

## Hypothesis Article.

Viruses' origin could relate to the act of prey among primitive life forms during the old ages.

Eslam Abbas<sup>1</sup>

Department of cardiology, Om El Masreyin Hospital, Giza, Egypt.

<sup>1</sup> Corresponding Author.

*Address: Om El Masreyin Square, Giza, 12525, Egypt.*

*Email: [islam.omr@med.au.edu.eg](mailto:islam.omr@med.au.edu.eg)*

**Abstract:**

Viruses could have originated from the frantic competition to survive among the primitive life forms of the old ages. This is the result of this new hypothesis which proposes that viruses could have originated as remnants of primitive microorganisms disintegration. The destruction can have resulted from an attack of other cells for the purpose of nutrition or imposing control on the nutritional sources. This view is conclusive and can replace old hypotheses and additionally, it is flexible and explains virus diversity.

## 1. Introduction:

The origin of viruses and their evolutionary relation with other cellular microorganisms are enigmatic. Three main hypotheses have been articulated to track this problem:

### 1.1. The virus first hypothesis:

It postulates that viruses existed in a precellular world as self-replicating units. Over time, these units became more organized and more complex. Eventually, enzymes for the synthesis of membranes and cell walls evolved, resulting in the formation of cells (1).

### 1.2. The reduction hypothesis:

It proposes that the existing viruses may have evolved from more complex, possibly free-living microorganisms that lost genetic information over time, as they adopted a parasitic approach to replication (2). This hypothesis is supported by the fact that the bacteria *Rickettsia* and *Chlamydia* are living cells that, like viruses, can reproduce only inside host cells. Their dependence on parasitism is likely to have caused the loss of genes that enabled them to survive outside a cell.

### 1.3. The escape hypothesis:

According to this hypothesis; viruses originated from bits of mobile genetic elements, RNA or DNA, that from the genes of larger microorganisms (3). The escaped DNA could have come from

plasmids or transposons (4), while the escaped RNA could have come from retrotransposons (5).

By checking these three hypotheses, we can find that, none of which was fully accepted. The virus-first hypothesis was usually rejected firsthand, since all known viruses require a cellular host. It clashes with the cellular theory of life and the traditional assumption that viruses are nonliving entities (6). The reduction hypothesis does not reconcile with the observation that the most reduced cellular parasites in the three domains of life do not look like the intermediate forms between viruses and cells. The escape hypothesis does not explain the complex capsids and other structures on virus particles. The three hypotheses have undergone a process of re-evaluation, but this new hypothesis seeks to provide a conclusive concept.

## 2. Hypothesis:

This new hypothesis postulates that viruses could have originated as remnants of the frantic competition to survive among the primitive life forms of the old ages. In a world ruled by this primitive microorganism; the act of prey spreads among them for the purpose of nutrition or impose control of the natural resources. They used various mechanisms to target each other, leading to the disintegration of the prey microorganism in favor of the predator microorganism which may consume the remnants as a source of nutrition. Thus, these remnants gain access to the predator microorganism. Under the effect of probability; some of these remnants contain a genetic material valid for reproduction.

During This Period, the natural world was governed by these unicellular microorganisms. They were competing for natural resources and the act of prey spread among them. They developed many strategies to perform this act. The passive strategy was the simplest, in which the predator cell developed techniques to engulf the remnants of other cells that disintegrate independently either due to intrinsic factors or extrinsic unfavorable environmental conditions. The active strategy was more complicated, as the predator cell contributes in the process of prey cell disintegration. Chemical release to induce or encourage the prey cell disintegration was a favorable wide spread technique.

The act of prey and the mechanism of virogenesis are shown in Figure 1. The predator cell interacts with the prey cell leading to its disintegration. The disintegration process involves the sequential breakdown of cellular components, including the genetic material. The

disintegration results in vacuoles packed with cellular components of the prey cell. Some of these are progeny vacuoles and contain genetic material. The predator cell contacts the progeny vacuoles to engulf them. During this reaction; the genetic material gains access to the predator cell. Some of the genetic material gets the ability to self-replicate inside the predator cell and others can not. The predator cell which then turned to be the host cell release the newly formed viruses to infect other cells.

