



The Nucleus

*Official Quarterly Newsletter of the
Texas Association of Biology Teachers*

Volume 17, Issue I

Spring, 2004

President's Message:

February, the month of valentines and presidents, brought an unexpected valentine to a new president.

I wasn't expecting to become the president of TABT until 2005, but due to health concerns Dan Wivagg stepped down, and the valentine arrived early. Actively working with and for TABT over the past fifteen or so years has been a labor of love. Being a student of biology is a passion that I've shared with students for thirty years. I am humbled to represent you as president and eager to serve the organization.

However, this is not a task I can do alone. In addition to the officer team of Robert Dennison, past president, and Jane Delaney, secretary-treasurer, Alton Biggs serves as presidential appointee. Alton will also continue to maintain our membership rolls and keep us connected on a weekly basis through the email TABT update and URL of the week. Dan Wivagg has agreed to continue on the TABT board as an "ex officio" member this year and to serve his term as past president next year.

We also need your participation and input. I am seeking members to serve on various committees, so if you are interested in contributing to the functioning of your organization, please contact me.

Last summer we had our first TABT summer drive-in conference. This is event is one I would like to see

us sponsor again.

What are your hopes for TABT? What is your vision or need? Please share your thoughts with me at agordontx@sbcglobal.net.

Anita Gordon



TABT Thanks Debbie Richards

TABT Secreatry/Treasurer 1994-2003

On behalf of TABT, Robert Dennison thanked Debbie Richards for her important service and stewardship as TABT Secretary/Treasurer. We're giving Debbie a well-deserved break, but we hope to have her serve in another capacity in the near future.

THANKS TO OUR SPONSORS!

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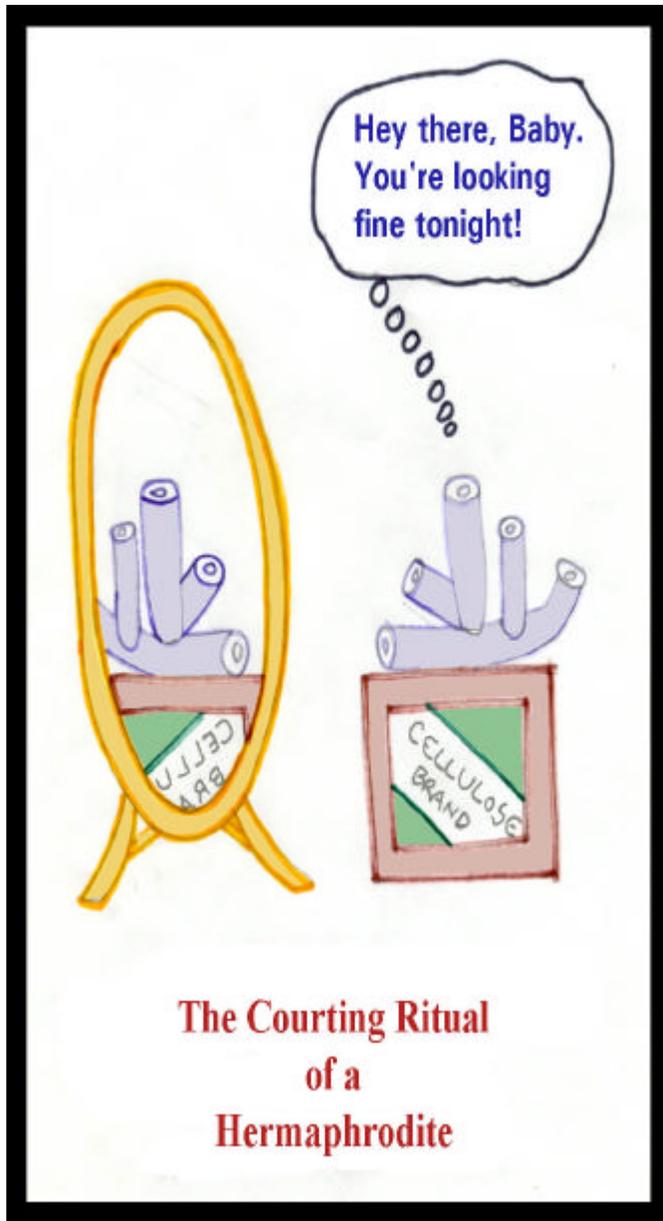
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You are reminded to check your label to see if your dues are approaching their expiration. All members are highly encouraged to submit an E-mail address. Members with E-mail addresses receive notice of publication of The Nucleus via E-mail. You can then download and print your own copy, or you can read your copy directly from the TABT Web site. In addition, Members who have E-mail addresses receive a weekly update of information important to biology teachers and a URL that may be useful for you and your students.



