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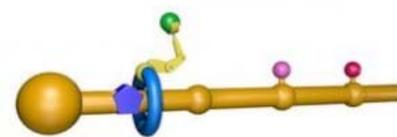
## Microscopic machine mimics the ribosome, forms molecular assembly line

By James Plafke on January 14, 2013 at 11:06 am

As the human race has advanced, we've made the process of creating products extremely efficient. Assembly line factories litter the planet's landscape, mass producing items piece by piece and maximizing worker efficiency — whether those workers be human or robotics. In order to maximize the efficiency of making new drugs or plastics, scientists have created a tiny machine that acts as something of an assembly line on the molecular level.

Professor David Leigh of Manchester University's school of chemistry stated that scientists hope to one day use artificial machines to create new types of materials or items — such as drugs or plastics — in molecular factories. Creating these items at the molecular level using automated machines would not only greatly increase the efficiency of the production process, but allow new materials to be made (since producers would be working at such a microscopic level of creation). Rather than performing some kind of arduous chemical process, the machine mimics the function of ribosome.

[1]Ribosome is the workhouse of protein construction. A cell's genetic code, held within its DNA [2], is taken from the cell and transported to the ribosome via RNA. Using amino acids, the ribosome deciphers the genetic code and builds polymer chains, which in turn fold and form proteins. Proteins, as you might've known, build our bodies and keep them going. The molecular machine works quite similarly to ribosome [3]. It resembles a rotaxane [4], which consists of a molecule shaped like a dumbbell that is "threaded" through a molecular ring, but with something added that can be imagined as a little mechanical arm attached to the ring. The new machine is able to act like the ribosome by moving up and down the dumbbell-like molecule while the arm manipulates the amino acids attach to the dumbbell, either by removing them or adding new ones.



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So far, Leigh's team is only able to create peptides — short bonds of amino acids — using the machine, and if they want to reach the ribosome level of creation, they will have to aim bigger at some point.

Though the molecular machine is far off from being mass produced and lined up in a molecular factory, Leigh and company feel this is the eventual goal of their work. They feel the molecular machines could be set to mass produce artificial — or "programmed" — molecules, shaped by the producer's whim. A current hurdle toward that goal is that a machine can only produce one molecule at a time; however, Leigh feels that millions of the machines can be set to work at once, forming something of a molecular assembly line that can churn out millions of molecules simultaneously.

Like all amazing tech that makes us feel like we'd be living in the future, there's no release date, so we'll just have to sit tight and have some patience before we start seeing designer molecule pop up shops.

Now read: Using DNA scaffolds to 3D print cancer drugs molecule-by-molecule [5]

### Endnotes

1. : <http://www.extremetech.com/wp-content/uploads/2013/01/rotaxanemachine.jpg>
2. held within its DNA: <http://www.extremetech.com/extreme/134672-harvard-cracks-dna-storage-crams-700-terabytes-of-data-into-a-single-gram>
3. molecular machine works quite similarly to ribosome: <http://www.sciencemag.org/content/339/6116/189.abstract>
4. rotaxane: <http://en.wikipedia.org/wiki/Rotaxane>
5. Using DNA scaffolds to 3D print cancer drugs molecule-by-molecule: <http://www.extremetech.com/extreme/143365-3d-printing-cancer-drugs-molecule-by-molecule-using-dna-scaffolds>

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