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Extreme Monopoly:
Venter's Team Makes Vast Patent Grab on Synthetic Genomes

Six months ago ETC Group exposed the Venter Institute's controversial patent applications on the world's first human-made living organism built entirely from synthetic DNA (dubbed "Synthia" by ETC Group). Newly published patent claims reveal an even bigger grab for ownership of synthetic life.

A suite of patent applications lodged by J. Craig Venter and his colleagues claims exclusive monopoly on a wide swath of synthetic biology and demonstrate a not-so-subtle move to position Venter's company, Synthetic Genomics, Inc., as the 'microbesoft' of synthetic life. Find out about "The Men & Money Behind Synthia."

This time, Venter's shop isn't claiming a single microbe (Synthia) made from synthetic DNA – the new claims are broadly framed to seek exclusive monopoly on ALL synthetic genomes. Venter's latest bid for extreme monopoly has drawn strong condemnation – but not much surprise – from civil society and from scientists in the field of synthetic biology.

"It appears that Craig Venter's lawyers have constructed a legal rats' nest of monopoly claims that may entangle the entire field of synthetic biology," explains Jim Thomas of ETC Group. "These patent applications need to be looked at very closely indeed. For example, the list includes proprietary claims on basic research steps such as adding synthetic DNA to a living organism – which pretty much sums up the current field of synthetic biology."

Despite repeated attempts to reach Dr. Venter and Synthetic Genomics, Inc., there was no response to ETC Group's request for comment.

Dr. Tom Knight, senior research scientist at the Massachusetts Institute of Technology's (MIT) Computer Science and Artificial Intelligence Laboratory, describes some of the claims as "absurdly, ridiculously broad." He told ETC Group that Venter's patent claims on synthetic genomes "evidence a lack of respect for prior art which is breathtaking."

"This is extremely serious," said Knight, "If the claims were to be granted, it's like saying 'we own life.'"

Dr. Paul Oldham from the ESRC Centre for Economic & Social Aspects of Genomics (CESAGen) at Lancaster University (UK) recently analyzed the portfolio of synthetic biology patent applications made by Venter and his scientific team (see chart below). What emerges is a series of applications from 2005 that seek exceptionally broad and far-reaching claims on the creation of synthetic genomes, and methods for transplanting them into living host cells (or cell-like systems) that may subsequently yield products of interest. In theory, synthetic cells could be

designed to have properties useful to industry – such as producing ethanol, hydrogen or other synthetic fuels. The claims extend to virtually any genome that has been partly or wholly modified using synthetic DNA, whether "substantially identical" to a natural genome or not. They also claim ownership of the living cells that result.

The patent applications also hint that Venter, famous for speeding up the reading of genomes using his 'shotgun sequencing' method, may be working on a new method to speed up the assembly of whole synthetic genomes – a sort of 'shotgun synthesis.' The patents describe a system for rapid automated prototyping of synthetic organisms that could produce millions of new synthetic organisms per day. Read more about "shotgun synthesis" here.

Another pioneer in the field of synthetic biology, Harvard University professor of genetics, Dr. George Church, told ETC Group that he believes Venter's strategy has more to do with raising money than innovation. "When you're trying to raise money, the more people who talk about it – the more you get attention. Knowing Venter's track record – he's trying to reinforce that. He's going after bragging rights on the first [synthetic] genome," said Church.

Wake Up Call: The patent claims are meant to be a harbinger of big news. In a matter of weeks or months, Venter's scientific team is hoping to make history by announcing the creation of the world's first-ever human-made species – a bacterium made entirely with synthetic DNA in the laboratory. Although Venter's Institute has already applied for worldwide patents on Synthia, it remains a theoretical achievement to date. How is Venter's team attempting to build a synthetic life-form? "The Story of Synthia" is available here.
No one knows when scientists will actually produce a fully functioning, self-replicating organism made from synthetic DNA. According to Venter, the announcement will be withheld until the work is simultaneously published in a scientific journal.

Venter asserts that he wants to create commercial microbes that produce drugs, chemicals and fuels. Earlier this year he told *Business Week*, "If we made an organism that produced fuel, that could be the first billion- or trillion-dollar organism. We would definitely patent that whole process."

