

Neglected Modern Theories on Inheritance and Evolution

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HIGHLIGHT

A fresh view on inheritance of acquired characteristics and multi-origin for evolution is represented in response to recent advances in understanding of the full spectrum of inheritance and non-Darwinian way of evolution.

ABSTRACT

Due to the neglect of epigenetics and non-Darwinian ways of evolution, our understanding of life has been limited and even distorted. The dominance of the genetics-based central dogma and common origin-based evolution tree in biology has created many paradoxes that are hard to resolve within the “conventional wisdom”. However, if we realize that the full inheritance actually includes both the genetic and the epigenetic components and complex evolution actually reflects the outcomes of parallel evolutions from multiple acellular origins then many enigmas in biology will be easily understood. Thus, it is time to appreciate the value of some long-neglected old theories as well as some recently advanced modern theories on life and its evolution so that our knowledge on life can be fully enriched.

KEY WORDS

Life, Origin, Evolution, Inheritance, Genetics, Epigenetics, DNA segregation, Cell reproduction, Cell aging, Cell life, Cell death, Darwin, Common origin, Dogma, Shi V. Liu, Multiple origins, Revolution

In a recent Viewpoint article addressing a different view of evolution Liu concisely summarized the history of studies on inheritance of acquired characteristics and its implications for understanding evolution (Liu, 2007n). He also objectively presented a tragic event in science – the neglect of Darwin’s hypothesis on pangenesis, Lamarck’s ‘biology’ of environmental influence on bioactivities and Waddington’s epigenetics. He asked a very pertinent question – “do we in fact need to enrich and expand Darwin’s pangenesis, and develop a modern theory of inheritance, which is broader in scope and consistent with the wealth of experimental evidence” and also “give a wider perspective of evolution”.

I firmly believe that some acquired characters can be passed into offspring. I also feel strongly a need for reevaluating the mainstream theory on evolution. For the former point I have proposed a comprehensive view on inheritance which combines genetic with epigenetic for a comprehensive understanding of total heredity (Liu, 1999; Liu, 2005c; Liu, 2005f). For the latter point I have presented a different view on evolution – a multi-origin for life and a mechanism-based view on evolution (Liu, 2006d).

Both theories were proposed in the earlier 1990s and published in various ways. Unfortunately, both theories are still neglected by the mainstream even today (Liu, 2006g; Liu, 2007c; Liu, 2007d; Liu, 2007i; Liu, 2007m) despite the fact that some “top”

journals are now beginning to publish some “new discoveries” (or, more correctly to say, re-discoveries) that contain experimental observations or modeling conclusions that are very consistent with my earlier true theoretical but more fundamental discoveries. More sadly is that these later publications, although revealed some solid observations, still contain many incorrect interpretations (Liu, 2007b; Liu, 2007e; Liu, 2007f; Liu, 2007j; Liu, 2007k; Liu, 2007l).

The disregard of largely confirmed pioneering discoveries may not have many precedents because pioneers were always fully praised later even though their far-in-advance discoveries sometimes met with cold reception in the beginnings. Thus, old-generation scientists seemed to have an even higher ethical standard than that maintained by today's scientists (Liu, 2006e; Liu, 2006j; Liu, 2006k). This regression in scientific ethics may be a result of unnatural selection which favors “scientists” good at publishing trending research in “top” journals but jeopardizes scientists “foolish” enough to challenge mainstream dogmas. This unnatural and unethical selection can happen and prevail because the evil action is often done in the secret peer review process which is full of conflict of interests and very suitable for high-level misconduct.

However, to really appreciate some alternative views, we must get rid of some dogmas and let alternative views compete under open field with total transparency. Only in this fair competition environment better knowledge can be selected out from poor knowledge.

The first dogma that I wish every biologist to get rid of is the “one mother two daughter” concept in cell biology. This centuries-old dogma is a total misunderstanding of cell reproduction at its best (Liu, 2006a; Liu, 2006b) or a very harmful deception at its worst (Liu, 2006c). A blind trust on this pseudo-scientific understanding of cell life has caused many fundamental mistakes in biology (Liu, 2007g).

