

Crows can recognise themselves in mirrors, use tools and plan for the future, all cognitive abilities more similar to those seen in primates than those of most other birds. Felix Ströckens at the Ruhr University and his colleagues analysed the brains of common ostriches, brown warren chickens, racing homer pigeons and three members of the corvid family: carrion crows, hooded crows, and rooks. These are the animals that had either been killed for food or pest control. The researchers were able to analyse the nuclei of the birds' brain cells using a method called isotropic fractionation. This allowed them to categorise the types of cells present in each brain and estimate how many there were of each. The team found that corvids had the highest number of interneurons, small cells that pass on local signals and are involved in cognitive processing. These cells process information received from sensory neurons and send inputs to motor neurons. They are involved in tasks such as decision making, future planning and risk assessment. "If we think about the neuron as the main processing unit of the brain, we can assume that a higher number of neurons equals more processing power," says Ströckens. But it is not enough to explain why crows have stronger cognitive abilities than most birds, he adds.

66. According to the passage, crows ----.

- A) have the ability to reflect on previous events but do not have an understanding of the future
- B) are diminishing in number because of the mass killings for pest control
- C) are substantially similar to most other birds in terms of the cognitive abilities they have
- D) have been studied because their resemblance to other species makes it hard to classify them
- E) have cognitive skills which are similar in some ways to thinking abilities of primates

67. One can understand from the passage that intelligence that corvids have ----.

- A) seems to develop more in time due to their reasoning capacities functioning well compared to that of others
- B) could be seen in a specific member of the corvid family excluding the crows killed for food or pest control
- C) is one of the most easily detected abilities they have as it can be seen and observed everywhere
- D) may be related to them having an unusually high number of brain cells involved in processing information
- E) is relatively equal to that of common ostriches, brown warren chickens, and racing homer pigeons

68. Which of the following statements is true according to the passage?

- A) The researchers performed an analysis of the nuclei of the birds' brain cells to help control pests.
- B) Sensory neurons process information and tasks are performed through cognitive processing.
- C) The isotropic fractionation method helped explain why crows have a higher number of brain cells compared to other birds.
- D) The study found that small cells that pass on local signals are used most when a risk is posed.
- E) Risk calculation and contemplating the future are among the examples of reasoning that corvids exhibit

Grafting, where the root of one plant is attached to the shoot of another, has been used in agriculture for thousands of years to improve the growth of plants such as apples and citrus trees and to eradicate diseases. But this technique was not thought to work for a major group of plants: the monocotyledons (or monocots). This category includes all grasses like wheat and oats, as well as other high-value crops like bananas and date palms. These species lack a tissue called vascular cambium, which helps grafts heal and fuse in many other plants. Now, Julian Hibberd at the University of Cambridge and his colleagues have found an approach that allows monocots to be grafted. They extracted a form of embryonic tissue from inside a monocot plant seed and applied it to the potential graft site between two monocot specimens belonging to the same species, for instance, wheat. The tissue stimulated growth and fused the two plant halves together. The researchers used fluorescent dyes to verify that the root and shoots had joined and could transport liquids and nutrients up and down the stem. "I have written on the record that I thought it was near impossible. So, as a science breakthrough, it's pretty amazing," says Colin Turnbull at Imperial College London.

69. According to the passage, the method of grafting was believed not to work efficiently for monocots because ----.

- A) they are high-value and vulnerable crops like bananas
- B) the diseases they have could not be eradicated until now
- C) they have been the world's most endangered crops
- D) they lack the necessary roots and shoots for grafting
- E) they do not have the tissue of vascular cambium

70. Which of the following is true about the grafting of monocots?

- A) Vascular cambium is a tissue that triggers growth in all grasses like wheat and oats and in crops like bananas and date palms.
- B) Embryonic tissue extraction is possible provided that the tissue concerned is vascular cambium.
- C) The researchers' studies indicated that grafting can work not only in the same species but also between species.
- D) The technique could be especially useful for combatting disease in vulnerable species which face extinction.
- E) The scientists confirmed plant growth occurred as the transportation of liquids and nutrients was observed within the stem.

71. What is the passage mainly about?

- A) The grafting technique which is preferable for stimulating plant growth effectively
- B) Grafting and its history as the most well-known plant growing technique
- C) The species which require grafting the most in order to thrive
- D) Making grafting possible for a specific plant species on which it was previously believed not to work
- E) Factors contributing to successful plant growth subsequent to grafting

Water pollution control methods can be subdivided into three treatment systems. Physical treatment systems rely on physical processes such as screening, filtration, and sedimentation to aid in the removal of pollutants. screening and filtration are similar methods used to separate coarse solids from water. Suspended particles are also removed from water with the use of sedimentation processes. Just as in air pollution control, sedimentation devices exploit gravity to remove the heavier particles from the water stream. Chemical treatment systems, on the other hand, are those which utilise chemical reactions to remove water pollutants or to form other, less toxic compounds. Chemical precipitation, for example is one of the most commonly used chemical treatment processes. It utilises the addition of chemicals to the water in order to bring about the precipitation of dissolved solids. A physical process such as sedimentation or filtration is then required to remove the solid. Lastly, biological water pollution control methods are used for the control of biodegradable organic chemicals, as well as nutrients such as nitrogen and phosphorus. In these systems, microorganisms consisting mainly of bacteria turn carbonaceous matter into gas. There are two main groups of microorganisms used in biological treatment; aerobic and anaerobic microorganisms, each of which requires special climatic settings to work effectively.

