Dis Information

AND OTHER WIKKID MYTHS

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I dedicate this book to the Internet, for its excellent role in disseminating Dis Information…

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Alcohol and Antibiotics

Antibiotics are one of the greatest success stories of modern medicine—up there with the discovery o vaccination, and the discovery that you shouldn't mix your drinking water and your toilet water. Like all drugs, antibiotics can have their bad side effects, but their benefits are enormous. Even so, some people wrongly believe that antibiotics are so dangerous that they should never be used. And, specifically, lots of people also wrongly believe that you should not drink any alcohol while taking antibiotics.

History of Antibiotics

Antibiotics go back a long way. The Chinese first used antibiotics about 2500 years ago. Back then they realised that the fungus that grew on soybean curd could cure boils. This ancient wisdom was known even earlier to the healers of Egypt and Mesopotamia. The soybean fungus was making a chemical (streptomycin), one of the first antibiotics. If you ate this antibiotic, it killed the bacteria that caused the boils. In fact, this same fungus today gives us streptomycin, which is our main defenc against the bacterium *Yersinia pestis* that caused the bubonic plague.

In 1910, Paul Ehrlich helped introduce Salvarsan (containing arsenic) to successfully treat syphilis. The sulfonamide family of antibiotics was introduced in 1932, and some of them are still used today.

The first really powerful and widely used antibiotic, penicillin, was discovered by Alexander Fleming way back in 1928. Once again, it was made by a fungus. This fungus was called *Penicillium notatum.* Fleming noticed that a chemical made by this fungus would stop *Staphyloccus* bacteria fron growing. Unfortunately he was a bacteriologist, not a biochemist, so he could not purify this mysterious chemical. Even so, he wrote about his discovery in the *British Journal of Experimental Pathology* in 1929.

In 1938 the brilliant biochemist Ernst Chain read this paper and managed to isolate and purify this mysterious chemical—not to try to invent a wonder drug, but just out of scientific curiosity. He called it 'penicillin', after its parent fungus. He worked in a pathology lab at Oxford University, whic was run by Howard Florey. At first, Chain didn't get much support from Florey. Chain wanted to test his penicillin by infecting two mice with bacteria and then injecting penicillin to see if it cured them —but he didn't know how to do injections, and Florey wasn't interested in helping. Chain had to get another colleague to inject the mice first with the bacteria and then with his mysterious penicillin. Th penicillin worked, the mice recovered fully—and suddenly Florey was very interested.

The Golden Age of Antibiotics

The next step was to test pencillin on humans. It was painstakingly difficult to get any penicillin at a but eventually they had enough. In 1940 a 48-year-old London policeman, Albert Alexander, made a tiny cut in his skin while shaving. A bacterium invaded his body through this cut and soon infected him. At death's door, he was rushed to the Radcliffe Hospital with a temperature of 40.5°C. Florey ar Chain gave him penicillin and he began to recover. After five days they ran out of penicillin,

andAlexander began to worsen. They managed to purify some penicillin out of his urine and he began to recover again. Finally there was no more penicillin, and Albert Alexander died. Florey and Chain had showed that penicillin worked, and that it wasn't harmful. So the treatment worked—but the patient died.

The Loving Lurgies

Tiny quantities of penicillin were soon made available to cure a very small number of people. Even though Fleming had long stopped researching *Penicillium notatum,* he still kept an eye on it. He had a friend who was dying from an infection, and managed to get him cured with some of the precious penicillin.

Chain and Florey were very concerned that a Nazi air raid might destroy their building and all their research. Before they went home each night, they would rub some of the raw fungus inside the pockets of their trousers. So if their lab was flattened overnight, they would still have some fungus le with which to start up again.

More is Better

Chain had been brilliant in isolating and purifying penicillin; Florey was brilliant in the next stage—ramping up from small quantities to mass production, by using some of the technology employed in

brewing beer. He grew the *Penicillium notatum* fungus in enormous 95 000-litre vats with air bubblin through. This meant that the fungus could grow anywhere in the volume of the tank, not just on the surface.

But *Penicillium notatum* did not make enough penicillin, especially of the quantity required to deal with the massive number of wounds and infections caused by World War II. As soon as the scientists realised this, they set out on a search for more productive penicillin moulds, from rainforests to the backs of people's fridges. Mary Hunt, a laboratory worker in Peoria, Illinois, hit the jackpot when she brought in a canteloupe (rockmelon) infected with a 'pretty, golden mould'. This particular fungus was *Penicillium chrysogeum*—and, in its natural form, it delivered 200 times as much penicillin as *Penicillium notatum.* By the time Florey and his American colleagues had finished mutating the new fungus with X-rays, and selectively breeding it, they had something that yielded 1000 times more penicillin than *Penicillium notatum.*

In the five months from January to May 1943, they could make 400 million units of penicillin. By the end of 1945, the American factories were making 650 billion units each month. Also in 1945, Fleming, Chain and Florey shared the Nobel Prize for Physiology or Medicine.

Wonder Drug

The first batches of penicillin in 1943 were reserved specifically for the military. Later, as larger quantities were produced, it was made available to civilians, first only for life-and-death cases, and then for general use in the community.

Penicillin was truly a miracle drug when it was first introduced. It worked quickly and effectively against pneumonia, meningitis and hundreds of other deadly diseases. It was also especially effective against what were then called venereal diseases (VDs) and are now called sexually transmitted diseases (STDs).

The Myth

The VD clinics of the 1950s and '60s gave the sombre and serious advice that alcohol should absolutely never be used while taking penicillin. But, in reality, there were—and are—no significant chemical interactions between penicillin and alcohol. The real reason the VD doctors and nurses gave this advice was based on moral, not pharmacological, grounds. They were worried that alcohol would reduce the inhibitions of the VD sufferers, who, while under the influence, might get a little 'frisky' and pass on their infections to other people—before the penicillin had a chance to cure the sexually transmitted diseases.

And that's how the mythconception that alcohol should never be taken with antibiotics arose.

Even so, it's well known that alcohol can interact quite nastily with a small number of modern drugs such as tinidazole (brand name Fasigyn) and metronidazole (Flagyl), potentially causing nausea, vomiting, abdominal cramps, headaches, fast heart rate and flushing. And alcohol can reduce the absorption of other antibiotics, such as the doxycyclines and some other tetracyclines. But these few interactions are well known to both medical doctors and pharmacists.

