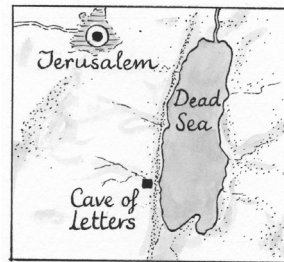


Ancient Refuge in the Holy Land

PROGRAM OVERVIEW

NOVA explores a remote Judean cave where ancient Jews sought refuge nearly 2,000 years ago.



The program:

- travels to the Southern Israel desert with a team of archeologists who are trying to learn more about the people who inhabited the Cave of Letters.
- chronicles a 1960–61 expedition to the cave, when Israeli archeologist Yigael Yadin theorized the cave had been inhabited by refugees from the Second Jewish Revolt against the Roman Empire in 132 A.D.
- describes how Yadin discovered the letters of Jewish rebel leader Simeon Bar-Kokhba and the personal documents of a Jewish woman named Babatha.
- shows how archeologists on a second expedition, led by Richard Freund, use ground penetrating radar, endoscopy, and electrical resistivity tomography to see beneath cave floor rubble.
- reviews details about the first and second Jewish revolts.
- examines Freund's controversial theory that the cave was initially occupied during the First Jewish Revolt in 66 A.D. and that the artifacts Yadin found were objects rescued from the sacred Temple in Jerusalem.
- conveys doubts from other archeologists regarding Freund's theory, claiming that there is no evidence in the cave of objects older than 135 A.D.
- presents Freund's counterargument to this claim, based on inferences from radiocarbon dating of the letters found in the cave, which suggest that some objects were older than 135 A.D.

Taping Rights: Can be used up to one year after the program is taped off the air.

BEFORE WATCHING

- 1 Ask students to imagine that they are living in 2055. If they were excavating an American dwelling unchanged from 2005, what types of objects would they be likely to find that might provide evidence about the culture of the time? (E.g., cars, appliances, TVs, DVDs.) What would they expect to find at a site where a culture existed without running water, electricity, or automobiles?
- 2 Ask students what types of items they would need to bring into a cave if they were planning to hide there for a long time. What would be the best way to store food? How would they dispose of waste products? What would they do for entertainment?
- 3 Organize students into two groups. As students watch, have one group record the technologies used to explore the cave and the other group record the items found.

AFTER WATCHING

- 1 Have a volunteer from each group share its group's list. What were the technologies used to explore the cave? (Ground-penetrating radar, endoscopy, electrical resistivity tomography.) How does each technology work? What items did archeologists find in the cave? Which items were found with which technologies? Which items were found through non-technical means?
- 2 Scientists used carbon-14 dating to analyze the age of a piece of rope found in the cave. Have students research how carbon-14 dating works and write a one-page summary of the process. Ask students to include the maximum age that can be determined using this technique.

CLASSROOM ACTIVITY

Objective

To learn how the International Phonetic Alphabet is used to communicate the sounds of words in different languages.

Materials for each team

- copy of the “Sound Communication” student handout
- copy of the “Forming Sounds” student handout
- copy of the “IPA Symbols and Sounds” student handout

Procedure

- 1 The parchments discovered in the Judean Desert’s Cave of Letters were written in two languages, Aramaic and Greek. Scientists who study language, known as linguists, can communicate about different languages using the International Phonetic Alphabet (IPA), a set of symbols that provides a universal way to communicate the sounds of words. In this activity, students will learn some of the symbols and sounds of the IPA.
- 2 Write the following words on the board and ask students to pronounce them:

- *jolly* (pronounced: jöll'e)
- *jai alai* (pronounced: hī' lī')
- *San Juan* (pronounced: sǎn wǎn')

Students might try to pronounce some or all of the J words with a hard “j” sound. Note to students that this demonstrates that the same letter can sound differently both within—and among—different languages. Using the IPA, linguists can communicate with each other about language based on the approximate sounds of words.

- 3 Organize students into teams and provide each team with a set of handouts.
- 4 Tell students that humans are able to speak, in part, because they have evolved the anatomy to verbalize words. Review with students the parts of the vocal tract diagram on the “Forming Sounds” handout. To help students understand how some sounds are formed, have them pronounce the consonants and vowels listed on the handout that includes the vocal tract illustration (note that this only represents a few of the consonants and vowels in the IPA). Tell students many other sounds are created using different parts of the oral cavity. For a full tutorial on these sounds, have students visit the International Phonetic Alphabet for Teens Web site at www.tulane.edu/~ling/IPA_for_Teens/

STANDARDS CONNECTIONS

The “Sound Communication” activity aligns with the following National Science Education Standards.

GRADES 5–8
Science Standard C:

Life Science

Diversity and adaptation of organisms

- Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

GRADES 9–12
Science Standard C:

Life Science

Biological evolution

- Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.

