ANYONE OUT THERE?

Ian Taylor MP

Doom and gloom. Famine, floods, pestilence, terrorism, environmental degradation, recession. It is enough for us to cry "Stop the world, I want to get off". Yet where could we go? Are there other worlds like ours in the universe or are we alone?

We may soon find out, though sadly not soon enough for mortals to go there any time soon, unless we also invent 'Star Trek' propulsion systems to boldly go where no man has gone before. NASA has just launched the Kepler satellite to discover how many Earth-size planets there might be in our galaxy, orbiting their parent stars at just the right distances to have liquid water on their surfaces and rock formations.[1]

Those of us who found exhilarating the story of the late 18th century astronomer Sir William Herschel in Richard Holmes' excellent book *The Age of Wonder* can now look forward to a feast of information that modern space technology can provide.

The Kepler Mission is named after Johannes Kepler (1571-1630), who discovered that planets travel around the sun in elliptical orbits. Since 1995, telescopes on Earth and in space have detected 340 planets elsewhere in the galaxy. The Kepler satellite has a much higher probability of detecting Earth-like planets than the Hubble Space Telescope, since it has a much larger field of view (approximately 10 degrees square), and will be dedicated for detecting planetary transits. Hubble is, in contrast, used to address a wide range of questions and rarely looks continuously at just one starfield.

Most of the extra-solar planets detected so far by other projects are mostly the size of Jupiter and bigger. Kepler is designed to look for planets 30 to 600 times less massive, closer to the order of Earth's mass. It is looking for orbiting planets in the 'habitable zone' – sometimes known as the "Goldilocks zone" – where conditions are not too hot and not too cold but just right for life. With the Kepler observations, NASA expects to have a reliable estimate for the number of Earth-like planets in our galaxy.

Finding such planets in similar orbits will require the entire length of the 3.5-year Kepler Mission. By then its planetary census will hopefully tell us if this type of planet is common or rare in our neighbourhood of the Milky Way galaxy.

According to NASA, the spacecraft will simultaneously measure the variations in the brightness of more than 100,000 stars every 30 minutes, searching for the tiny "winks" in light output that happen when a planet passes in front of its star. The effect lasts from about an hour to about half a day, depending on the orbit and the type of star. The mission is designed to detect these changes in the brightness of a star when a planet crosses in front of it, or "transits the star."

The task is not simple. A NASA official remarked, "Trying to detect Jupiter-size planets crossing in front of their stars is like trying to measure the effect of a mosquito flying by a car's headlight. Finding Earth-sized planets is like trying to detect a very tiny flea in that same headlight." Detecting planets with characteristics suited to life forms is one thing, confirming that life – even simple microbial life – exists on them is another matter altogether.

As Clive Cookson commented in the Financial Times, "Silicon-based life has featured in science fiction but most chemists say only carbon-based systems such as on Earth would be versatile and robust enough to evolve elsewhere. These would have to follow the rules of organic chemistry – and of Darwinian evolution".

Investing in the science and technology to send missions such as Kepler is vital. The UK has a proud record in this scientific activity (such as in the Hubble craft and many other missions [2]). Even though this mission is financed by NASA, our scientists will be poring over and interpreting the results. So let us with bated breath await the results. But once again, space exploration has the ability to enthrall and inspire.

Ian Taylor MP *is co-chairman of the Parliamentary Space Committee and Chairman of the Parliamentary & Scientific Committee.*

[1] http://kepler.nasa.gov

[2] http://www.bnsc.gov.uk/3200.aspx

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