Mind you, too much alcohol can put an extra load on your liver and immune system, can impair your judgment, liberate aggressive tendencies, reduce your energy state—and be associated with staying up late, behaving recklessly and not getting all the rest that your body needs to heal itself. So half a glass of an alcoholic beverage of your choice would be fine with most antibiotics, but probably

no more than that…

Another True Reason

Another‘reason’ people were told about why antibiotics and alcohol did not mix was to help keep the peace while at war. The story goes (and I have no written reference for this, only personal anecdotes from World War II soldiers) that during World War Two there was some occasional friction between the American and British military units stationed in Great Britain. Apparently, there were so many fi fights while under the influence of alcohol that the US Army Surgeon General recommended that the soldiers should not mix alcohol and antibiotics.

Penicillin Kills Guinea Pigs, but Not People

Most drugs are tested on animals before they’re released onto the market. Luckily for us, penicillin did not get tested on guinea pigs—because it kills them. If penicillin had been developed in peacetime, and in a more litigious society, it might have never come to market.

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Jetsetting Germs

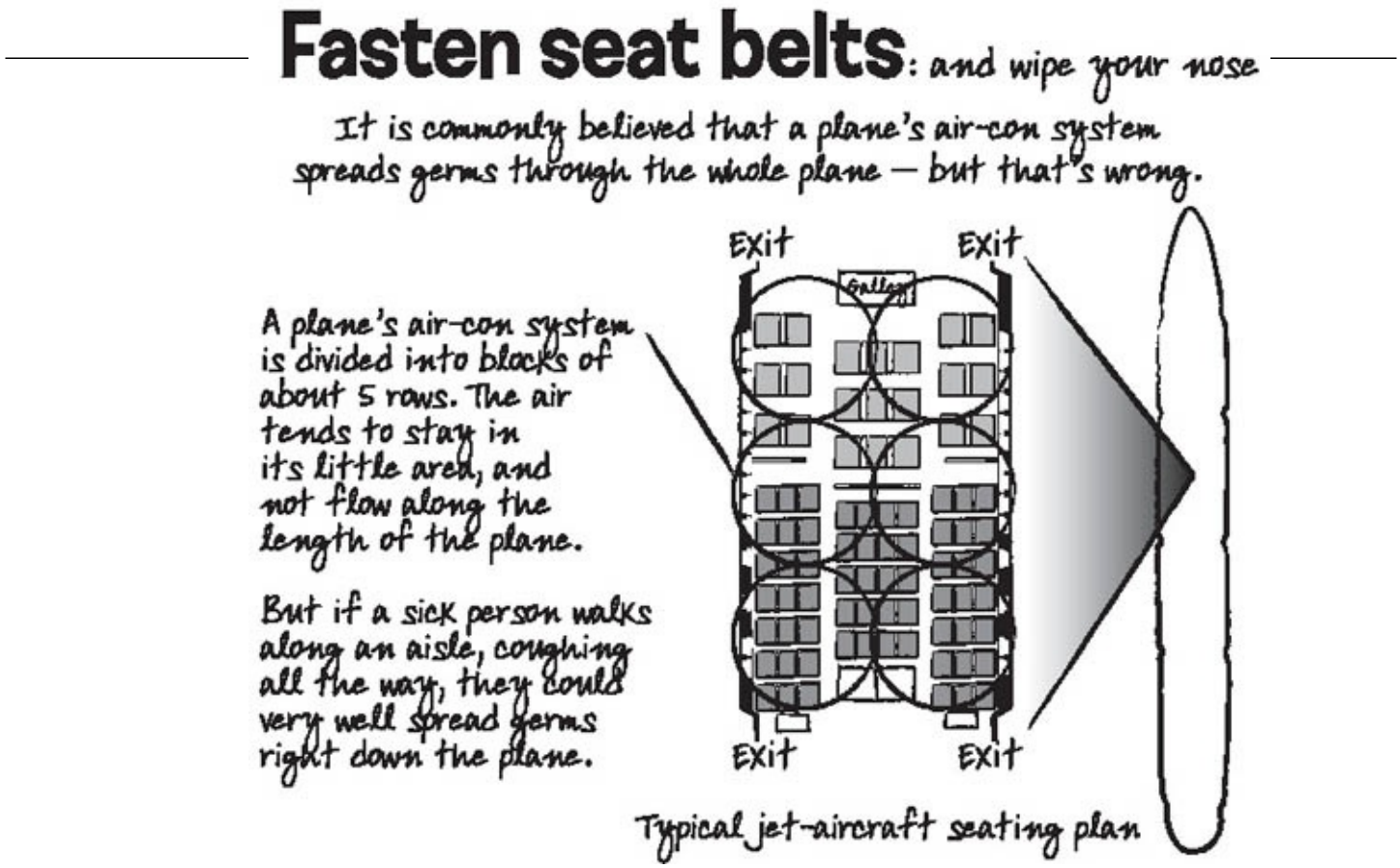
I spend a lot of time inside those high-speed aluminium tubes with wings called jet planes. The maximum number of flights I've had in one calendar year is 104, but nowadays I'm more sensible, so last year I took only 67 flights. Many people believe that in planes the air conditioning system spread the germs through the whole plane, and so you are more likely to pick up an infectious disease from other passengers in the plane—but that's wrong.

Going on a holiday, leaving your daily life behind and arriving somewhere lovely and different, is very nice. The actual experience of flying, however, is not that pleasant. For example, an aircraft cabin gives the smallest volume of air per person of any public space. So, while the air conditioning may not give you diseases, it doesn't really give you that much air.

Thrill of Flying

Your typical jet plane is noisy. When I started flying a lot, I noticed that my fellow passengers comin off jets were talking to each other very loudly. This was a result, I thought, of them being slightly (an temporarily) deafened by the background noise on the plane—from the air rushing over the body, the jet engines, and so on. So I started wearing earplugs during an entire flight. When I took them off at the end of a flight, I noticed that the other passengers were talking to each other more loudly than the had at the beginning of the flight, which seemed to prove my theory. Nowadays, I wear noise-cancellation headphones on jets with plug-in sound systems, and earplugs on puddle-jumpers (planes with propellers).

Your average jet plane is very dry. The air is at 10–20% humidity instead of a more pleasant 40%. Each person on a plane breathes and sweats out about 100 ml of water each hour. On a typical trans-Pacific flight (for example, Sydney to Los Angeles), this works out to be approximately 600 kg of water. (By the way, some of this will condense in the cavity between the cabin wall and the aluminium skin of the plane and can possibly cause corrosion, or degrade the wiring insulation.)



