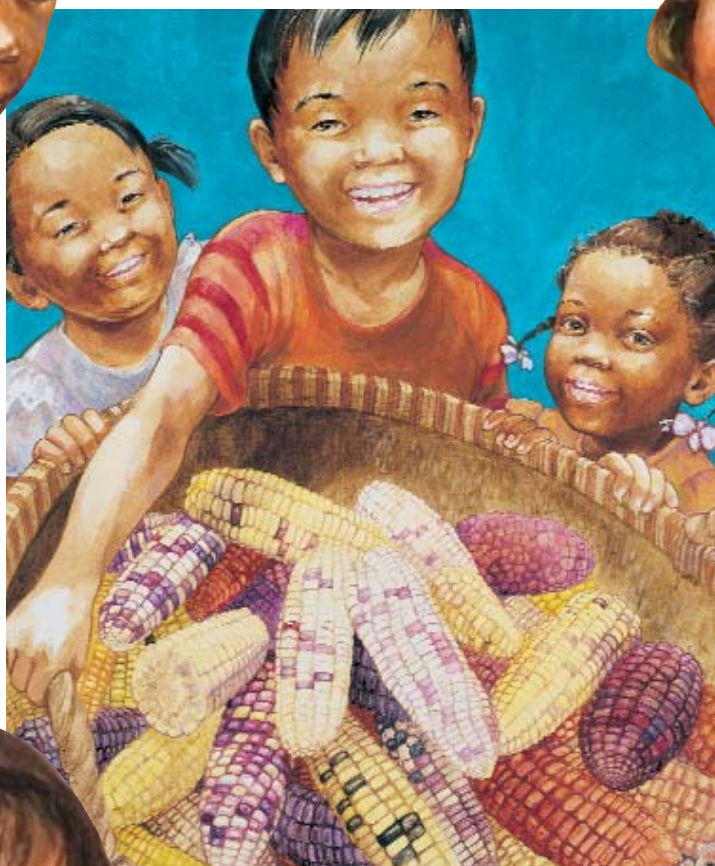




Geneflow *Junior*



How many kinds
of maize can you
count in this
picture?



Why do
we need
so many
different
kinds?



For the answer,
see inside!

Jennifer Northway

Why are plants important?

* If there were no plants, there would be no life on Earth.

* Plants help clean the air by removing carbon dioxide and putting oxygen back into it.

* Plants give us food to eat.

* Plants provide people with a way to earn a living from forests and fields.

* Many of the medicines you take when you are sick have ingredients that come from plants. And billions of people around the world use plants directly as medicines.

* We use plants for shelter and clothing.

* Animals eat plants and use them as shelter and as protection from other animals.

* Plants affect the temperature, climate and soil, help prevent floods and hold back the deserts.

* Plants can be beautiful.





LEARN ABOUT THE PLANTS NEAR YOUR HOME

Try to find at least three interesting plants that grow near where you live. It's more fun if you choose plants that you don't already know. Be sure to ask the farmer or landowner for permission first if you want to cut the plants and take them home.



Draw a picture of each of the plants you have chosen and try to answer these questions:

How would you describe the place where you found the plant?

Was it wet? Dry? Sunny? Shady?

How would you describe the plant? What does it look like?

How does it feel? Rough? Smooth?

Can you guess how the plant is used?

Ask your parents or your grandparents if they know about the plant and how they would use it.

THE HISTORY OF PLANTS

For many thousands of years, plants have travelled around the world, transported by the wind and the waves, caught in the fur of animals or carried by people journeying to different countries.



Try to find on a map the country or region where each of these plants grew for the first time.

Tomatoes grew first in South America. Explorers brought them back to Europe in the 1500s.

Bananas originally came from Southeast Asia. They were probably the first fruit to be farmed by humans.

Carrots grew in the area of Afghanistan around 3000 years ago and slowly spread to the Mediterranean. The ancient Greeks and Romans knew them well. They used carrot juice to cure stomach problems. The first carrots were white, purple and yellow.

Potatoes originally came from the Andean Mountains of South America, where they were important to the diet of the Inca people.



Plants that you see growing in the fields where you live or in your local markets may have had their start in a far away country.



Wheat got its start in Syria. It is believed to have been cultivated for over 10 000 years.

