CALLING MR. MENDEL

By Helen Meyer

The following letter was written as a cooperative paper by a group of 6th and 7th grade students. It was the culmination of their experience with the GCK program that we had worked with in class for the prior six weeks. It is important to know that the students began and completed the paper during the last week of school, even though they knew that their grades had already been turned in so they were not getting "credit" for their paper. It may also be useful for you to think back to the dynamics of boy-girl relationships in middle school and then consider that these students wrote the paper after school hours at the home of one of the group members.

I would like you to know these few simple facts so that you will understand some of the excitement that my students and I experienced last spring while we worked with GCK. I was the middle school science teacher at The Eagle School of Madison, in Madison Wisconsin last year. My 6/7th-grade class used GCK to study genetics. I do not want to say simple genetics because most of the student groups by the end were grappling with multiple allele and/or linkages problems; problems that are usually considered beyond the scope of high school let alone junior high students!

In order to fully introduce the paper I would like to briefly share some of the gains made by my students, their parents, and myself. My students enjoyed the freedom to work at their own pace in the class room with no consideration for the amount of time spent on any particular type of problem and only their own self or group assessment for when they understood enough to move on. They demonstrated their enjoyment by doing research outside of school, staying in during lunch periods to struggle with a particular problem, completing extra (not extra credit) assignments at home and by 3/4 of the class completing their letter to Mr. Mendel only because they thought it was important!

During the time period that we worked with GCK I had more parents come in and speak to me about their kid's work than in the pervious two years I was at the school. One of the parents exclaimed to me that, "every dinner conversation that we have revolves around genetics and *Jurassic Park."* (Reading *Jurassic Park* was one of the extra assignments.) Other parents told me how impressed they were with what their children knew and how willingly and well they could explain what it was that they were learning.

What I enjoyed most as a teacher was the opportunity to learn about my students. All but one of the students I had taught for almost two full years and for some it was like meeting them for the first time. I could take time to watch and talk with individuals about how they were thinking about the problems and the types of questions they were generating. In my most struggling students I was given a chance to see how they learned and thought about science. And it became clear to me that their struggling was not with the science but with my structuring of it.

The success that I felt and my students felt was extraordinary and the results that were achieved were equal to that. Now I would like to share a sample letter to Mendel with you.

==========Sixth Grade Letter==========

Andy Sattler
Julie Bulgrin
John Meyers
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Madison, WI

Dear Mr. Mendel,

We have been studying your life's works. We respect all that you have done in the field of inheritance. We are also amazed that you could know so much about inheritance long before anyone knew about chromosomes and genes. Your theories about dominant and recessive characteristics which you discovered in plants we now know also hold true in all living things that have inheritance.

However, not everything fits your laws. You developed your law by studying plants. But also in plants inheritance is not always a matter of simply dominant and recessive. For example, red snapdragons crossed with white snapdragons yield not only red and white snapdragons but also pink snapdragons which is intermediate between red and white. Consequently, we call this intermediate inheritance.

Another example of intermediate inheritance involves chickens. We know that as a scientist you were interested in many things besides plants; but did you know that in a certain strain of chickens, a black chicken mating with a white chicken gives all blue chicks? A cross between these blue chickens will then give black, blue and white chickens in the ratio of 1 : 2 : 1. This is different than simply dominant : recessive, wouldn't you say?

A third example of a type of intermediate inheritance that does not strictly follow from your theory is the " three trait problems" we have studied in class. For example, we were given the following:

We have *Bobbed, Cut, Rotated*
The *Bobbed* has a rr genotype.
The *Cut* has a RR genotype.
The *Rotated* has a Rr genotype.

When we bred as rotated and a rotated, we could get:

By your laws there are three different genotypes and only two obvious phenotypes. However, there are actually three different phenotypic traits inherited: bobbed, rotated, and cut in the ratio of 1 : 2 : 1. You couldn't have known some of these things, even with the advances in inheritance you made. The genotype of plants make science even more complicated but much more accurate.

One more example of a variation from your strict dominant and recessive laws are sex-linked characteristics. In our modern times, the inheritance factors you spoke about are called genes which are small parts of a chromosome. There are many genes which occur on the X-chromosome but not on the Y chromosome. Hence, in the male, all sex-linked characteristics are inherited from only the mother. Two well-known examples of these sex-linked characteristics are red-green color blindness and hemophilia. Men who are red-green colorblind inherit this trait from their mothers who are not colorblind but carry the gene for this trait.

One final point Mr. Mendel. The environment did not have anything to do with the way you looked. It was all in the genes you inherited from your parents. If you were raised by someone else not your parents, you would still look like your parents in some ways and not like the people who raised you.