ESOcast Episode 47: Finding Life **Special 50th anniversary episode #7**		
00:00 **[Visuals start]**		**Images:**
00:45 **[Dr J]** 1. Have you ever wondered about life in the Universe? Inhabited planets orbiting distant stars?		Dr J, close up, with La Silla observatory panorama in background
00:52 **[Dr J]** 2. Astronomers have - for centuries.		Dr J, close up, with La Silla observatory panorama in background
00:55 **[Dr J]** 3. After all, with so many galaxies, and each with so many stars, how could the Earth be unique?		Dr J, close up, with La Silla observatory panorama in background
01:02 **[Dr J]** 4. In 1995, Swiss astronomers Michel Mayor and Didier Queloz were the first to discover an exoplanet orbiting a normal star.		Another view of La Silla with Dr J in the foreground
01:12 **[Dr J]** 5. Since then, planet hunters have found many hundreds of alien worlds. Large and small, hot and cold, and in a wide variety of orbits.		Artist impressions of exoplanetary systems
01:22 **[Dr J]** 6. Now, we're on the brink of discovering Earth's twin sisters.		Dr J, close up, with La Silla observatory panorama in background
01:27 **[Dr J]** 7. And in the future: a planet with life – the Holy Grail of astrobiologists.		Exoplanet animation

01:39 **[Narrator]** 8. The European Southern Observatory plays an important role in the search for exoplanets.		ESO sign at start of La Silla road
01:46 **[Narrator]** 9. Michel Mayor's team found hundreds of them from Cerro La Silla, ESO's first Chilean foothold.		Views from the road to La Silla, ending with panorama.
01:55 **[Narrator]** 10. Here's the CORALIE spectrograph, mounted on the Swiss Leonhard Euler Telescope. It measures the tiny wobbles of stars, caused by the gravity of orbiting planets.		Close-up of CORALIE Overview of Leonhard Euler telescope
02:08 **[Narrator]** 11. ESO's venerable 3.6-metre telescope is also hunting for exoplanets.		Outside and inside views of the ESO 3.6-metre telescope
02:16 **[Dr J]** 12. The HARPS spectrograph is the most accurate in the world. So far, it has discovered more than 150 planets.		Dr J at HARPS
02:28 **[Narrator]** 13. Its biggest trophy: a rich system containing at least five and maybe as many as seven alien worlds.		Artist's impression of HD10180
02:48 **[Dr J]** 14. But there are other ways to find exoplanets.		Dr J walking on La Silla towards the Danish 1.54-metre telescope, and into building.
02:58 **[Dr J]** 15. In 2006, the 1.5-metre Danish telescope helped to discover a distant planet that is just five times more massive than the Earth.		Dr J in the dome of the Danish 1.54-metre telescope.
03:12 **[Narrator]** 16. The trick? Gravitational microlensing. The planet and its parent star passed in front of a		Animation explaining gravitational microlensing Artist impression of the planet

brighter star in the background, magnifying its image.		
03:26 **[Narrator]** 17. And in some cases, you can even capture exoplanets on camera.		Exoplanet animation.
03:34 **[Narrator]** 18. In 2004 NACO, the adaptive optics camera on the Very Large Telescope took the first image ever of an exoplanet.		More OmegaCAM images.
03:45 **[Narrator]** 19. The red dot in this image is a giant planet orbiting a brown dwarf star.		Picture of 2M1207
03:54 **[Narrator]** 20. In 2010, NACO went one step further.		NACO instrument
04:01 **[Narrator]** 21. This star is 130 light-years away from Earth. It is younger and brighter than the Sun, and four planets circle around it in wide orbits.		Keck image of HR8799 system
04:13 **[Narrator]** 22. NACO's eagle-eyed vision made it possible to measure the light of planet c — a gas giant ten times more massive than Jupiter.		Zoom-in on VLT/NACO image of HR8799 with planet c, artist's impression
04:25 **[Narrator]** 23. Despite the glare of the parent star, the feeble light of the planet could be stretched out into a spectrum, revealing details about the atmosphere.		Animation(s) of obtained spectrum
04:36 **[Narrator]** 24. Today, many exoplanets are discovered when they transit across their parent stars.		Animation of planetary transit
04:43 **[Narrator]** 25. If we happen to see the planet's orbit edge-on, it will pass in front of its star every cycle.		Closeup of transit, with accompanying graph of star's brightness

Thus, tiny, regular brightness dips in the light of a star betray the existence of an orbiting planet.		
04:59 **[Dr J]** 26. The TRAPPIST telescope at La Silla will help search for these elusive transits.		Dr J and the TRAPPIST telescope.
05:05 **[Narrator]** 27. Meanwhile, the Very Large Telescope has studied a transiting planet in exquisite detail.		Artist impression of GJ1214b
05:14 **[Narrator]** 28. Meet GJ1214b, a super-Earth 2.6 times larger than our home planet.		Artist impression of GJ1214b
05:23 **[Narrator]** 29. During transits, the planet's atmosphere partly absorbs the light of the parent star.		Animation of starlight being filtered by planet's atmosphere during transit
05:34 **[Narrator]** 30. ESO's sensitive FORS spectrograph revealed that GJ1214b might well be a hot and steamy sauna world.		Animation/artis impression of sauna world
05:46 **[Narrator]** 31. Gas giants and sauna worlds are inhospitable to life. But the hunt is not over yet.		Animation/artis impression of sauna world
05:54 **[Narrator]** 32. Soon, the new SPHERE instrument will be installed at the VLT. SPHERE will be able to spot faint planets in the glare of their host stars.		Views of SPHERE
06:06 **[Narrator]** 33. In 2016, the ESPRESSO spectrograph will arrive at the VLT and greatly surpass the current HARPS instrument.		Computer drawings of ESPRESSO
06:17		Animation of E-ELT

[Narrator] 34. And ESO's Extremely Large Telescope, once completed, may well find evidence for alien biospheres.		
06:30 **[Narrator]** 35. [Start with few seconds silence] On Earth, life is abundant.		Landscape, animals, closeup of flying condor
06:37 **[Narrator]** 36. Northern Chile offers its share of condors, vicuñas, vizcachas and giant cacti.		Views of other Altiplano lifeforms
06:49 **[Dr J]** 37. Even the arid soil of the Atacama desert teems with hardy microbes.		Dr J kneeling in Atacama desert, pouring sand
06:57 **[Narrator]** 38. We've found the building blocks of life in interstellar space.		Molecular clouds / nebulae
07:03 **[Narrator]** 39. We've learnt that planets are abundant.		Exoplanet artist impressions
07:10 **[Narrator]** 40. Billions of years ago, comets brought water and organic molecules to Earth.		Comet animations
07:17 **[Narrator]** 41. Wouldn't we expect the same thing to happen elsewhere? Or are we alone?		Cosmic scenes with Earth-like planet
07:30 **[Dr J]** 42. It's the biggest question ever. And the answer is almost within reach.		Dr J in desert; Zoom out to reveal VLT in distance. Dr J stands up and walks away, in the direction of Paranal.
07:45		**[Outro]**

08:51 END