Many types of **beans** are originally from Mexico. Because they are high in protein, people in some parts of the world often eat beans instead of meat.

Peppers first grew in Central and South America. They were introduced into Europe by the famous explorer Christopher Columbus.

Onions probably originated in Central Asia. In Ancient Egypt, onions symbolized the universe and their images appear on pyramids dating back to 2500 BC.

Pumpkins come from tropical America. Seeds from plants related to the pumpkin have been found in Mexico dating from 7000 to 5500 BC.

Scientists think that **maize** grew first in South America over 10 000 years ago.

PLANT COLLECTORS IN HISTORY



Queen Hatshepsut, who ruled Egypt 3500 years ago, sent a fleet of ships to the Land of Punt near present-day Somalia to collect the resin of the myrrh plant and frankincense trees. These

were used to make fragrant ointments that the Egyptians used for religious purposes and cosmetics.



In 1492, Italian-born explorer **Christopher Columbus** stumbled upon North and South America and the Caribbean Islands while trying to find a new trade route to Asia. The voyages of Columbus had huge consequences for the rest of the world. They inspired many explorers to seek their fortune in the 'New World.' Plants, animals and people began to move between Europe and the Americas, an exchange that is still going on. Potatoes and sweet potatoes, maize, tomatoes, peanuts, cassava, cacao, peppers, tobacco, beans and squashes were completely unknown outside of the Americas before the time of Columbus. Sugar, rice, wheat, bananas, cattle, horses and pigs were brought to the New World from Europe and, from Europe, they spread to other parts of the world. So was disease, against which the native people had no natural immunity. Smallpox alone wiped out millions!

Thomas Jefferson, the third president of the United States, wrote, 'The greatest service which can be rendered any country is to add a useful plant to its culture'. While serving as Minister to France in the 1780s, Jefferson frequently asked for plants from home to be sent to him so that he could impress his European friends with the wealth of the New World species. While he was Secretary of State, in the early 1790s, Jefferson introduced vanilla, tea, tomato and many other plants to the United States. He brought olives from Europe and tried to persuade people in the US to grow them.



Nicolai Vavilov, a plant scientist, was born in Russia at the end of the 19th century. He was one of the first people to understand how the diversity of plants and related wild species could

be used to improve agriculture. Vavilov probably travelled to more places than any other plant collector in history. He crossed five continents between 1916 and 1940 in search of new plant species. In the process, he identified geographic areas—called centres of diversity—where he found the greatest number of different types of plants important for food and agriculture. Vavilov's work helped to improve Soviet agriculture. Later, however, his views conflicted with official Soviet ideas about plant breeding and agriculture and he was arrested in 1940. He died in a labour camp in 1943. Many years later, Vavilov's reputation was restored and today he is recognized as one of the most important of all Russian scientists.



THE TREE OF LIFE

The coconut is called 'The Tree of Life' in many countries because it provides more than 100 separate products, including food, drink, fuel, feed for livestock, fibre and building materials.

Coconut is thought to have grown first in Southeast Asia. It probably arrived in Egypt in the 6th century AD.

The coconut probably got its name from Portuguese explorers in the 15th century. When they found the fruit growing on Indian Ocean islands, the three holes in the coconut reminded them of two eyes and a little round mouth, so they called it coco, which means 'grinning face'.

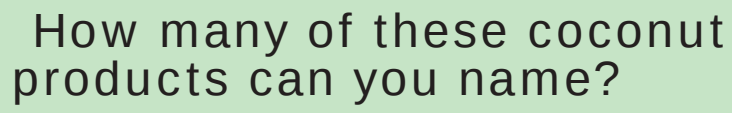
In the Middle Ages, coconuts were so rare and valued in the West that their shells were polished and mounted in gold. By the 19th century, new trade routes and steamships made them common in European markets.

