



Close encounters

The Science of Aliens studies how real creatures such as this deepwater fangtooth fish inspired the creators of alien monsters. Photograph: Martin Hayhow/AFP/Getty Images

Experts' imaginations run wild as aliens invade the Science Museum

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Step past the life-sized model of the queen from the Aliens movie, around the displays of creatures that live in the harshest regions of Earth and past a vast picture of our galaxy. Suddenly, in middle of the first floor of the Science Museum, you enter a bizarre new world.

It is a world teeming with life. Huge, whale-like creatures glide through the sky, continually gulping down tiny airborne plants. What look like balloons rise into the air, tethered to roots scattered on the ground. Creatures no bigger than hummingbirds fit between the leaves of plants the size of a small house.

Tomorrow, visitors to South Kensington will get their first look at two startling new visions of what life might be like on other planets. The colourful multitude of plants, animals and planets are not simply the fruit of an artist's imagination, however. These worlds represent some of the latest thinking in evolutionary biology, astronomy and biomechanics.

"Imagine out there, billions of different stars, billions of other planets, different conditions, let's say life evolved there," said Jon Tucker, the head of the Science Museum. "On a different planet, under different conditions, what might develop?"

The museum worked with a team of scientists led by the evolutionary biologist Simon Conway Morris. "Once you know what the ground rules are, then you can begin to explore the alternatives on any planet," he said. "An evolutionary biologist should come along and say, I can't tell you exactly but I can give you a very good guess what you can find."

The first job was inventing the planets – Aurelia and Blue Moon. The former is a planet with no seasons and has two very different sides: a dark side that is forever cold, trapped in constant winter. In contrast, the lighter side is so hot that it suffers from harsh storms and hurricane-force winds.

Blue Moon is more like Earth, a pale blue dot orbiting a giant gas planet. Oxygen makes up 30% of the planet's atmosphere, compared to 21% on Earth. But carbon dioxide is also plentiful here – 30 times more so than on Earth. The result is a planet with an extreme greenhouse effect and a thick, cloying atmosphere.

"Both those planets are based on a whole stack of scientific references," said Stephen Foulger, an exhibition manager responsible for putting much of the

Life off Earth Designing for new worlds

Gulphog

A bipedal predator, standing almost 4.5 metres tall, the gulphog lives on Aurelia, where it uses its excellent vision and teeth to sense the vibrations of prey. It has the same level of intelligence as a baboon and lives in small clans



Skywhale

This giant aerial grazer has a wingspan of five metres and glides on thermals in the dense atmosphere of Blue Moon. It hunts using echolocation, just as bats do. It is a social animal and nurses its young



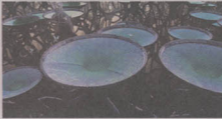
Mudpod

Amphibious mudpods live on the dams they build from Aurelia's stinger fans. They are 90cm long and can swim like a crocodile. They hide in burrows and protect themselves with poisonous spines on their tails



Pagoda trees

The Pagoda forests of Blue Moon stand seven times taller than the highest tree on Earth, at 1,000 metres, thanks to their interlocking branches. They collect water in their canopies



display together. Blue Moon has a much denser atmosphere than that of Earth – a feature taken from worlds such as Saturn's moon Titan, where thick clouds of methane fill the sky.

"What would happen in an Earth-like planet with a much denser atmosphere? Well, things would fly much more easily," said Prof Morris. Enter the skywhale. More than five metres (16ft) long and weighing in at around 600kg (1,300lb), this bizarre animal takes advantage of a principle of flight used by flies on Earth. While we might think nothing of moving through the air around us, flies have a problem – at their size, air is a thick, gluey fluid. In effect, they don't fly, they swim. Scale that up and the skywhale can too.

Strangeness aside, if the animals and plants seem somehow familiar, there is a reason. "There's a principle called convergent evolution which basically says that some physical attributes have evolved independently loads of times on Earth," said Mr Foulger.

The eye, for example, has evolved more than 40 times in completely unrelated creatures. It is the same story with wings – flies, birds and bats all have them but each wing type is different.

Life on other planets is likely to face similar evolutionary pressures, according to Prof Morris. The end result is a great deal of similarity – but that does not imply things would be identical. "There's a constraint on life, but despite that you still have this amazing diversity in our biosphere."

Mr Tucker said that however odd the creatures on Blue Moon or Aurelia might look, they do not come close to the strange animals that already exist on Earth. "There are some creatures alive now on this planet that are phenomenal. Creatures you get near deep sea vents, their front end is 200C warmer than their back end," he said.

While Prof Morris took the evolution ball and ran with it, he stepped when it came to intelligence. "We did explore the idea of equipping some of our animals with the beginnings of technology but in the end we decided not to," he said.

Mr Tucker said the exhibit stayed within the realms of known science. "When you get into the area of speculating what another intelligent life form and civilisation would be, we start getting much shorter on grounded evidence based on what we see on this planet. At that point we can conjecture anything."

The Science of Aliens exhibition opens at the Science Museum tomorrow