

BBC JAMES LOVELOCK ON THE COMING AGE OF HYPERINTELLIGENCE

Science Focus

To infinity and beyond

The tech that
SNIFFS OUT DISEASE

Why fizzy drinks and
FISH FINGERS WON'T KILL YOU

Is too much
SUN CREAM BAD FOR YOU?

SPACE 2069

**MOONBASES, MARS,
FIRST CONTACT, AND BEYOND...**

SF
SCIENCEFOCUS.COM
27 >
9 772632 284004
£4.99 #338
SUMMER 2019

**APOLLO
SPECIAL
ISSUE**

Moon Landing

How to argue with someone
who thinks it was fake

Small Steps

How NASA prepared
for the first moonwalk

The Missions

50 years of lunar
exploration visualised



PEAS IN A POD

Dolphins prefer friends with similar interests **p15**

PARENTS REJOICE

Artificial intelligence deciphers baby screams **p16**

THINK OR SWIM

Seals actively control their circulation pre-dive **p20**

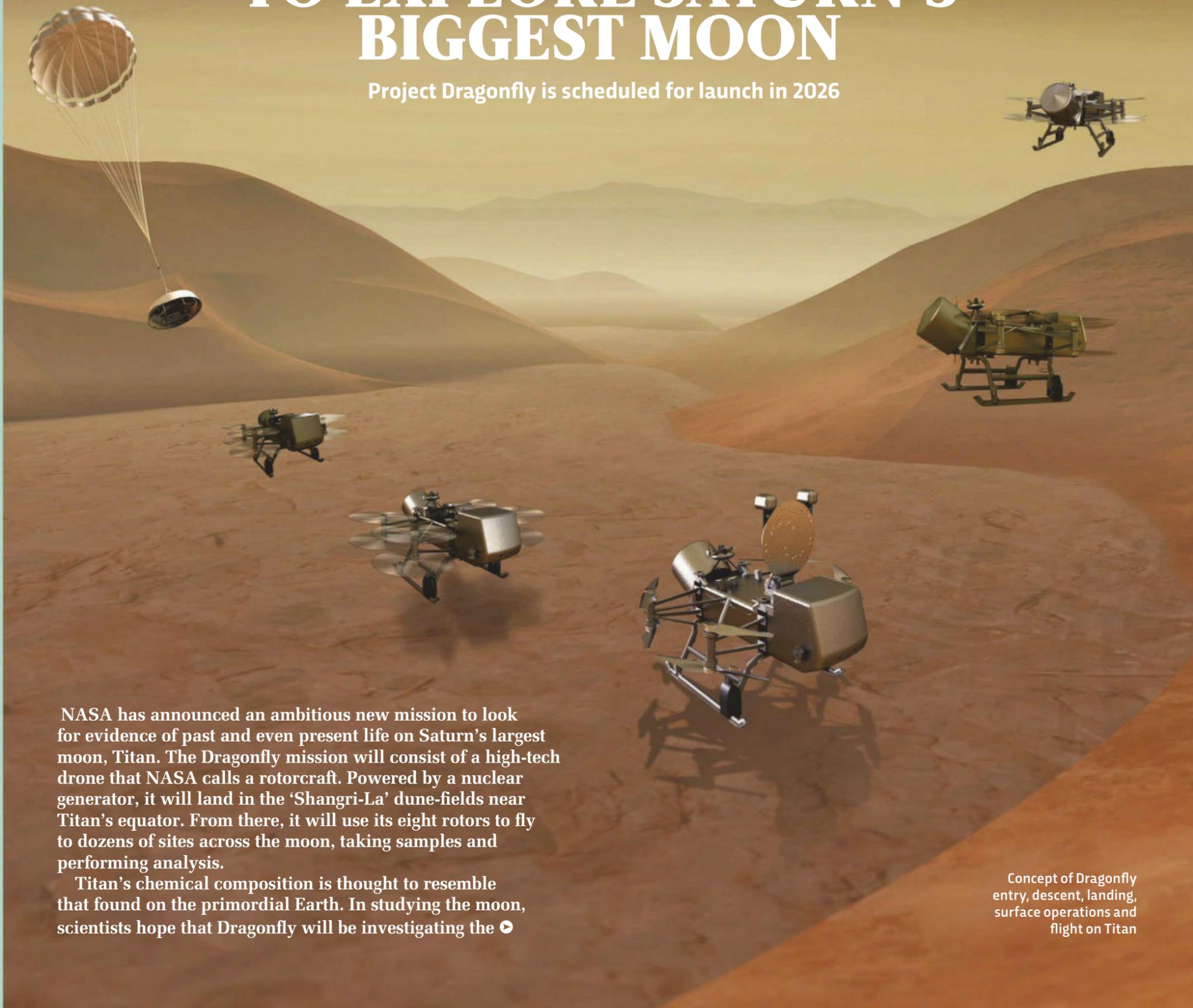
A NEW DAWN

The first long range solar-powered car **p21**

DISCOVERIES

NASA TO SEND A DRONE TO EXPLORE SATURN'S BIGGEST MOON

Project Dragonfly is scheduled for launch in 2026



NASA has announced an ambitious new mission to look for evidence of past and even present life on Saturn's largest moon, Titan. The Dragonfly mission will consist of a high-tech drone that NASA calls a rotorcraft. Powered by a nuclear generator, it will land in the 'Shangri-La' dune-fields near Titan's equator. From there, it will use its eight rotors to fly to dozens of sites across the moon, taking samples and performing analysis.

Titan's chemical composition is thought to resemble that found on the primordial Earth. In studying the moon, scientists hope that Dragonfly will be investigating the

Concept of Dragonfly entry, descent, landing, surface operations and flight on Titan

NASA

Stressed sheepdogs Feeling the strain? So is your dog **p14** **Truth about vaping** Are e-cigs dangerous? **p22**
Wellcome Photography Prize Intriguing shots from the world of science **p24**

News in brief

IS JUNK FOOD BEHIND FOOD ALLERGY INCREASE?

Food allergies are on the rise – especially in kids – and now we may know why. Researchers have found a link between junk food and food allergies in kids aged 6 to 12. The study, at the University of Naples Federico II, found higher levels of ‘advanced glycation end-products’ (AGEs) in children with food allergies. AGEs are

