Letters

For Want of a Word

Dear Editor:

An article in the March 24, 1995, edition of *Science* reports on the discovery of a master gene that governs eye development. The gene or variations of this gene are found in such diverse organisms as insects, mollusks (squid) and mammals (humans). The implications of this discovery are that this master gene must have been established very early in evolution, perhaps as early as 500 million years ago, and was passed to these various groups as they evolved.

It should not be too difficult to accept the analogous idea that genes related to behavior (that increase survival rates) such as aggression, kinship bonding, self preservation, threat displays, etc. also evolved early and are common in many animal groups.

A few weeks ago I let my three-year-old granddaughter out of the car and turned to close the door. She took off across the parking lot into oncoming traffic. Without thinking, I yelled and ran after her, completely oblivious of traffic. It was an interesting reaction, strictly instinctive; an inherited response geared to survival of the species. She was not hurt (and, by chance, neither was I).

In writing a friend, I wanted an adjective to describe how I shared this reaction of protecting close kin with many other species. I wrote, "My reaction was ?; I reacted as many other animals would." I could have used the word *altruistic*, relating my response to the altruistic gene, first proposed by William Hamilton in 1968, but I wanted to encompass a broader idea. My primitive response was linked to behavior commonly shared by many species of many diverse groups. The genes for such basic responses, just like the gene for eye development, must have evolved early in the history of evolution.

Random House Unabridged Dictionary, 2nd ed., offered two words, *atavistic* (atavism) and *zoomorphic* (zoomorphism). *Atavistic* came close, but was off the mark. *Atavism*: 1a) The reappearance in an individual of characteristics of some remote ancestor that have been absent in intervening generations. 1b) An individual embodying such an earlier type; a throwback. *Atavism* emphasizes the unusual or surprising reappearance of ancestral traits, like a human born with a tail or hairiness that completely covers the body.

My reaction was no throwback, no surprise. It was as common as salt.

Neither of the two definitions of zoomorphism were applicable since they refer not to behavioral traits but to resemblances of gods or humans to animal forms.

May I offer a new word, *anthropozooic*; a term relating human to animal. *Anthropozooism*: An inherited human trait or traits thought to be, or accepted as, shared with other animal species (e.g. pair bonding, aggression, territorial defense, etc.). *Anthropozooic* is the best I can come up with. If you can think of a better word, that's great—but we need a new word. So now I can complete my sentence: "My reaction was anthropozooic; I reacted as many other animals would."

Think what this will mean to countless students who get the dreaded comment "anthropomorphic" for daring to attribute human traits to animals in a sentence such as, "The chimpanzee died of grief." Is grief recognized by science as a solely human response? I don't think so. (Neither is depression. Prosac was first tried on monkeys in various stages of depression before it was given to humans.) The student could counter, "Grief is anthropozooic. It is a trait we share with many other animals." Surely it's time that we recognize the work of scientists such as Lorenz, Goodall, Fosse, Wilson and dozens of others who have studied the behavior and social organization of species as diverse as geese, chimpanzees and ants, and found an astonishing number of common traits. Although *anthropomorphic* is a useful word, perhaps it is overused.

We should perhaps spend less time suggesting, rightly or wrongly, that some animal traits approach human characteristics and more time emphasizing the fact that many of our human traits are anthropozooic, having arisen early in evolution and therefore shared with many other animal species.

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Double Helix Clarified

Dear Editor:

My article "The Double Helix Revisited" was just published in *ABT*, March, 1995. I have just discovered an error and hope that you can print a correction.

On page 146, I state that the Noble Prize winning work won the prize in 1954. This is clearly a mistake. The correct year was **1962.**

I apologize for the error. It must have been my oversight.

Thank you.

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More on Meiosis

Dear Editor:

I was delighted to see John Stencel's article, "A String & Paper Game of Meiosis That Promotes Thinking" in *The American Biology Teacher* (January 1995). For the past five years I have been using almost the same technique as Stencel with my students, except that recently I have discovered an even easier method that demonstrates meiosis and its consequences more clearly. Most students are easily confused when they cannot physically demonstrate the exchange of a single gene (a segment of a DNA molecule) during the process of crossing-over, by simply using strips of paper, as shown in Stencel's article (and as I did in the past). Crossing-over is the process through which the reciprocal exchange of corresponding segments of genetic material between two homologous non-sister chromatids takes place. The result is rearrangement of genes. My solution was to use various lengths of different-colored, thin clothesline, and insert them into different lengths of colorless straw. This method of demonstrating meiosis (including crossing-over, independent assortment and their consequences) is vividly observable and easy for students to understand, and it also makes the process of teaching this complex topic much easier. (The following is a brief summary of my method, which will be published in its entirety in a