LIFE

FILMING TECHNIQUES

STORIES FROM BEHIND THE SCENES

A series of the scale and ambition of LIFE has the chance to develop and employ a whole series of filming techniques and approaches many of which have enabled the team to get previously impossible shots. Here are some stories behind the scenes.

1 Timelapse - beyond the naked eye

1.1 Under the ice

One of the most ambitious shoots LIFE attempted was a sequence showing the behaviour of creatures under the permanent ice of the Ross Sea. Starfish and nemertean worms move incredibly slowly across the sea floor, but when filmed in time-lapse, they come to life. The envelope was pushed further by the desire to film a tracking shot, so not only is time speeded up but the camera is moving across the scene. The trickiest part was trying to rig the gear under 8 feet of solid ice. Every piece of equipment had to be brought through a specially drilled hole in the ice and had to be monitored every day. It took the crew over 100 dives to get the sequence. There is more about this story in the Life on Location film at the end of episode eight.

1.2 Plants on the move

By far the most extensive use of time-lapse was in the plants programme. To bring the behaviour of plants to life and to the screen, time-lapse techniques pioneered and lessons learnt in David Attenborough's *Private Life of Plants* were used and developed even further. The breakthrough for the LIFE series was in the application of high definition digital stills rather than using film images. This proved much more reliable and produced clearer, more detailed images.

Many of the programme's time-lapse sequences were filmed over many days on location but because the changes in light and weather conditions can be so great a number of detail shots were photographed in controlled conditions in studios. Over two years, a menagerie of plants were lovingly tended by cameraman and time-lapse expert Tim Shepherd, allowing him to shoot amazing plant behaviour, from climbing tendrils and bamboo shoots rocketing upwards to sunflowers stamens emerging in perfect sequence, and from carnivorous plants catching their prey to wheat, orchids and lilies bursting into bloom. The story of filming the most extensive time-lapse in the programme can be seen in the Life on Location film at the end of episode nine.

1.3 The transformation of a Stalk-eyed fly

Stalk-eyed flies are smaller than a grain of rice and their eyes are the size of a pinhead. This together with the strange way they grow their eye stalks created a number of challenges. First the almost microscopic filming techniques needed a lot of light, something that is in short supply in the forest undergrowth of South East Asia. Second, shooting a time-laspe of the eyestalks growing ideally required the flies to keep reasonably still, which they refuse to do! We consulted with the authority on stalk-eyed flies who studies them both in Malaysia and in London. We decided that the only way to film the details of their eye stalk growing was in a studio where we could control the lighting conditions and for the time-lapse we decided to call in an expert on using stills of moving subjects.

Our stalk-eye fly expert came with the flies and stayed to help and advise on husbandry. They happily grew their eyes and we took hundreds of still images at the various stages. Then our time-lapse effects maestro, managed to orientate each frame of the time-lapse so that the eye grew smoothly and showed in amazing detail exactly what happens at this most critical stage of the fly's life.

1.4 Coral larvae

In order to demonstrate how a coral reef begins to grow, and especially what happens when a coral larva begins to transform into a polyp required a combination of approaches. We decided to use the first stages of the colonisation of a ship wreck as the best way to show this stage and this involved sinking our own boat in the Bahamas! The story of how we did that is in the Life on Location film at the end of episode 8. Coral larvae are microscopically small and when they land on the sea bed, or in this case on the hull of a wreck, and for the first stage of their development they continue to be too small to film conventionally, so we used detailed scientific descriptions to create a 3D time-lapse of the polyp growth.

A later stage in the life of corals posed one further challenge. When they begin to fight for space they attack each other by extruding their stomachs over each other trying to eat each other. This typically happens at night and requires time-lapse photography to visualise. We were able to film this behaviour in conditions where we could isolate coral heads and control the lighting to provide a time-lapse of the extraordinary battle to out eat each other!

2 Tracking with travellers

Being able to track the camera alongside animals as they move gives a potentially wonderful sense of being right with them. The problem is that animals have a tendency to head off where they want to go rather than where we have set up our cameras! The solution was to devise a much more flexible way of getting a camera to them that was both smooth and easy to position. The answer for tracking on ground was the invention of 'yogi-cam'. This uses the same 'Heli-gimbal' camera system used so spectacularly in helicopters to get amazing eye-in-the-sky views of landscapes and animals from above, but instead it is rigged to a 4x4 vehicle. The camera is gyroscopically stabilised to smooth out any vibrations and it's then attached to a counterbalanced arm that smoothes out the big bumps. The result means for the first time the camera appears to be running shoulder to shoulder with caribou across the tundra and to be amongst an elephant heard as it marches across the savannah, all without disturbing them.

