

Edited by:

Christopher Slade,

Nichols Weise

and Samuel Amis



# A Bat Out Of Hell

*Everybody has heard the myths that follow Dracula, but just how valid are they?  
The true story of the misunderstood Vampire Bat*



Article by David Cornish

An unfortunate, shared name has made the vampire bat a creature of myth and misunderstanding. Associations with Dracula, justified only by a mutual love of blood, have created endless superstition and folk stories: that these remarkable flying mammals drink human blood, or are capable of shifting in form between man and bat. However, what the myths conceal is one of the most highly evolved and perfectly adapted animals living on the planet Earth today.

Vampire Bats (all three species, which belong to separate genera) are native to the Americas, inhabiting tropical and sub-tropical

areas from Central and Latin America in the North to Brazil, Chile and Argentina further south. In many parts of Central and Latin America, these bats are regarded as dangerous pests, where large areas of forest are cleared for cattle grazing. Of the three species, only the Common Vampire bat feeds on mammal blood (the Hairy-Legged Vampire bat and the White-Winged Vampire bat feed on the blood of birds), but due to superstition and the potential of the bats to carry rabies which could be passed to the cows, it has become routine for the ranchers to dynamite and burn caves and roosts.

The Common Vampire Bat only hunts when it is fully dark, using low energy sound pulses to locate prey, and then infrared to find a

point on the unsuspecting animal where the blood flows close to the skin. Unique amongst bats and even mammals in general, the Common Vampire Bat is as manoeuvrable on the ground as in the air, walking on its thumbs, forwards, backwards and sideways in much the same way as a spider does. It approaches its prey on the ground, running at speeds of up to 7.9 km/h. If the animal is hairy, it uses its canines and cheek teeth to shear an exposed patch of flesh. It then uses its razor sharp incisors (which lack enamel, making them easier to keep sharp) to make a cut 7 mm long and 8 mm deep. Vampire bat saliva contains a number of anticoagulants such as 'draculin' to prevent the victim's blood from clotting, keeping red blood cells from sticking together and veins near the wound from constricting. This ensures a constant blood flow, which the bat then 'laps', rather than sucks, a popular misconception.

A typical vampire bat weighs 40g but will consume up to 20g of blood in a single feed. This would make it impossible for the bat to then fly away but for a number of other adaptations.

Within minutes of beginning to feed, the bat is already excreting large amounts of blood plasma, which has no nutritional value. However, even with this rapid processing and digesting of the blood, the bat has still gained 20-30% of its own bodyweight in an average 20-minute feed. To take flight, the bat uses its thumbs to leap high into the air, propelling itself rapidly upwards before extending its 20 cm wingspan to take flight. It then returns to its roost around 2 hours after having set out.

(continued on page 2)

## Inside This Issue of Life

|                                |   |
|--------------------------------|---|
| Amis' Ailments                 | 2 |
| Vampire Bats, (continued)      | 2 |
| The Neurology Page - amygdalae | 3 |
| Science In Crime               | 3 |
| Four Limbs Extra               | 4 |
| Invasive Species               | 4 |
| Marfan Syndrome                | 5 |
| Molecule of the Month          | 5 |
| Sports Science                 | 6 |
| Life Quiz                      | 6 |