Let us realize that a cell is just like any other macroorganism in term of its adherence to some basic life principles. Its life span should include the typical juvenile-, adult- and senescent-phase or stage (Liu, 2004; Liu, 2005e). A mother cell usually does not “die” and then “self-renew” into a daughter cell but remains alive after giving birth to a true daughter cell (Liu & Zhang, 2004a; Liu & Zhang, 2004b). All reproduction-paired cells bear a mother-daughter relationship, not any “twin daughter” relationship. This correct understanding not only forms a solid basis for revealing the true sense intrinsic cell aging (Liu, 2005b; Liu, 2005d;

Liu, 2006i; Liu, 2007a; Liu, 2007e; Liu, 2007h) but also provides a useful criterion for disapproving any falsely claimed “cell differentiation” (Liu, 2005a; Liu, 2006h).

More importantly, the above correct view on cell life and the insightful linkage between age-based asymmetric DNA segregation into generation-distinct cells also extends the understanding of semi-conservative DNA replication into deep levels and larger scopes.

The semi-conservative nature of DNA replication can be understood as a conservative replication of DNA sequence (the genetic information) but non-conservative replication of DNA modification (the epigenetic information). The conservative replication of the genetic information forms a basis for reliable inheritance and thus contributes to the gross similarity between a parent and a child or the so-called “like father like son”. The non-conservative replication of epigenetic information leaves room for each individual cell to gain different modifications as required for adapting into each own living experience and environment and thus allows some variations between individuals or the so called “no daughter is completely alike her mother” or even “there is no truly identical twins”.

The above dual aspects of genetic inheritance and epigenetic adaptation can happen at the unicellular life on the single cell level. While this single cell-level semi-conservative inheritance is still functional in the various cells of a multicellular organism, additional higher level separation of inheritance and adaptation do happen in multicellular organisms.

In multicellular lives, only those acquired characteristics imprinted on the DNA of germ cells can be passed down to the offspring. Those acquired characteristics stayed just in the somatic cells will mainly contribute to the non-inheritable individual adaptability. However, there is a grey area in such understanding. If the somatic cell adaptation also change the system's biology that alter the way germ cells live and reproduce, then such soma-based adaptation may also indirectly contribute to the germ evolution.

The second dogma that I wish all scientists to get rid off is the orthodox Darwinian view on evolution – the common origin for all life forms. As I pointed out earlier, the biggest mistake that Darwin made was not his less emphasis on the action of environment to the occurrence of variation but his overemphasis of similarity means common origin. This ungrounded view of evolution has not only resulted in some great waste in scientific research by misleading scientists into fruitlessly efforts of building various truly artificial trees of life (TOL)

and endless searching for the really non-existent last common ancestor (LCA) but also boxed our thinking on evolution to just a few options.

With a correct understanding of the multi-origin nature of evolution, we should come to a reasonable assessment on the contribution of horizontal gene transfer (HGT) to the convergence of biotic characters. It is also clear that building truly genealogical-based phylogenetic trees of life is not only difficult but also less valuable for understanding the mechanisms of evolution.

It is ironic that Darwin's incorrect view on evolution (a common origin for all extent lives) has dominated biology even until today but his correct view on evolution (a pangenesis explanation on variation) has so far under appreciated. It is even more ironic that today's scientific establishment have treated some reinventions of wheels as great "discoveries" but ignored more insightful pioneering discoveries as "non-citable" publications.

To conclude my Correspondence on another Liu's view on inheritance and evolution I wish to adapt his quotation on Darwin's statement into something like:

"Now all these points" (on the linkage of DNA aging and cell aging and combination of genetics and epigenetics for total inheritance) "and many others" (such as the multi-origin hypothesis for life initiation and a mechanistic view on evolution) "are connected together, whether truly or falsely is another question", by New Biology (Liu, 2006f). "You see I work hard, and stick up for my poor child" (of New Biology). I wish you can adopt this child into your mainstream or give me some solid reasons for refusing it [the quoted parts should be from Darwin (Darwin, 1988 or 1888) if the other Liu's quotation is correct].

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The publication here is the same as submitted to *EMBO Report* except for the added highlight, abstract and keywords.