The air pressure in the cabin is lower than normal—about 70–80% of sea-level air pressure. You breathe in less volume of air with each breath, so your oxygen saturation levels are lower. In one stud of 84 people aged 1–78 years, about half had their oxygen saturation level drop to a relatively low 94% when the plane was at cruising altitude. If you were a patient in a hospital with an oxygen saturation level of 94%, the hospital doctors would seriously consider giving you oxygen from a mas This low oxygen level would slightly reduce your thinking capacity; the low air pressure is also thought to cause your legs to bloat a little.

Finally, planes are squashy. Dr M.B. Hocking from the Department of Chemistry at the University of Victoria in Canada wrote that 'air travellers represent one of the most diverse groups o people called upon to sit in close proximity for prolonged periods with the smallest available air spac per person of any current social setting'. Each passenger in an aircraft cabin gets 1–2 m^3 of air space This is much less than the 4–10 m^3 of air they would get in an auditorium, 10–20 in a ballroom, or 10 30 in an office building.

Because of these cramped conditions, many people believe germs run rampant on planes and lea happily from one person to the next in a domino effect. They also believe that they are likely to pick up an infectious disease from other passengers because the air-conditioning system spreads bacteria through the entire plane.

Pressurised Planes

In the old days (before World War II), planes were not airtight and air leaked in and out. The air pressure inside the plane was the same as the air pressure outside.

In the 1940s, aircraft cabins were pressurised so that the crew (and passengers) would remain conscious at higher altitudes. In a jet engine the outside air is sucked in, heated (to 250°C) and compressed (to 30 atmospheres—1 atmosphere is 10 tonnes per m^2). These conditions will definitely

kill all known germs. Some of this sterile, hot, compressed air is bled off, expanded, cooled down and then fed into the cabin to increase the pressure. Modern planes have several outlet valves through which the cabin air 'leaks' into the thinner air outside. The flight crew in the cockpit controls the cabin pressure by operating these valves—how many are open, how far open they are, etc.

There are advantages and disadvantages to a pressurised cabin. On one hand, a plane flying at 30 000 ft (9 km) saves about 38% on fuel costs. This is because the air is thinner at this altitude, so there is less resistance to the plane pushing through the air. But on the other hand, the plane has to be pressurised so that the passengers and crew stay conscious. Thus, some of the 'working air' has to be stolen from the engine to pressurise the cabin. This gives a penalty of 2% of fuel cost for the extra energy needed to pressurise the cabin. You can see that the fuel savings (38%) massively outweigh the costs (2% extra).

Cabin Air—Dump or Recycle?

Back in the early days of pressurising cabins the air was fed in and then dumped, so that the passengers breathed the air only once. This was very good for the passengers, but it cost fuel. So the plane-makers introduced recycling of some of the cabin air, in order to bleed less air from the engine. The 1945 Boeing Stratocruiser was one of the first planes to recycle passenger cabin air.

The advantage of recycling air is that it saves the airlines about US$60 000 per jet plane each year. The disadvantage is that the passengers breathe air with higher than normal levels of carbon dioxide. Other factors (such as low humidity) make the air not quite as lovely as rainforest air.

The fact that the flight crew determines how much of the air is recycled and, hence, the quality of the air you breathe helps explain why sometimes you come off a plane feeling okay, while other times you might have a slight headache. By the way, the flight crew in the cockpit usually has totally fresh air that has not been recirculated, for safety reasons.

Back in 1970, a passenger in an average aircraft of the day would get 7 litres per second of outside air. By 2000 this had dropped as low as 2.8 l/sec and, occasionally, 1 l/sec. You can see this trend in different models of the Boeing 737: a 1967 737 – 100 provided 7.6 l/sec, but this had dropped to 4.8 l/sec in the 1984 737-300. This amount of outside air is much less than that recommended by many experts, who would prefer the rate to be 15 l/sec.

Aircraft Air and Germs

Today, recycled air in planes is cleaned with filters that can remove bacteria. These filters are present in about 85% of the planes that carry over 100 passengers, but usually not in smaller planes.

So what about germs swirling around in the cabin air of a jet with air filters? It turns out that you are probably more protected from germs in a plane than if you work in an office.

The plane's air-con system is divided into blocks of about five rows of seats. The air tends to stay in its little block, and not flow along the length of the plane. The air in the plane's cabin comes out of vents in the ceiling, flows over the passengers and then back into the air-con system via vents at floor level. Each cycle takes about 3–5 minutes. About 63% of germs are removed on each cycle, thanks to the combination of some fresh air being admitted on each cycle, and the filters. So the germs from one person are not spread along the length of the plane by the air con—they stick in the block of five seats. You can be infected by the air con on a plane, but only by people near you—which is the same as going to the supermarket, or travelling on a bus. However, if a sick person walks along the aisle

coughing all the way, they might spread germs right down the plane.

Therefore, it's not impossible to get sick on a plane. And one study predicted that the infection rate on a plane could be halved if you doubled the ventilation rate. But this would cost about $1 in fu per passenger on an eight-hour flight, and in that case most airlines would earn less on their investment than they would from putting the monetary equivalent to that investment in a bank and earning interest. On the other hand, how much does it cost society to care for sick people? Maybe the airlines could crank up the ventilation rate during outbreaks of infectious diseases?

Dr Ron Behrens, a consultant in Travel Medicine at the London School of Hygiene and Tropical Medicine, said in *New Scientist* magazine that departure lounges at airports are far riskier than the actual flight.

Aircraft Carry People with Germs

There is one major infectious diseases risk associated with planes—spreading diseases around the world.

Each year, over one billion passengers fly on planes, with about 50 million passenger flights to the poorer countries (where many new diseases start). Since the 1960s, influenza epidemics have followed major air-transport routes. Back in the 14th century, the Black Death took about three years to get from southern Italy to Great Britain via rats. Today, a passenger on a jet can carry infectious diseases anywhere in the world in a few hours—but probably won't infect the other passengers on the jet.

Squashy Planes

Over the years the airlines have reduced the seat pitch (distance between the seats) in an effort to stu in more passengers. The SeatGuru website (**www.SeatGuru.com**) gives information regarding seatin on specific aircraft on specific airlines, e.g. which seats on the plane are extra quiet, have extra leg room or a non-restricted recline.