Student-drawn cartoons often illustrate a student's ability to make novel connections. The cartoon at left was created by Ashley Wilson, when she was a sophomore at Allen High School. Ashley indicated that she was intrigued by the idea of sexual reproduction among the hermaphrodites. She then made connections between her knowledge of the internal and external anatomy of a hermaphroditic sponge, the misconception that cellulose sponges come from the animals instead of merely having similar openings in "The Courting Ritual of a Hermaphrodite" to complete this assignment for Alton Biggs.

Alton suggests that you give your students an assignment to draw an original cartoon that illustrates something they've learned during their time in your class. From the results he had over the years, he says he doesn't think you'll be disappointed with the creative results of your students.

Did You Know?

The percentage of Africa that is wilderness is 28% while the percentage of North America that is wilderness is 38%

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Digital Microscopy Professional Development Program

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- Continuing Professional Education credit available in some states!
- Digital Microscopy Forum
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What Teachers Say About Our Workshop:

"The Digital Microscopy workshop was incredibly informative, practical, and fun. Much of the workshop was hands-on, and I found that to be the most valuable experience. Many workshops are informative, but then you get back to your class and have no experience on how to work the instruments, or how to apply them to your lessons. Science Kit did it all!!! Thanks Science Kit!"

-Melanie G. Hayward, Apopka High School, Apopka FL.

"It was the best workshop that I have ever attended!"

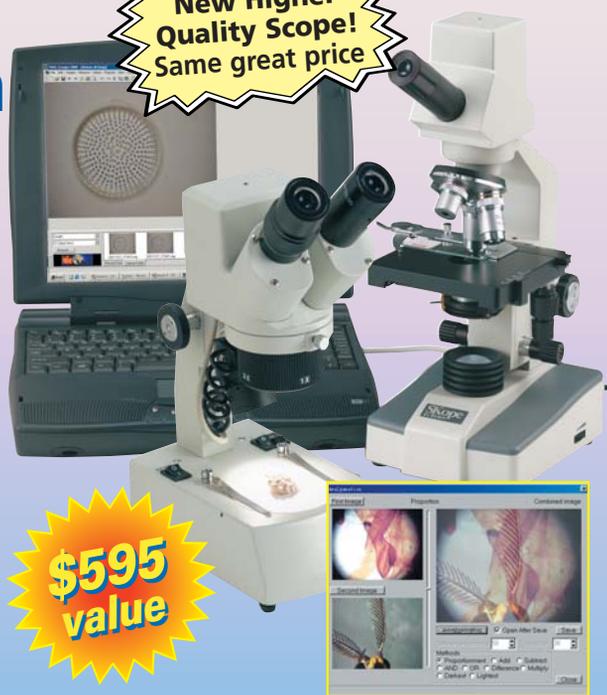
-Michelle Dumais Grady, Tolland High School, Tolland CT.

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2004

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CA	San Diego*	10/22	NY	White Plains	12/3
CA	San Francisco*	8/13	OH	Cincinnati	8/13
CT	Norwalk	5/21	OH	Cleveland	4/23
FL	Orlando*	3/27	OH	Columbus	10/1
GA	Atlanta	7/23	OK	Oklahoma City*	10/8
IA	Iowa City*	5/7	PA	Philadelphia	6/29
IL	Rockford	3/5	PA	Pittsburgh	11/5
IN	Indianapolis*	11/12	RI	Providence*	7/21
MD	Baltimore	7/7	TN	Knoxville	10/9
MI	Detroit	7/7	TX	Amarillo*	2/27
MN	Minneapolis	4/30	TX	Austin	6/8
MO	Columbia	2/7	TX	Dallas	6/16
MO	St. Louis	10/1	TX	Houston	12/3
MS	Jackson	10/29	VA	Newport News*	4/23
NJ	Parsippany*	3/19	WA	Seattle	3/5
NV	Las Vegas*	10/29	WI	Madison	11/12

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Introducing Digital Microscopy Into Your Classroom (K-12 Professional Development Opportunity)

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This workshop is eligible for funding from a variety of sources including: Federal Title II Part A, Federal Title II Part D, National Challenge Grants for Technology in Education, Individuals with Disabilities Education Act of 1997, Local and State Professional Development and Technology Funding Initiatives

All Participants will receive: A complimentary Boreal Digital Microscope with computer imaging software, a copy of the Boreal Digital Microscope manual, lesson plans & activities, instructional materials, instruction on how to both use a digital microscope and integrate it into their curriculum.

