E-Content

entitled

"One gene one enzyme hypothesis"

Principle of "One gene one enzyme hypothesis"

- 1. All biochemical processes in all organisms are under genetic control.
- 2. The overall biochemical processes are resolved into a series of individual step-wise reactions.
- 3. Each single reaction is controlled by a single gene. In other words, in every case a 1: 1 correspondence of gene and biochemical reaction exists.
- 4. Mutation of a single gene results only in an alteration in the ability of the cell to carry out a single primary chemical reaction.

The underlying hypothesis is that each gene controls the reproduction, function and specificity of a particular enzyme as shown below-



Present status of "One gene one enzyme hypothesis"

Beadle and Tatum's original hypothesis has undergone necessary changes in the light of later development in molecular biology.

- According to S. Banzer(1956), the classical gene has three different functions.
- It is called 'muton' when it acts as a unit of mutation. It is called 'recon' when it acts as a unit of recombination and 'cistron' is the functional gene responsible for protein synthesis.
- The gene in Beadle and Tatum's hypothesis refers to the 'cistron' in modern terminology.
- Proteins are very complex molecules having different drgrees of structural complexities.
- A protein may contain more than one polypeptide chains but a cistron is responsible only for a single polypeptide chain and not the whole protein.
- So, at present, Beadle and Tatum's hypothesis is better known as 'one cistron one polypeptide chain'.

But this is not sufficient to find out the relationship between the gene and its function. Some genes do not manufacture any polypeptide chain but determine the base sequence of various tRNA's and rRNA's.

Therefore, "one cistron one polypeptide chain" hypothesis is not universal. "One cistron one function" is perhaps the best statement for Beadle and Tatum's hypothesis.

> Dr. Saumen Chakrabarti Associate Professor Department of Zoology Women's College, Agartala, Tripura, India