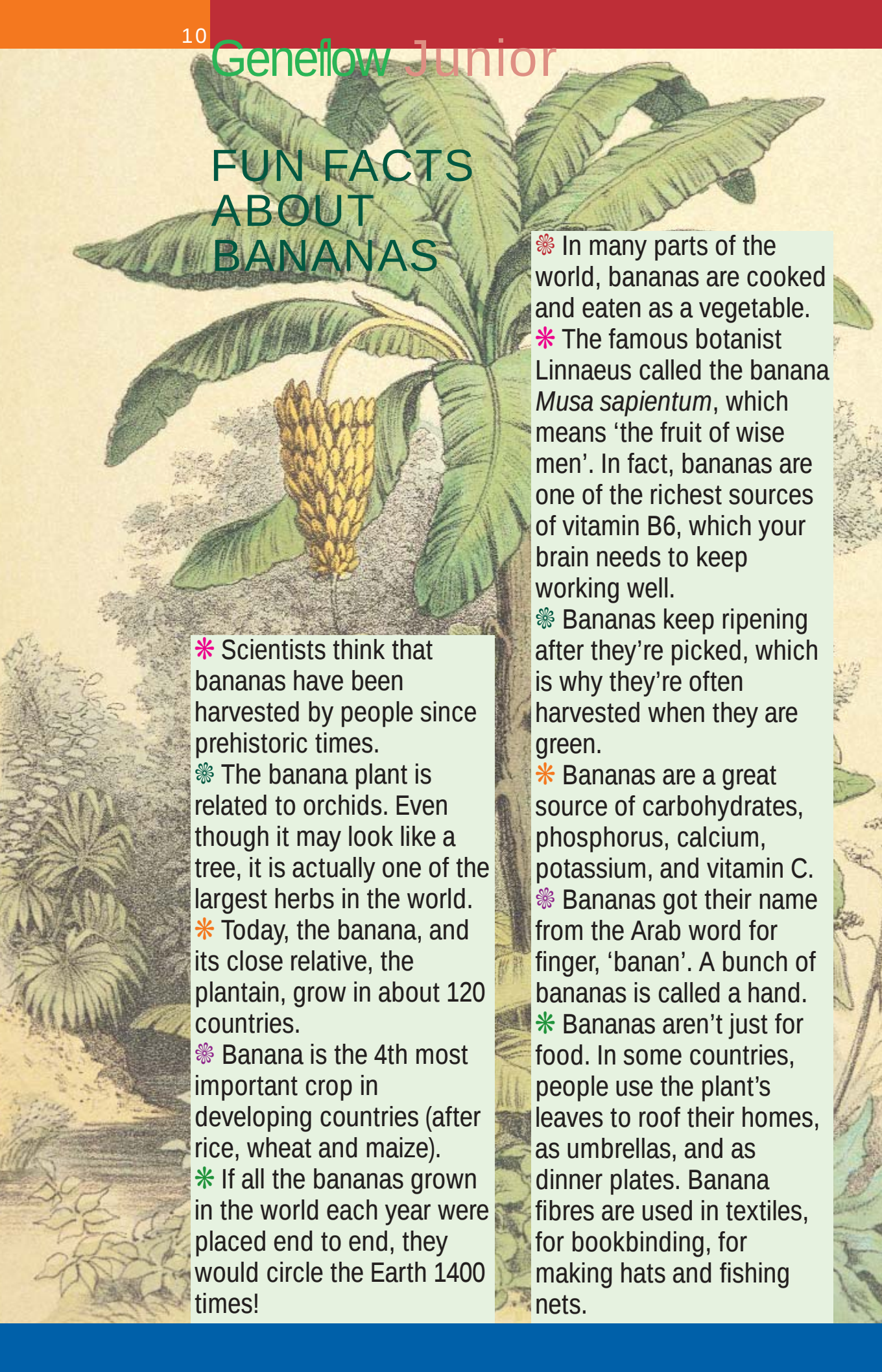
The coconut is part of magic and myth in many tropical countries where it is a very important source of food.

Today, coconuts grow on about 12 million hectares in 90 countries—an area larger than Denmark, Switzerland and the Netherlands combined!

About 50 million people make their living from growing coconuts, and about 30 million of them live in Asia.

96% of the world's coconut crop grows on small plots of less than 4 hectares.





FUN FACTS ABOUT BANANAS

* Scientists think that bananas have been harvested by people since prehistoric times.

* The banana plant is related to orchids. Even though it may look like a tree, it is actually one of the largest herbs in the world.

* Today, the banana, and its close relative, the plantain, grow in about 120 countries.

* Banana is the 4th most important crop in developing countries (after rice, wheat and maize).

