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Dr. Francis Crick  
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Dear Francis:

I am sure that you realize how frightfully angry a lot of people will be if you say that much of the DNA is junk. The geneticists will be angry because they think that DNA is sacred. The Darwinian evolutionists will be outraged because they believe every change in DNA that is accepted in evolution is necessarily an adaptive change. To suggest anything else is an insult to the sacred memory of Darwin.

This additive is so pervasive that if no reason can be found for an evolutionary change, it is necessary to invent one. Kimura points out that one author attributed the pink color of flamingos to protective coloration against the setting sun. This type of thinking carries over into people who sequence mRNA. They claim that differences between rabbit and human globin mRNAs are because each species has its own requirements for secondary structure.

Various people have tried to think up possible functions for the regions of DNA that do not code for anything as far as is known. Roy Britten says that such DNA has a regulatory function.

Actually, the scheme proposed by Britten about ten years ago was that occasionally events of saltatory duplication took place, so that a great many copies of a short piece of DNA were made. As time went by, the composition of a family of identical copies became changed by drift, until the copies no longer closely resemble each other. Figure 55 of the article by Britten shows a diagram of a sort of "junk DNA generating system". I note that he says on page 105 "the rate of increase in DNA content per cell resulting from saltatory replication alone may prove to be embarrassingly large and a mechanism for the loss of DNA may have to be invoked". I gather that you agree with this.

I quoted you on drift in DNA in a talk that I gave at the symposium for Emil Smith (see enclosure). Your concept of "junk DNA" presumably includes this idea. I shall look forward to hearing more about it, and I have been asked by Die Naturwissenschaften to write an article on silent changes, so I hope I can include mention of your new manuscript when I start to write mine.

With best regards,

Tom

THOMAS H. JUKES

ENCL.