



# Forgotten Dreams

*Why do humans have dreams every night?  
 And why do we forget them?*

By Damir Rafi

Dreams are a bizarre phenomenon, which even to this day, scientists struggle to understand. We have dreams every night, whether we remember them or not. According to *Scientific American*,

**on average we have 5 dreams every night, which equates to 1,825 dreams every year. So why do we forget them?**

Perhaps more importantly, where do our dreams come from? A couple of (fairly) recent studies have provided some light on this intriguing topic.

The first notable study explored the dreams of people with amnesia, a condition in which memory is disturbed or lost, due to a region of the brain, called the hippocampus, being damaged. Therefore, they are unable to store new information (declarative memory). It is these declarative memories which had been previously thought to cause dreams. With this logic, if dreams come from declarative memories, amnesiacs shouldn't dream at all. However, the study showed quite the opposite. Every day, the

people in the study played several hours of Tetris. At night, both the amnesiacs and the people with normal memories remembered seeing rotating blocks in their sleep. Therefore, it is now thought that dreams come from implicit memories, which even amnesiacs have.

Implicit memories are those which take no effort to remember. For example, many physical tasks, such as learning to walk, are implicit, as this is not a task which people forget; we do not need to remind ourselves how to do it every time we stand.

Another interesting fact is that **95% of all dreams we have are forgotten.**

In short, this is because the brain's chemistry changes rapidly when we are asleep. When we are awake certain neurotransmitters allow us to be able to have short-term memory. However, when we dream, many parts of the brain are deactivated. This also explains the lack of rationality of our dreams, since the brain's rational centre is deactivated when we sleep. A fur-

ther reason why our dreams are forgotten is that many are too weak to remember. Just as in our waking moments we forget a number of our slight experiences and perceptions soon after having them, the same is true with dreams.

In Freud's book, *The Interpretation of Dreams*, he argues that we do not remember dreams as the brain is attempting to block out wishes or longings that we are emotionally not equipped to handle. He also suggests that when we are unable to recall aspects of dreams, it is because they are too traumatic. This theory of repression is one of the most well known theories about dream recall.

Dreams are a vast, captivating topic, of which all of their complexities are impossible to cover in one article. However, one further aspect which I will briefly touch on is the ability to see dreams in black and white. Research shows that 70-80% of our dreams are in colour. It seems surprising that some dreams are in black and white, due

to the plethora of colour around us, so it is suggested that the colours of our dreams are symbolic of the emotional state that conjured up the images. In other words, the colours in our dreams represent our feelings and moods, and give us a better understanding of them. A blue ocean, for example, will give you more of a sense of harmony and tranquillity than an ocean with no colour at all.

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# Virgin Birth

## Why Virgin Births are Possible

By James Wickenden

Although many people's instinctive reaction to this question, religious or not, is no, new evidence has forced a re-think on virgin births.



In 2001, in a zoo in Nebraska, a bonnethead shark pup was born in a female only tank. Although sperm could have been stored, the shark had been in captivity for three years. Also, the mother had no bite marks – a telltale sign of shark sex. This was initially dismissed as a freak of nature, until it happened again ... twice.

In 2002 a female white-spotted bamboo shark, in Detroit, gave birth to two pups, and in 2008, in a Hungarian Zoo, a female shark gave birth, although she had never been in contact with a male. One consistent theme was noted – all the shark pups concerned were female.

This natural phenomenon is known as parthenogenesis. Instead of an egg being fertilized by a sperm, two eggs combine to make a new organism with genetic material from only one parent. This has worried shark experts, as if parthenogenesis becomes more widely used in the

wild, the male population of certain shark species could be wiped out. As parthenogenesis stops genetic variation, this would stop evolution, and could lead to whole species being wiped out by new diseases.

Although in captivity parthenogenesis has only been largely seen in sharks, several species are now confirmed to be able to reproduce parthenogenically – including several shark and reptile species and many crustacean and insect species.

More relevant to the question, mammals have never been found to reproduce parthenogenically. This is due to imprinting; a process where sperm and eggs are imprinted on by their owner, and an egg will only develop if it contains two im-

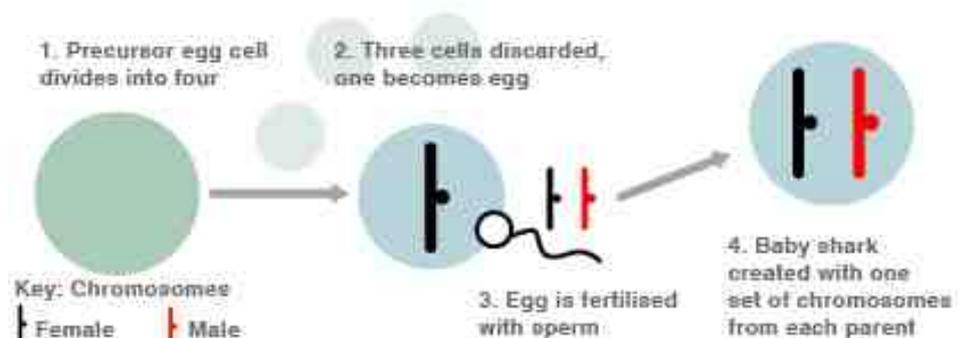
prints.

