



The Nucleus

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Texas Association of Biology Teachers*

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President's Message:

Twenty years ago, Reagan was president, a postage stamp was 22 cents, there were 60 million fewer internet domains than there are today, and a brand new biology teacher's group was formed in the state of Texas. On October 24, 1985, a group of some 60 science teachers, in a meeting led by Alton Biggs, established the Texas Association of Biology Teachers (TABT) to address the needs of life science and biology teachers in the state. Since its beginning twenty years ago, TABT's membership has grown to a current, thriving, membership roster of more than 475 members.

During the twenty years since TABT's inception, the typical biology teacher's classroom has certainly changed a great deal. In 1985 there was a single Apple MacIntosh computer in my classroom and when I called something a "floppy" disk, I meant it literally. The IBM computer in the office downstairs operated under MS-dos commands, since 1985 was the year that Windows I was released. The year TABT was born there were 6 registered internet domains and I had not visited a single one of those sites. None of the students in my 1985 classroom carried a cell phone probably because "back then" a cell phone weighed 30 ounces and cost more than \$3,000.

Now, in 2006 I can send an email to all TABT members with one click of a mouse. I can navigate my way to the TABT website in a matter of seconds. I can access an electronic archive of past editions of TABT's publication, *The Nucleus*, and download an entire edition at will. In fact, most of you reading this are doing so on an electronic copy. Although there have been times when I have been almost overwhelmed by the rapid expansion of technology, I am compelled to embrace the potential power to educate that rests at my finger tips.

I welcome the opportunity to serve as president as TABT celebrates twenty years as an organized body of educators. As technology-rich 2006 unfolds, Anita Gordon will serve as past-president, Jennifer Jordan will be our president-elect and Kristin Martin will be filling the secretary/treasurer position. Alton Biggs will continue to send out the *TABT Update* and *URL of the Week*. Robert Dennison will continue as our Outstanding Biology Teacher Awards (OBTA) director. Joe Stanaland has graciously agreed to come on board as editor of *The Nucleus* and several of you have committed to serve on the standing committees.

If you are new to the profession and have always owned a computer or if you have been teaching since TABT was an infant group and computers had green screens, I encourage you to become involved in our organization. Collectively, we are more talented and capable than any one of us alone. There are several opportunities to become involved. For example, there are positions on long range planning, publications, election, and nominations committees that need to be filled. Additionally, you can become involved by submitting articles or activities for publication in *The Nucleus*. If you enjoy organizing events, you can become involved by helping plan our summer drive-in conference. Those who like sharing ideas can become involved by agreeing to present as part of the TABT strand at CAST in the fall.

As TABT looks back over 20 years of success, we look ahead to the next 20 years with eager anticipation. Change is coming, no doubt. Who knows, twenty years from now Scotty may really be able to "beam me up."

Debbie Richards, TABT president

Genetics Using Fictitious Organisms

David Allard

The basic principles of genetics are important concepts for students to understand. Students will face many issues that will involve knowledge gained from genetics. These issues include cloning and genetic engineering.

According to the Texas Essential Knowledge and Skills (TEKS), students should begin to become familiar with concepts of genetics as early as grade 3 (*TEKS Grade 3 (10) Science concepts. The student knows that many likenesses between offspring and parents are inherited from the parents. The student is expected to: (A) identify some inherited traits of plants; and (B) identify some inherited traits of animals*). The TEKS in higher grades include more complex genetics concepts. The high school biology TEKS, for example, include concepts that are taught in this activity [(6c) *compare genetic variations observed in plants and animals* and (6e) *compare the processes of mitosis and meiosis and their significance to sexual and asexual reproduction*] among others.

Many of the more abstract concepts of genetics are difficult for concrete learners to understand. One of the most effective ways that I have found to teach some of these concepts is by the use of simulated organisms called Reebops (Soderberg, 1992). Concepts such as alleles, dominance, codominance, genotype, phenotype, meiosis, segregation, independent assortment and ratios are easily taught with this activity. Punnett Squares and mutation could be added.

Materials to make Reebops are prepared beforehand and placed in plastic bags for students. Make antennae from yellow toothpicks broken in small pieces. Eyes can be made from green toothpicks broken into two or three pieces. Blue and red toothpicks can be used for legs. Break toothpicks into two pieces. The nose can be made from miniature marshmallows. You need red (or pink), orange and yellow miniature marshmallows. Use green miniature marshmallows for the humps. Make tails from chenille stems cut into about ten cm lengths. For curly tails wrap them around a pencil. Body segments are regular marshmallows and plain toothpicks are connectors. The chromosome master can be xeroxed onto pink paper for maternal and blue paper for paternal chromosomes and then cut into separate chromosomes. You can make four sets of chromosomes from the master. Place a set of maternal and paternal chromosomes into envelopes. You should consider the worksheet that follows as a suggestion for what you might do with Reebops in your classroom. When you enhance it, please notify the author of your modifications so that they may be incorporated in future versions.

