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## Artificial life

### Patent pending

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#### Move over Dolly. Synthia is on her way

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YOU have to hand it to Craig Venter, he is not someone who thinks small. The latest adventure of the man who was the first to sequence the genome of a living organism (three weeks after his grant request to do so was rejected on the grounds it was impossible), the first to publish the genome of an identifiable human being (himself) and the first to conceive the idea of sequencing the genome of an entire ecosystem (and to enjoy a nice cruise across the Pacific Ocean in his yacht while he did so) is curiously reminiscent of the incident that made him a controversial figure in the first place. That was when, 16 years ago, he attempted to patent parts of several hundred genes—the first time anyone had tried to take out a patent on more than one gene at a time.

This time, he is proposing to patent not merely a few genes, but life itself. Not all of life, of course. At least, not yet. Rather, he has applied for a patent on the synthetic bacterium that he and his colleagues Clyde Hutchison and Hamilton Smith have been working on for the past few years.

The patent application itself was filed without fanfare some eight months ago. But it was only at the end of May that the slowly grinding bureaucracy of America's patent office got round to publishing it. The central claim is to what Dr Venter calls the "minimal bacterial genome". This is a list of the 381 genes he thinks are needed to keep an organism alive. The list has been assembled by taking the organism he first sequenced, *Mycoplasma genitalium*, and knocking out each of its 470 genes to see which ones it can manage without. The theory—and the claim made by the patent—is that by synthesising a string of DNA that has all 381 of these genes, and then putting it inside a "ghost cell" consisting of a cell membrane, along with the bits and pieces of molecular machinery that are needed to read genes and translate them into proteins, an artificial organism will have been created.

Given that the ghost cell will be an enucleated natural bacterium rather than a synthetic structure in its own right, the new bug will not be a completely man-made creature. Nevertheless, if the three researchers can pull it off, they will have achieved an impressive piece of genetic engineering—or, rather, of synthetic biology as this high end of the field is now usually called. And there is every reason to believe that they will be able to pull it off. In 2003 the same team, working then as now at Dr Venter's research institute in Rockville, Maryland, were the first to produce a truly viable synthetic virus. And techniques have moved on since then.

The patent does not claim that an organism based on the minimal bacterial genome has yet been made—and it hasn't. It is more a question of the Venter Institute getting its retaliations in first. Nevertheless, the mere filing of the patent has upset some people. Among the dischuffed is ETC Group, a Canadian bioethics organisation whose eagle-eyed spotters noticed the publication of patent 20070122826 last week. They have asked Dr Venter to withdraw the patent—and, on the assumption that he will not, have also asked the patent office to reject it on the grounds that it is contrary to public morality and safety.

ETC's objections seem twofold, and also slightly contradictory. One objection is that the patent's claims are too widely drawn. It attempts, for example, to reserve the right to any method of hydrogen or ethanol production that uses such an organism. (Dr Venter thinks synthetic biology is going to be important as a way of making fuels.) It also, bizarrely, claims an interest in the genes the three researchers have identified as non-essential, as well as the essential ones.

To the extent that sweeping claims may stifle innovation, these are certainly things that need to be considered. However, the more profound objection ETC has seems to be based on the idea that there are areas where mankind should not meddle. As Pat Mooney, the group's boss, put it, "For the first time, God has competition." No doubt Dr Venter, hardly famous as a shrinking violet, will be amused by the comparison.

ETC's argument has some force. Synthetic biology is developing fast and it is easy to see it being used out of malice. That said, one of the advantages of a minimal genome is that the genes removed, while not essential for survival, are essential for robustness. A bug relying on such a genome could not possibly live in the wild if it accidentally escaped. Also, the biologists in the field are as concerned as anybody that the subject develops safely. They have been asking for regulation rather than resisting it, and have already established codes of conduct to try to stop the malicious synthesis of pathogens.

Nevertheless, ETC is hoping to provoke a debate. And to give people a name to hang on to in that debate it suggests nicknaming *Mycoplasma laboratorium*, as the application calls the putative invention, as "Synthia". The organisation hopes this name will stick in the popular consciousness in the way that Ian Wilmut's cloned sheep Dolly did. Indeed, it is rather a good name. Given the affection that Dolly attracted once the shock of her existence had been absorbed, perhaps Dr Venter—himself no slouch at publicity—will adopt it.

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