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## The fastest contracting muscles in the world

The fastest contracting muscles in the human body are those of the eyelids, which can contract to close the eye in as little as 0.3 - 0.4 seconds. Recently, researchers were studying the ways in which various songbirds make their calls and they stumbled upon the fastest muscles known to man. They discovered that the vocal muscles of European starlings and zebra finches were able to contract and relax 100 times faster than our eyelids can blink - in an impressive 0.003 seconds.

Using "superfast" muscles, the birds change the position and stiffness of their syrinx (voice box) to alter the volume and pitch of their songs. Although only found so far in the two species mentioned, the study leader (Coen Elemans of University of Utah) believes that most other songbirds probably have these muscles too. It is also likely



A pair of zebra finches. Image: Wikipedia

that the muscles used to vibrate a rattlesnake's tail also belong to this class of muscle fibre, but they have not been studied yet.

The research is detailed in the July 9 edition of the Public Library of Science's online journal PLoS ONE.

## What is a keystone species really?

Most of us have heard the term "keystone species", but do we really understand what this means? Over the years, I have heard field guides give a variety of different explanations to their guests and I get the impression that the real meaning behind the term is somewhat confusing to many of them.

Firstly, what a keystone species is not. Keystone species are not named because of their abundance or their size. They can be quite uncommon, large or small - it makes no difference. They are not named because of their importance to conservation. Tigers and rhinos are not keystone species just because they are at the forefront of conservation efforts and publicity worldwide. A keystone species can be a carnivore or a herbivore - that makes no difference either. **Keystone species earn their title because of their influence on the ecosystems in which they live.**

In 1969, a zoologist named Robert T. Paine discovered that when he removed a certain sea star (*Pisaster ochraceus*) from some tidal pools along the Washington state coastline, the species diversity of the tidal pools fell off

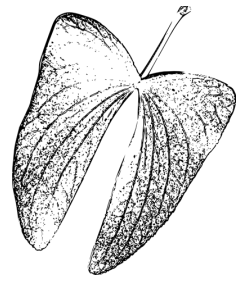


drastically, the species total for the rock pool dropping from 15 to only 8 at the end of his experiment. He had discovered that this species of sea star was regulating the "balance" of life within the rock pools by controlling the mussel population that grew there. When he removed the sea star, the mussel population grew so much that other species were incapable of competing. When the sea stars were returned, the spe-

cies diversity slowly increased again.

He likened this influence to the keystone in a Roman arch, which is responsible for preventing the entire arch from collapsing. **A keystone species is one that plays an essential role in the structure, functioning or productivity of an ecosystem and ultimately keeps the ecosystem from falling apart.**

Paine's discovery stimulated ecologists and biologists to find other keystone species, which they did using similar removal and replacement experiments. In this way the list has grown to include African elephants, sea otters, certain bats and birds responsible for pollination, fig wasps etc.



## How to forecast weather using natural signs

### Keep an eye on the moon



When looking at the moon at night and it appears reddish, it means that there is a lot of dust in the air which is usually stirred up by dry air resulting from a high pressure system. This indicates that weather conditions should be good for a while yet. If on the other hand, the moon is very bright and clearly defined, then a low pressure system has probably cleared out the dusty atmosphere and rain could be on its way.

A ring around the moon at night (image left) is caused by light shining through ice crystals in cirrostratus clouds, which are associated with an approaching warm front and moisture in the air. This sort of ring will probably indicate rain falling within the next 36 hours. Remember the saying "circle around the moon, rain or snow soon."

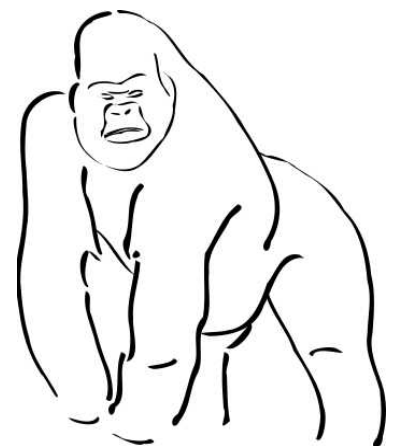
"The most incomprehensible thing about the world is that it is comprehensible."

Albert Einstein"

## Mountain gorilla population on the rise

Although there are fewer than 1000 mountain gorillas known to exist on earth, the population is growing according to the latest census. Last year, 72 people in six teams from DRC, Rwanda and Uganda systematically combed more than 1000 km of the Virunga Massif looking for fresh gorilla droppings. These were genetically analysed in order to reach an accurate population figure. What they found was a total of around 480 gorillas living in 36 groups and 14 solitary silverbacks in the range sampled. The previous census conducted in 2003 showed a total of 380 animals in the same area. This would seem to indicate a healthy population growth, but may also be as a result of differences in sampling efficiency.

