

Researchers extend genetic code of an entire animal

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Caenorhabditis elegans. Image: Wikipedia.

(PhysOrg.com) -- Researchers Sebastian Greiss and Jason Chin of the Medical Research Council's Laboratory of Molecular Biology in Cambridge, have succeeded in manipulating the DNA of a nematode such that a 21st protein was created and subsequently naturally replicated throughout the entire worm. The result, which the two describe in their paper in the *Journal of the American Chemical Society*, is the first ever animal with artificial information embedded in its genetic code.

The protein created glows bright red when exposed to UV light, causing all 1000 cells in the 1 mm long [nematode worm](#) *Caenorhabditis elegans* to glow like a string of Christmas lights under the microscope, proving that the procedure worked.

Normally there are just 20 amino acids used by all [living organisms](#); in this case though, the two researchers have altered the DNA of the nematode (which details how the amino acids should assemble

themselves to make proteins) so that it creates a 21st. Previously such a feat had only been accomplished with a simple [bacterium](#), (at the Scripps Institute ten years ago where Dr. Chin was part of another team). The technique works by manipulating one of the A, C, G or T DNA letters such that cells reading it would interpret it as a guide for producing the previously unknown amino acid.

The results demonstrated are considered to be a transformative event in microbiological science because it suggests that it will now be possible to create a whole host of new amino acids and proteins in animals, each limited only by the imagination. Initially it is expected that such proteins will be of the kind that would be sensitive or reactive to light, thus allowing researchers to cause or control effects in an animal by doing nothing more than illuminating them. Such experiments would be truly groundbreaking because unlike previous trials that sought to recreate natural phenomenon, new research in this area could lead to the creation of new types of animal biology.

Greiss and Chin next plan to work together to see if a means can be found to control neural cells in the nematode brain that would lead to directing animal behavior using simple laser flashes.

More information: Sebastian Greiss and Jason W Chin, Expanding the Genetic Code of an Animal, *J. Am. Chem. Soc.*, Just Accepted Manuscript, [DOI: 10.1021/ja2054034](https://doi.org/10.1021/ja2054034)

ABSTRACT

Genetic code expansion, for the site-specific incorporation of unnatural amino acids into proteins, is currently limited to cultured cells and unicellular organisms. Here we expand the genetic code of a multicellular animal, the nematode *Caenorhabditis elegans* (*C. elegans*).

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