### 3. Supporting Argument:

This proposed hypothesis has supporting advantages as following:

#### 3.1. Conclusiveness:

This hypothesis is conclusive as it can explain the origin of both RNA and DNA viruses, or the origin of the viruses of the three domains of life: Archaea, Bacteria and Eukarya. The presented hypothesis gives an acceptable illustration of the origin of viruses and avoids the defect of the other hypotheses.

The reduction hypothesis does not explain the fact that the most reduced cellular parasites in the three domains of life do not look like the intermediate forms between viruses and cells. The previous fact does not relate to the present hypothesis as it depends on the act of prey among primitive life forms in the genesis of viable genetic material that capable of self-replicate inside a host cell.

The escape hypothesis fails to explain the complex capsids and other structures on virus particles. The progeny vacuoles described in the present hypothesis, which results of prey cell disintegration, can contain a viral structure at any level of complexity.

The present hypothesis can illustrate the origin of Prions, which are transmissible self-replicating proteins. The hypothesis depends on the action of probability that the produced progeny vacuoles of the disintegrated prey cell would produce a self-replicating material inside a host cell. It does not specify the type of

the transferred material which is transferred passively during the act of prey.

### 3.2. Dynamic and Flexible:

Two factors enhance the flexibility of the present hypothesis:

First is the action of probability, which lies in the heart of the present hypothesis. It would result in a large variety of viable progeny vacuoles during the continuous act of prey among the primitive life forms. These viable vacuoles would in turn produce highly diverse types of viruses. However; the action of probability was trimmed by the action of natural selection, the result would still be highly diverse.

Second is the action of prey itself, which is dynamic by nature. The predator host cell can engulf multiple progeny vacuoles before being disintegrated and preyed by another cell and so on. This action leads to genetic material mix-up.

Virogenesis, according to this hypothesis, diminishes or ceases as the primitive life forms evolve to be more complex. The probability of forming viable progeny vacuole diminishes. The disintegration of a more complex unicellular organism will produce multiple vacuoles containing various cellular components packed within, less of them and may be none, will be viable progeny vacuole.

The act of prey itself also diminishes when the primitive life forms evolve to be more complex. The unicellular microorganism shifts to other measures to get nutrition, especially when the multicellular organisms evolved.

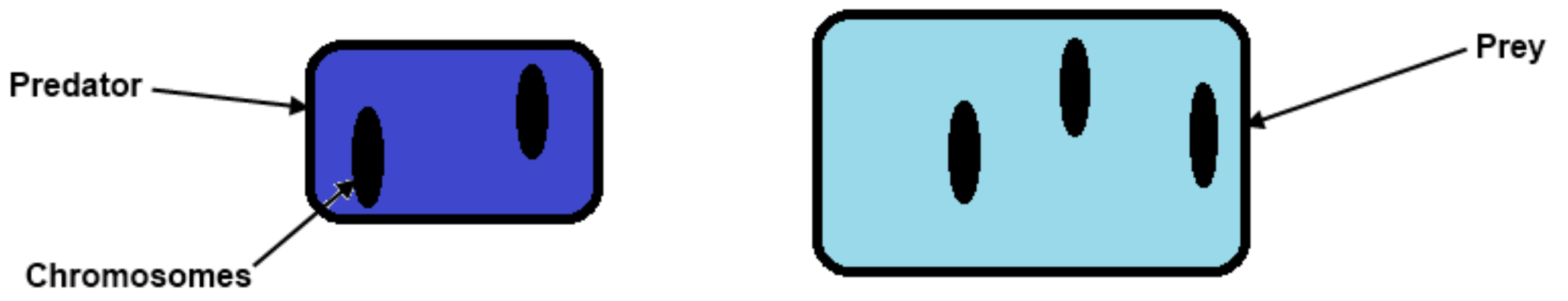


#### 4. Conclusion:

This new hypothesis proposes that viruses could have originated from the frantic competition to survive among the primitive life forms of the old ages. The act of prey among these forms may result in viable progeny vacuole that is capable of self-replication inside a host cell. This new hypothesis is more conclusive and avoids the defects of other hypothesis.