*Video is not required
for this activity.*

Classroom Activity Author

Developed by WGBH Educational Outreach staff.

CLASSROOM ACTIVITY (CONT.)

- 5 Once students have investigated how some consonants are formed, have them work in their teams to review the chart on their “IPA Symbols and Sounds” handout. Have students speak the sample words to hear the sound represented by each symbol.
- 6 After students have studied the chart, have them attempt to decode some of the words into English and then encode some English words using the IPA. Finally, have them try to encode the sentences using the IPA. Remind them to add a stress mark (ˈ) before the stressed syllable for words with more than one syllable and to add slash marks (/) at the beginning and end of words or sentences. Help them decode words they are having trouble with. Make sure students are concentrating on sounds, not on how the words might be pronounced based on how they are spelled.
- 7 To conclude the lesson, discuss with students why it is important to study language, including ancient languages. What can be learned by studying a culture’s language? (Language provides an important way to communicate. Studying a culture’s language can shed light on how traditions get passed down and how ideas are exchanged. How languages are formed and used also helps scientists better understand brain cognition.)
- 8 As an extension, have students research how languages evolved and how many languages are currently spoken worldwide. Find an interactive U.S. Census-based map that shows the density of U.S. speakers of 37 languages and language groups at www.mla.org/census_main

ACTIVITY ANSWER

The IPA is based on the Roman alphabet. The IPA used in this activity pertains to Standard American English sounds; other language-specific IPAs contain symbols not used in the American English IPA. Although dictionary transcription symbols may be similar to IPA symbols, dictionaries often develop their own pronunciation systems.

Student Chart Answers

IPA Word	English Translation	English Word	IPA Phonetic Transcription
1. 'ʌntɪl	until	1. bath	bæθ
2. 'mʌŋki	monkey	2. CD	'sɪdi
3. mit	meat	3. young	jʌŋ
4. 'bækpæk	backpack	4. got	gɒt
5. jɛs	yes	5. them	ðɛm
6. 'tʃɛkbʊk	checkbook	6. chilling	'tʃɪlɪŋ
7. ðʌd	thud	7. monthly	'mʌnθli
8. ə'nʌf	enough	8. poach	pəʊtʃ

Sentences:

Is this chicken or fish?

/ɪz ðɪs 'tʃɪkən ər fɪʃ?/

To be or not to be? That is the question.

/tu bi ər nɒt tu bi? ðæt ɪz ðə 'kwɛstʃən./

Quick, Robin. To the Batmobile!

/kwɪk 'rəʊbɪn. tu ðə 'bætməbɪl/

When translating words using the IPA, students may have trouble getting the correct symbols for the words *bath* and *them*. If this is the case, point out to students that the “th” sound in *bath* is pronounced with the breath only, while the voice is used to pronounce the “th” sound in *them*.

Students may also have trouble differentiating /ə/ from /ʌ/, which sound similar. The difference is that the /ə/, known as a schwa, is used when the all parts of the vocal system—tongue, lips, etc—are relaxed (schwa means rest), while the /ʌ/ involves slightly raising just the center of the tongue. In addition, the schwa often occurs in unstressed syllables, while the /ʌ/ occurs only in stressed syllables. The /ʌ/ is basically a more forceful version of the schwa. The schwa appears frequently in the English language; some students may recall seeing it in dictionaries. Some additional examples that contain the /ə/ are the, Russia, and procession.

Capitalization should not be used because a capital letter could potentially be mistaken for a different IPA sound. Punctuation, however, is fine.

LINKS AND BOOKS

Links

NOVA Web Site—Ancient Refuge in the Holy Land

www.pbs.org/nova/scrolls/

Find articles, interviews, interactive activities, and resources in this companion Web site to the program.

Cave of Letters Map

www.uwec.edu/col/sub_pages/map.html

Shows a map of each chamber of the cave.

How Language Works

www.indiana.edu/~hlw/Introduction/intro.html

Presents an introduction to the study of linguistics and considers the meaning of words and how they are formed.

IPA Project

multiweb.lib.calpoly.edu/medialib/ipa/ipap.html

Links to English, German, French, and Spanish phonetic alphabets, and provides recordings of sounds and sounds in words.

Linguists

www3.ccps.virginia.edu/career_prospects/briefs/k-o/linguists.html

Learn about what a career in linguistics involves, including some of the discipline’s subspecialties.

Book

Freund, Richard A.

Secrets of the Cave of Letters: Rediscovering a Dead Sea Mystery.

Amherst, NY: Humanity Books, 2004.

Reviews the history of the Cave of Letters, including the story of the woman named Babatha, whose cache of letters was found in the cave.