Spreading Disease with the Greatest of Ease

Different diseases range in how infectious they are. They can be very infective, such as the common cold, or much less infective, e.g. leprosy.

They spread by different methods too. Some will spread only by direct blood-to-blood contact; others will spread by kissing or prolonged face-to-face contact with one person breathing in another person's exhaled air. Other diseases will spread when one person inhales the infected saliva droplets of an infected person.

Different diseases also need different numbers of infective particles (bacteria, viruses, etc.) to have a reasonable chance of infecting you.

It is not a good survival policy for a disease to be very nasty and very quick to act. In that case, i might kill its host before it has a chance to infect another person, and then it might die out.

UV Light and Sick Buildings?

'Sick Building Syndrome' was first recognised in the 1980s. People in such buildings suffer

respiratory symptoms such as asthma, itchy eyes, stuffy nose, and so on. It turns out that some of these symptoms are caused by germs (such as bacteria and fungi) growing in various parts of the air-conditioning system.

Ultraviolet light has lots of energy. It some cases, it has enough energy to kill germs. Dick Menzies at McGill University in Montreal, Canada, installed some UV Germicidal Irradiation lamps in the air-conditioning systems of three office blocks. This treatment reduced people's symptoms by 20–40%. The effect was greatest in non-smokers and people with allergies.

The treatment was certainly cost effective. It cost $52 to install and $14 to run for a year. It would pay for itself in less than six months if it reduced each worker's absenteeism by one day per year.

Perhaps this treatment could be used in planes, to make them even safer?

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Bullets Fired Up

One of my readers asked me this very sensible question: ‘We often see overseas images of crowds of people firing off hundreds of rounds of bullets into the air in celebration. What happens to those bullets? Surely they cannot keep heading into space for ever? When gravity finally takes over, why aren’t they falling back and killing the same people that fired them off in the first place?’ I’ve never been in one of these crowds, but I would guess that most of these revellers think that the falling bulle can’t hurt them or their friends. They are very wrong.

Going Up

The first thing to realise is that what goes up usually comes down. In the case of a bullet fired upwards, it *will* come down—but more slowly.

In most of these celebrations, the bullets are fired from military rifles. A rifle bullet is fired wit a typical muzzle velocity of around 2700 ft per second, or around 3000 kph. Once the gases stop pushing it, and it has well and truly left the barrel of the gun behind, it begins to slow down.

Two forces are acting together to slow it down. First, the resistance of the air that it’s pushing through slows down the bullet. Second, the downward suck of gravity also slows the bullet. On average, a bullet will take around 20 seconds to climb to a height of around 3 km, at which point it ha come to a dead halt. Then, after the briefest of instants, it begins to fall towards the ground.

So far we have looked at the bullet slowing down from 3000 kph to zero. Now let’s look at the bullet accelerating from zero as it falls.

Coming Down

As the bullet falls, once again it’s subject to two forces. The big difference is that this time the forces are acting against each other. On one hand, the suck of gravity is trying to make the bullet fall faster. But on the other hand, the wind resistance is trying to slow down the falling bullet.

The suck of gravity is not as powerful as the exploding gases that pushed the bullet out of the barrel. So the plummeting bullet will not accelerate to a maximum speed of 3000 kph; instead, its top speed is somewhere between 330–770 kph, depending upon the weight and shape of the bullet. Because it’s falling more slowly on the way down, it takes about 30 seconds to reach the ground from the top of its flight.

This is the essential difference: the maximum speed on the way up is around 3000 kph, but on th way down it’s about 770 kph.

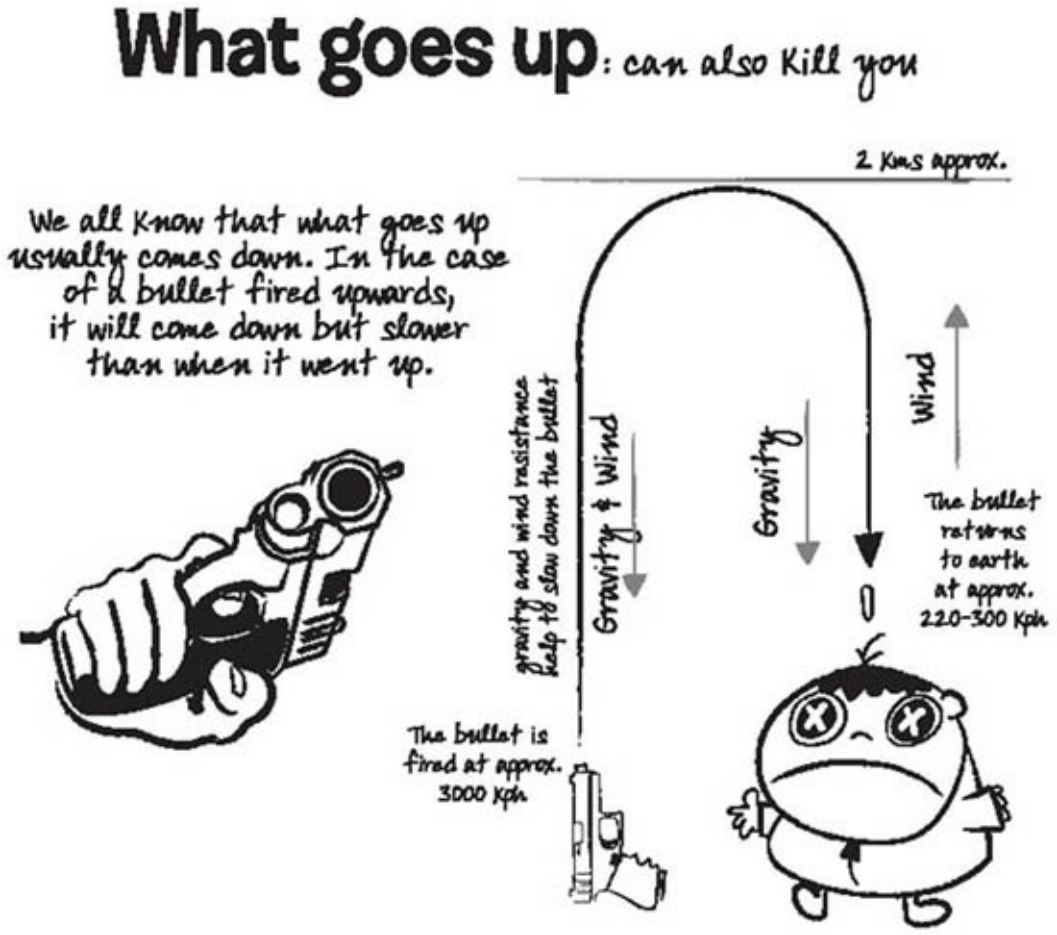
Injuries and Death

A speed of 770 kph is not as fast as 3000 kph—but it’s more than enough to penetrate any human sku —you need a velocity of only around 220 kph to do that (110 kph will penetrate skin while 220 kph will shatter bone, according to studies by the American National Rifle Association). Most people wh have been hit by bullets falling out of the sky get hit on their upper back, the top of their head or thei

shoulders.