However, in 2004 a team of Korean researchers attempting to clone human cells accidentally produced them through parthenogenesis, though this is very different to producing a healthy child. Also in 2004, a Japanese team successfully produced a live adult mouse, proving its possibility in mammals, although 600 eggs were used to create it, making it currently unviable as a reproduction technique in humans.

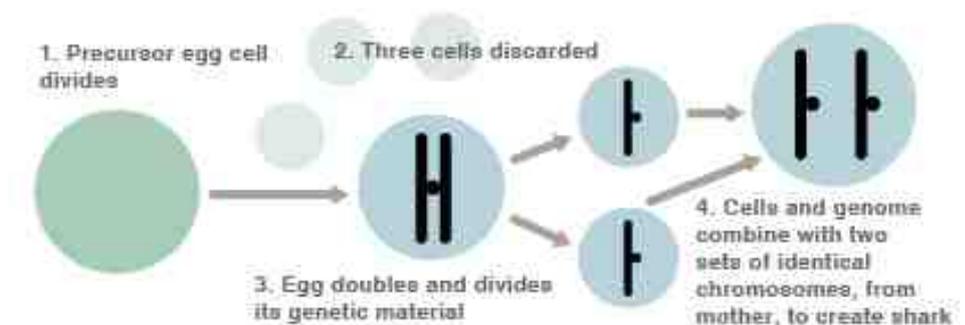
To answer the question, Jesus could not have been born by parthenogenesis, as all children of parthenogenesis are female. However, international religion is littered with tales of virgin births, including many females, leading to a theory that parthenogenesis may have already naturally occurred in the human race.

### HOW NORMAL FERTILISATION AND PARTHENOGENESIS DIFFER

#### Normal Fertilisation



#### 'Virgin birth' - Parthenogenesis



# Extinction

## *The Reasons Behind the End of a Species*

By Luke Anderson

Newspapers and the internet are filled today with reports that the human race is to blame for the annihilation of many species. The rapid loss of species today is estimated by some experts to be between 100 and 1,000



times higher than the natural extinction rate.

By definition, extinction is the end of an organism or a group of organisms, usually a species. The definitive moment and the scientific certainty of extinction is when there are officially no other surviving individuals in that species left to reproduce. Some animals that are associated with extinction are the infamously dim-witted Dodo, the enormous woolly Mammoth and of course the Dinosaurs, which became extinct almost 65 million years ago. Charles Darwin argued that extinction is merely part of natural selection and that those that are incapable with surviving must be forced into extinction for progressive evolution. So what are the reasons as to why an entire species becomes extinct? To answer this question it is necessary to divide the history of the earth into two time periods, before man and during man's reign of the Earth. Once this has been done, it is easy to view the causes of extinction as natural causes and human causes.

The natural causes of extinction are unavoidable and before man these reasons would have caused huge amounts of species to become extinct, many of which we do not know about. It is fascinating to think that

there could have been thousands of species that roamed the earth millions of years ago that we have no idea about. Natural causes for extinction could be an asteroid hitting the earth at an extreme force; this is the main theory behind why the dinosaurs became extinct. It could be the falling of acid rain which killed acid intolerant species or cosmic radiation from outer space causing various genes to mutate and weaken that specie's gene pool. Changes in sea level or sea temperatures could also move some species out of their natural environment and unless they are able to adapt to these changes they will not survive. However the foremost natural cause of extinction is due to diseases and epidemics. As climates change and invasive species enter into other species environments (bringing with them new bacteria), individuals become less able to fend off disease. Some diseases have been able to wipe out an entire species; one example of this would be different species of frogs in the rain-



forest with fungus disease. Natural factors usually occur at a slower rate and therefore cause a lower extinction rate.

Human factors on the other hand occur at a faster rate and are mostly responsible for the present extinction rates. Human population has dramatically increased in the past 200 years and this has lead to a number of other human problems which can increase the likelihood of a species becoming extinct. These include:

1) Destruction of habitats – As humans grow in population and spread around the world, the habitats in which animals live can often be destroyed, forcing the animal to move away from its natural habitat. This lowers its chance of survival as it may not be able to survive in its new environment. Habitat loss and degradation today affects 86% of all threatened birds, 86% of threatened mammals and 88% of threatened amphibians.