formed when proteins or fats combine with sugars, and large amounts are present in highly processed foods. “Existing hypotheses of food allergy do not adequately explain the dramatic increase [of allergies] observed in the last years,” said study leader Dr Roberto Berni Canani. “Dietary AGEs may be the missing link.”



• chemical environment that gives rise to life on Earth. It will also look for evidence of life on Titan.

“Visiting this mysterious ocean world could revolutionise what we know about life in the Universe,” said NASA administrator Jim Bridenstine in his announcement of the mission on 27 June 2019.

Dragonfly will be the first drone to fly on another planet. As the operators gain experience flying the craft, they will build up to a series of longer flights, called leapfrogs. Each of these will take the rotorcraft up to eight kilometres at a time. The goal is to reach the Selk impact crater, where there is evidence for liquid water and carbon-rich molecules having once existed in abundance. These are the conditions that scientists think are essential for life to emerge.

Titan has been visited once before by the European Space Agency’s Huygens lander. It was carried to the Saturnian system by NASA’s Cassini spacecraft, which completed a 13-year tour of Saturn and its moons in September 2017. Among other things, Cassini revealed that Titan had lakes of liquid methane across its surface.

“[Dragonfly] is a really exciting mission that follows on from the findings of the Cassini mission. Titan is like a primordial Earth, covered in liquid methane lakes. If we were to find life outside of Earth but within our Solar System, places like Titan would be prime candidates,” said Dr Sheila Kanani of the Royal Astronomical Society in London.

NASA hopes to launch Dragonfly in 2026. It will arrive at Titan in 2034, and its mission is planned to last for at least 2.7 years.

by **STUART CLARK**

Stuart is an astronomy journalist.