In Kuwait after the end of the 1991 Gulf War, the Kuwaitis celebrated by firing weapons into the air—and 20 Kuwaitis were killed by falling bullets. In Los Angeles between the years 1985 and 1992 doctors at the King/Drew Medical Center treated some 118 people for random falling-bullet injuries; 38 of them died. According to the Los *Angeles Times*, most of the injuries happened during 'raucous Independence Day and New Year's Eve celebrations'. Most of the survivors were left with severe long-term disabilities such as chronic pain, seizures, paraplegia and quadriplegia. Every single one of them was taken by surprise—they did not see anybody with a gun, and they did not hear any gunfire.

Unfortunately, this tradition of firing bullets into the air for celebrations has arrived in Australia. A nine-year-old girl in Belfield, Sydney, was watching fireworks with her parents from their driveway to celebrate the incoming New Year of 2002. At 12.05 a.m., a bullet fell out of the sky and lodged in her upper arm. If she had been standing a few centimetres to one side, she could have been killed…



USA Experience

In Slidell, Louisiana, in the USA, it is illegal to shoot firearms into the air to celebrate (say) the New Year. The maximum penalties are six months in jail and a $500 fine.

In New Orleans, Louisiana, the falling bullets problem is so severe that there is now a 'Falling Bullets Kill' ad campaign between Christmas and New Year. It began in the mid-1990s after a tourist was killed by a falling bullet on the riverbank in the middle of the French Quarter. The more cautious folk usually head indoors (to be under a thick roof) for about a quarter of an hour each side of midnight.

According to the National Institute of Justice, the research and development agency of the US Department of Justice, people have been killed by falling bullets in New Orleans, Detroit, Kansas

City, Philadelphia, California and Missouri.

USA Experiment

There have been very few experiments to actually measure the velocity of falling bullets. The US Army Ordnance conducted one of the first in 1920.

They set up a 3 m x 3 m platform in the middle of a lake or inlet near Miami, Florida. The platform was covered with a thin sheet of armour plate, to protect the soldiers. The gun fired .30 calibre, 150-grain. Spitzer point bullets at 2700 feet per second (3000 kph) muzzle velocity. The gun orientation could be adjusted to bring the falling bullets near the platform.

The soldiers fired a total of 500 bullets. Four landed on the platform, one on their boat moored t the platform, some on land, and the rest in the lake (making an audible splashing sound). The bullets from each burst of firing would land over an area about 25 m across.

Wind had a dramatic effect on where the bullets landed. An 8 kph ground wind would have the bullets landing 100 m away. But the winds aloft are very variable, and could even blow in a completely different direction.

ShotSpotter

A new technology, ShotSpotter, uses microphones and earthquake detection mathematics to find just where the bullets were fired from. There are claims that the accuracy is to within 8 m.

One early test was done with this technology for the New Year of 1999/2000, in the 2.5 km^2 Willowbrook area of Los Angeles. In just two hours it detected over 1200 ‘celebratory’ gunshots. Th police at the station knew the location of the firearms within 15 seconds of their being fired.

Bullet on Moon

The situation is different when the bullet is fired upward through a vacuum, such as on the surface of the Moon, as there is no wind resistance. So, if the bullet leaves the barrel at 3000 kph, it will hit the ground at the same speed—3000 kph. It will also climb much higher (35 km) and take 168 seconds fo the round trip.

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Attack of the Killer Piranhas

Our shallow Western culture loves cheap thrills, and so we embrace the gruesome reputation of the piranha fish. According to all the authoritative sources (such as James Bond movies, the movie *Piranha II* and the console game *Tomb Raider III)*, piranhas can strip all the flesh off a man within minutes. The mental image is that you change from a fully fleshed human being to a cartoon skeleton almost immediately. Even former US President Teddy Roosevelt wrote after a trip to Brazil in 1913 that the piranhas are 'the most ferocious fish in the world. They will snap a finger off a hand incautiously trailed in the water. They will rend and devour alive any wounded man or beast'. But it seems that the piranhas are the mostly innocent victims of a cruel mythconception.

40 Species, Mostly Mild

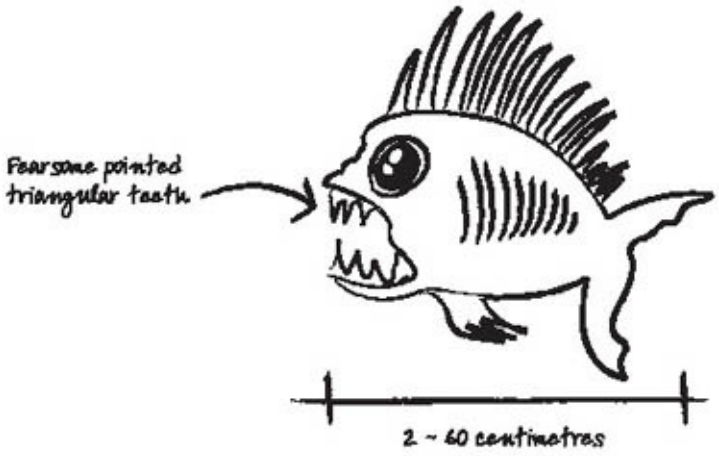
There are about 40 species of piranha, found in South America from north Argentina to Colombia, bu only about three species (especially the Red-bellied Piranha) show any real signs of aggression. In th local Amazonian Tupi language, the word *'piranha'* means 'toothed fish'. Some languages or dialect give them the name *'caribe'*, which means 'cannibal' or, sometimes, 'donkey castrator'.

