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1. Seti stands for the Search for ExtraTerrestrial Intelligence.
2. If intelligent aliens are out there, Dr Seth Shostak, the Seti Institute's senior astronomer, believes they will be "thinking machines". He believes a highly advanced species will be several centuries ahead of us in technological development.
3. Professor Duncan Forgan, an astronomer from Edinburgh University, estimates that between 360 and 38,000 life forms capable of interstellar communications have evolved at some point in the history of our galaxy.
4. In April 2006, Dr Shostak predicted we would find evidence of extraterrestrial life between 2020 and 2025. He believes the best way of bringing them up to speed with the human race is to send them the contents of the internet.
5. So far, no alien signals have been heard, however.
6. It was a September 1959 article in the journal *Nature* that persuaded the scientific community that, despite the unlikely aliens found in the era's Cold War-inspired UFO films, alien intelligence was more likely than not, so kick-starting the Seti project.
7. The search proper began in 1960, however, with "Project Ozma" at the Green Bank radio telescope in West Virginia, America, directed by a Harvard graduate, Frank Drake.

8. Project Ozma was named after the queen of L Frank Baum's fictional land of Oz, a place which is "very far away, difficult to reach, and populated by strange and exotic beings".
9. The Microsoft founder Paul Allen is funding 42 radio antennae – the Allen Telescope Array in California – at a cost of £16m for the Seti project. It powered up this month.
10. When complete, the Allen Telescope Array will have 350 antenna dishes, each six metres in diameter.
11. At the moment, scientists scavenge time on the world's biggest telescopes to hunt for signals. One of the most significant is the Arecibo Observatory radio telescope in Puerto Rico, made famous by Pierce Brosnan in the final sequence of the James Bond film *Golden Eye*. It's the world's biggest with a 305m diameter.
12. The most promising radio signal found to date, SHGb02+14a, was detected in 2003 at Arecibo. It was found on three occasions but emanates from between the constellations of Pisces and Aries where there are no stars. It is also a very weak signal. Scientists think it may have been due to an astrological phenomenon or a computer glitch.
13. A set of quickly pulsing signals known as LGM1 (Little Green Men) caused great excitement in 1967. It turned out that they were from a previously unknown class of super-dense rotating neutron stars now known as pulsars. The discovery won Tony Hewish, emeritus professor of radio astronomy at Cambridge University, a Nobel prize.
14. While radio telescopes on Earth are tuned into frequencies that scientists believe are the most likely to be used by intelligent life, there have been many attempts to contact aliens by sending signals and objects from Earth to likely-looking stars.
15. In 1974, astronomers sent crude pictures of humans, our DNA and our solar system to the star cluster M13, which is 21,000 light years away and contains a third of a million stars.
16. In 2001 a "reply" to the 1974 message was found in Hampshire in the form of a crop circle, featuring crude pictures of an alien, modified DNA and an improbable solar system. It is believed to be a hoax.
17. Nasa's attempt to communicate with aliens by playing a Beatles track in February 2008 caused consternation. Some scientists pointed out that making a highly advanced race, which might have exhausted all the resources on their planet, aware of our existence might not be the most sensible thing to do.
18. Now an international agreement is in place preventing any reply to an extraterrestrial signal unless there is agreement that it's a good idea.
19. However, if Einstein's theory is correct that it is impossible to travel faster than the speed of light, there is no need to worry. It would take extraterrestrial life-forms millennia to reach us, unless they had the technology to cut corners in space by travelling through highly theoretical tunnels called wormholes. "You're not going to see them in person, I think," Dr Shostak said. "To go from here to the nearest star is a project requiring a 100,000-year trip. And that's longer than you're going to want to sit there eating airline food."
20. But maybe they do have wormhole technology. See No 2.
21. The nearest stars likely to have planets are three parsecs away (one parsec equals 3.26 light years, or 19 million million miles) so even if a common language were found, it would take a century to communicate.
22. Seti hit the headlines in 1977 when a volunteer found a strong signal and wrote "Wow!" in the margin of a printout. The "Wow! Signal", as it came to be known, was never found again despite repeated attempts.
23. Frank Drake's Ozma project was originally kept secret as the observatory was government-funded and nobody wanted to let Congress know they were looking for aliens.
24. Nevertheless, Congress pulled the plug in 1993. The project is now funded by private donations.
25. Five million people have joined a scheme organised by the University of California in 1999 in which home computers help sift the millions of Seti readings during their "downtime" after a special screensaver is downloaded. SETI@home is the world's largest supercomputer.
26. SETI@home can do tens to hundreds of billions of operations per second.
27. There are now lots of group-computing projects using the same software as SETI@home, from decoding enigma messages sent in the Second World War to predicting future climates or helping to find a cure for Aids.
28. Searches for other-worldly intelligence also involve looking for signals aliens may have sent us using light waves or infrared as

well as radio waves.

