

### "How the Gay Gene(s) Might Work" in Question

**Dear Editor:**

As the principal investigator for the BSCS module *Genes, Environment, and Human Behavior*, I was pleased to see the publication cited in your May 2000 issue, in the article on sexual orientation by Ron Good, Mark Hafner, and Patsye Peebles, and in the accompanying editorial by Dr. Good. Both pieces highlight the need to address the biological basis of human behavior for high school students and to convey the complex and as yet unknown interactions between genes (actually, their protein products) and numerous environmental variables.

The authors' treatment, however, does not comport with the heading "How the Gay Gene(s) Might Work," which appears on page 327 of their article. The clear message of modern genetics is that locutions such as "gay genes" are misleading, as are statements about "aggression genes," "intelligence genes," or even "genes for" single-gene disor-

ders such as cystic fibrosis or sickle cell disease. Genes can do little by themselves. They encode protein products, which mediate complex physiological processes that contribute to the broad range of traits that we see as phenotypes. Continued use of terms such as "gay genes" conveys a deterministic view of human genetics that never was accurate and that will become even less tenable as the Human Genome Project identifies multiple genetic variations associated with a broad range of human traits. Research in proteomics, which will probe the complex interactions of the related proteins with one another and with environmental factors, likely will provide further evidence that deterministic language is misleading.

Although I no longer can speak as a BSCS staff member, I do know that BSCS developed the behavior module to help teachers and students expand their views of genetics beyond single-gene traits (most of which are disor-

ders) to encompass common, complex traits. Study of the latter category represents the trajectory of human genetics, and especially of genetic medicine. We chose the biological basis of behavior (one of the original BSCS themes) because we knew it would interest students and teachers and because it demonstrates the challenges that one faces when trying to explain complex characters.

The genetics community faces those challenges right along with science educators. Interested readers can find an emerging framework for thinking about the genetics of common, complex disease at [www.fgec.org](http://www.fgec.org). The same site incorporates aspects of that model in brief pieces for the public on the genetics of bipolar disorder and schizophrenia, disorders of special importance to young adults.

I have no doubt that BSCS will continue to provide leadership in this area for biology teachers. Meanwhile, all of

**Biology & Chemistry**

**4 years**  
**44 programs**  
[www.cyber-ed.com](http://www.cyber-ed.com)

**CYBER ED®**  
Future Education Today

**Free Previews**  
**Network Versions**  
**Windows and Macintosh**

us should beware the use of phrases such as "gay genes," lest messages such as those Drs. Good, Hafner, and Peebles want to convey be undone by a sound bite.

Joseph D. McInerney, Director  
Foundation for Genetic Education &  
Counseling  
Baltimore, MD 21231

**Dear Editor:**

The authors of the paper, "Scientific Understanding of Sexual Orientation: Implications for Science Education" make a case for teaching homosexuality in the biology classroom. I agree with the authors that this topic makes for interesting social and bioethical discussions in the classroom but I found that their approach to teaching this topic in the science classroom appeared to be driven more by a social agenda than teaching "good" science. For instance the authors mention a gay gene but do not discuss how it was discovered or describe its chromosomal location. Furthermore, the authors miss an opportunity to discuss the relationship between homosexuality and reproduction. Reproduction is one of the defining characteristics of life and much time is spent in the biology classroom on this topic, yet homosexuality appears to be a "dead-end" with respect to reproduction. The authors could have raised some interesting questions

about how homosexuality could affect the reproductive capacity of populations or possibly promote extinction of a subpopulation.

The authors mention a few publications regarding the physiology of homosexuality. However some of these studies have been discredited and many have been found to be fraught with error (Byne 1994; Garland 1993; Gay Genes. . . 1995). For instance, in one study the scientist measured brain regions of homosexual cadavers. How can you determine scientifically if a cadaver is homosexual? Could the arbitrary grouping of cadavers affect the interpretation of the brain size measurements? Consideration of how a scientist would set up such an experiment could promote an interesting discussion concerning the scientific method, yet the authors do not mention anything about how these studies were done. Since the authors are only providing partial information on this topic it appears that they are trying to avoid the controversy or hide an agenda.

The authors mention the teen suicide rate among homosexuals, but it is not clear what this has to do with the biological basis of homosexuality. In addition, the claim of a higher suicide rate among teens appears to be unfounded. One Yale researcher even doubts there is a connection (Byne 1994; Garland 1993). Why did the authors not mention the controversy?

Would that not make for a more open and stimulating discussion in the classroom? The authors also try to validate human homosexuality by highlighting the fact that it occurs among various animal species. They infer from these observations that because it is "natural" it therefore should be accepted. However, infanticide, fratricide, incest, cannibalism, and harmful aggressive sexual behavior are found in nature yet we do not consider these "natural" behaviors as acceptable human behaviors. Why weren't these other natural tendencies mentioned and compared and contrasted with homosexuality? Why did the authors not promote a framework for how students could determine what is acceptable and unacceptable behavior?

