

## Re: New Discipline: Synthetic Biology

**Source:** <http://sci.tech-archive.net/Archive/sci.bio.evolution/2004-10/0095.html>

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**From:** Inman Harvey ([inmanh\\_at\\_susx.ac.uk](mailto:inmanh_at_susx.ac.uk))

**Date:** 10/05/04

Date: Tue, 5 Oct 2004 06:01:34 +0000 (UTC)

Anthony Cerrato wrote:

> "Tim Tyler" <[tim@t1lock.org](mailto:tim@t1lock.org)> wrote in message  
> <*snip*>  
>>>>>[Anthony Cerrato:] I do like  
>>>>>this idea of engineering "synthetic" life in a real biological  
>>>>>sense.  
<*snip*>  
>>>[Anthony Cerrato:] Make no mistake, I am not putting down computer simulation  
>>>and other techniques in the study of synthetic methods of  
>>>various kinds (as a rather old retired analytical chemist I  
>>>am very aware of the power and utility of these techniques  
>>>in increasing our knowledge and ability to duplicate/improve  
>>>various real world processes.)

The terms simulation, synthesis and analog have different shades of meaning to different people, and I suspect different people in this discussion may be using different palettes.

- (A) Mathematics has been used in theoretical biology for some considerable time.
- (B) Computers are a fairly recent tool that allow simulations such as agent-based or individual-based models of all sorts of biological phenomena, ranging from molecular to cell to genetic to ecological to evolutionary to dynamics of motion to ... This is an alternative, or supplement to (A)
- (C) Quite a few groups build physical robots to test biological theories, ranging from insect mate-identification to animal navigation to dynamics of motion to ... This is an alternative, or supplement to (A) and (B)
- (D) Some chemists work on trying to create 'in a test-tube' autopoietic cell-like systems, or self-replicating molecules. Labs of people such as Pier Luigi Luisi, or Gerald Joyce. This is a different alternative, or supplement, to (B) and (C).

Within the Artificial Life community, (B) and (C) and (D) are all usually considered exercises in Alife. [I teach a course on Artificial Life in the biggest research group in the world in such areas, and my

colleagues would share this view]

(B) refers to simulations, often referred to as 'not real world'

(C) and (D) are always considered as 'real world'

{AC} I would agree that the

>>>*extension of such techniques to biology may well turn out to*

>>>*be invaluable in ultimately duplicating the Origin of Life*

>>>*process(es) in the lab— they certainly will be useful in*

>>>*studying various aspects of the subject. The only point I*

>>>*was making was the following: if some sequential method were*

>>>*theoretically developed for an OOL process, using computer*

OOL = Origin of Life in this context, I assume?

>>>*[AC] models for example, and the method was completely accepted by*

>>>*biologists through peer review, no one will completely really*

>>>*believe it until and if it is actually duplicated in real world*

>>>*labs. Would you? :))*

>>

I fully agree. And the term Artificial Life has always included such duplication in real world labs, as Tim Tyler said!

>>*[Tim Tyler:] "Artificial life" was /never/ a term confined to computer  
> simulations.*

>>*It has /always/ been a term that referred to man-made organisms –  
>>of \*all\* sorts.*

>>

>>*Whether the orginsms in question have been in virtual worlds,*

>>*made from metal, plastic, silicon, fullerenes, molecular*

>>*nanotechnology – or other material – has never been specified*

>>*in definitions of the term.*

Absolutely right!

<snip>

> *[Anthony Cerrato:]*

> *Dunno 'bout that. Wikipedia:*

> *[http://en.wikipedia.org/wiki/Artificial\\_life](http://en.wikipedia.org/wiki/Artificial_life)*

>

> *gives the following statement:*

>

> *"Artificial life, also known as alife, is the study of life*

> *through*

> *the use of human-made analogs of living systems. Computer*

> *scientist Christopher Langton coined the term in the late*

> *1980s when he held the first "International Conference on*

> *the Synthesis and Simulation of Living Systems" (otherwise*

> *known as Artificial Life I) at the Los Alamos National*

> *Laboratory in 1987."*

>

- > *Note the phrase, "...is the study of life through*
- > *the use of human-made analogs of living systems."*
- >
- > *This jibes with my readings which have always only discussed*
- > *alife in terms of electronic or electromechanical/simulation*
- > *or analog techniques, i.e., they do not usually include real*
- > *world or lab biology/synthesis, which was what I was*
- > *speaking of.*

Alife has always included (C) and (D), which we always consider as 'real world', as well as (C) computer simulations which are usually not considered 'real world'!

- > *[AC] I also note the following definition (which specifically*
- > *includes the word, "simulation,") given in: The American*
- > *Heritage® Dictionary of the English Language, Fourth Edition*
- > *Copyright © 2000 by Houghton Mifflin Company.*
- > *Published by Houghton Mifflin Company. All rights reserved.*
- >
- > *artificial life*
- > *n.*
- > *The simulation of biological phenomena through the use of*
- > *computer models, robotics, or biochemistry. Also called*
- > *Alife.*
- >
- > *Regards, ...tonyC*
- >

Precisely: through the use of (B) computer models, (C) robotics, or (D) biochemistry. If it had said "computer models but NOT robotics or biochemistry" it would have supported your position, but your quotation clearly and unambiguously supports the point Tim Tyler was making!

Inman Harvey

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