Who Should Attend: K-12 Science Teachers, Science Department Chairs, Supervisors, Curriculum Directors, Technology Specialists, and district level science administrators.

Fee: \$900 payable by check, purchase order, or credit card. Make checks payable to Science Kit.

Where and When to attend: A complete schedule of dates and locations can be found on the reverse side of this flyer or on our website at www.sciencekit.com

How to Register: Please mail or fax this registration form, along with payment to Science Kit & Boreal Laboratories Attn: Customer Service, 777 East Park Drive, Tonawanda, NY 14151-5003.

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Registration Form:

To register please mail/fax this form to Science Kit (Attn: Customer Service), call 800-828-7777, or visit us at www.sciencekit.com

Teachers rate this workshop
4.8 out of 5!

Name _____ School _____

Primary Course of Instruction _____ Workshop Location and date _____

Attendee's School Address _____

School Phone Number _____ - _____ - _____ Contact email address _____
(for order confirmation and updates)

Home Phone Number _____ - _____ - _____
(optional, for notification purposes)

Method of Payment: Credit Card P.O.
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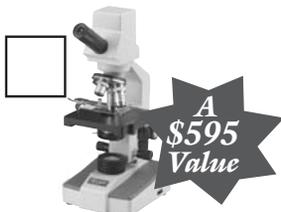
Workshop Preference: AM PM

AM Session: 8 to Noon **PM Session:** 1 to 5 (Registration is 30 minutes prior)

Digital Microscopy Professional Development Program Price: \$900

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Dr. John Charles, a cardiovascular physiologist from NASA, was the speaker for the TABT Luncheon. His presentation, "Human Exploration of Mars: Romance to Reality", considered the rigors of traveling and surviving in deep space for a 30-month journey to Mars. The longest amount of time spent in space to date is 14 months by a Russian cosmonaut. Due to planetary orbits, astronauts would have to stay on Mars for two years before a return flight would be possible. Simple radio communication would have a 3-minute to 22-minute delay between transmissions. Logistical issues must be well planned.

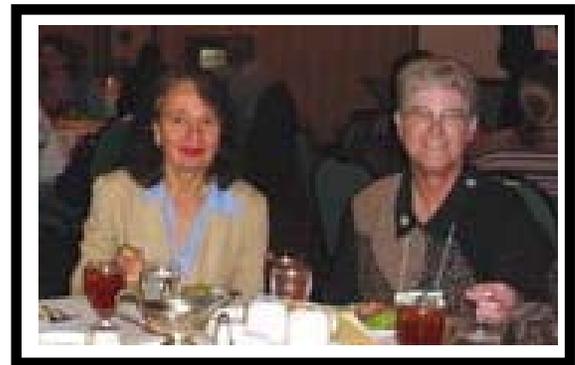
Lengthy travel time has been proven to have deleterious effects. A new field of study, bioastronautics, researches the health and physiologic issues related to space flight. Previous flights have demonstrated that time in space causes a loss in bone density of about 1% per month. Extended flights would put astronauts at risk for bone fractures, particularly dangerous in an environment with limited access to health care and medical equipment.

In addition to physical issues, extended flight can also produce an ailment commonly called "space stupid" where response time and reasoning ability are affected. This condition is a normal reaction to space flight, not a disease process.

Dr. Charles' presentation was visually stunning, provocative, and very enjoyable. You should make plans to attend the next TABT luncheon at CAST 2004. You never know what interesting information you'll come away with - not to mention the wonderful door prizes!



Joe Restivo (TABT president 1994 and 1995) Keith Watson (TABT president 2002), and Sue Watson prepare to enjoy the TABT Luncheon. Keith was honored as the NABT Outstanding Biology Teacher of the Year and elected TABT Honorary Member.



Irene Pickhard, Assistant Science Director, gave a TEA Update. Deborah Mims (right) served on the state's biology textbook committee.



Dan Wivagg, TABT President Elect, Robert Dennison, TABT President, and Dr. John Charles, TABT Luncheon Speaker



Anita Gordon was elected TABT President Elect for 2004 and Jane Delaney was elected TABT Secretary/Treasurer for 2004-2005.