In my opinion, the proposals in this paper are based on incomplete science and partial information and appear to be influenced by the desire to promote a pro-homosexual socio-political agenda. Is this how this topic should be presented in a science classroom?

Joseph W. Francis  
Cedarville College  
Cedarville, OH 45314

Byne, W. (1994). The Biological Evidence Challenged. *Scientific American*, (May).

Garland, A. (1993) Adolescent Suicide Prevention. *American Psychologist*, (February).

Gay genes revisited: Doubts arise over research on the biology of homosexuality. (1995). *Scientific American*, (November), p. 26.

**The Authors respond:**

The letter by Joseph McInerney supports the need to address the biological basis of human behavior for high school students, the focus of our May 2000 article, but he cautions against the use of terms such as "gay gene" because they convey a "deterministic" view of human genetics. We agree that the *interaction* of biology and environment should be emphasized as the basis of human behavior and that terms which might oversimplify should be avoided. However, in the case of traits that have a large heritability factor, such as sexual orientation and handedness, it is important to understand that nature plays a large role in influencing a person's behavior. Whether the number of genes involved is small or large,

Visit NABT's Website  
[www.nabt.org](http://www.nabt.org)

Keep up with the latest NABT news by visiting us on the Web. You'll learn about publications, conventions, meetings, grant projects, awards and volunteer opportunities – plus obtain free activities and more!

if the trait is associated with high heritability it implies the role of nature is large and the role of nurture is correspondingly less. Clearly we are just at the beginning of a new frontier of genetic understanding with the prospect of being able to better determine the role that genes play in influencing physical and behavioral characteristics. Biology teachers should always be aware of possible misconceptions and emphasize that inheritance is seldom "simple", but involves interaction among many factors.

The letter by Joseph Francis criticizes us for, among other things, trying to "promote a pro-homosexual socio-political agenda" in a science classroom. The main purpose of our paper is stated clearly on p. 328: "The main purpose of this paper is to encourage more discussion among biology teachers and others of what has been known by many scientists for some time—the origins of sexual orientation are biological." We did not promote any particular approach to teaching behavioral genetics/sexual orientation in high school biology; instead we encouraged teachers to consider how they want to approach this important

topic with their students. The BSCS module *Genes, Environment, and Human Behavior* was identified as a good source of ideas as were other articles, books, and videos. We did state our hope that "If more people understood that homosexuality is as natural as left-handedness, it is likely that the climate of fear and hate that is fostered by ignorance would be reduced considerably with a corresponding reduction in the negative feelings that lead some homosexuals to commit suicide" (p. 329). Perhaps this is what Francis was referring to when he accused us of trying to promote a pro-homosexual socio-political agenda.

Francis argues that certain of the studies cited in our paper (as support for a genetic component of homosexuality) "have been discredited" or are "fraught with error." The references he cites suggest otherwise. For example, the articles by Byne (1994) and Horgan (1995) point out possible methodological and analytical flaws in previous research on the biology of homosexuality, but they stop far short of discrediting these works. In fact, Byne considers the biological basis of sexual orientation to be a given, and states

that "the salient question about biology and sexual orientation is not whether biology is involved but how it is involved" (Byne, 1994:50). Similarly, the Garland and Zigler (1993) article that Francis cites as evidence of a dubious link between teen suicide and homosexuality contains the following statement, "The humiliation and frustration suffered by some adolescents struggling with conflicts over their sexual orientation may precipitate suicidal behavior. . . , although there is considerable debate over whether homosexuality is a risk factor for suicide (Garland & Zigler, 1993:173).

To repeat: we do not (as Francis claims) "make a case for teaching homosexuality in the classroom," but we recommend including the topic of sexual orientation in any discussion of the biological basis of human behavior. Francis makes a valid point in noting that many so-called "natural" human behaviors (by which we mean behaviors that are wholly or partially genetic-based) may not be acceptable behaviors in human society. Therefore, no amount of scientific evidence showing a genetic component to sexual orientation will ever be sufficient to validate any particular orientation, including homosexual behavior. Validation of a behavior is a societal decision, and a discussion of ways in which human societies reach such decisions seems to belong more in a social studies class than in a biology class. However, scientific evidence documenting a genetic component to sexual orientation is important information for students in biology classes to know, and it may influence how they perceive sexual orientations branded by many as "unnatural." The leadership taken by BSCS in producing *Genes, Environment, and Human Behavior* is commendable and we hope teachers take advantage of this excellent resource as they introduce more behavioral genetics information into the high school biology curriculum.

Sincerely,

Ron Good  
Professor of Science Education  
Louisiana State University

Mark Hafner  
Professor of Biology  
LSU

Patsye Peebles  
Instructor of Biology  
LSU Lab School

# Basic Skills start here...

Introduce your students to the Winkler Titration Method used in the LaMotte Dissolved Oxygen kit and help develop these skills:

- Analytical Technique
- Experimental Design
- Data Interpretation
- Scientific Method
- Observation
- Monitoring



**LaMotte**

PO Box 329 • Chestertown • Maryland • 21622  
800-344-3100 • 410-778-3100 • f 410-778-6394 • www.lamotte.com