The Virunga Massif includes three contiguous national parks spanning the Virunga Volcanoes on the border of three countries, Parc National des Virunga in DRC, Volcanoes National Park in Rwanda, and Mgahinga Gorilla National Park in Uganda. The only other location where mountain gorillas exist is Bwindi Impenetrable National Park in Uganda, which has 302 mountain gorillas. The total world population of mountain gorillas amounts to around 786 individuals according to the census takers. John Makombo, director of conservation at the Uganda Wildlife Authority said "Uganda continues to pledge her support towards any efforts that will see the sustainable existence of a healthy mountain gorilla population for the benefit of the local communities, Ugandans and the global community as we conserve for generations." The full report on the census will only be available later this year.



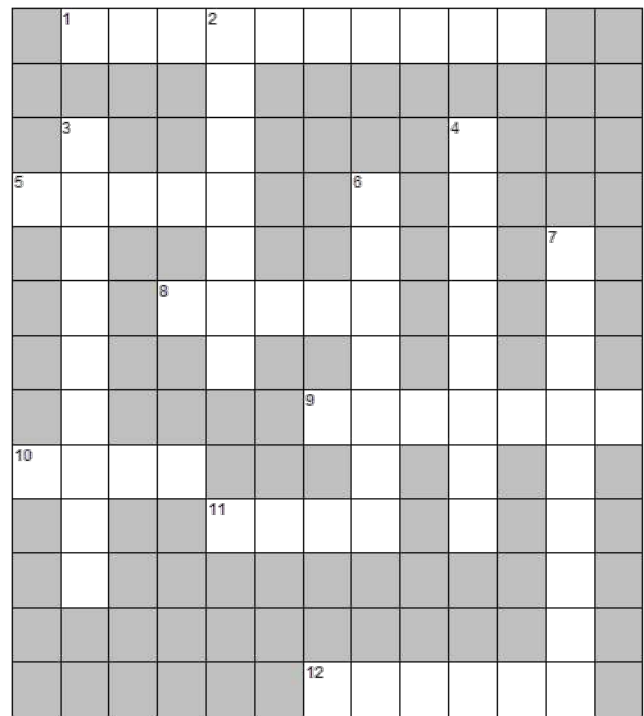
## Crossword

### Across

1. Shedding of flowers and leaves and fruit following formation of scar tissue in a plant. It happens to leaves in autumn. (10)
5. An antelope for which Mala Mala private game reserve is named (5)
8. Another common name for the honey badger (5)
9. A part of a plant (e. g., a leaf) that has been modified to provide protection for insects, mites or fungi (7)
10. The antelope emblem of SANParks (4)
11. A close relative of the extinct bluebuck (4)
12. The growth of hair, wool or fur covering the body of a mammal (6)

### Down

2. A mammal named from the Hindi word meaning "spotted one" (7)
3. Emblem of the Sabi Sand Wildtuin (9)
4. The proposed new name for the bushbuck (8)
6. South Africa's national fish (7)
7. The stalk of a leaflet (9)



EclipseCrossword.com

## How hogs hang

Most of us are familiar with sounders of warthogs grubbing around on their knees in the veld. But, have you ever really observed what the sex and age makeup of these groups is - and at what times of the year they exist? According to research conducted here in South Africa, two types of groups occur. The first is the mixed sounder, consisting of adults of both sexes and juvenile hoglets. The second group type consist only of sows and their combined offspring.

Pregnant sows give birth to their hoglets (in early spring) underground in the safety of a customised aardvark burrow or similar substitute, allowing the young to form a bond and to identify with their own mom. Once this has taken place, the female will usually join up with another new mother and her hoglets and then share the responsibilities of babysitting and even adopting each other's hoglets. These female groups also sleep together in the same burrows thereby generating more heat and keeping the youngsters warm. (Warthogs have little fat on them and the young are notoriously susceptible to the cold.) Once the young are several months old, the females will again allow males to join the group and the mixed sex sounder continues for the rest of the season until birthing season comes around and the mixed groups then disassociate once more.

This social system has obvious benefits for a variety of reasons. Male warthogs can be very intolerant of non-kin offspring, even killing unrelated young if they have the chance. If the males are kept away for long enough, they do not recognise which are their own offspring and which are not when they finally meet them. The co-operation between mothers is also advantageous in that adoption is possible, allowing hoglets to survive a mother being killed. By sharing the responsibilities of raising the young the mothers also ensure that fewer of their babies are lost to the cold, and to the large cats, crocodiles and other predators that hunt them.

White, A. and Cameron, E. (2011). Evidence of helping behaviour in a free-ranging population of communally breeding warthogs. *Journal of Ethology*

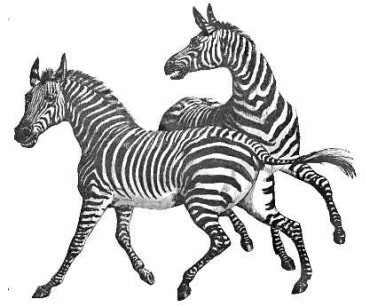
**"The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom."**

- Isaac Asimov

## Chemically induced abortion in zebra mares

In the above story about warthogs, I mention that male warthogs are not really welcome around the sows and their young because of the likelihood of non-kin aggression. This is also known to occur with plains zebras. If a stallion suspects that a foal is not of his own making, he will often bite and kick it to death.