The Hardy-Weinberg Theorem & Teddy Grahams

by Kathy Bodner, J. J. Pearce High School, Richardson ISD



Introduction: Charles Darwin’s unique contribution to biology was not that he “discovered evolution” but, rather, that he proposed a mechanism for evolutionary change- natural selection, the differential survival and reproduction of individuals in a population. In *On the Origin of Species*, published in 1859, Darwin described natural selection and provided abundant evidence in support of evolution, the change in populations over time. However, at the turn of the century, geneticists and naturalists still disagreed about the role of selection and the important of small variations in natural populations. How could these variations provide a selective advantage that would result in evolutionary change? It was not until evolution and genetics became reconciled with the advent of population genetics that natural selection became widely accepted.

Ayala (1982) defines evolution as “changes in the genetic constitution of populations.” A population is defined as a group of organisms of the same species that occur in the same area and interbreed or share a common gene pool, all the alleles at all gene loci of all individuals in the population. The population is considered to be the basic unit of evolution. Populations evolve, not individuals.

In 1908, English mathematician G.H. Hardy and German physician W. Weinberg independently developed models of population genetics that showed that the process of heredity by itself did not affect the genetic structure of a population. The Hardy-Weinberg theorem states that the:

*frequencies of alleles in the population will remain the same regardless of the starting frequencies.

Furthermore, the equilibrium genotypic frequencies will be established after one generation of random mating. In this scheme, if **A** and **a** are alleles for a particular gene locus and each diploid individual has two such loci, then **p** can be designated as the frequency of the **A** allele and **q** as the frequency of the **a** allele. Thus, in a population of 100 individuals (each with two loci) in which 40% of the alleles are **A**, **p** would be 0.40. The rest of the alleles (60%) would be **a**, and **q** would equal 0.60 (i.e., $p+q = 1.0$). These are referred to as allele frequencies. The frequency of the possible diploid combinations of these alleles (**AA**, **Aa**, and **aa**) is expressed as:

$$p^2 + 2pq + q^2 = 1$$

This theorem is valid only if certain conditions are met:

- The population is very large. (The effect of chance on changes in allele frequencies is hereby greatly reduced).
- Matings are random. (Individuals show no mating preference for a particular phenotype).
- There are no net changes in the gene pool due to mutation. (Mutation from **A** to **a** equals mutation from **a** to **A**.)
- There is no migration of individuals into and out of the population.
- There is no selection; all genotypes are equal in reproductive success.

Purpose: To study the Hardy Weinberg theorem using Teddy Bear Grahams.

Natural Selection in Teddy Grahams

You are a bear-eating monster. There are two kinds of bears that you like to eat: happy bears and sad bears. You can tell the difference between them by the way they hold their hands. Happy bears hold their hands high in the air, and sad bears hold their hands down low. Happy bears taste sweet and are easy to catch. Sad bears taste bitter, are devious and hard to catch. Because of this you only eat happy bears. The happy trait in bears is caused by the expression of a recessive allele. The homozygous recessive condition is being happy. The sad trait is caused by a dominant allele. New bears are born every year (when they are hibernating in their den, the cardboard box) and the birth rate is one new bear for every old bear left from last year.

Materials: Teddy Bear Grahams, and the lab worksheet.

Procedure:

1. Obtain a population of 10 bears and record the number of happy and sad bears and the total population number. Using the equation for Hardy-Weinberg equilibrium, calculate the frequencies of both the dominant and recessive alleles and the genotypes that are represented in the population.

Example: If 5 of the 10 bears are happy, then 10 out of 20 alleles would be happy alleles. Therefore the q^2 number would be 0.5. You must then determine the q number by taking the square of 0.5.

2. Now, go hunting! Eat 3 happy bears. (If you do not have 3 happy bears then eat the difference in sad bears.)
3. Once you have consumed the bears obtain a new generation from your den (the box). You should only remove 7 additional bears from the den for a total of 14 bears.
4. Repeat the procedures again, be sure to record the number of each type of bear and the total population.

Materials: Teddy Bear Grahams, lab.