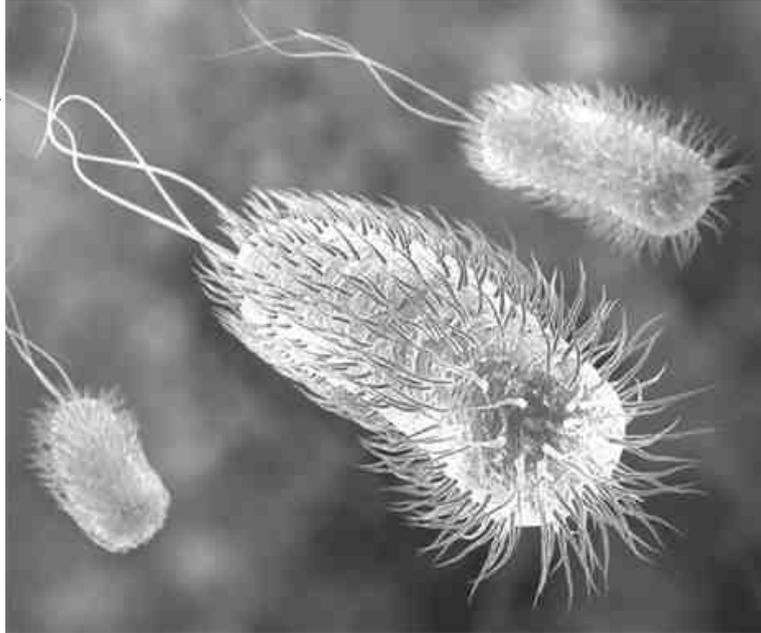
# Amis' Ailments

*'A look at some of the more gruesome and obscure diseases, that plague mankind'  
- Necrotizing Fasciitis*

By Sam Amis

As far as the producers of medical dramas are concerned, everyone who walks into a hospital nowadays has an aggressive, debilitating and exceptionally rare condition, that they contracted in some bizarre and entertaining way. Fortunately, this is not the case and the majority of a doctor's diagnoses will be far less serious and far more mundane. However, the more uncommon and horrific afflictions do tend to be far more interesting, which is why I've decided to write this column about the most obscure and gruesome diseases, which you might not have even known existed.

I'm guessing most people reading this will not know what I mean when I talk about necrotizing fasciitis but will instead know it by another, more colloquial name; 'flesh eating bacteria.' This rare condition begins with an often unnoticeable infection that infiltrates the skin at a site of trauma; a small paper cut for example will be enough. The infection then spreads at the fastest rate of any disease; within an



hour the site of initial infection is incredibly painful and has begun to swell. Soon the victim suffers diarrhoea and vomiting as the area of inflammation worsens, often with the skin turning violet and blisters forming. By this stage, only several hours since contamination, the swollen tissue is decaying rapidly and the patient experiences a high fever as the bacteria overwhelm any ineffectual immune response. There is a 30% mortality rate and most of the survivors suffer disfigurement to some

degree when the diseased tissue has to be removed.

As the disease progresses so quickly and is at first very similar to any other minor bacterial infection any treatment must be fast and effective. The appropriate antibiotics must be determined quickly as they take time to act on the infection, time the victim does not have. By the time they have begun to control the spread of infection, through the deeper layers of the skin and

the subcutaneous tissue below, a large mass of tissue may have already died. Despite the title of 'flesh eating' it is the toxic by-products of bacterial metabolism that causes the decay of the tissue and the subsequent surgical removal of any dead and diseased tissue. It is not uncommon for someone suffering from this disease to lose whole limbs and even have several surgeries as only a tiny segment of diseased tissue has to survive to restart the infection.

Many strains of bacteria can cause this condition as most produce similar by-products, but it is important to note that it is very rare for a bacterial infection to manifest itself as 'flesh eating bacteria,' the majority of the time the infection will cause a less serious condition. The worst form of the disease is now caused by MRSA (*Methicillin Resistant Staphylococcus Aureus*), which as you'll all know from our previous issue, is resistant to most antibiotics and therefore can cause an even more prolific form of this issues gruesome and obscure ailment: necrotizing fasciitis.

(continued from page 1)

Vampire bat colonies, in old wells, hollow trees, caves and buildings, typically number just a single male and around twenty females and their offspring, though have been known to number in the thousands. They will often roost with other species of bat (which has created problems when beneficial fruit bats have been killed in Latin America by attacks on vampire bat roosts). These colonies are extremely so-

ciable, with bats grooming each other and, when an individual has failed to feed, the regurgitating of blood from mouth to mouth to prevent starvation.

After a feed, due to the large amount of protein consumed, vampire bats excrete extremely concentrated urine, controlled by a number of specialised hormones. Vampire bats mate all year round but usually have only one offspring per year, as their gestation period is six-eight months.

Hopefully this shows that despite the controversy surrounding the vampire bat, stemming from its name, it is one of the most highly evolved and misrepresented of creatures

*The vampire bat is found in areas of Central and South America*



# Corpus Amygdaloideum

By Edmund Bradbury

The amygdalae are neural structures connected to the hippocampus and the hypothalamus. These small areas of the brain are mainly responsible for emotional processing. More recently, research has shown the amygdalae to also play a role in our understanding of fear.

