·0	..	..	34·4
3	122	,,	55·5	12·8	7·5	5·3	27·0
4	132	,,	67·0	12·8	12·2	7·4	23·5
5	52	,,	79·0	9·6	12·2	7·4	20·8
6	49514	Inaba	22·4	2·4	..	..	4·0
7	123	,,	12·4	4·0	..	..	15·2
8	119	,,	34·0	6·4	5·3	3·5	10·6
9	113	,,	44·8	6·4	7·6	5·3	15·0
10	74	,,	54·6	10·6	7·6	5·3	12·3
11	49524	,,	56·5	10·6	6·4	2·1	18·1
12	569B	,,	67·2	5·3	4·3	2·1	12·3

* Q_N = μl of nitrogen calculated from the corresponding ammonia values.

The results (Table I) show that *Vibrio cholerœ* possess deaminases in their enzyme make-up and the rate of deamination varies from amino acid to amino acid and from one strain to another. Among the amino acids studied, arginine, aspartic acid, glycine, glutamic acid, lysine, serine and threonine were deaminated. Aspartic acid and serine showed maximum activity. Activity on alanine, phenylalanine, leucine, histidine, methionine, tyrosine, tryptophane and valine was negligible. Deamination was found to be strictly ærobic as would be expected from the fact that the organism itself is highly ærobic. The optimum pH of action was in the range of 7-8 for the amino acids studied. Various factors influencing the activity of deaminases and the relation of the former to the enzymes responsible for synthesising amino acids in vibrios are under investigation.

The interesting feature observed in these studies was that, in general, the Ogawa subtypes showed higher deaminase activity than the Inabas, and this is clear from the differences between the activities of the Ogawa strains 123 and 49514 and the Inaba sub-types derived from them.[3] This aspect of the change of enzyme activity during the transformation of Ogawa into the Inaba sub-type is under further study.

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