Piranhas range in length from a few centimetres up to 60 cm. They do indeed have fearsome, pointed, triangular teeth. A few of the species are vegetarian, but most of them eat meat. Most of the species of meat-eating piranha will simply graze on other fish, taking a single, small, semicircular bi out of a fin or scale before letting the wounded fish swim away. Each fin or scale is between 35–85% protein, making it very nutritious. In addition, the blackwater rivers of South America are often low i calcium and phosphorus, and fish scales or fins are loaded with these minerals. The fin or scale of the victim will grow back in a few weeks so the piranha can have another feed. Piranhas are like cattle that gently nibble on only some of the grass in a sustainable fashion.

A few of the piranha species are almost totally vegetarian, preferring to feed on flowers, fruit, nuts and seeds. This diet probably evolved with the massive Amazon floods that can inundate an area the size of England for seven months at a time. Some 200 species of fish, including a few species of piranha, migrate into this new feeding ground to eat and make babies. In many cases, the seeds need t pass through the piranha's gut to better help them germinate.

Bite me!

According to the authoritative sources (James Bond movies, Lara Croft games and the movie Piranha II) piranhas can strip all the flesh off a man within minutes.



Pirahna

(Amazon Tupi language for 'Toothed Fish')

Fishy Story

In general, the carnivorous piranhas prefer to graze or scavenge off dead animals rather than attack a whole healthy animal. They also tend to travel in schools of 20 or more; even so, they are usually quite timid.

The Brazilian scientist Professor Ivan Sazima from the Institute of Biology, Universidade Estadual de Campinasin, has studied piranhas. In many years of research, his team could not find one single case of piranhas killing a human. Instead, they found only people who were already dead in the water, *before* the piranhas came along to have a nibble. For example, one person's drowned body had indeed been reduced to bones by losing all its flesh to piranhas—but that was after four days in the river. After 20 hours in the water, another person's drowned body lost the flesh off the arms and legs but not the trunk. A third person, who had died from a heart attack while in the water, lost only small amounts of flesh after a few hours in the water.

In no case was it like in the James Bond movies, in which the unwanted villain has every shred of flesh torn from him as he vanishes into the foaming water. There has never been found a case similar to Teddy Roosevelt's description of a man travelling on a mule which returned to camp without him. Roosevelt wrote that when his travelling companions found the skeleton in the water, 'his clothes [were] uninjured, but every particle of flesh stripped from his bones'.

'Boiling' Water

However, there are a few rare cases where the piranhas (usually the red-bellied ones) will actually 'make the water boil'. But these are very special cases.

One situation is when the local fishermen will deliberately throw unwanted fish guts into one small part of the river. Over time the piranhas learn to migrate to where the eating is good, and will

quickly demolish (for example) a plucked dead chicken if you throw one into the water. These piranhas have been conditioned to eat bleeding guts, and will go into a feeding frenzy over a chicken. But just a few hundred metres upstream, a different bunch of piranhas of the same species, who have not been so conditioned over a period of time, will not get as excited over a plucked dead chicken.

Another situation in which the water 'boils' with voracious piranhas is when a whole bunch of birds have their nursery in a tree that overhangs the river. The parents nourish their babies by vomiting up food for them. Their aim is not perfect, and the babies don't yet have very quick and accurate reflexes, so some of the regurgitated food drops out of their mouths into the river—and the piranhas learn to hang around for this Free Food From Above, just as they would for the chicken. Once they have been conditioned to eat this Free Falling Food, the piranhas will attack any baby bird that drops into the river below.

A circumstance in which you should be cautious is when you have just caught a piranha which is now flapping about in the bottom of your boat. This piranha is quite annoyed, and it's probably better to keep away from it. This, however, is not the 'water-boiling' situation.

The Truth

But in general, apart from these few specific cases, piranhas are harmless to humans, who can happily swim in the same water as the fish. In the July 1999 issue of *The Smithsonian*, Richard Conniff describes how he swam with piranhas, both in a tank in Dallas and in the Amazon rainforests, and came to no harm. While he did write that he wouldn't try skinny dipping with them, he also noted that the Amazonian kids would—and never came to any harm.

In general, the vast majority of piranhas 'lead lives of quiet desperation. Instead of swarming over their victims in a tumult of flashing teeth, piranhas mostly lurked and stalked and even disguised themselves as other species to snatch their food on the sly,' according to Conniff. Thus, with the piranha, their bark is worse than their bite.

More Dams, More Piranhas

In late 2003, Professor Ivan Sazima wrote about how increased damming of rivers had led to increased piranha attacks on bathers. He described in the scientific journal *Wilderness and Environmental Medicine* how parent piranhas looking after their babies would protect them from humans—with just one bite per human.

A river is commonly dammed to slow down the water so tourists and locals can go swimming, or for flood protection as the population increases. But the speckled piranha *(Serrasalmus spilopleura)* likes to breed in slowly flowing water. It lays its larvae in floating or submerged waterweed (e.g., water hyacinth). Rapidly flowing water usually washes these plants away, but they survive better in still water, so piranha numbers can increase tenfold in such conditions. The fretful piranha parents guard their larvae, who swim comfortably in the shelter of these plants.

Unfortunately, swimmers can accidentally disturb these plants—and the baby pirahnas. The proud piranha parents swoop in to give a single warning bite to the swimmer, leaving behind a circular bleeding wound. But the other piranhas would leave the swimmer alone and never do the rip-flesh-to-the-bones sequence for which they are infamous in the movies.

The town of Santa Cruz of Conceicao, on the Rio Mogi Guacu river, never had any piranha bites before the river was dammed in 1998. But, since then, the incidence of piranha attacks has increased.

Over the short period of five weekends, there were 38 piranha attacks—all to defend piranha babies.

Piranha—the Original Funding Fraud

Barry Chernoff, the Professor of Environmental Studies at Wesleyan University, calls the piranha 'th fake monster'.

Perhaps only half joking, he reckons that the original European explorers of South America had to return with specimens and stories to impress the fund-givers enough that they would give the explorers another batch of money to return and continue their explorations. He says that piranhas wer 'probably the original funding experiment'.

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Alien Autopsy—the Roswell Case

There's an old saying in medicine: 'You can always make a correct diagnosis—but sometimes you have to wait until the autopsy!' The autopsy is the gold Standard of Credibility—it's the only test tha reveals what really killed a patient. So when the Fox Network in the United States showed film of the autopsy of an actual alien body recovered after the Roswell Incident of 1947, there was huge interest. Maybe this film would finally prove that intelligent aliens have been visiting our planet.