People with autism often have certain skills which are more highly developed than the general population, such as advanced mathematical skills. However, autistic people often seem emotionally remote or disconnected socially. If we look at fMRI (Functional Magnetic Resonance Imaging) scans of people trying to work out how people around them are feeling, using facial expressions, we see that the amygdala shows increased activity. People with autism show dramatically reduced amygdala activity, which may account for the 'social disconnection'.

In colloquial terms, the amygdala could be described as the "gut feeling centre" of the brain. When people take the 'eye reading' test, (a test involving showing pictures of people's eyes, and the subject must determine the emotion of the person in the picture) it is often found that if people answer the questions quickly without thinking too deeply about each question, and trusting their "gut feeling" they achieve higher results. This is because the "gut feeling", triggered by the amygdala is working all the time in social situations without us noticing its actions. We are effectively, from children, trained to recognise emotions from facial expressions quickly. The more we think about the problem in the 'eye-reading' test, the more the frontal lobe of the brain

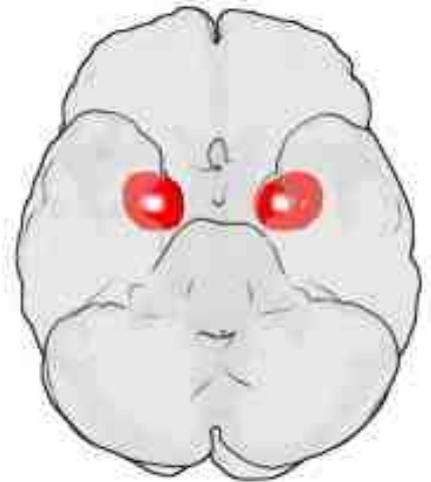
works. This conscious, logical area of the brain is not used to working out facial expressions, explaining the decrease in correct answers.

Most people's amygdalae are automatically and naturally developed to recognise a huge range of emotions, however, in the case of an autistic person, they must learn to recognise these emotions artificially. Researchers have developed an "encyclopædia of emotions" which can be learnt and memorised, to help autistic people to improve their social skills.

One of the amygdala's more intriguing properties, is its ability to store fear memories. In the 1980s, Professor Joseph LeDoux did an experiment on the fear response in rats. A tone was played and simultaneously a shock was delivered to the rats. Even from the first pairing of tone-shock the rats started to fear the tone itself. He then tried to find where in the brain this fear memory was being created. Starting with the auditory cortex he removed parts of the rat's brain until they could no longer learn to fear the tone. After much research he found, using a tracer dye, a connection to the amygdala. When the amygdala was removed from the brains of the rats, they could not learn the fear response.

The memories stored by the amygdala, are very basic, they do not contain all the information stored by traditional memories, but simply a stimuli-fear pairing.

For instance, if one were walking in a forest and one saw a sudden movement to one side, one would not think, "bear!" and then feel fear, one would feel fear first. Adrenaline would be released; this is all the triggered



reaction from the amygdala. Then the conscious part of the brain would think of an explanation for the stimulus: "bear!".

The fact that the memories are simply fear responses, can lead to completely irrational fear, or phobias. Someone who has had a bad experience of, say a bird as a child may have a fear response upon seeing a bird, simply from the memory stored in the amygdala. Even if the bird seen was safely caged, meaning that the person is completely safe, the amygdala would still trigger a fear response, despite the conscious part of the brain knowing that the person was not at risk.

The study of the amygdala has helped us to understand the many different layers of interpretation or "thought" the brain is capable of; the logical conscious areas can be influenced by the more primitive, subconscious elements of the brain, such as the amygdalae.

## Science In Crime

By Oliver Curwen

### The Case: Dandelion Poisoner

During the year 1922, Arthur Martin fell ill because of arsenic poisoning. In the early 20<sup>th</sup> Century, one could buy arsenic as a means of killing dandelions. Obviously, one could not buy enough to kill a human. One man, Major Armstrong, however had bought enough arsenic and kept it, to take out his company's opponents. He was eventually arrested and executed. Arsenic is an element on the Periodic Table and is also

classified as a Class 1 Carcinogen. Dimer-caprol is a drug that was developed to combat arsenic poisoning. To test for Arsenic poisoning, one must dissolve any of the infected person's tissue in Hydrochloric acid and then place a copper strip in the mixture. If a dark grey coating forms on the copper strip, Arsenic is present.

