

So many planets, so few telescopes

November 8 2012, by Michael Lemonick

Over the last few weeks, astronomers announced not one but two extraordinary discoveries in the ongoing search for planets orbiting stars beyond the sun. The first was a world about the size of Neptune, 5,000 light-years away, whirling around in a solar system with four stars. It's something like Luke Skywalker's home world of Tatooine in the "Star Wars" movies, except that fictional planet sported only two suns.

The second was an Earth-size planet right next door in the Alpha Centauri system - three stars that orbit one another not thousands or hundreds but a mere four light-years from our solar system. That makes it not just the nearest "new" planet ever found but the nearest that could be found. (It isn't for nothing that so many sci-fi authors - although not George Lucas - have set their tales in the Alpha Centauri system.) With a surface temperature of 2,000 degrees or so, this planet's surface is probably molten, but its presence implies, tantalizingly, that there could be more.

All of this is exciting and wonderful, but it's a far cry from the discoveries astronomers thought they would be making by now. Back in the mid-1990s, when the first "exoplanets" ([extrasolar planets](#)) were found in distant star systems, NASA talked boldly about the new generation of powerful telescopes it was planning to build, in large part to hunt for alien worlds, especially those in balmy, life-friendly orbits.

By the early 2000s, something called the Space Interferometry Mission, or SIM, was going to measure the nearly imperceptible side-to-side wobbles caused by the gravity of Earth-size [planets](#), tugging their stars

first one way, then the other as they orbited. By 2007, the original version of the [James Webb Space Telescope](#), designed to be bigger and more powerful than the Webb scope now under construction, was supposed to be taking direct images of [giant planets](#), along with other astronomical duties. And by 2020 or so, the Terrestrial Planet Finder, or TPF, would be imaging true Earth "twins," scanning their atmospheres for gases that might betray biological activity.

As of today, however, SIM has been canceled; the smaller, less powerful Webb will launch by 2018 perhaps; and the TPF has been put on the back burner, maybe permanently. These disappointments have partly to do with NASA's ever-shrinking science budget, but SIM and TPF were also torpedoed by internal squabbling among scientists who disagreed about the best designs and about whether SIM was vital or unnecessary.

Yet even without the scopes they hoped for, astronomers are finding planets by the carload, using the Kepler space telescope, launched in 2009, and even small, ground-based instruments. Rather than wait for NASA to come through with expensive new toys, innovators like Harvard University's David Charbonneau; William J. Borucki of the NASA Ames Research Center in the Bay Area; and Michel Mayor at the Geneva Observatory in Switzerland kept pushing existing the science to its limits, and then pushing again.

Borucki, for example, lobbied for more than a decade to have NASA approve his Kepler mission, which is designed to look for the faint dip in light that occurs when an exoplanet passes in front of its star. It was a simpler and cheaper planet discovery method than SIM and the rest, but the agency kept finding fault with his proposal, so he answered their objections and re-proposed it five times. Since its launch, Kepler has found more than 2,000 probable planets.

Charbonneau chose to look for dips in starlight as well, but from the

ground; his innovation was to look at dim red stars, figuring a dip in light would be easier to spot if the star was dimmer to begin with. And Mayor took his 1990s-era instruments, which look for subtle changes in a star's color as a planet yanks it back and forth during the planet's orbit, and refined them beyond what anyone thought was technologically possible. It was his team that found the Alpha Centauri planet.

The result: While the telescope makers dithered, the roster of planets has exploded, from just one in 1995 to 800 known [alien worlds](#), and an additional 2,300 - provisionally identified by Kepler - that are waiting to be confirmed by further observations. Some of these provisional planets come from an unlikely source: Citizen scientists on the website [planethunters.org](#), scouring Kepler spacecraft data, were the ones who flagged the new four-star planet in Kepler's database, after the professional scientists had missed it.

This sort of scrappy ingenuity has kept the field of exoplanetology hopping with new discoveries, astonishing even the most seasoned scientists with the endless surprises the cosmos seems to hold. But just imagine the discoveries that would be happening with a NASA science budget that could keep up with astronomers' dreams.

More information: Michael D. Lemonick is a senior writer at Climate Central and the author of "Mirror Earth." He wrote this for the Los Angeles Times.

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