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Sound Communication

Linguists study diverse languages. In order to transcribe the speech sounds of the world's many languages, linguists have developed a standardized alphabet known as the International Phonetic Alphabet, or IPA. Each symbol in this alphabet represents a different sound. See if you can decode some words using some of the IPA symbols.

Procedure

- 1 As a class, you will review how some consonants shown on this page are formed in your vocal tract.
- 2 In your team, review how some of the consonants are formed using the information on your "Forming Sounds" student handout.
- 3 Next, review symbols and their accompanying sounds. Sound out each of the sample words listed with each symbol until you feel comfortable that you understand the sound each symbol represents.
- 4 Once you have studied the chart, try some decoding. See if you can translate the IPA words in the chart below. When you are translating, you might want to write down the sound for each symbol in the word and then try to sound the word out.
- 5 When you have finished, try transcribing some words using the IPA. It might help to write down the sounds each word is composed of and then look for the corresponding sounds in the sample words in the IPA chart to find the symbols those sounds represent.
- 6 Once you are done with the words, translate the sentences from English using the IPA.

Sentences:

Is this chicken or fish?

To be or not to be? That is the question.

Quick, Robin. To the Batmobile!

Questions

Write your answers on a separate sheet of paper.

- 1 Why would linguists need to have a common language?
- 2 Why is it important study languages?

IPA Word	English Translation	English Word	IPA Phonetic Transcription
1. 'ʌntɪ		1. bath	
2. 'mʌŋki		2. CD	
3. mit		3. young	
4. 'bækpæk		4. got	
5. jɛs		5. them	
6. 'tʃɛkbʊk		6. chilling	
7. ðʌd		7. monthly	
8. ə'nʌf		8. poach	

Forming Sounds

The different sounds that you make are formed by using different parts of your oral cavity, which is the airway, especially above the vocal cords (larynx), that is used to produce speech. The vocal tract includes the pharynx, mouth, and nasal cavity.

The consonants are formed by just using your breath or by using your breath and your voice together. Try forming these consonants:

/t/ Place your tongue up against the alveolar ridge at the top of your mouth, just behind your front teeth. Keep your lips and teeth slightly open. Now expel a breath and let your tongue drop down.

/d/ Form your mouth in the same position as for the “t” sound, but this time when you expel your breath, add your voice.

/p/ Close your lips, keep your teeth slightly parted, let your tongue rest naturally, and then expel a breath.

/b/ Form your mouth the same way you did for the “p” sound but now add your voice.

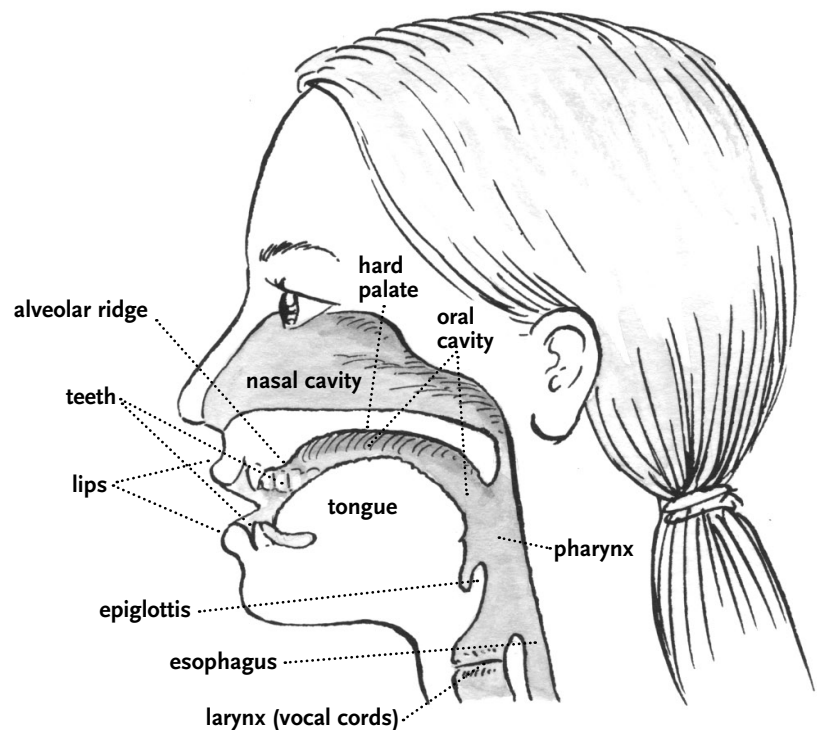
The vowels are also formed in the front, central, and back parts of the mouth, with the tongue being in different states of relaxation. First say the word listed below with each vowel, and then try to say the vowel alone to see what shapes your mouth forms. Then try saying the different vowels one after the other to better see how your mouth changes with the vocalization of each vowel.

/ɪ/ bit: Mouth is slightly open and tongue is relaxed.