**My Score for this poison:** 9/10. It is not immediate, giving the attacker time to run; the time it takes to release symptoms is approximately two weeks. Arsenic is expensive and only found in Mexico, The Andes, Russia and The Alps.



# Four Limbs Extra

By Nicholas Weise

**India, 2005.** On the eve of Diwali a girl is born to a rural Indian family who live in Bahir. But this is no ordinary girl. Whereas most people have two hands and two feet, she has four of each giving her eight limbs in total. As she was born on the night when all Hindus celebrate the benevolence of the Goddess Lakshmi (who is also believed to have four arms) she is named after the deity.

Last year in October Lakshmi Tatma, the girl with eight limbs, celebrated her second birthday. However, unlike the other children her age, she could not walk as she had control over her uppermost arms and legs but not the lower pairs. Realising that her extra arms and legs would hinder her motor skills, her parents took her to their local doctor who referred them to specialists at a nearby hospital. Here it was discovered that Lakshmi was not one child, but two. She was another example of conjoined twins (joined



at the pelvis), however in this rare case the second and until then unrecognised twin had no head leaving just most of the ribcage and four extra limbs.

It was deemed necessary, that Lakshmi undergo an operation to separate her from her

twin, in order that she live a full and normal life. Without the operation, she would not have been expected to reach her teenage years. The operation took place in November 2007. It had been estimated that the whole operation would last for 40 hours with 30 medics working on the child, but in reality it lasted only 27 and was a complete success. It involved removing the extra limbs and duplicated organs of the headless twin from Lakshmi and re-angling her bladder and pelvis so that she would be able to walk on her own two legs. It was also necessary to transplant the single, shared kidney to Lakshmi from her undeveloped sister.

Several people had been opposed to the operation believing that this girl was the reincarnation of a Hindu Goddess. In her old village people used to queue to receive blessings from her. But her parents were more interested in her living the happy and normal life, which should now be possible for her.

# Invasive Species

By Nick Pepper

So, what is an invasive species? Has it come from outer space? Is it going to overthrow earth? Fortunately the answer is no. An invasive species is a species that has been imported from another country that would otherwise be out of the species' range. This is a major threat to biodiversity; it is second only to habitat destruction and as such has caused governments internationally to try to reduce the risk, that the invasive species cause. In the next few lines I will tell you why.

## Problems of invasive species

Non-native species entering countries was not a problem until the modern age. Before natural barriers like the sea, mountains and inhospitable climates stopped species from spreading to habitats unsuited for them. Now, in the jet set age a species can find itself transported to anywhere in the



world. This really poses a problem when the foreign species enters the ecosystem of its new home. In their new habitats the new residents can out compete other organisms and dominate the food chain. This can cause all sorts of problems; the severing of the food chain means that some species can become extinct and habitats uninhabitable for others. This is why governments are keen to pre-

vent foreign species entering their countries. A classic example of extinctions as a result of invasive species is that of the grey squirrel.

## The grey squirrel

The grey squirrel was originally introduced to 30 different areas of the UK, it was imported from the USA and Canada and adapted well to its surroundings.

There would have been no problem, were it not from an unseen danger in the grey squirrels. They carried a virus in their fur, a virus to which they were not susceptible, but which was absolutely lethal to the grey squirrel's neighbour, the red squirrel. It was so damaging that even today there are only 160,000 red squirrels left in the UK. The grey squirrels also had another impact, this time on the timber industry. They would strip the bark from broadleaved and coniferous trees. The damage was valued at around £10,000,000.

A simple walk through Manor Park today will reveal the extent of which the problem has spread. There are millions of grey squirrels in Britain at the moment and despite being easy to catch, the problem has not and is unlikely ever to be solved.