* If all the bananas grown in the world each year were placed end to end, they would circle the Earth 1400 times!

* In many parts of the world, bananas are cooked and eaten as a vegetable.

* The famous botanist Linnaeus called the banana *Musa sapientum*, which means 'the fruit of wise men'. In fact, bananas are one of the richest sources of vitamin B6, which your brain needs to keep working well.

* Bananas keep ripening after they're picked, which is why they're often harvested when they are green.

* Bananas are a great source of carbohydrates, phosphorus, calcium, potassium, and vitamin C.

* Bananas got their name from the Arab word for finger, 'banan'. A bunch of bananas is called a hand.

* Bananas aren't just for food. In some countries, people use the plant's leaves to roof their homes, as umbrellas, and as dinner plates. Banana fibres are used in textiles, for bookbinding, for making hats and fishing nets.



**In Costa Rica,
Pedro writes to his
American pen pal
on paper made
from banana
fibres.**

**In Uganda,
Siifa helps her mother
to make a stew for
dinner using plantain and
other vegetables.**



**In the Philippines,
people eat off banana leaves
and use them
as umbrellas too. Armando is
wearing a shirt made from
banana fibre.**

**In Brazil, Carlos
helps his father
cover the roof
of their house with
banana leaves.**



**Jane, who lives
in Australia,
is protecting herself
from the sun with
banana
suntan cream.**



**Fisher folk in
Bangladesh
use nets made
from banana fibre.**



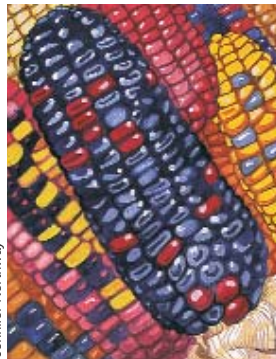
WHAT IS BIODIVERSITY?

Bio means 'life' and diversity means 'variety'. Biodiversity is the variety of life that exists on the Earth.



There are three different kinds of biodiversity:

Diversity of ecosystems. An ecosystem—shorthand for ecological system—consists of all the plants and animals and other living things in a particular area that interact with

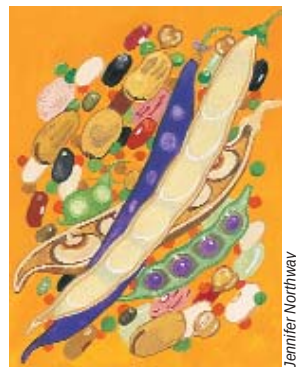


each other and with their environment (weather, soil, air, water, sunlight, minerals and nutrients). Forests, mountains, deserts, oceans and polar regions are examples of different kinds of ecosystems.

Diversity of species. A species is the basic unit that people use to classify living things. All the organisms that belong to the same species share common characteristics and are able to breed with one another. Panda bears, coconuts and people are examples of different species. So far, about 1.4 million species have been

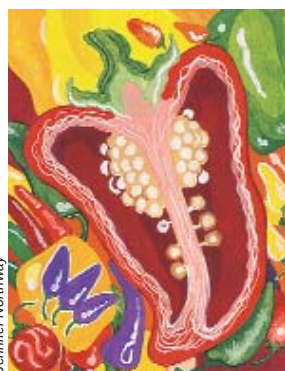


identified and scientists think there may be anywhere from 1 million to 100 million more species to be found.



Jennifer Northway

Diversity of genes. The next time you are with a group of your friends, have a good look at them. You are all people—but you are all



Jennifer Northway

different. It is mostly your genes that determine how you will turn out: genes contain the instructions for the traits, such as hair and eye colour, that you have inherited from your parents. All living things contain genes. Dogs have genes for their tails. Bananas have

genes for the peel around the fruit. If the genes are even a little bit different, a dog might have a straight or a curly tail and a banana might have a thick or thin peel. Look at the picture on the cover of *Geneflow Junior*. All

of the different types of maize you see there (called 'varieties') have different kinds of genes.

Did you know?

The International Rice Research Institute in the Philippines has a collection of more than 90 000 *different* kinds of rice.



WHY DIVERSITY IS IMPORTANT

Diversity is very important to farmers. When farmers grow many different crops, there is a better chance that they will have enough of the right kinds of foods to meet their needs and those of their families.