29. The Drake equation ( $N = N^* \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot f_L$ ) was created by Frank Drake in 1961 to work out how many intelligent civilisations there may be in our galaxy. The values stand for things such as the number of stars and estimated number of planets. The answer varies from 2.31 to 1,000, as many of the values rely on guesswork.

30. Gene Roddenberry used the equation to justify the number of inhabited planets discovered by the crew of the Starship Enterprise in *Star Trek*.

31. Scientists admit, however, that aliens may already have tried to contact us with a form of communication completely unknown to us – a bit like trying to make contact with a lost tribe in Borneo using TV signals.

32. In 1950, Italian Nobel laureate and nuclear scientist Enrico Fermi stated the Fermi paradox: there's a high probability of alien life but we haven't detected any yet.

33. In the mid-1990s, Seti scientists thought they were on to something when they picked up a signal every evening at 7pm. It turned out to be from a microwave oven used by technicians in the cellar at the Parkes Observatory in Australia. There is now a note on the microwave asking people not to use it while Seti is active.

34. Other false calls have included signals from electronic garage doors, jet airliners, radios, televisions and even the Pioneer space craft. "We found intelligent life," said Richard Davis, a radio astronomer at Jodrell Bank in Cheshire, "but it was us."

35. The privately funded Seti Institute in California has an annual budget of \$7m. It employs 130 staff and was founded 25 years ago in November.

36. The MoD recorded 394 UFO sightings in the UK in the first eight months of this year.

37. In 1996 only six exoplanets – those outside our solar system – had been found. Now nearly 400 have been discovered. Although none are Earth-like, scientists believe it is just a matter of time before one shows up.

38. Which is why Nasa launched the Kepler telescope in March. It will survey 100,000 Sun-like stars over the next four years, looking for Earth-like planets in the "Goldilocks Zone" – a distance from the Sun that is not too hot and not too cold.

39. Some think early flying saucer stories originated from sightings of experimental Nazi aircraft.

40. In June this year, Seti upgraded its Serendip (Search for Extraterrestrial Radio Emissions from Nearby Developed Intelligent Populations) programme at Arecibo. The first programme listened to 100 channels simultaneously, the new programme can track more than two billion.

41. *ET and Close Encounters* director Steven Spielberg has been obsessed with the search for life outside our planet since childhood and donates money to Seti.

42. Ilie Arroway, Jodie Foster's character in the film *Contact*, finds aliens using the same methods as a Seti radio-wave analysing programme Project Phoenix based in Australia.

43. Those hopeful of so-called "exo-biology" have been encouraged by recent discoveries of the building blocks of life floating around in space. Radio telescopes have picked up the chemical signatures of 150 molecules in interstellar space, including sugar, alcohol and amino acids.

44. The twin *Voyager* space probes, launched in 1977, carried gold discs containing information about Earth, including recordings of greetings in 54 different human languages, humpback whale song, 117 pictures of Earth and a collection of sounds including music from Mozart to Louis Armstrong. The discs were put together by the Seti advocate Carl Sagan at the request of Nasa. It will be 40,000 years before the discs get anywhere near another planetary system.

45. If aliens do find them, they will need to locate an old vinyl record player. Fortunately, there are instructions and a stylus on the spaceship.

46. In the 1820s the German mathematician Carl Friedrich Gauss, below, tried to contact aliens by reflecting sunlight towards planets. He also wanted to cut a giant triangle into the Siberian forest and plant wheat inside to show a geometric object visible from the Moon.

47. Around the same time, the Austrian mathematician Joseph Johann von Littrow proposed digging a circular canal in the Sahara 20 miles in diameter, filling it with paraffin and setting it on fire, thus alerting alien species to our existence.

48. Charles Cros, a French poet and inventor, thought spots of light on Mars and Venus were indicators of civilisations. He tried to

convince the French government to build a giant mirror to communicate with the aliens. The lights he saw were probably noctilucent clouds (clouds so high they reflect sunlight at night); the mirror was almost certainly impossible to build.

49. Japan has prepared guidelines on how to handle aliens if they land and a strategy to defend the country from alien attack.

50. Early alien hunters at the 1960 conference at Green Bank, West Virginia, which established Seti as a scientific discipline, called themselves the Order of the Dolphin in honour of John Lilly, who had recently concluded that dolphins were intelligent and pioneered attempts to communicate with them.

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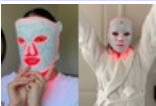
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