

## Comment

---

### Life in Its Uniqueness Remains Difficult to Define in Scientific Terms

<http://www.jbsdonline.com>

Research on life's genome and proteome and its possible origins is challenging and fascinating. Defining life in scientific terms, however, remains a highly difficult task. Over 100 definitions have been suggested in the course of generations of philosophers and scientists and the list of definitions just continues to grow. This points to an actual lack of a convincing consensus on the definition of life. At the recent 17<sup>th</sup> Albany Conversation, June 14-18, 2011, New York, E. N. Trifonov presented first results of a unique linguistic word count analysis, performed on the large corpus of all definitions of life. This carefully performed statistical analysis suggested (1) that *Life is self-reproduction with variations*.

In his most recent report in this journal E. N. Trifonov (2) describes the analysis of 123 tabulated definitions of life in high detail. Some of these definitions were also discussed in a special issue of the journal "Origins of Life and Evolution of Biospheres" (3) reflecting on the difficulties of defining life. E. N. Trifonov argues that most of the definitions do have some shared common sense suggesting that one could arrive to a consensus. Even if the different authors cannot be brought together – through space and time – E. N. Trifonov organized a sort of voting in absentia by statistically analyzing individual words used in the set of definitions. The words most frequently used might – according to Trifonov – reflect on their importance, as shared by many of the authors. The careful analysis originated one first attempt for the word count generated definition of life. It goes like *Life is [a] metabolizing material informational system with ability of self-reproduction with changes (evolution), which requires energy and suitable environment*. This first life-defining attempt was discussed in the context of previous comparative linguistic studies on the definition of life. E. N. Trifonov continued to search for a more concise and shorter definition of life by extracting two terms from the vocabulary of definitions. Trifonov concluded, as mentioned in the context of the Albany Conference above, with the definition of life saying that "life is *self-reproduction with variations*". This definition can indeed be applied as a practical guide in topical origin-of-life research, for example on protocell formation including the encapsulation and elongation of nucleotides (4).

Is this the ultimate and universal definition of life? – Probably not. Take a self-reproducing malicious software script like a computer virus, a computer worm, or a Trojan horse. Computer viruses spread from one computer to another via a network or via internet by reproducing themselves. After several hundreds of copies (and infected computers) random variations will provoke that the latest-generation offspring virus is not to 100% identical to the ancestor virus script. A computer virus performs self-reproduction with variations. It is not alive. Please note that variations observed in biological evolution such as mutations are

Uwe J. Meierhenrich

ICN, UMR 6001 CRNS,  
University of Nice-Sophia Antipolis,  
06108 Nice, France

Corresponding author:  
Uwe J. Meierhenrich  
Phone: +33 (0) 492 076177  
Fax: +33 (0) 492 076151  
E-mail: Uwe.Meierhenrich@unice.fr