Table:

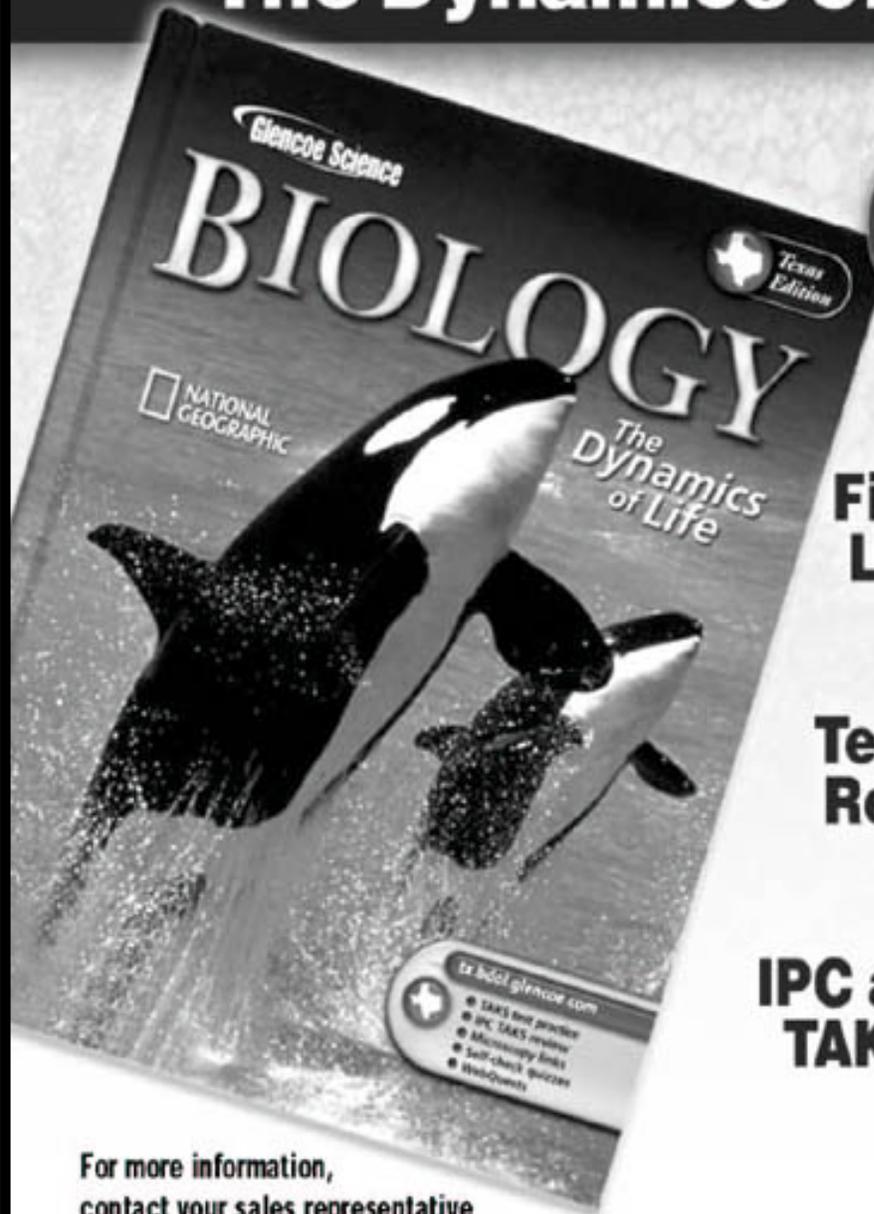
Generations	P^2 (sad)	$2pq$ (sad)	q^2 (happy)	p	q
1. Initial					
2.					
3.					
4.					

Questions:

1. Describe what is happening to the genotype and allele frequencies in the population of Teddy Grahams?
2. What would you expect to happen if you continued the selection process for additional generations?
3. How would the frequencies change if you were to now select for the sad bears?
4. Why doesn't the recessive allele disappear from the population? How is it protected?

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Home Street Address, City, State, Zip: _____

E-mail address (*very important*): _____

Type of membership: Active (\$10) Student (\$5) Retired (\$5) Life (\$250)

Please complete the following to assure balanced representation in planning TABT activities

1. Professional Class (**Check one only**)

Biology Teacher Department Chairman Curator/Interpreter
 Supervisor/Administrator Teacher Training Student
 Other _____

2. Male Female (**OPTIONAL**)

3. Have you ever received the OBTA? No Yes If yes, what year? _____

4. Number of years teaching? _____

5. Organizational Class (**Check one only**)

Elementary Middle/Junior High Secondary College/University Zoo/Aquarium
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6. Special Interests (**Check no more than 2**)

Cellular/Molecular Botany/Plant Science Laboratory Science Reproduction/Evolution Zoology
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7. I am also a member of (**Check all that apply**): National Association of Biology Teachers (NABT)

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