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An Evolutionary Continuity Principle for Evolutionary System of Organism Divisions

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Abstract: Evolutionary research is guided by the scientific basis of organism evolution. To overcome the limitations of being partial and subjective in the tree of life or phylogenetic system, the authors proposed a basic principle of organism evolution, evolutionary continuity principle. Based on this principle, the evolutions can be divided into two basic forms: vertical evolution and horizontal evolution. The vertical evolution is that evolution of the structures and features of organisms from non-existent to entirety, from simple to complex, or from primitive to advanced. The evolutionary course of vertical evolution can be divided into two or three significantly different phases, such as plants: the non-vascular → the vascular, non-seed → Gymnospermophyta→ Fructophyta, and the animals: Proenteratozoa → Coelenteratozoa → Euenterata, Prochordatozoa → Chordatozoa → Vertebrognathozoa. The horizontal evolution is that evolution of structures and features from loose to compact, from inefficient to efficient, or from primitive to advanced, which can also cause significant organism changes, such as Nudembryophyta (Plantae) → Proenteratozoa (Animalia), Bacterophyla → Acytophyla. Based on the continuity principle, the new evolutionary taxonomical system of divisions was established and the evolutionary diagram was drawn. The new system includes 20 divisions in three kingdoms, and 11 of those divisions are new. These are: I. Regnum Microbia D. L. Fu: 1.Cyanoalgophyla D. L. Fu & H. Fu, phyl. nov., 2. Bacterophyla D. L. Fu & H. Fu, phyl. nov., 3. Acytophyla D. L. Fu, 4.Monoalgophyla D. L. Fu & H. Fu, phyl. nov., 5. Monomycophyla D. L. Fu & H. Fu, phyl. nov., 6.Eualgophyla D. L. Fu & H. Fu, phyl. nov., 7. Fungophyla D. L. Fu & H. Fu, phyl. nov.; II. Regnum Plantae L. emend. D. L. Fu: 8. Nudembryophyta D. L. Fu, 9.Bryophyta, 10. Pteridophyta, 11. Gymnospermophyta D. L. Fu & H. Fu, phyl.nov., 12. Fructophyta D. L. Fu & H. Fu, phyl. nov.; III. Regnum Animalia L. emend. D. L. Fu: 13. Proenteratozoa D. L. Fu & H. Fu, phyl. nov., 14. Coelenteratozoa, 15.Nematozoa, 16. Annelidozoa, 17. Arthropodozoa, 18. Prochordatozoa D. L. Fu & H. Fu, phyl. nov., 19. Chordatozoa, 20.Vertebrognathozoa D. L. Fu & H. Fu, phyl. nov.. The new evolutionary theory, new evolutionary taxa and new evolutionary system can provide scientific bases for Evolutionomy, a new science of organism evolution.

Keywords: Evolutionary Continuity Principle, Evolutionomy, Evolutionary System, Organism Division, New Evolutionary Taxa

1. Introduction

Almost all evolutionary researches of organisms were guided by the tree of life or phylogenetic system. The tree of life was a description of the evolutionary theory of natural selection principle by Charles Robert Darwin [1] in *The Origin of Species* as that *the affinities of all the beings of the same class have sometimes been represented by a great tree*. Why did Darwin restrict the tree of life in the beings of the same class? Because all animals and plants of the same class *throughout all time and space could be related to each other in group subordinate to group* by specific affinities sometimes such as that it could be related a specimen of Class Insecta to order Hymenoptera, Lepidoptera, Coleoptera or others by its wing morphology. So the tree of life could not be applied in the superordinate taxa above class without clear affinities.

Phylogenetic system is another tree of life based on the

DNA or RNA of organisms. Because it is impossible to obtain the sequences of all beings of the same class throughout all time and space, so phylogenetic system being partial sometimes. The system can show phylogenetic relationships among different beings, but it cannot show evolutionary relationships, which can lead to a subjective system sometimes. For example, the system of three Superkingdoms [2, 3, 4], Archaea, Bacteria and Eukarya based on 16S rRNA gene is partial for not including viruses. Although the phylogenetic relationships among three superkingdoms are clear, the evolutionary relationships looking like Archaea→ Bacteria → Eukarya are inauthentic. The worst of all, the system is unnatural for Archaea including very simple beings of prokarya survived in special niches, Bacteria also very simple ones, but Eukarya including very large quantity and mixed organisms of three kingdoms of Microbia D. L. Fu, Plantae L. emend. D. L. Fu and Animalia L. emend. D. L. Fu [5].

How to overcome the limitations of being partial and subjective in the tree of life or phylogenetic system, the authors proposed a basic principle of organism evolution, evolutionary continuity principle.

2. Evolutionary Continuity Principle

For the scientific reflection and research of evolutionary process of organisms, to establish evolutionary taxa, analyze their evolutionary relationships and establish the evolutionary system based on the continuity of organism evolution, could be called evolutionary continuity principle, a basic scientific principle of organism evolution.

Evolutionary taxa should be possibly established to reveal the evolutionary hierarchy and evolutionary processes scientifically. For example, the primitive taxa of Kingdom Animalia are a new division called Proenteratozoa D. L. Fu & H. Fu, phyl. nov., established by the authors, which include all the most primitive animals without enteric or similar structures such as Porifera, and the synonyms of Placozoa and Mesozoa. Comparing Proenteratozoa with other divisions of organisms, the origin of Kingdom Animalia L.emend.D. L. Fu could scientifically be reflected.