# Marfan- The Tall Man's Syndrome

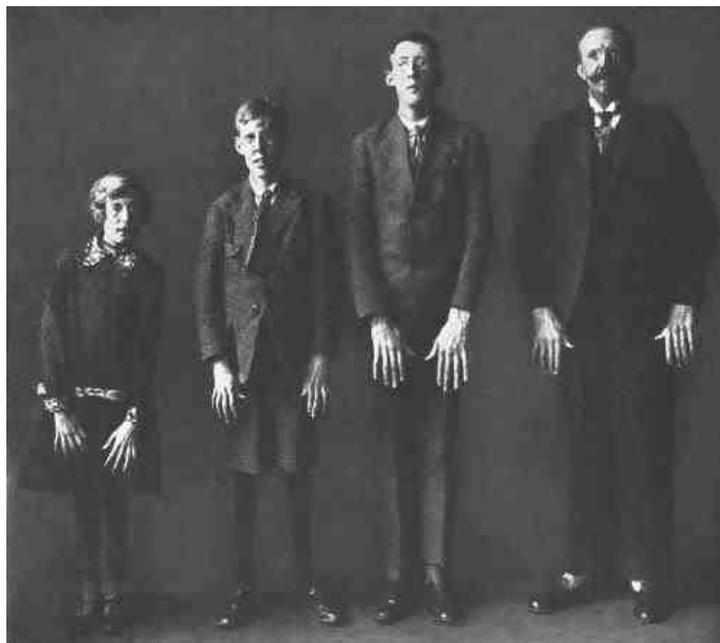
By *Ali Jawad*

Have you ever wondered why some people are freakishly tall with very extensive arms and fingers? The answer maybe that they suffer from Marfan syndrome: an incurable, genetic disorder of the connective tissue mainly distinguished by a tall stature, elongated limbs and having cardiac and ophthalmic complications. Studies show that 1 out of every 5,000 people in the world have been diagnosed with Marfan Syndrome. The condition can affect anyone regardless of gender, ethnicity or age however it is still seen as a relatively rare disease.

Most people with Marfan Syndrome are taller than normal and males can reach at least 6'5" while most females are taller than 6'. Nonetheless there are some truly dangerous symptoms which predominantly relate to the heart and eyes. The problem is that sufferers have a defect in the FBN1 gene which produces a vital protein called fibrillin. This protein is absolutely crucial for the formation of elastic fibres in your con-

nective tissue which are in the ligaments, joints and the structure that connects your heart, eyes, lungs and bones throughout your body. This means that these structural proteins used are far weaker than they are meant to be. Now imagine a heart under stress, pumping vigorously, how far can it go until the connective tissues on your heart tear?

Nevertheless it's not all doom and gloom, there are some very effective treatments, but each of them are aimed at any one of the symptoms. Doctors advise victims of Marfan Syndrome to take regular eye tests so that the doctor can prescribe glasses and contact lenses which very much improve the quality of life. Orthopaedic surgeons also check the curvature of the spine who may prescribe a removable brace to stabilize the spine, and additionally, cardiologists make several scans and can even prescribe beta-adrenergic blockers which prevent aortic dilation. As you can see the quality of life can be improved significantly and cases can be stopped



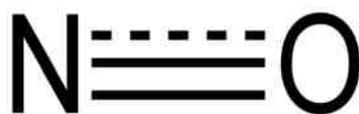
from increasing in severity all by continual assessment and examination.

There are numerous ways to diagnose someone with Marfan Syndrome, the physical effect is quite evident and through close inspection doctors can confirm that a case is in fact Marfan Syndrome. However many developing countries still do not have the

knowledge or a sufficient enough health care system to measure how many people are actually suffering from this fatal and unique illness. MFS is, in spite of everything, quite a complex disease and this is illustrated by the fact that even now the world of medicine still cannot find a cure for this extraordinary human defect.

## Molecule of the Month

### Nitric Oxide



response to external stimuli, and then carry it to a conclusion themselves. But apoptosis is extremely important in keeping the body healthy.

When the cell receives the correct signals telling it to undergo apoptosis, a certain type of enzymes known as 'caspases' are activated. These begin to break down key components of the cell, such as DNA, repair enzymes and proteins in the cell structure. In turn, 'DNases' are activated, which begin to break up the DNA in the cell's nucleus. Finally, the cell shrinks and deforms as its structure breaks up. It wraps itself

into a form that is easily accessible to macrophages. These cells are a type of phagocyte specifically responsible for clearing up the remains of suicidal cells.