Dr Ludek Bartos from the Institute of Animal Science in the Czech Republic lead a study into the pregnancy success rates of domestic horses. The study aimed to discover why there is such a high rate of abortion in mares that are mated with foreign stallions. Horse breeders obviously want to get new genetic material into their bloodlines from time to time, and will send a mare away to be mated by a stud male. Unfortunately, what happens in about 33 per cent of cases is that the female aborts when brought back to her "herd stallion". By contrast, (in this study) no mares mated within their home stable aborted.



In a previous study on zebras in captivity, Dr Bartos found that when a new zebra stallion was introduced into a herd just after a mare became pregnant, there was a less than five per cent chance of the foal surviving. If the pregnancy had progressed to more than a month, there was a greater than 60 per cent chance of it surviving to term.

The significance of this is thought to relate to infanticide by herd males. If a female is unable to disguise the paternity of her foal, she will rather abort it than waste the effort of carrying it to term only to have it killed by the herd stallion once it is born.

The exact way that the mares do this is still unknown, but it probably relates to chemically triggered abortions which are a well known phenomenon in biology. The research was published in the journal **Behavioural Ecology and Sociobiology** (<http://www.springerlink.com>)

"He who knows all the answers has not been asked all the questions."

Confucius

## What are they?

What are these small holes seen in the underside of the leaf of a bushveld gardenia. Similar structure can be found in other leaves such as rhino coffee. They typically form in the axils of the leaf midrib and the side veins.



## Spatial sorting and the cane toad invasion



Cane toads have been invading Australia in a steady wave for the last few decades, killing all manner of wildlife in their path. The toads are very poisonous and anything trying to eat them dies as a result. Because the toad is not native to the area, none of the indigenous animals have any defence against them.

Now at least this menace is contributing to our understanding of the processes behind evolution. The toads were introduced into Queensland Australia in August 1935 with the idea that they would control the beetle pests that were damaging the sugar cane crops. This was largely a failure, but the introductions went on in 1936 and nearly 100000 toads had been introduced by that time. They quickly turned their attentions on other prey and began a steady march westwards across the continent.

What has become apparent, is that there is a form of evolutionary selection at work in this progress - the invasion has been gaining speed steadily over the last 70 years. The toads with the best hopping skills and longest legs



Current range of cane toads in Australia.  
Image: Wikipedia

move into vacant territory more quickly than the “normal” toads. These speed models then mate with one another, giving rise to an even speedier generation. This process leaves the normal toads behind, resulting in what has been termed spatial sorting - slow toads behind and fast ones up front.

This is a new driving force behind evolution not previously recognised. It does not fall into the category of natural selection in that it is not the selection of a trait that bestows a greater survival advantage on the population. It is a necessity in that only a certain genetic strain of animals will be found in an area based on their ability to move. The process was described by biologist Rick Shine as being “*mating between the quickest*” rather than “*survival of the fittest*”. Three Australian biologists, Professor Rick Shine and Dr Greg Brown from the University of Sydney's School of Biological Sciences and Dr Ben Phillips from James Cook University believe they have identified a completely new evolutionary process.

## Maasai beekeepers and farting mongooses?

The years of drought in the great rift valley have left scores of cattle dead and Maasai herders without a living. The Kajiado District has been particularly hard hit, with about 70 per cent of their cattle succumbing to the drought. Now many Maasai herders have turned their attention to beekeeping as an alternative.

Honey harvesting has given these communities hope again, and now that money is coming in, they are able to send their children to school, buy better beekeeping equipment and generally improve the quality of their lives once again. At first, the harvesters had to rob hives without any protective clothing, but now they are becoming more sophisticated and are learning better beekeeping skills. The honey is harvested twice a year and is sold locally, and there are plans to export it. Honey worldwide has become a diminishing resource with bees mysteriously dying and honey becoming tainted with undesirable chemicals. Organic honey is highly sought after and could fetch top prices if done properly.



More than 600 Maasai in 31 different communities have already turned to beekeeping and the numbers are growing. Already, more than 400 modern beehives have been given to community beekeepers. The project has also had some beneficial cultural and environmental spinoffs. Fewer trees are being cut because they are needed for the bees and their hives. Fewer cattle also means less impact on the grasslands. Maasai women (who are culturally dominated by men) are now empowered since it is they who are harvesting and selling the honey. When asked what would happen once the climate returned to normal, the beekeepers said that the money earned from beekeeping will be returned to the old standby - buying more cattle!



The locals have one major honey thief that they face - mongooses. According to the locals, the mongooses climb up to the hives at night and break wind, forcing the bees to flee the foul smell! They then knock the hives down and steal the honey. Anyone like to challenge that wisdom?

## What are they - answer

The little holes pictured are called domatia (singular domatium) from the Latin word *domus* meaning a home. The domatia are formed by the plant itself and are usually enclosed by part of the leaf tissue or by a fringe of fine hairs. Their purpose is usually to house predatory mites which help keep the plant free of parasitic mites.