Although helicopters can get amazing results from the air there are occasions when they are impossible to use - when flying very low through trees or very slowly or amongst flocks of flying animals. The amazing migration of straw coloured fruit bats in Zambia was a perfect opportunity fly amongst a flock. So a powered balloon was used to fly with them at bat speed. The bats completely ignored the slow moving and very quiet balloon as it flew alongside them - something they would have never have done with a helicopter!

3 **Scientists to the fore**

The value and amount of help given by scientists and academic institutions on this series was incalculable. The results of many years of detailed and painstaking observations were willingly shared with our camera teams. It was only through this generosity that we were able to film so many new and surprising behaviours. Although, sometimes, by applying our camera techniques we were lucky enough to reveal new things to the scientist themselves!

In some scientific studies the researchers spend time getting their study animals used to their presence (what researchers call 'habituating') so they can study the intimate details of their behaviour without disturbing them. This has a great advantage for the camera team because they too can get not only get close but can spend extended periods of time with the creatures and really get to know their behaviour.

3.1 Leaping Stoats and Trail running Sengi

Filming young stoats is a good example because in order to use a high-speed camera to record stoats leaping and play fighting the camera and cameraman would need to be very close to the animals. Being very close to a stoat's nest could put the youngsters at risk of disturbance, but by filming from a hide next to a habituated family of stoats the team were able to record the behaviour without disturbing the young at all.

The crew also travelled to a remote part of Kenya to film the spectacular running abilities of the diminutive, rufous sengi as never seen before. The sengi's agility is too fast to be observed with the naked eye so the ultra high speed camera was used. Working with local experts we spent four weeks getting the sengis used to our presence and the positions of our super slow motion HD camera. The experts were also on hand to ensure that the welfare of these speedy animals. The only danger was to the crew, when a herd of wild elephants tried to take a detour through our enclosures one morning.

3.2 Camera-shy Chimps

In the Guinean rainforest chimpanzees are notoriously elusive, but with the help of Tatyana Humle our camera team where able get close to one particular troop she has been studying for years. Getting so close meant special precautions had to be taken by the camera woman to ensure she didn't pass on any human diseases to the chimps – she had to wear a surgical face mask all the time she was with them! Even with Tatyana's help it still took weeks to get the shots of all the different types of tool using and without her guidance we would probably still be there trying. The story of how the chimps were filmed is in the Life on Location film at the end of episode 10.

3.3 Poison arrow frogs

Our consultant herpetologist Pompilo Campos Chinchilla has a large enclosed piece of forest in Costa Rica which was perfect for filming these tiny frogs. Pompilo was confident that the only way to be sure to get a female frog behaving naturally in front of the camera was to bring her in to his forest enclosure and get her habituated to camera and team. This we did, and after the filming was finished he released her and her young back where he found her in the forest.

3.4 Finger-tapping Aye-ayes

The mysterious aye-aye is one of the strangest and rarest mammals in the world and its feeding behaviour is stranger still. Aye-ayes are nocturnal primates native to the island of Madagascar. They feed by drumming their long fingers on woody branches, listening for subtle differences in tone which reveal the presence of wood boring grubs. In order to capture this unique behaviour it was necessary to use a variety of approaches. First the crew travelled to a remote island in Madagascar to film them feeding in the wild in the tree tops at night. What resulted is the best footage of this endangered primate ever recorded in the wild. Then to film some detail shots of the finger drumming we worked with aye-ayes at a conservation facility in Madagascar. These animals were used to human presence and so this avoided the danger of disrupting wild aye-ayes.

3.5 Weedy seadragons

Filming underwater is always tricky. The cameramen used to be limited by the air in their SCUBA tanks or by the amount of film in their cameras. However, the development of 'rebreathers' and the use of video cameras (with much longer recording times) has increased our time underwater and so the chances of filming unpredictable underwater behaviour.

Of course, we still needed expert advice to be in the right place at the right time to witness and film the wonderful mating dance of weedy sea dragons in Australia. The mating dance takes hours to perform and the fish are quite secretive so using rebreathers meant that the divers didn't release bubbles that might put the fish off their courtship.