This process has many important applications. In the immune system, cells known as T-lymphocytes are responsible for triggering apoptosis in damaged or infected body cells. This helps to fight viral infections, and prevents cells with corrupted DNA becoming cancerous. T-lymphocytes themselves are 'screened' before they enter circulation, with potentially dangerous mutant lymphocytes be-

ing forced to undergo apoptosis. Mutant lymphocytes could attack healthy cells, and this is thought to be what causes some degenerative diseases.

Nitric oxide is one of the chemicals that regulates apoptosis. It has various effects depending on the dosage and the cell type it is directed at. It has various different effects. In some tissues it will induce apoptosis in the cells, while in others it will inhibit it. This means it could have potential in treating some degenerative diseases, as these are thought to be caused by too much apoptosis, leading to degeneration in tissues.

It's such an amazing molecule; it's back for a second time! As well as its role in immune responses, nitric oxide also helps in apoptosis, or programmed cell death.

Apoptosis may seem a strange thing for an organism to develop, the controlled suicide of its own cells. Cells begin this process in

By *Richard Morris*

# Sport Science - Steroids

By Alex Grimes

Anabolic steroids are a drug used to help people exercise and to enhance the size of their muscles. Steroids are not illegal drugs (laws change from country to country) however almost all sports have banned the drugs, calling them an unfair advantage and cheating. However steroids can have some severe side effects. There are many different types of anabolic steroids, one being testosterone.

Anabolic steroids are also known as anabolic-androgen steroids (AAS). Many people think of steroids as muscle building drugs. This is in a way true, what they actually do is increase protein synthesis which results in a build-up of cellular tissue, in particular muscle tissue. This means it is easier for people to grow larger muscles. Another things that people use steroids

for is that anabolic steroids maintain male characteristics. They can deepen voices and increase the growth of body hair. This is due to the virilizing and androgenic properties of steroids. Although this article is focused on sport, there are medical uses for Anabolic Steroids such as bone growth and increasing appetite.

However, as mentioned earlier anabolic steroids are banned in most sports, including football, tennis, cricket and athletics. Use of drugs such as this in sport can result in players being banned. An example of this was the 400m world champion Christine Ohuruogou who was banned for several years previously due to missing drug screenings.

There are many side effects of anabolic steroids. A lot of these are gender specific. The two main side effects are increased



blood pressure and a change in the balance of cholesterol. They may increase the amount of bad cholesterol, also known as LDLs (low density lipoproteins) and a decrease in good cholesterol, also known as HDLs (high density lipoproteins). There are also several more illnesses caused by anabolic steroids; however there are two many too list. Gender specific side effects include:

growth of breast tissue on males, temporary infertility in males and increased body hair on women.

In conclusion anabolic steroids help people in sport. However they are not allowed in most major sporting bodies as it is considered cheating. There are also many severe side effects that can be fatal, in the worst cases.

## That's Life

By Joe Robinson

**Q1.** What's the largest living thing on Earth?

**Q2.** What's the biggest thing a whale can swallow

- a) A large boat
- b) A small car
- c) A grapefruit
- c) A sailor



**Q3.** How many legs do centipedes have?

**Q4.** In the world, what country do most tigers live in?

**Q5.** How long do your hair and fingernails grow after death?



**A1.** It is not the blue whale, in fact it is a giant mushroom. The honey fungus mushroom is extremely common and grows on rotting wood. In the Malheur National Park in Oregon there is a honey fungus which covers 890 hectares! Most of this is underground and it is believed to be between 2000 and 8000 years old.

**A2.** C. A grapefruit. The whale's throat has the same diameter as its belly button, about the size of an average dinner plate.

**A3.** Not 100. The centipede closest to having a hundred legs had 96. The majority of centipedes have an odd number of paired legs and this can range from 15 to 191 pairs.

**A4.** The USA, in captivity.

**A5.** Hair and fingernails do not continue to grow after death. It is simply the skin of the body shrinking giving the appearance of longer hair and fingernails.

*Life—Now presented to you by a new editing team, with thanks to Jack Shepherd, for his efforts in the past year.*  
*Please keep sending in your articles to Chris Slade at Twoosa@aol.com*