9.2: Are Transposons Parasites or Symbionts?

Do the transposable elements confer some selective advantage on the "host"? Or are they merely parasitic or "selfish," existing only to increase the number of copies of the element? This critical issue is a continuing controversy. As just mentioned, certain results of transposition can be detrimental, leading to a loss of function or changes in regulation of the genes at the site of integration after movement. Also, we are starting to appreciate the intimate connection between viruses and transposable elements. Thus one can view many transposable elements as parasites on the genome. The number of transposable elements can expand rapidly in a genome. For instance, it appears that transposable elements making up a majority of the genome of maize are not abundant in the wild parent, teosinte. Thus this massive expansion has occurred since the domestication of corn, roughly within the past 10,000 years.

However, other studies indicate that the presence of transposable elements is beneficial to an organism. Two strains of bacteria, one with a normal number of transposable elements and the other with many fewer, can be grown in competitive conditions. The strain with the higher number of transposable elements has a growth advantage under these conditions. Various proposals have been made as to the nature of that advantage. One intriguing possibility is that the mechanism of transposition affords an opportunity to seal chromosome breaks. Other possible benefits have not been excluded. Thus the relationship between transposable elements and their hosts may be as much symbiotic as parasitic. Resolving these issues is an interesting challenge for future research.

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