2) Climate Change/Global Warming – With the evidence for climate change and global warming ever increasing, scientists are now starting to see trends in the death rates of animals linked to climate change. Areas such as the Peruvian Andes, portions of the Himalayas and southern Australia could have a profound impact caused on indigenous plants and animals due to climate change.

If we are not careful then the human causes for extinction are going to be gaining more and more victims of extinction in the years to come. Now that we could potentially be losing some of the largest and most magnificent animals we have on Earth, the public's awareness on the errors of our specie's ways have suddenly become apparent. It is incredible to think that within a matter of years such tremendous species like the Tiger and the Giant Panda could be completely wiped off the face off the Earth. Unless serious action is taken to prevent this happening then we will not be seeing these animals for much longer. However if we as a species can care enough and be responsible enough then there is still a hope for these endangered animals to avoid a similar fate to that of the dinosaurs.

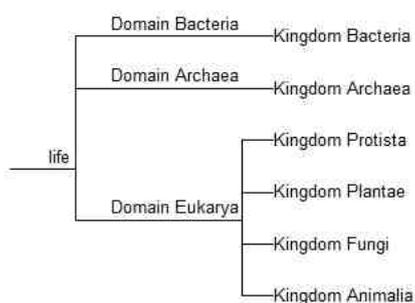
# Discovery of Animals

## How many species are there in the world?

By Peter Zolczer

The world as we know is filled with millions of species, each categorised into a domain, kingdom, phylum, class, order, family, and genus. But just how many different species are there on our planet?

During Aristotle's era (384 BC-322 BC), living organisms were classified into *Regnum Animale* ('animal kingdom') and *Regnum Vegetabile* ('vegetable kingdom'). This had been accepted until the mid-19<sup>th</sup> Century, when Richard Owen, John Hogg and Ernst Haeckel proposed a third kingdom of life. But over the years, the number of kingdoms continued to change as the world was learning about the nature of science as well as new species constantly being discovered. From around mid-1970s on-



wards, the six kingdom system was agreed upon and has become standard.

So you would have thought that all species on Earth would have been discovered by now, but think twice before you make that assumption. Scientists are continually discovering new organisms living among us, which begs the question; how many species are there currently in ex-

istence? Well, in order for that to be answered, examples must be considered.

The Amazon basin contains the largest rainforest and river system on Earth, and is perhaps the most biologically diverse ecosystems on the planet. The region spans eight South American countries and consists of over 600 different types of terrestrial and freshwater habitats and is inhabited by 10 percent of the world's known species, including endemic and endangered plants and animals.

To date, at least 40,000 plant species, 3,000 fish, 1,294 birds, 427 mammals, 428 amphibians, and 378 reptiles have been scientifically classified in the region.

In the year 2000, the Rio Acari marmoset, or *Mico acariensi*, was discovered inhabiting the lowlands of the rainforest. This marmoset species is endemic to Brazil and was first seen by scientists as a pet kept by residents of a small settlement near the Rio Acari, a remote region of the Amazon.

In 2006, there was sufficient scientific evidence of a separate species of the pink river dolphin, *Inia boliviensis*. Unlike the Amazon River dolphins, discovered in the 1830s, their Bolivian relatives have more teeth, smaller heads, and smaller but wider and rounder bodies.

Amongst one of the amphibians, a poison dart frog has also been discovered, referred to as the

*Ranitomeya amazonica*. The frog's main habitat is in the lowland moist



forest near the Iquitos area in the region of Loreto, Peru.

A new species of catfish was found that lives in waters in the state of Rondonia, Brazil. Bright red, blind and tiny, the fish *Phreatobius dracunculus* was first found after a well was dug in the village of Rio Pardo, when they were trapped in buckets used to extract water. The species has since been found in another 12 of 20 wells in the region.

Furthermore, hundreds of new plants have been recorded, from families that include herbaceous, perennials and bulbous flowering plants, trees and shrubs, vines, ferns and lilies.

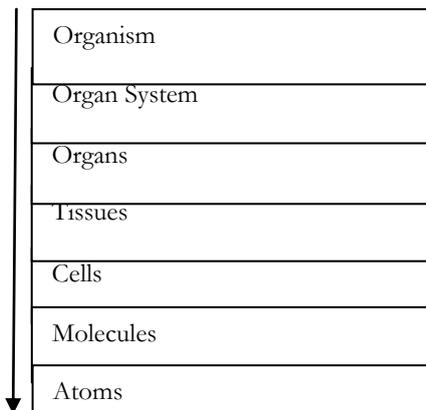
With new organisms being discovered so often, one cannot help but wonder how many species of plants and animals there are in existence today. There are still parts of the globe that have remained untouched by scientists, and so the possibility of uncovering new and exciting creatures is very high.