According to a 1997 Gallup Poll, about 80% of Americans had heard of the 'Roswell Incident', and about 30% thought that it involved an alien spaceship crashing at Roswell, New Mexico. In a nutshell, the Roswell Incident was the supposed recovery of strange debris and a few dead aliens fron a crashed alien UFO (Unidentified Flying Object), and the subsequent cover-up by the military.

Important Background Info

First, the Roswell Incident happened only a few weeks after an Idaho businessman and pilot, Kenneth Arnold, claimed that he had seen UFOs around 3 pm on 24 June 1947, while flying near Mt Ranier in Washington State. He said that he saw nine silvery disc-like objects darting about in the sky and described their agile movements as being 'like pie plates skipping over the water'. It was the newspaper reporter who came up with the phrase 'flying saucers', which has stuck ever since. This report started up a near hysterical short-lived flurry of UFO sightings, which then quietened down to the steady trickle of reports that we get today. But in early July 1947, UFO sightings were everywher

Second, Roswell Army Air Force Base was home to the 509th Bomber Wing. The USA had used up three of its atom bombs by the end of World War II—one was tested in New Mexico, the other tw were dropped on Japan. At the time, the USA successfully bluffed the rest of the world into thinking that they still had lots more left. By the time of the Roswell Incident, the USA had manufactured only a handful of nukes, and the 509th Bomber Wing at Roswell was the only bomber wing on the planet that carried atom bombs—so the base was under very high security.

Third, both parties involved (the military of the day and, later, the conspiracy theorists) have tol tiny lies, little lies and big lies; also, they have accidentally said things they didn't mean to say, as well as deliberately not said things that they knew to be true and that they should really have told us. They also changed their stories over time. In other words, they were just like the rest of us. So it's been very difficult to get close to what actually happened. But this is probably pretty near the truth…

Roswell—Project Mogul

In 1947, the USA launched several special top-secret high-technology balloons as part of Project Mogul. These balloons were designed to go to a set height and remain there, listening for the sounds of possible Soviet nuclear tests. During World War II the US military had mathematically analysed the Krakatoa volcanic eruption of 27 August 1883, which was so loud that the sound was heard in Australia, some 3500 km away. The US military scientists had worked out that there must be some kind of 'sound channel' or 'acoustic duct' in the upper atmosphere that caught and confined the soun of the Krakatoa eruption, and then carried it around the world. So perhaps if they could place listenin

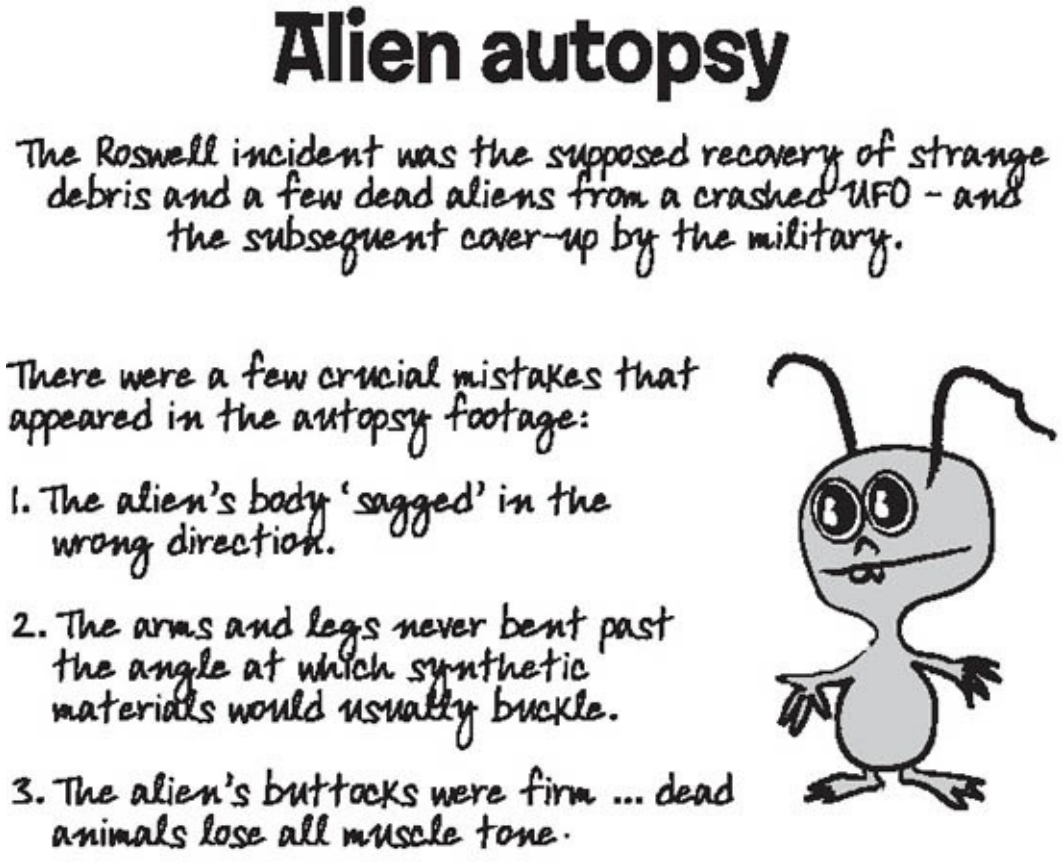
balloons at the right height, they could hear sounds from the other side of the planet—and they hoped that these sounds would include clandestine nuclear blasts.

Each balloon was not a single balloon. Instead, it was actually a series of smaller balloons, batteries, radar reflectors, listening devices and so on, strung vertically together, hanging downwards for over a hundred metres.

As it turned out, however, the Soviets didn't explode their first nuke until two years later, in 1949. Also, the Project Mogul balloons were never really successful as listening devices. But the project did develop techniques that were later very useful in other projects; these included using planes to catch payloads dropped from balloons, which later evolved into using planes to catch payloads of undeveloped film dropped from spy satellites—and the highest ever jump from a balloon (Joe Kittinger, 1960, 31.3 km).