However when it came to filming the part of the sequence where weedy sea dragons give birth we decided the risk of disturbing a 'pregnant' male was too high. Luckily our scientific expert was observing pregnant males in his research station as part of his work and so these fish were used to human presence. We were able to get close to the fish

without disturbing them, but this part of the filming still took over two and half weeks of round the clock effort because the moment of “birth” was so unpredictable.

3.6 Hawaiian climbing gobies

Filming the waterfall climbing gobies was potentially very dangerous. So to obtain the slow-motion close-ups shots of gobies climbing, our consultant scientist was able to create perfect conditions for the fish alongside the waterfall but out of danger of being directly under the falling deluge. It took a very great deal of effort to get conditions perfect for the fish – water temperature, taste and rate of flow all contribute to making this a very delicate balance. The set up also allowed the scientist to observe the behaviour in such detail that it increased his understanding of why, how and when the fish climb.

3.7 The caring Clownfish

The ultra close up detail shots of the developing eggs in the clownfish sequence was proving impossible to film in the wild without the risk of disturbing both parents and young. So the team consulted Swansea University who suggested a way of getting these macro shots without causing the fish any problems, using fish and young they were studying in their research.

3.8 The bouncing Pebble Toad of Venezuela.

Filming the bouncing toad was very challenging; the remote mountain plateau is one mile high and 26 square miles in area, whilst the toad is one inch long and very elusive. The tarantulas which prey on them are also very hard to find. To give the crew the best chance of finding and filming them, the expert on these creatures came on the shoot. He searched for a week before the crew's arrival to find both species and a location where they could come together and where the toad would demonstrate its bouncing-ball method of escape. This allowed the cameraman to set up his slow-motion camera in the right place. The scientist was able to ensure that the toad was never in danger of being harmed by the tarantula as a result of us filming them. The technique was a total success - the toad tucked its legs in, rolled and bounced, allowing the crew to film its method of escape in slow-motion detail.

4 Faster than the blink of an eye - the Ultra High speed camera.

4.1 Running on water – the Jesus Christ lizard

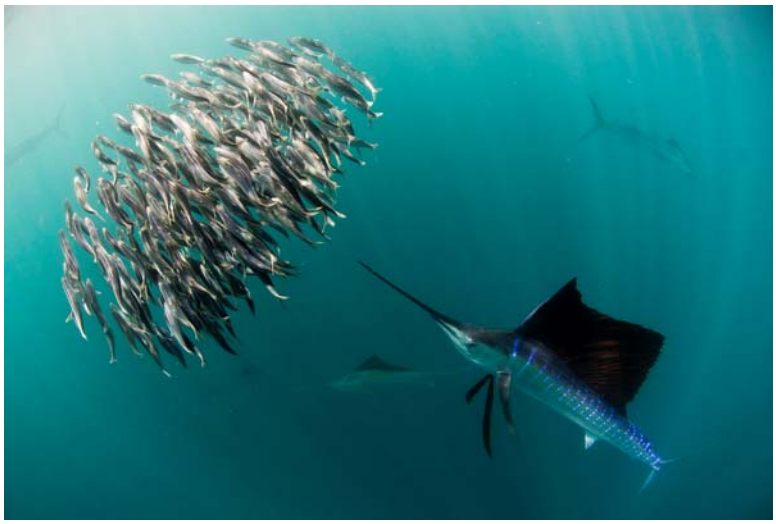
A Jesus Christ lizard running on water is so fast that a human would have to run at 65 miles per hour to achieve the same trick. The speed makes it an enormous challenge to film. After consulting with a scientist at Harvard University who has made a ground-breaking study of the lizard's water sprint, the crew decided that as well as filming the behaviour at normal frame rates they would attempt to capture the close up details of the lizard's run with a slow-motion camera filming at 2000 frames per second (i.e. slowed down by 80 times).

It's very hard to predict exactly where and when a lizard will run, what's more it's all so quick that once the lizard *is* spotted it's gone in a blur! Learning from the scientist's observation methods was essential and as a result it was decided to film the details of the sprint would need some degree of control to ensure that the crew had some idea of where and when the lizard would run. They travelled to Belize, home of the lizard, to work with local animal experts who had some lizards in natural forest enclosures. If, and when, these lizards decided to run, they always ran along the same stretch of water, where the cameraman could station his camera.

The key to success was using the latest digital slow-motion camera that continuously records into a memory buffer, so that when the cameraman hits the trigger button he downloads the action that took place a second or so *before* that moment. Whenever a lizard sprinted past the cameraman over the water the cameraman hit the trigger, desperately trying to keep the lizard in the frame and in focus. The final end result of this was stunning, slow motion shots of the lizards, with every drop of water visible as they sprinted through the surface.