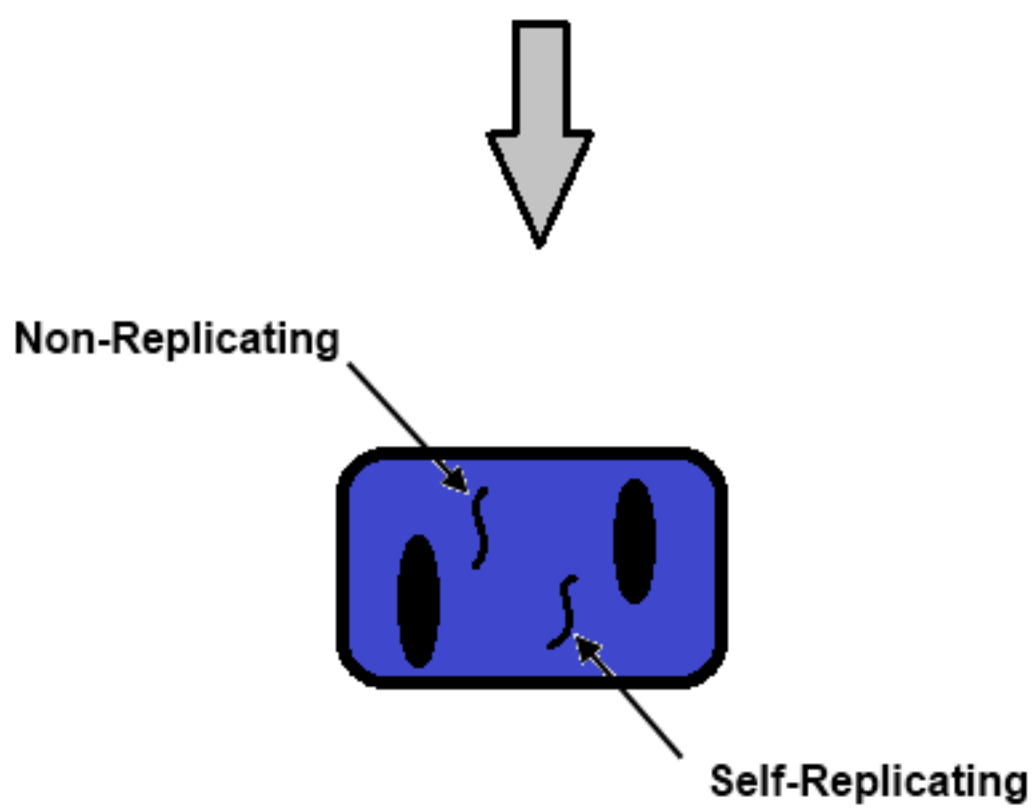
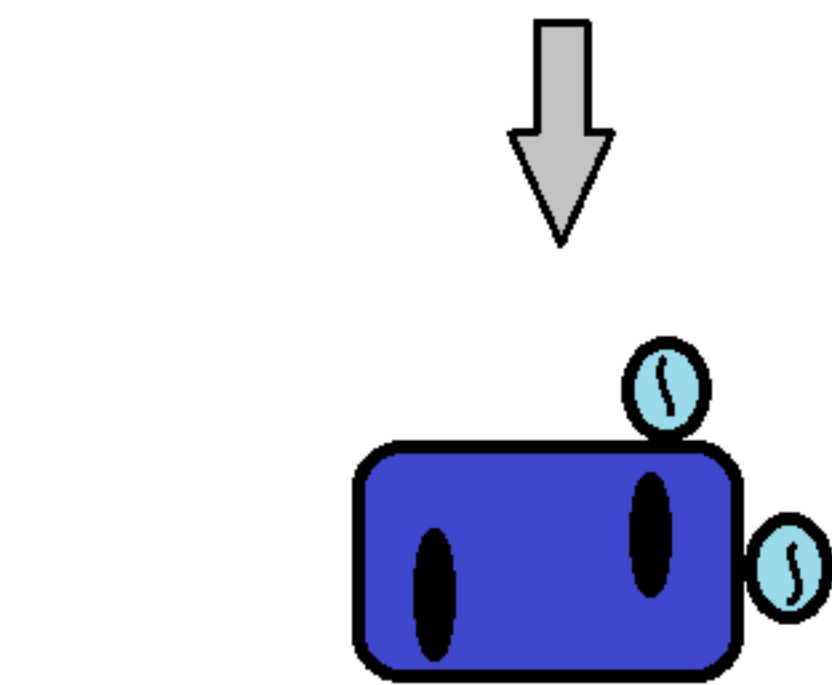