Roswell—The Incident

In 1995, one of the three surviving scientists who had worked on Project Mogul, Professor Charles B. Moore, openly spoke about it. As a cover, some of the flights had been officially known as New York University (NYU) balloon flights. Moore reckons that the strange debris of the Roswell Incident came from NYU Flight #4, which he personally helped launch on 4 June 1947, from Alamogordo Army Air Field. NYU Flight #4 was tracked until its batteries ran flat. By then, the wind had carried it north-ish to about 27 km from where the Roswell debris was finally found.



On 14 June 1947, William W. 'Mac' Brazel, a sheepherder foreman on the Foster Ranch, found some very strange debris strewn across one of the ranch's fields. The debris was made up of shiny thi foil, grey rubbery material, small sticks and heavy paper, amongst other things. Brazel reported his findings to the local sheriff, and soon the nearby Roswell Army Air Field heard about it. An overenthusiastic report to the newspapers by Military Intelligence at Roswell spoke of a UFO, but thi

was retracted the next day; conspiracy theorists made claims of UFOs and aliens confiscated by the US Air Force. But, without any hard evidence, the mainstream media soon lost interest, with only dedicated UFO-logists still believing.

Roswell—The Rush

The Roswell Incident was mostly forgotten until 1980. That's when Charles Berlitz (infamous for his *Bermuda Triangle* book—see my story in *Great Mythconceptions)* and William L. Moore wrote *The Roswell Incident*, the first book about the events of 1947. This was followed by segments about Roswell on a few TV shows, and a few more books.

Interest really increased on 28 August 1995, when Englishman Ray Santelli released a 17-minut silent black-and-white film of an 'autopsy' of one of the Roswell aliens; the film was shown on the Fox Network. Santelli said that he had been making a film of Elvis Presley's 18 months in the US Army and had been searching the Army's archives. Apparently he was approached by the cameraman who shot the footage of the 'alien autopsy'. They teamed up to produce *Alien Autopsy—Fact or Fiction?*.

This film attracted almost as much interest as the film accidentally taken by Abraham Zapruder of the assassination of US President John F. Kennedy. The alien film showed two pathologists in whi contamination suits performing the autopsy, a third person taking notes and a fourth person observing from behind a window. A six-fingered, small, naked humanoid lay on the operating table. As corroborating evidence it was claimed that Kodak had analysed the 16-mm film and verified that it had been shot in 1947.

Sceptics—Special Effects

The Truly Dangerous Company (a special effects company for the movie industry) ridiculed the alien shown in the film.

First, the alien's body 'sagged' in the wrong direction—towards its feet, not the table it was lyin on. This is what you would expect if the alien corpse was made from a body-cast done on a living person while they were standing, not lying down.

Second, the arms and legs were never bent past the angle at which the synthetic materials used b special effects people would usually buckle.

Third, the alien's buttocks stayed firm and held its legs and lower back off the table. But a dead person or animal loses all muscle tone immediately after death and sags onto the underlying surface.

Fourth, there were problems with the scalpel incisions. Each time the scalpel cut the skin on the upper body, a dark liquid oozed out of the incision. But once the heart stops, there is no pressure in th circulatory system: dead people or animals don't bleed. (It's easy to fake bleeding, though, by carrying 'blood' to the cut via a thin pipe glued to the side of the scalpel away from the camera.) And when the skin was cut by the scalpel, the skin didn't spontaneously pull apart, leaving a gap—unlike the skin of dead animals or humans.

Other special effects artists made similar criticisms. These individuals include Gordon Smith (special effects in *JFK* and *Natural Born Killers)*, Steve Johnson (movie-effects designer from *The Abyss, Species* and *Roswell)* and Stan Winston (special effects on *Aliens* and *Jurassic Park).* So the special effects experts were sceptical.

Sceptics—Forensic Pathologists

Medical pathologists also had a few problems with the autopsy techniques shown in the film.

First, the white-suited characters held their scissors in a tailor grip, which puts the thumb and index finger in the scissor holes. This is quite different from the standard surgical grip, which has the thumb and *middle* (or ring) finger in the scissor holes, with the first finger near the pivot point of the scissors, steadying them.

Second, these so-called 'pathologists' didn't start the autopsy the usual way, which is to move th arms and legs (how else will you find a broken limb?).

Third, they cut very slowly, tentatively and indecisively—which is totally different from the quick, decisive cuts made by pathologists. In every autopsy, the pathologist will always be able to se the tip of the scalpel or scissors, so that they know what they are doing at all times. In this so-called autopsy, the 'pathologists' made many blind cuts. At no stage did they try to follow one plane of one tissue through to its natural end—they just cut straight through everything.

Fourth, the hooded anti-contamination suits worn by the 'pathologists' didn't have any air pipes coming in or out, so their face masks would have fogged over within a few minutes.

Finally, the four individuals present showed very little interest in the internal organs of the alien's gut. This is very unusual for what should be the most important autopsy in the history of the human race. They just quickly and indifferently pulled out the organs (which, strangely, didn't seem to be attached to anything) and plunked them into a bucket.

For comparison, consider the coelocanth. It was an ancient fish that was thought to have died ou with the dinosaurs, 65 million years ago. But a live coelocanth was discovered in 1938, near Madagascar. Ichthyiologists (fish scientists) travelled from all over the world to be present at its lon slow and careful dissection, preservation and study. But the supposed alien autopsy was carried out b a few bumbling amateurs in under three hours!

Many pathologists, including Dr Cyril Wecht, ex-president of the US National Association of Forensic Pathologists, are thus very sceptical about the Roswell autopsy.

Sceptics—Camera and Film

If the intention was to record the first autopsy of an alien, why use black-and-white film when colour film was available? Why not record sound, which had been possible for years? And why document th event only with a movie camera, when a still camera with colour film would have gathered so much more information?

Also, the camera technique seems unusually modern and jerky for post-World War II camera operators, who prided themselves on their smoothness. Unusually, the camera was not mounted on a tripod but was hand-held instead. Also very unusual is how the camera went out of focus and became very shaky in the close-ups (where a lot of extra detail would be seen).

So what about the film that was submitted to Kodak? Yes, a film was submitted to Kodak, and Kodak did date it to 1947. But the film that Kodak was given showed images of a staircase and a doorway, as well as some end pieces of film containing no images. In other words, Kodak was never given any images of the autopsy to test. Peter Milson, Kodak's manager for Marketing Planning and for Motion Picture and Television Imaging, said, '…what he's done, obviously I can't blame him for this, is given me a bit of the leader…and said this is the same as the neg, this is from the same bit of film.'