Diversity of genes (or genetic diversity) is important too. Different varieties of a single crop may have different tastes, may ripen at different times or have different cooking qualities. Some varieties grow well in sandy soils while others need plenty of water. When farmers grow many crop varieties, it is more likely that at least some varieties will survive if the weather is bad or if there is an outbreak of pests and diseases in the area. And farmers can use the different genes in their crop varieties to breed new types that meet their special needs.



**JUST AS THERE ARE DIFFERENT
KINDS OF PEOPLE, THERE ARE
DIFFERENT KINDS OF BEANS...**

AND POTATOES...

AND PEPPERS...

AND EVERYTHING.



Did you know?

Agriculture began about 12 000 years ago when people started to gather seeds from wild plants.

Farming communities in the Andes in South America may use up to 3000 different varieties of potatoes!

In Java, Indonesia, farmers may plant more than 600 crop species in a single home garden

About 30 000 of the world's estimated 300 000 to 500 000 plant species can be

eaten and about 7000 of these have been used by humans for food at one time or another.



Indonesian home garden.
Jennifer Northway.

WHAT IS HAPPENING TO DIVERSITY?

The bad news is that both species and varieties of plants are disappearing...fast! There are lots of reasons why this is happening. Many farmers have stopped growing their traditional crop varieties and are replacing them with just a few modern types. With no one to grow them, the old varieties disappear forever. More and more people are leaving their farms to find jobs in the cities. And forests



where important plants once grew are being cleared out to make room for larger cities and farms and more houses for the world's growing number of people. Millions of hectares of forests are destroyed every year, and with them, entire plant species and varieties within species.

European fruit market.
Jennifer Northway.

Did you know?

In the past 100 years, as much as 75% of the genetic diversity of agricultural crops may have been lost.

In the 1940s, people in China grew nearly 10 000 wheat

varieties. By the 1970s, they were growing only 1000 varieties.

Farmers in India once grew 30 000 rice varieties. Today, 75% of India's rice crop comes from just 10 varieties.

Only 20% of the maize varieties known in Mexico in 1930 can be found there now.

Only 14% of the 7000 apple varieties grown in the US in 1900 are still available.

Today, humans depend on just 30 crops to feed themselves. About 60% of our calories come from just 3 foods: rice, wheat and maize.



Children used to learn a lot about plants from their parents and grandparents. Now, that knowledge is being lost as more and more young people move to the cities.

Jennifer Northway.

collecting

For 40 years, Carlos Ochoa, a Peruvian scientist, has travelled through the Andes looking for new varieties of potatoes. Once, while collecting in the mountains, he ran into a gang of thieves. Ochoa overheard one of them telling the others, 'Take him alive', and realized that he was in danger. He pulled his revolver (necessary equipment for collectors in those days) and fired shots over the gang's head while running toward his truck. The gang rolled boulders down the mountain toward him, but he managed to escape. Another time, in Colombia, he managed to collect a wild potato species and escape down a mountain just before a volcano erupted and destroyed the rest of the plants. Despite frequently difficult working conditions, Ochoa has discovered more than 80 wild and endangered species of potato—almost one-third of the known wild potato species on Earth.



WHAT ARE SCIENTISTS DOING TO PROTECT DIVERSITY?

Scientists are working hard to save what remains of plant diversity. They have set up 'genebanks' all over the world. In a way, these genebanks are like the banks you may know from your town or village because they are used to store and protect something of great value. But you won't find money or jewels in a genebank. Genebanks store seeds and plants, all of them alive!

Conservation in genebanks is called *ex situ* (a Latin term meaning off-site) conservation. Normally, genebanks store seeds, which are dried and kept in big refrigerators to help them last as long as possible. Sometimes plant parts are stored in test tubes or collections of whole plants are grown in special fields.

Scientists and farmers can ask the genebanks for samples of the stored plant material to use in their research and breeding programmes. Genebanks also keep information about all of the traits and

characteristics of the plants, which makes the material much easier to study and use.

Another way to conserve plants is through *in situ* (a Latin term meaning on-site) conservation. This protects plant resources in the places where they originally grow, whether in farmers' fields, in the wild, or in nature reserves. It allows scientists to study the plants in their natural environments. *In situ*, the plants continually evolve as they adapt to changing environments and as farmers select and grow the types that are most useful to them.