Some scientists contacted by ETC Group are confident that Venter's patent claims will be rejected by patent examiners because they fail to pass the test of being novel and non-obvious inventions. ETC Group puts no faith in a patent system that, over the past quarter century, has awarded sweeping patents on all biological products and processes. Corporate giants like Monsanto (and Microsoft) have won monopolies that are used to quash competition and stifle research. And, even the most egregious claims, once granted, can take decades to overturn in court (and millions of dollars in legal fees).

"The fledgling synthetic biology industry keeps talking about how they're going to fix climate change – but these sweeping patent claims reveal that the companies are much more focused on securing profits than on human needs," explains Hope Shand of ETC Group. Venter's research on synthetic microbes is supported by millions of dollars in funding from the U.S. Department of Energy. "Taxpayer dollars support this research, but public debate and regulatory oversight of synthetic biology lag far behind," adds Shand.

See ETC Group's snapshot of the new synthetic biology industry – "Syndustry."

Open-science advocate, Dr. Richard Jefferson, founder of BIOS – Biological Innovation for Open Society – believes that, if the patents are granted, Venter might be convinced to surrender them to a "protected commons" where basic research tools can be used without fees as long as subsequent improvements are made freely available. Although inconsistent with Venter's prior actions, that possibility cannot be ruled out.

The final disposition of Venter's patent claims, whether or not they are granted in whole or in part, or placed in the public domain, doesn't resolve serious concerns about how synthetic biology will be used or abused, and what impacts it will have on society, said Kathy Jo Wetter of ETC Group. "Venter has suggested that one published article reviewing ethical concerns related to synthetic biology, [in the journal *Science* in 1999], is all that was needed to give his work a green light. In reality, the public debate on synthetic biology has yet to begin," said Wetter.

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Synthetic Genomes:
Patent Application Portfolio of the J. Craig Venter Institute (JCVI) and Synthetic Genomics, Inc.

Title	Patent Application Number	Filing Date (earliest provisional application)	Publication Date	Inventors	Assignee	# of claims
Installation of genomes or partial genomes into cells or cell-like systems	US20070269862 A1	23 Dec. 2005P	22 Nov. 2007	John Glass; Lei Young; Carole Lartigue; Nacyra Assad-Garcia; Hamilton Smith; Clyde Hutchison; J. Craig Venter	None	18
Synthetic Genomes	US20070264688	6 Dec 2005P	15 Nov. 2007	J. Craig Venter; Hamilton Smith; Clyde Hutchison	None (This invention was made with U.S. govt. support -DOE grant number DE-FG02-02ER63453).	38
Synthesis of Error-Minimized Nucleic Acid Molecules	US20070128649/ WO2007065035	2 Dec 2005P	7 June 2007	Lei Young	No assignee for U.S. app; WIPO app. assigned to Synthetic Genomics, Inc.	21
Minimal Bacterial Genome	US20070122826 /WO2007047148	12 Oct 2005P	31 May 2007	John Glass; Hamilton Smith; Clyde Hutchison; Nina Alperovich; Nacyra Assad-Garcia	JCVI	28
Method for In Vitro Recombination	US20070037196/ WO2007032837	11 Aug 2005P	15 Feb. 2007	Daniel Glenn Gibson; Hamilton Smith	JCVI (Aspects of the invention were made with govt. support - DOE grant number DE-FGO2-02ER63453	63 original 24 cancelled 39 remaining
Amplification and Cloning of Single DNA Molecules Using Rolling Circle Amplification	WO2006119066	29 April 2005P	7 June 2007		JCVI	62

Source: Based on information provided by Dr. Paul Oldham, CESAGen

Note: According to the website of Synthetic Genomics, Inc.: "Synthetic Genomics handles the prosecution of any patent applications covering intellectual property developed by the JCVI under a Sponsored Research Agreement between Synthetic Genomics and JCVI. Rights to any resulting patents are assigned to Synthetic Genomics." http://www.syntheticgenomics.com/press/SG-BP_FAQs.htm