Reference

Soderberg, P., "Marshmallow Meiosis," *The Science Teacher*, 59:8 (1992), pages 28-31.



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REEBOP Genetics

1. Work with a partner and obtain an envelope with paper “chromosomes” in it.
2. One student takes pink (maternal) chromosomes and the other blue (paternal) chromosomes.
3. Place chromosomes face down on the table so you cannot see the letters. Keep the sets separated by color.
4. Arrange the chromosomes by length.
5. Choose one chromosome of each length of each color and place it in a new “baby” pile. Do this for the pink and blue chromosomes.
6. Return the remaining chromosomes to the envelope.
7. Use the key to determine what your baby REEBOP will look like.
8. Get a plastic bag with materials to construct your REEBOP baby. Your teacher will have instructions about the items, and what each represents.
9. On the table below list your REEBOP’s “secret code” and appearance based on that code.

Characteristic	Genotype	Phenotype	Code (Genotypes)	Appearance (Phenotype)
Body segments	DD or Dd	3 body segments		
	Dd	2 body segments		
Antenna	AA	1 antenna		
	Aa	2 antennae		
	Aa	No antennae		
Hump	MM	1 green hump		
	Mm	2 green humps		
	Mm	3 green humps		
Nose	QQ	Red Nose		
	Qq	Orange Nose		
	qq	Yellow Nose		
Tail	TT or Tt	Curly Tail		
	Tt	Straight Tail		
Eyes	EE or Ee	2 eyes		
	Ee	3 eyes		
Legs	LL or Ll	Blue Legs		
	Ll	Red Legs		

10. Look at the other “babies” in the class as they are presented at the nursery. How many others are exactly like yours?
11. What do you think is the reason for the situation in question 10?
12. On the table below, compile data for the total number of REEBOPS in your class having each appearance or characteristic.

Characteristic	Number of Reebops with Characteristic	Percentage with Characteristic
1 antenna = AA		
2 antennae = Aa		
No antennae = aa		
1 green hump = MM		
2 green humps = Mm		
3 green humps = mm		
Red nose = QQ		
Orange nose = Qq		
Yellow nose = qq		
Curly tail = TT <i>or</i> Tt		
Straight tail = tt		
2 eyes = EE <i>or</i> Ee		
3 eyes = ee		
Blue legs = LL <i>or</i> Ll		
Red legs = ll		
2 body segments = dd		
3 body segments = DD <i>or</i> Dd		

13. What is the ratio for each trait? Show on the table above. (As an example, suppose a class of 25 students finds 6 with one antenna, 12 with two antennae, and 7 with no antennae. The ratios would be: 1 antenna = $6/25 = .24 = 24\%$; 2 antennae = $12/25 = .48 = 48\%$; and No antennae = $7/25 = .28 = 28\%$.)
14. What are the ratios for the other traits or characteristics? Are they different from the previous ones? If so, can you offer an explanation?
15. If data are available from other classes, calculate the ratios when combined with your data. Do they follow the same pattern?

A	a	L	l	T	t	M	m	w	W	ƚ	J	l	T										
		Q	q							E	e												
										D	d												
												p	D			e	E	b	Q	a	A		
A	a	Q	q	E	e	D	d																
																		p	D	e	E		
																T	t					b	Q
		L	l							ƚ	J	l	T	a	A								



Texas Association of Biology Teachers
c/o Alton Biggs, Computer Records Clerk
1002 Madera Court
Allen, Texas 75013-3639



Membership Application (Please Print All Information)

Name: _____ Telephone: (____) _____

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**)

- | | | |
|---|--|--|
| <input type="checkbox"/> Biology Teacher | <input type="checkbox"/> Department Chairman | <input type="checkbox"/> Curator/Interpreter |
| <input type="checkbox"/> Supervisor/Administrator | <input type="checkbox"/> Teacher Training | <input type="checkbox"/> Student |
| <input type="checkbox"/> 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
 Business/Institution Other _____

6. Special Interests (**Check no more than 2**)

- Cellular/Molecular Botany/Plant Science Laboratory Science Reproduction/Evolution Zoology
 Computer Instruction Environmental Biology Teaching Materials Other _____

7. I am also a member of (**Check all that apply**): National Association of Biology Teachers (NABT)

National Science Teachers Association (NSTA) Science Teacher Association of Texas (STAT)

Please send membership application and dues to: Alton L. Biggs, TABT Records Clerk
 1002 Madera Court, Allen, TX 75013-3639

Make all checks payable to: Texas Association of Biology Teachers