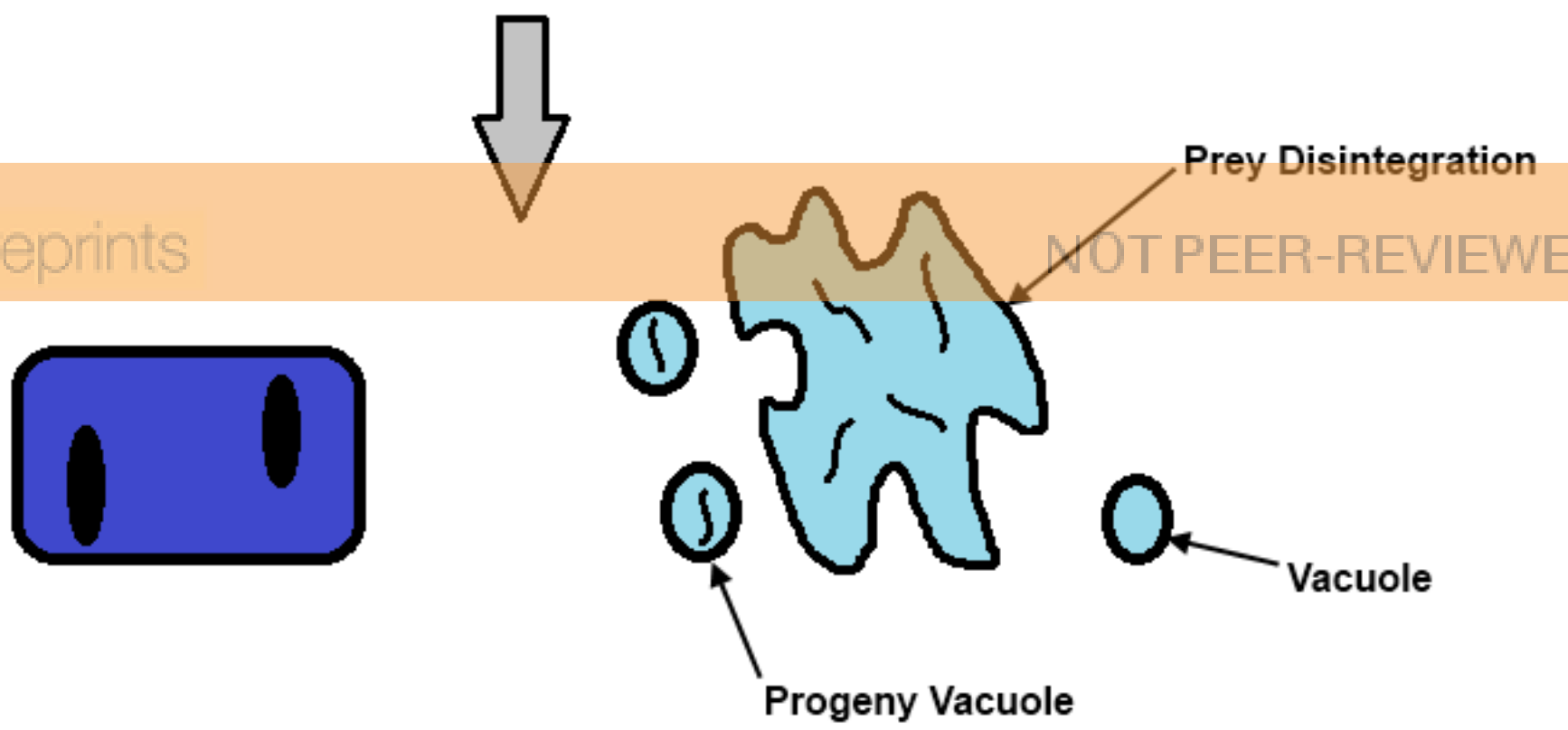
## References:

1. Koonin EV, Martin W. On the origin of genomes and cells within inorganic compartments. *TRENDS in Genetics*. 2005 Dec 31;21(12):647-54.
2. Dimmock NJ, Easton AJ, Leppard KN. *Introduction to modern virology*. Blackwell Publishing Limited; 2007.
3. Cushion MT, Balows A, Sussman M. *Topley and Wilson's microbiology and microbial infections*. Topley and Wilson's *Microbiology and Microbial Infections*. 1998.
4. Shors T. *Understanding viruses*. Jones & Bartlett Publishers; 2011 Nov 8.
5. Cann AJ. *Principles of Molecular Virology (Standard Edition)*. Academic Press; 2001 Mar 1.
6. van Regenmortel MH, Mahy BW, editors. *Desk encyclopedia of general virology*. Academic Press; 2010 May 21.



PeerJ Preprints

NOT PEER-REVIEWED



PeerJ Preprints | <https://doi.org/10.7287/peerj.preprints.1801v1> | CC-BY 4.0 Open Access | rec: 1 Mar 2016, publ: 1 Mar 2016

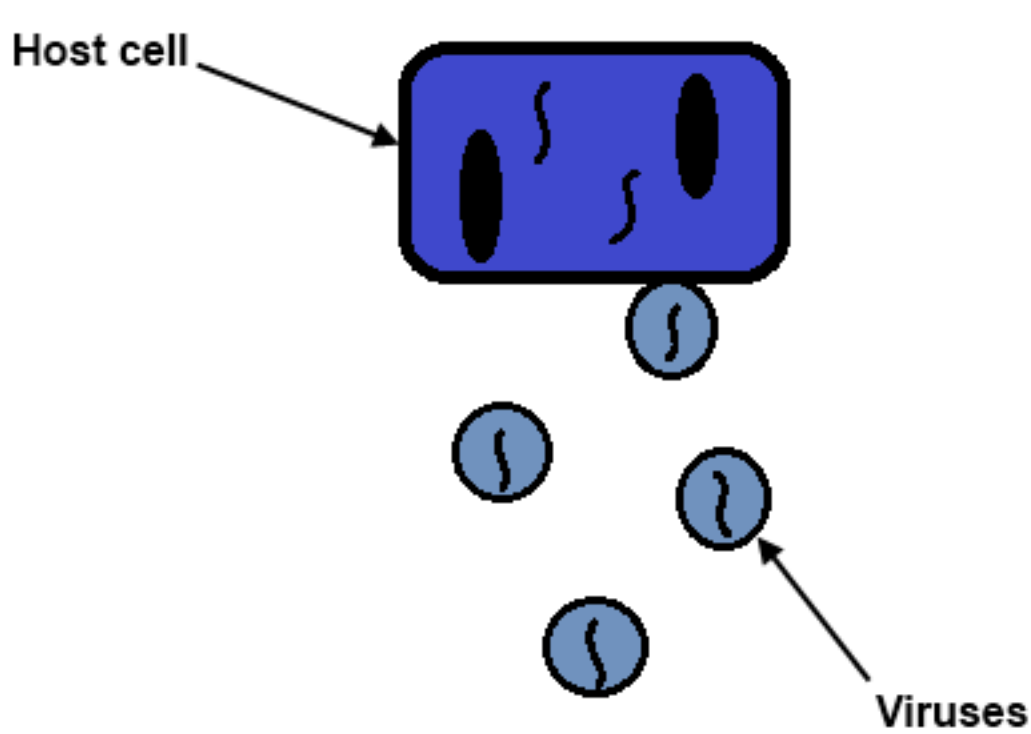


Figure 1