

READING PASSAGE 1**Tree Tapping**

A method of resin and sap extraction that has been used for centuries

Tree tapping is an ancient means of extracting substances from trees or other plants. It takes different forms around the world depending on the type of tree and the substance being extracted. Most commonly, it is a means of getting either the sap or resin from a tree, both of which are important for making a range of products and foodstuffs. Sap from the sugar maple tree, for example, is used to make maple syrup, and the sap of the aloe vera plant is now a common element in many cosmetics. Resin, on the other hand, is used in the production of varnishes and adhesives for woodwork. It is not common in edible products although it is found in food glazing substances as well as many perfumes.

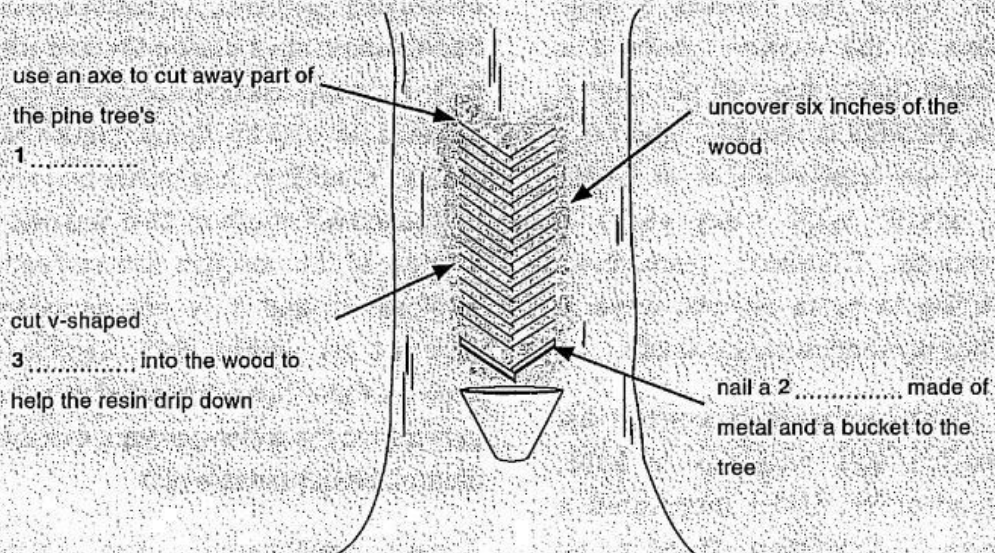
Although tree tapping varies considerably, most practitioners use a variation on a common method. In the case of resin extraction, a pine tree – usually of the slash pine or longleaf variety – is used. Firstly, some of the bark of the pine tree will be hacked away with an axe to expose a six-inch tall area of wood. A v-shaped metal trough will be nailed to the bottom of this. Beneath this trough, a metal bucket is hung onto another nail. Finally, lines should be cut into the sapwood to create a series of v-shapes. These help the resin drip downwards. The tree will repair the damage done to it through producing this resin, which will also drip into the bucket where it can be collected over a series of days.

Tree tapping is also used to extract latex from rubber trees, which is a complicated procedure that requires some skill to do correctly. However, when it is done by experts, it is one of the most sustainable forms of land use as it causes very little damage to the environment. This is because only one half of the tree is used at a time to allow the other half of the tree to heal. This is a common practice in many parts of South East Asia. Mucilage is another substance that is extracted from trees in a similar way. At one time, this was used as a cough medicine, but it is most famous as the basis for marshmallows.

Questions 1–3

Label the diagram below.

Choose **ONE WORD ONLY** from the passage for each answer.



Questions 4 and 5

Do the following statements agree with the information given in Reading Passage 1?

Write

- | | |
|------------------|--|
| TRUE | if the statement agrees with the information |
| FALSE | if the statement contradicts the information |
| NOT GIVEN | if there is no information on this |

- 4 Resin is commonly used as an ingredient for food.
- 5 The extraction of latex is an eco-friendly form of tree tapping.

Doing Something about an Increasingly Plastic World

Plastic waste has become a huge problem in the modern world. It is estimated that a mere 10 per cent of plastic garbage is recycled, and once it is in the ecosystem or in landfill sites, plastic takes many years to decompose. Therefore, researchers are trying to come up with ways to significantly reduce plastic waste.

One viable option is to convert the plastic into light crude oil. In 2005, geochemist Bill Ullom discovered a process of converting plastic waste into this precious commodity. He later worked with a businessman to put the process into practice. The process starts by putting various plastic items in a shredder. The shredded plastic is then heated repeatedly to produce vapour, which is collected and distilled. The distilled vapour creates consumer products such as gasoline for fuel. The remaining solid by-products can be used in the production of rubber.

Another potential solution is to replace plastic with similar materials that are more ecologically sustainable. Plastic film used in the food industry is rarely recyclable due to food contamination, which means most recycling centres do not accept it. An environmentally friendly substitute is collagen film. Collagen is a fibrous material found in the connective tissue of animals. If it is combined with water and a moisture-

preserving substance, collagen can be transformed into a plastic-like material that is nearly transparent and easily adheres to slightly damp foods like meats. In addition, it is edible and can be cooked with the food. One downside to most of the collagen film currently available is that it is not as water resistant as plastic. Still, scientists such as Peter Kunz are seeking ways to increase the water resistance of this natural, biodegradable film.