Today, there are more than 6 million different samples of plants stored in 1300 genebanks all over the world.

START YOUR OWN SEED COLLECTION!

* Go on a collecting mission in your neighbourhood. Collect as many different kinds of seeds as you can. Collect seeds from the fruits and vegetables that you eat at home. Ask neighbours for permission to collect their seeds.

* Write down everything that you can about the seeds and about the plants they came from. Where did you collect the seeds? What do they look like? Do they have a smell?

* Clean the seeds and spread them on paper in a cool dry room. After several days they should be dry enough to store.

* Place the seeds in airtight jars or plastic containers (like pill bottles). Put each different type of seed in its own jar. Label the jars with the date, where you collected the seeds, and any other important information.

* Put the containers on a shelf in a cool, dry place and arrange them by size or by colour. Check them every few months and throw away any of the seeds that appear to be mouldy. Be sure to keep the lid screwed on tight. If the seeds remain cool and dry, they can live for many years.

* Test the seeds from time to time to see how they are doing. Put them on some blotting paper or newspaper in a dish with a loose fitting lid.

Keep the dish in a warm (not hot) place for a week or two then have a look at them. The seeds that have started to sprout and grow are still alive. When the sprouts get a little bit larger, you can plant them in a pot or in the ground and watch them grow.



WORD SEARCH

AGRICULTURE	ENVIRONMENT	JEFFERSON	TOMATO
BANANA	EX SITU	MOUNTAIN	TRAIT
BEAN	FARMER	NATURE	VAVILOV
BIODIVERSITY	GENE	OLIVE	VEGETABLE
CONSERVATION	GENEFLOW	RAINFOREST	
DESERT	HARVEST	SEED	
ECOSYSTEM	IN SITU	SPECIES	

V	D	S	P	E	C	I	E	S	Y	J	B	Z	E	E
O	B	D	R	B	C	L	I	V	I	I	R	B	R	R
L	A	E	V	I	L	O	E	G	O	N	K	F	U	U
I	N	H	N	N	H	G	S	D	P	T	M	A	T	T
V	A	S	Z	I	E	A	I	Y	N	P	B	R	L	A
A	N	O	I	T	A	V	R	E	S	N	O	C	U	N
V	A	Y	A	T	E	T	M	V	E	T	F	X	C	J
H	C	B	R	R	R	N	N	X	E	I	E	N	I	E
E	L	A	S	E	O	X	S	U	D	S	A	M	R	F
E	I	I	S	R	C	I	T	A	O	E	T	I	G	F
T	T	E	I	K	T	T	U	Z	B	M	E	N	A	E
Y	D	V	J	U	R	E	M	R	A	F	L	S	E	R
R	N	R	A	I	N	F	O	R	E	S	T	I	N	S
E	W	O	L	F	E	N	E	G	U	H	N	T	E	O
F	X	S	F	R	T	O	M	A	T	O	G	U	G	N

Find these words hidden in the word search puzzle. You can find the words by looking backwards, forwards, diagonally and upside down!