/i/ beet: Lips are drawn back and mouth is slightly closed; tongue is tensed.

/æ/ bat: Mouth is slightly open, jaw drops down.

/ʌ/ but: Jaw drops down, tongue is relaxed.



IPA Symbols and Sounds

The following chart shows some of the International Phonetic Alphabet symbols and sounds they represent. Use it to decode the words found on your “Sound Communication” handout. The underlined portion of the word represents the part of the word where the symbol’s sound is heard. This chart only represents most, but not all, of the Standard American English IPA sounds.

CONSONANTS							
IPA Symbol		Sample Words		IPA Symbol		Sample Words	
Voiced	b	<u>b</u> est, skatebo <u>ar</u> d, cl <u>u</u> b	Voiceless	p	pa <u>in</u> ful, po <u>p</u> qu <u>i</u> z, sto <u>p</u>		
	d	<u>d</u> ream, e <u>d</u> it, ki <u>d</u>		t	ta <u>r</u> dy, la <u>t</u> e, la <u>s</u> t		
	g	<u>g</u> et, a <u>g</u> ar, ta <u>g</u>		k	lo <u>ck</u> er, ba <u>s</u> ketba <u>ll</u> , st <u>r</u> eak		
	v	<u>v</u> ery, o <u>v</u> er, o <u>f</u>		f	<u>f</u> riend, go <u>p</u> her, tou <u>gh</u>		
	ð	<u>th</u> ere, o <u>th</u> er, smoo <u>th</u>		θ	<u>th</u> ought, e <u>th</u> er, pa <u>th</u>		
	z	<u>z</u> one, la <u>s</u> er, ga <u>m</u> es		s	<u>s</u> inger, ce <u>l</u> ebri <u>t</u> y, bli <u>s</u> s		
	ʒ	treas <u>u</u> re, leis <u>u</u> re, colla <u>g</u> e		ʃ	<u>sh</u> iny, prec <u>i</u> ous, a <u>sh</u>		
	dʒ	<u>g</u> iraffe, a <u>g</u> ile, <u>j</u> olly		tʃ	<u>ch</u> ild, na <u>t</u> ure, it <u>ch</u>		
	l	<u>l</u> istserv, b <u>l</u> og, coo <u>l</u>		h	<u>h</u> ide, a <u>h</u> a, coh <u>o</u> rt		
	m	<u>m</u> otion, lim <u>ber</u> , swi <u>m</u>		VOWELS			
	n	<u>n</u> othing, empt <u>in</u> ess, <u>n</u> ada		i	pe <u>ek</u> , bea <u>t</u> , me <u>ek</u>		
	ŋ	ba <u>nk</u> , ea <u>r</u> ning, ba <u>ng</u>		ɪ	pi <u>t</u> , ki <u>ck</u> , si <u>t</u>		
	r	<u>r</u> ight, <u>w</u> rong, a <u>r</u> ena		e	wa <u>it</u> , ba <u>k</u> e, ta <u>k</u> e		
	j	<u>y</u> ell, be <u>y</u> ond, <u>y</u> ep		ɛ	be <u>d</u> , pe <u>t</u> , me <u>t</u>		
w	<u>w</u> ater, qui <u>et</u> , awa <u>k</u> e	æ	pa <u>d</u> , ba <u>t</u> , sa <u>t</u>				
		Voiced	ɑ	do <u>t</u> , po <u>t</u> , fa <u>th</u> er			
			ʊ	to <u>ok</u> , go <u>od</u> , pu <u>t</u>			
			u	bo <u>o</u> , mo <u>o</u> , du <u>e</u>			
			o	fl <u>oa</u> t, mo <u>a</u> t, bro <u>k</u> e			
			ə	o <u>f</u> , ide <u>a</u> , a <u>b</u> out			
			ʌ	tu <u>ck</u> , cu <u>p</u> , hu <u>b</u>			

Translation Tips

- The word using the IPA symbols may not be the same length or look like the traditional English spelling of the word.
Example: *Photograph* is transcribed as /fotogræf/
- As you translate each word, remember that although some IPA symbols resemble English letters, they are not pronounced in the same way. Make sure to use the sound associated with the IPA symbol listed in this key.
Example: The phonetic word *cast* is actually pronounced “cost”
- Letters that are not pronounced are not transcribed.
Example: *Note* is transcribed as /not/
- Some sounds are made with the breath only; others are made by adding your voice.
Example: In *pike*, the “p” is created using only your breath; in *bike* the “b” sound is created by adding your voice.
- An apostrophe symbol (') indicates where a word with more than one syllable should be stressed when spoken. The stress mark should appear before the stressed syllable.
Example: *Classroom* is transcribed /'klæsrum/.
- Slashes are used to indicate that the characters contained within them are IPA characters.
Example: *Take* is transcribed /'tek/.