# The Invisible Line - The Definition

By Ajanth Varathanathan

We can clearly see that some things are living, and that some are non-living. For example a slug is obviously living, whereas a table is obviously non-living. But the table is made from wood: which came from a tree. The tree is obviously living, but what is the boundary between living and non-living things.

In year seven we learn that all living things do the following: **M**ove, **R**espire, **S**ense things, **G**row, **R**eproduce, **e**xcrete and get **n**utrition. Unfortunately, these laws are slightly flawed. For example, a mule (a cross between a horse and a donkey) can not reproduce because it has an odd number of chromosomes. This doesn't suddenly make it non-living. We can't use Mrs Gren as a law to define living things, but we can use it as a principle. Mrs Gren tends to apply to most living things, but not all. Look at the diagram:



As you can see, organisms boil down to little less than atoms. An organism is made of organ systems that are made of tissues that are made of cells that are made of molecules. The most basic living thing is the cell. The cell is made of molecules and I'm pretty sure that a molecule is not living! The question is: When does a collection of interacting

molecules, become a living cell? This is what I call the invisible line. The line that separates living and non living things. It's an illusive boundary that can't really be defined.

Maybe there isn't a boundary. Biology tends not to have fixed boundaries. Take a virus for instance. They have been described as "organisms at the edge of life", they possess genes, evolve by natural selection and reproduce. Although they have genes, they don't have a cellular structure, which is often seen as the basic unit of life. Viruses don't have their own metabolism, and require a host cell to reproduce. Are they living things? The first living things would have been much the same. We probably wouldn't recognise them as living, but as a mixture of complicated interacting molecules that give the illusion of life.

## The 'Fat Gene'

By Charles Connor and Alex Guyon

**Recent research has discovered that some people may be more prone to getting obese and will find it harder to lose weight.**

This research was undertaken in 2007, headed by Dr Ulrich Ruther, from the University of Dusseldorf in Germany. It has discovered that a person with two copies of the FTO gene is more likely to be obese than a person with no copies of the FTO gene. This may explain why obesity is predominant in white Europeans and Americans – a sixth of them have two FTO genes.

**"The typical message has been that if you are overweight it is due to sloth and gluttony and it is your fault"**

*Professor Andrew Hattersley*

Obviously if your diet is woefully imbalanced and you do not exercise enough you will probably start putting on weight. However, this

discovery seems to indicate that genetics play a greater role than previously anticipated in obesity.

As this gene is relatively unknown, scientists are not 100% sure as to how it works with humans. The German research team has only undertaken experiments in laboratory conditions with mice which makes the finding very hard to apply to humans. But several surveys, carried out by Oxford University and Professor Andrew Hattersley have given the strongest possible indication that FTO is directly linked to weight loss.

This is a momentous discovery. Hattersley believes that it may even lead to the development of obesity suppressing drugs that can work by suppressing the FTO gene in people that have two copies of it. But leading academics argue that it will be impossible to control the gene until more research is commissioned that will identify *how* the gene affects weight loss.



People carrying one copy of the FTO gene had a 30% increased risk of being obese compared to a person with no copies of that version. Those carrying two copies of the gene had a 70% increased risk of being obese, and were on average 3kg (6.6lb) heavier than a similar person with no copies.

**"This study is important because it has yielded evidence for the first obesity susceptibility gene"**

*Dr Sadaf Farooqi, Department of Clinical Biochemistry, University of Cambridge*

The dream of suppressing this gene and saving lives from obesity related diseases is still far off but this discovery paves the way for vital new research.

## *GCSE Help*

Life is introducing a column to help with the most common problems of GCSE biology. If you have any questions or area of difficulty please email:

[sai8sen@yahoo.co.uk](mailto:sai8sen@yahoo.co.uk)

The most common issues will be included in the next issue to hopefully help students reach a greater understanding of biology.

## *Life Needs You*

If you are interested in Biology then why not write for life magazine?

Articles can be on anything to do with biology but must be under 1000 words.

All articles must be sent to [andej002@suttonlea.org](mailto:andej002@suttonlea.org).

Life magazine relies upon Sutton Grammar students to fill the publication , so get writing!



## *Amazing but True*

Human lungs have a surface area of about 70 m<sup>2</sup>. If all of the capillaries that surround the alveoli were unwound and laid end to end, they would extend for about 992 km (620 mi).

It takes 20seconds for a red blood cell to do a complete circuit of the body.

An ostrich's eye is bigger than its brain

Intelligent people have more copper and zinc in their hair

There are more bacteria and microbes in our body than actual cells that make up the body.

The acceleration rate of a flea's jump is 20 times that of a space shuttle during launch.

A flea can jump 350 times its own body length. That like a human jumping 620 meters in one jump.

Mike the chicken once lived with the majority of his head chopped off for 18months , eventually choking to death as a circus manager tried to feed him by dropping food down his windpipe.