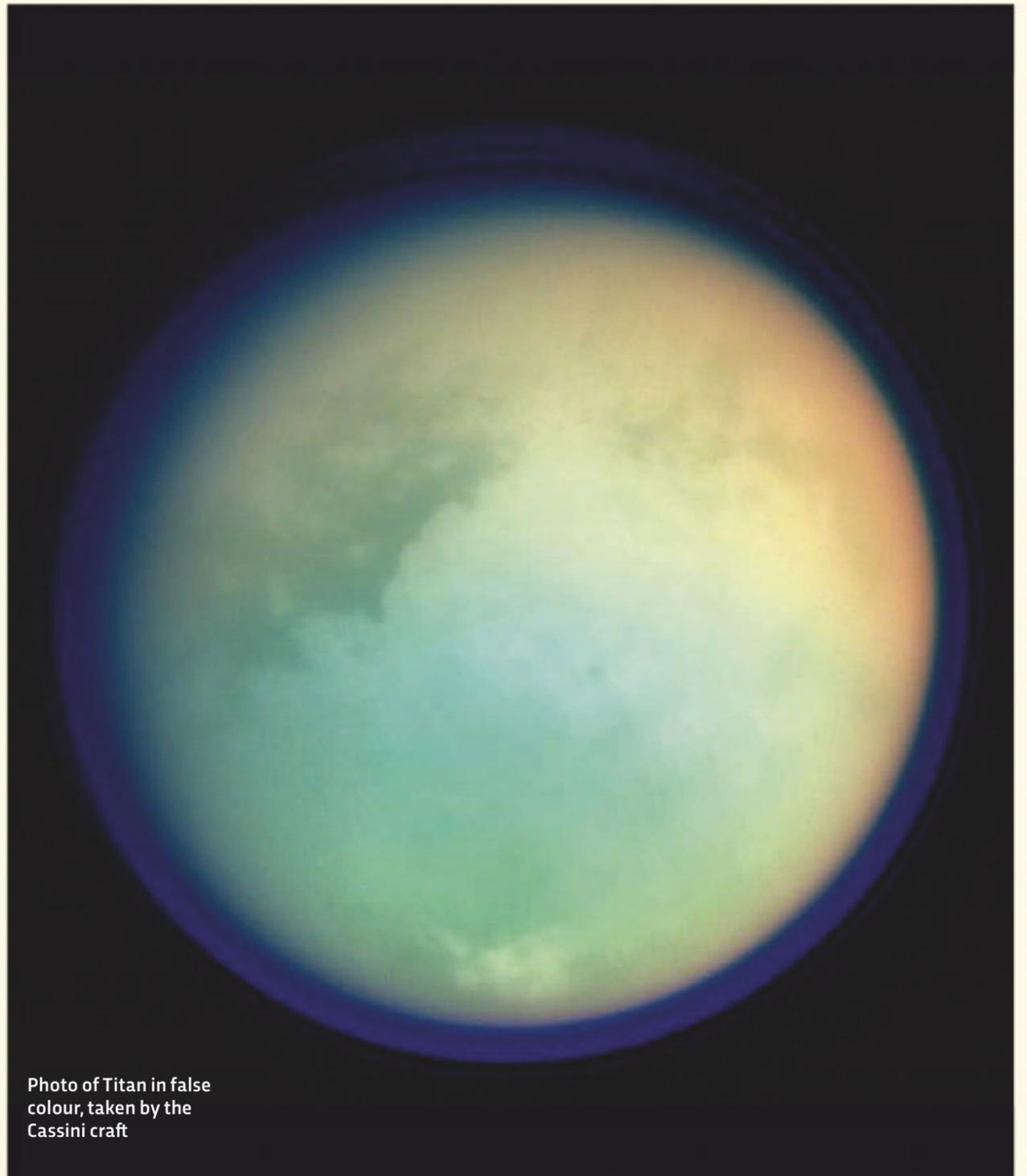


Photo of Titan in false colour, taken by the Cassini craft



NASA X 2

x4

Titan is the only moon in the Solar System with an appreciable atmosphere. It is four times denser than Earth’s atmosphere.

**15 DAYS
22 HOURS**

This is the amount of time it takes Titan to orbit Saturn. Titan keeps its same face to Saturn, like our Moon does to Earth.

-179°C

This is the surface temperature on Titan. This means that methane can exist as a liquid, and water freezes as hard as rock.

90%

The amount of sunlight falling on Titan that is absorbed by its thick atmosphere. This means that it is always twilight.

**25 MARCH
1655**

The date that Titan was discovered by the Dutch astronomer Christiaan Huygens, after whom the ESA lander was named.