4.2 Birds in fight and the fastest fish in the sea

Filming birds in flight was also a perfect opportunity to use the high speed camera. In Tobago we were able to rig the camera with an extreme telephoto lens and shoot the 'dog fight' between tropic birds and frigate birds. In Dominica we filmed a unique ultra-high speed tracking shot with purple throated carib hummingbirds feeding on heliconia plants.



The speed of sailfish is astonishing; they are capable of speeds in excess of 60 mph. To film their hunting behaviour was a particular challenge, but to gain an insight into their techniques we decided to try and use the ultra-high speed camera under water. A special housing had to be built from scratch containing not only the camera, but all the recording discs and other electronics. The shots of the sailfish scything into the sardine shoal were the first underwater behaviour sequence filmed at such high frame rates. There is more about the filming of sailfish and flying fish at high speed in the Life on Location film at the end of episode 4.

4.3 Bulldog bats in a blur

For the majority of shoots in the Hunters and Hunted film we used the longest telephoto lenses available in order to cover the action. But to reveal some of the most extraordinary details of the hunter's strategies required ultra-high speed camera close-ups.

Bulldog bats hunt at night using ultrasonic calls to detect fish that they snatch from the water at speeds of around 60 mph. To see the catch we needed to film at 2000 frames per second. High speed cameras require an enormous amount of light and extensive lighting rigs. The team felt that these rigs could only be effectively used with bats that had been given time to become accustomed the equipment. The only way to get the bats used to this light was to create a lighting 'studio' in an area of rainforest that contained a pool where they hunt; and over a number of months get the bats used to ever increasing light levels.

The bats were happy to behave absolutely naturally under lights – that is until the final light was introduced. The bigger light was only fractionally more powerful than had been used before – but the difference was that has to run off a different, special type of power source.

As soon as it was switched on the bats seemed to be less proficient at spotting their targets and the team were left scratching their heads as to reason why. Moments later the answer came to them – an ultrasound detector revealed that the power source was generating a lot of high frequency sound at exactly the frequencies the bats were using to hunt. Effectively the bats couldn't hunt properly because the noise from the power source was jamming their "radar".

A quick rethink and a longer cable allowing the power to be moved far away meant the bats returned to fishing as happily as ever – and the team were able to record some unique images.

4.4 The super-sniff of a Star-nosed mole

It has only recently been discovered that when star nosed moles dive they can blow out bubbles and then immediately inhale them allowing to "smell" their prey underwater. To film the details of this meant shooting with an ultra high-speed camera from underneath the mole as it hunted. This required the team to create conditions where they were able to get the camera below the mole and below a sheet of glass. The moles seemed remarkably unfazed by the attention and fed happily in front of the camera – revealing previously unseen behaviour.

4.5 The Bombardier beetle

In order to film detailed behaviours of insects, camera teams often work in a studio under controlled conditions. However for LIFE, because we were able to send cameramen into the field for longer periods of time than is usual, we aimed to film as much behaviour as possible under natural conditions. Even so, there were occasions when it was necessary to control the circumstances to some degree, especially for the extreme close-ups of the explosive reaction of one particular beetle.

The Bombardier beetle sprays a pulsing jet of boiling, caustic acid at its enemies to deter them. Surprisingly it doesn't appear to be lethal to other insects. After their initial shock they pick themselves up and walk off (insect armour is amazing). However they are very unlikely to come anywhere near the beetle again!

It's certainly spectacular, but it's a real problem for a cameraman because, to the naked eye, all there is to see is a momentary white puff of smoke. In order to show the dramatic nature of this beetles defence, we needed to film in close-up and in extreme slow-motion at 2,500 frames per second.

In nature the beetles are rarely seen. Not only is their spraying behaviour is very hard to predict they tend to skulk under stones and logs, so filming the details of this behaviour would be nigh impossible in the wild. Instead it was decided to provide the conditions under which the beetle might fire its jet in a natural way but in which we could also film in the detail and at the frame rate necessary.

The technique the crew came up with was to keep a beetle in a small enclosure, giving the cameraman a chance of keeping it in frame. A few foraging ants were encouraged into the area. Being inquisitive creatures the ants investigated the beetle every so often and, once in a while, the beetle reacted by spraying. Making use of the slow-motion camera's pre-record facility, when the cameraman saw the tell-tale puff of white he hit the trigger and recorded the event - the spectacle of the pulsing jet of boiling spray in close-up.