CROSSWORD PUZZLE

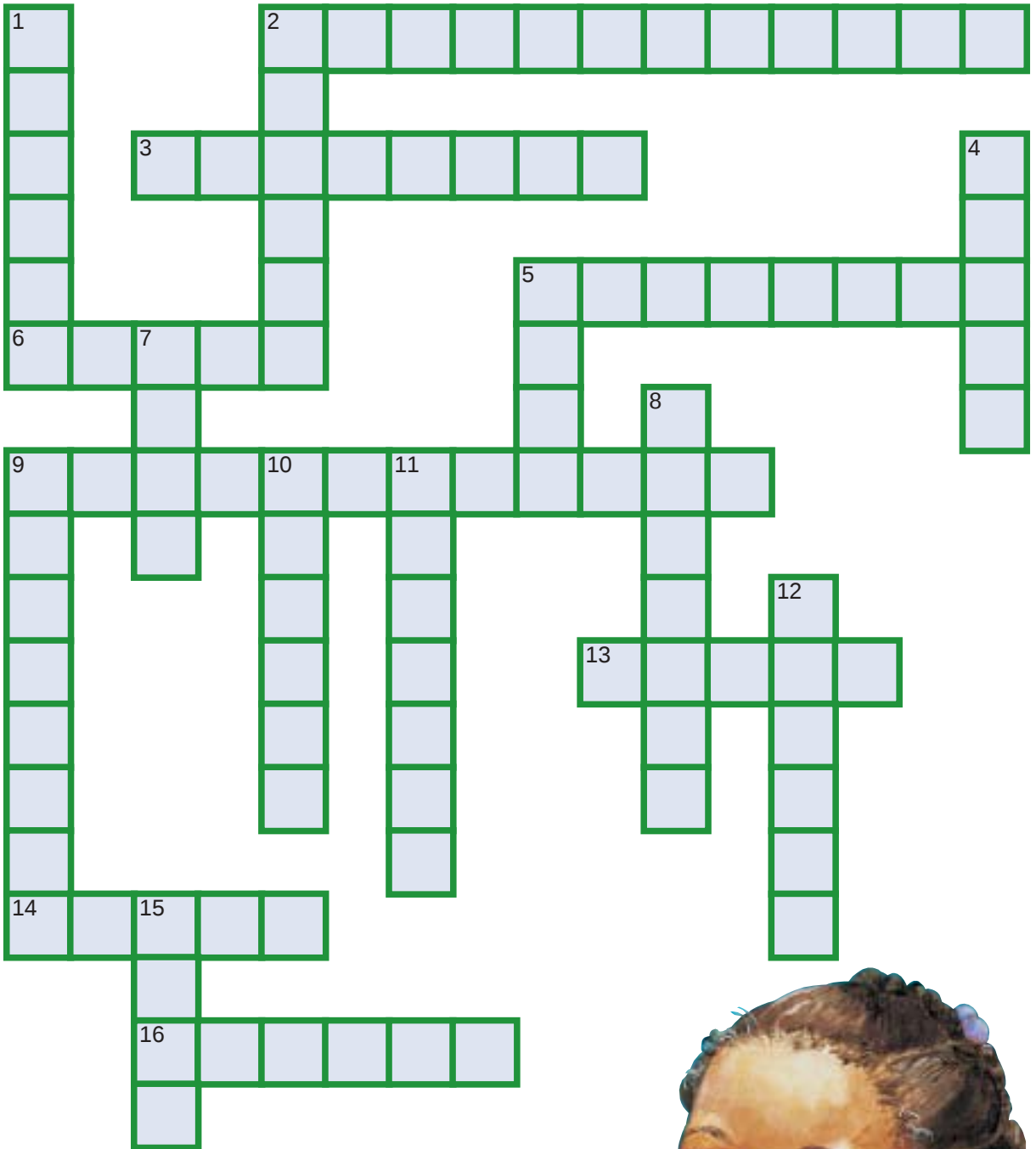
Across

2. The variety of life
3. Seeds can be 'saved' here
5. Close relative to the banana
6. Peruvian plant explorer
9. The protection of the Earth's resources
13. Where potatoes got their start
14. Scientists think that wheat grew here first
16. This vegetable was first used as a medicine

Down

1. Some beans grew here first
2. The tree that is really an herb
4. They contain instructions for inherited traits
5. An Egyptian queen collected plants here
7. A bunch of bananas
8. The tree of life
9. He introduced New World crops to Europe
10. Off-site conservation
11. Famous Russian plant scientist
12. A type of ecosystem
15. The world's most important crop

For answers see back cover



Find out more about plant diversity
Visit your local market and look at the different kinds
of fruits and vegetables being sold there.

Can you **find** more than one variety of any of the
different fruits and vegetables?

Do the varieties **look** the same or different? How?

Draw a picture of the different varieties showing how
they look different.

Ask your parents or grandparents whether
they remember eating fruits and vegetables
that can't be found in the markets anymore.



Puzzle answers

Crossword			Puzzle		
Across					
2. biodiversity					
3. genebank					
5. plantain					
6. Ochoa					
9. conservation					
Down					
1. Mexico					
2. banana					
4. genes					
16. carrot					
14. Syria					
13. Andes					
5. Punt					
7. Land					
8. coconut					
9. Columbus					
10. ex situ					
11. Vavilov					
12. desert					
15. rice					

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