Recent experiments have found that a very common organism could be the key to reducing the world's plastic garbage. Professor Jun Yang discovered that mealworms, the larvae of a species of beetle, devour polyethylene, a form of plastic commonly known as Styrofoam. Bacteria in the gut of mealworms break down the plastic into a biodegradable form so that it can be safely used as a horticultural potting mix or incorporated into the soil for agriculture. Federica Bertocchini of the Spanish National Research Council has since made a similar discovery with a species of caterpillar that is even more effective at consuming plastics, suggesting that insects may be the answer to humanity's plastic problem.

Questions 6–8

Look at the following statements (Questions 6–8) and the list of researchers below.
Match each statement with the correct researcher, **A–C**.

- 6 He is looking for ways to add water resistance to a film.
- 7 He learned that a type of beetle larva eats a common form of plastic.
- 8 He found a process for turning plastic into a valuable product.

List of Researchers

- A** Bill Ullom
- B** Peter Kunz
- C** Jun Yang

Questions 9 and 10

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

A Natural Substitute for Plastic

Plastic film often cannot be recycled. This is because most recycling centres do not take it due to its **9** by food. A more sustainable choice is collagen film. Collagen is a material found in animal **10** It can be made into a film that is almost clear and very similar to plastic.

READING PASSAGE 3

Questions 11–14

Reading Passage 3 has four paragraphs, A–D.

Choose the correct heading for each paragraph from the list of headings below.

List of Headings

- i Altruism in different ape species
- ii Evidence against chimp altruism
- iii Chimp behaviour alone and in groups
- iv Research investigating why male chimps undertake risky patrols
- v Testing chimp generosity through a game
- vi Campaigns against using chimpanzees in experimental studies
- vii Possibility of altruism in the natural world

11 Paragraph A

12 Paragraph B

13 Paragraph C

14 Paragraph D

Generosity in Chimpanzees

- A** The idea that animals can be altruistic, that they may choose generosity over self-interest, appears to contradict the basic tenets of the natural world. Nevertheless, new research reveals that animals can exhibit altruism by choosing to sacrifice their own gain so that another can benefit. This research has focused on chimpanzees, to whom humans are closely related, which means that it could also offer insights into how self-sacrifice and altruism influenced the development of cooperative human social groups. It may also reveal whether chimpanzees and animals in general are capable of experiencing empathy. While this is a basic human emotion, it is not usually apparent in the animal world.
- B** The first study of animal altruism was conducted by psychologists Martin Schmelz and Sebastian Gruneisen at the Max Planck Institute for Evolutionary Anthropology in Germany. They trained six chimps to play a game in which a pair of them would take turns pulling four ropes. The first rope would give the chimp a banana pellet, the second would give the chimp's partner a pellet, the third would give both of them pellets, and the last would mean the chimp gave up its turn and wanted its partner to choose. However, one of the chimps, a female named Tai, was trained to only pull the last rope. This gave the other chimps the chance to choose to reward her, which they did 75 per cent of the time by choosing the rope that gave treats to both partners. Gruneisen claims that this activity was a 'kind of reciprocity', which is 'a landmark of human cooperation'.
- C** The second study, which was carried out at Arizona State University in Tempe, aimed to discover why male chimps embark on risky patrol missions. These involve circling their group's territory to sniff out any intruders. While this activity would make sense if the chimps were protecting their children, researchers studying these primates in Uganda found that almost a quarter of the male chimps who went on patrol did not have any relations in the group. The study's lead author, anthropologist Kevin Langergraber, believes that the chimps were motivated by something called 'group augmentation'. This means that because an increased amount of patrolling would allow

the chimps to hold on to their territory and attract more females, it would eventually increase every male's chances of reproducing. Thus, the chimps suppressed their self-interest because they were motivated by long-term benefits. According to Langergraber, these mechanisms could have 'served as building blocks for the subsequent evolution of even more sophisticated cooperation later in human evolution'.

- D** Although these two experiments appear to present compelling evidence for chimp generosity, critics have claimed that, actually, there is no basis for thinking that their behaviour is altruistic, and that chimps are in fact indifferent to altruism. This was evident in an experiment led by the University of Manchester. In this experiment, chimps were given the chance to feed a fellow chimp that they could observe through a glass panel. Unlike other experiments involving chimp altruism, the chimp subject was not rewarded in any way for his or her actions. The study found that the chimp was not more likely to release the food when it could see the other chimp through the glass, suggesting that chimpanzees are not altruistic when there is no immediate or long-term gain for themselves. Dr Keith Jensen of the University of Manchester suggested that this could mean that 'pro-social behaviour' actually developed later in evolution, 'after our split with the other apes'.

Questions 15–17

Do the following statements agree with the views of the writer in Reading Passage 3?

Write

- YES** if the statement agrees with the views of the writer
NO if the statement contradicts the views of the writer
NOT GIVEN if it is impossible to say what the writer thinks about this

- 15 Empathy can often be observed among animals.
- 16 The chimps who were partnered with Tai were all males.
- 17 Dr Jensen believes humans developed as social creatures after evolving from apes.