72. According to the passage one mutual method used in air and water pollution control systems is to ----.

- A) separate pollutants into sub-categories before the process starts
- B) decrease toxicity levels with chemical reactions
- C) mix a variety of solutions to absorb pollutant agents
- D) utilise gravity to remove particular pollutants
- E) convert carbon-containing matter into gas

73. It is clear in the passage that the chemical precipitation process.

- A) decreases toxicity levels faster than biological processes
- B) is among the most preferred chemical methods for water pollution control
- C) includes the use of heavy chemicals that may harm underwater species
- D) requires specific microorganisms to be effective
- E) is particularly efficient in removing heavy metals

74. According to the Passage, aerobic and microorganisms ---.

- A) are solely used for the removal of phosphorus from water streams
- B) selectively destroy disease-causing organisms in water
- C) do not work as efficiently on nitrogen as they do on biodegradable organic chemicals
- D) rely on environmental conditions to function in an efficient way
- E) may be as harmful to the environment as some

Muscles, bones, and connective tissues grow stronger by sustaining damage. Skeletal muscle in particular responds to unfamiliar exercise with a measure of harm. Unlike other muscle tissues like the cardiac muscle, it is made up of long, thin fibres that are composed of several different proteins. These proteins interlock inside fibrous compartments called sarcomeres. Sarcomeres can stretch, but only so far. During certain kinds of movements, some of these sarcomeres within the affected muscles are pulled past their tolerance. The proteins inside separate, resulting in micro-tears throughout the muscle tissue. Hours or even a day or two after the exercise, this cellular-level damage is thought to lead to inflammation. Blood vessels dilate in the affected sections of muscle, white blood cells and other immune-system-related cells flood in, and tissues swell and warm. This familiar sensation is known as 'delayed onset muscle soreness, or DOMS, and affects anyone who works out. Strange muscle contractions during which forces are applied to muscles as they lengthen, are the main causative factors. In general, this soreness is a good thing. Afterwards, the tissues rebuild themselves, becoming stronger and more flexible, a process known as adaptation.

75. According to the passage, when the sarcomeres stretch beyond their limit ---.

- A) it leads to a small amount of damage in the muscle tissue which becomes sore
- B) muscles require professional treatment to heal afterwards
- C) the proteins that they contain start to connect with one another
- D) it becomes impossible to exercise in the following couple of days
- E) they cause cellular-level damage which can be alleviated in a couple of hours

76. According to the passage, which of the following is true about DOMS?

- A) It creates a burning sensation right after the exercise and disappears quickly.
- B) It is not experienced by people who do certain kinds of exercise.
- C) It results in an irreversible damage done to muscle tissue.
- D) It is the result of extending the muscle fibres while working out.
- E) It could be avoided by comprehensive warm-up before exercise.

77. What is the passage mainly about?

- A) The need for adequate rest after working out
- B) The importance of exercise on muscle growth
- C) The workings of different kinds of muscles
- D) The way muscles react to stretching
- E) The danger of muscle soreness after exercise

Various theories about the end of the Universe all concern the balance between the expansion of the Universe and the pull of gravity. In one scenario, gravity may not be strong enough to stop the Universe from expanding, meaning it will continue to do so forever. The Universe will become darker and colder. Even black holes will evaporate as the Universe becomes an endless and timeless void where nothing ever happens. This is called the 'Big Freeze'. But, according to a second theory, if gravity is strong enough to overcome expansion, then the Universe will start to contract again. Eventually, it will collapse on itself to become a compact fireball. The 'Big Crunch', as it is called, will swallow all matter and energy, as well as space and time. A third theory concerns the mysteries of 'dark energy'. Astronomers have found that the expansion of the Universe is actually speeding up due to dark energy, and if this acceleration continues, the expansion will overcome all the forces of nature. The result will be the 'Big Rip.' All matter, and space-time itself, will be ripped apart and destroyed. Estimates say this could happen in about 22 billion years.

79. According to the passage, which of the following is true about the end of the Universe?

- A) Despite the name 'Big Freeze', the Universe will actually heat up in that scenario.
- B) Only black holes will be able to survive the end of the Universe.
- C) If the Universe turns into a fireball, it will be due to its expansion.
- D) The discovery of dark energy rules out all the other theories.
- E) Astronomers can calculate a probable time for the end of the Universe.

78. What are all of the hypotheses about the end of the Universe based on?

- A) The relation between gravity and the increase in the size of the Universe
- B) The difference in temperature between different parts of the Universe
- C) The continuation of the expansion of the Universe
- D) The probability that the Universe may shrink
- E) The eventual decrease in the speed of the expansion of the Universe

80. What is the main purpose of the author?

- A) To warn the reader about the approaching end of the Universe
- B) To inform the reader about different possibilities concerning the end of the Universe
- C) To correct some misconceptions about the forces of nature that act upon the Universe
- D) To explain the reason why astronomers cannot agree on one scenario
- E) To highlight a new theory refuting other abstract classical theories