There were two main viewpoints about the origin of animals (Figure 1). One could be called Leaping Origin proposed by R. H. Whittaker [6] which thought animals were evolved from Protist (Protozoa). The viewpoint disobeyed the basic principal of evolutionary continuity of organism evolution. Protist or Protozoa, unicellular haploid organisms could not continuously evolve to Animalia, multicellular diploid organisms, because the intermediate evolutionary organisms, multicellular haploid organisms must be requisite. The other viewpoint could be called Extinct Origin in modern university textbooks [7] which generally agreed that animals (Metazoa) were evolved from Protozoa, but the intermediate taxa were all extinct. This viewpoint is subjective because the intermediate taxa of multicellular haploid organisms such as stonewort and Porphyra are really existent.

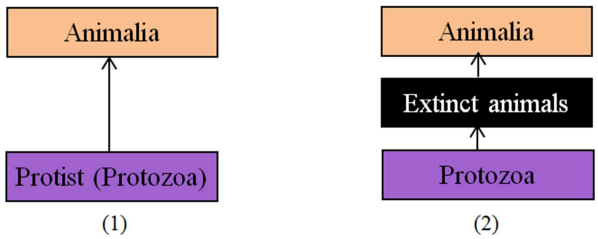

Figure 1. *Two main viewpoints of the origin of Animalia.*

(1)= The viewpoint of Leaping Origin of Animalia, (2)=The viewpoint of Extinct Origin of Animalia

Then how did the kingdom Animalia originate? Comparing Proenteratozoa, the most primitive taxa of Animalia with Nudembryophyta D. L. Fu [5], it can be find that the evolutionary level, reproductive and survival state of Proenteratozoa are almost exactly same as some taxa of Nudembryophyta such as Codium and carrageen, except that Proenteratozoa are heterotrophic but Nudembryophyta are autotrophic. The evolution from autotrophic to heterotrophic is familiar in different taxa, such as Cyanoalgophyla D. L. Fu & H. Fu, phyl. nov. → Bacterophyla D. L. Fu & H. Fu, phyl. nov.. The more convincing evidence is that the sporophytes of modern plants of Bryophyta are heterotrophic. So it can be conclude that the continuously evolutionary relationship Nudembryophyta D. L. Fu→ Proenteratozoa D. L. Fu & H. Fu, phyl. nov., is scientific. This evolution can be called horizontal evolution.

Another important example of horizontal evolution is the origin of viruses, which used to be considered an evolutionary mystery [2, 8]. Viruses did not have correct taxonomic position until Acytophyla D. L. Fu was established [5]. But what are the evolutionary relationships with other taxa in Kingdom Microbia D. L. Fu? The structures of viruses are extremely simple, but very compact, and their ability to take full advantage of the intracellular environment, indicating their high-level in the evolution of Microbia. According to the evolutionary continuity principle, it can be concluded that viruses originated from bacteria because some bacteria such as tubercle bacillus and mycoplasma survived in organism cells as viruses. In short, the horizontal evolution is that evolution of structures and features from loose to compact, from inefficient to efficient, or from primitive to advanced, which can cause significant organism changes.

Correspondingly to horizontal evolution, the vertical evolution is more well known and has been studied more fully since the times of Darwin. One example is the origin of kingdom Plantae L. emend. D. L. Fu. Comparing Nudembryophyta D. L. Fu with Eualgophyla D. L. Fu & H. Fu, phyl. nov., a new division for multicelluar algae in Kingdom Microbia D. L. Fu, it can be find that Nudembryophyta D.L.Fu have very close relationships with Eualgophyla D. L. Fu & H.Fu for they all autotrophic, multicellular structures and, haploid and diploid interlaced life cycles, except that Nudembryophyta are embryonated but Eualgophyla are not embryonated. According to the evolutionary continuity principle it can be conclude that Plantae L. emend. D. L. Fu.

evolved from Microbia D. L. Fu. So based on embryo origin and its evolution, the evolutionary system of three kingdoms of organisms [5], is scientific, whose taxa have continuously evolutionary relationships as Figure 2.

Figure 2. *Evolutionary system of organism kingdoms.*

Traditional dichotomous classification system cannot fully reflect the vertical evolutions of organisms scientifically. For example, the taxa of division Chordata were regarded as the highest evolutionary level of animal divisions, but in fact the evolutionary taxa of Vertebrognathozoa D. L. Fu & H. Fu, phyl. nov., the new division established by the authors, are really the highest evolutionary level of animal divisions. Also, the taxa of Spermatophyta [9] were generally regarded as the highest evolutionary level of plant divisions, but in fact the evolutionary taxa of Fructophyta D. L. Fu & H. Fu, phyl. nov., the new division established by the authors are really the highest evolutionary level of plant divisions. So the vertical evolution can be defined as that evolution of the structures and features of organisms from non-existent to entirety, from simple to complex, or from primitive to advanced. The evolutionary course of vertical evolution can be divided into two or three significantly different phases, such as plants: the non-vascular → the vascular, non-seed → Gymnospermophyta D. L. Fu & H. Fu, phyl. nov.→ Fructophyta D. L. Fu & H. Fu, phyl. nov., and the animals: Proenteratozoa D. L. Fu & H. Fu, phyl. nov. → Coelenteratozoa → Euenterata (coelomica), Prochordatozoa D. L. Fu & H. Fu, phyl. nov.→Chordatozoa→Vertebrognathozoa D. L. Fu & H. Fu, phyl. nov..

3. Evolutionary System of Organism Divisions

Based on the evolutionary continuity principle, the new evolutionary taxonomical system of divisions was established and the evolutionary diagram was drawn as Figure 3. The new system includes 20 divisions in three kingdoms and 11 of those divisions are new. These are:

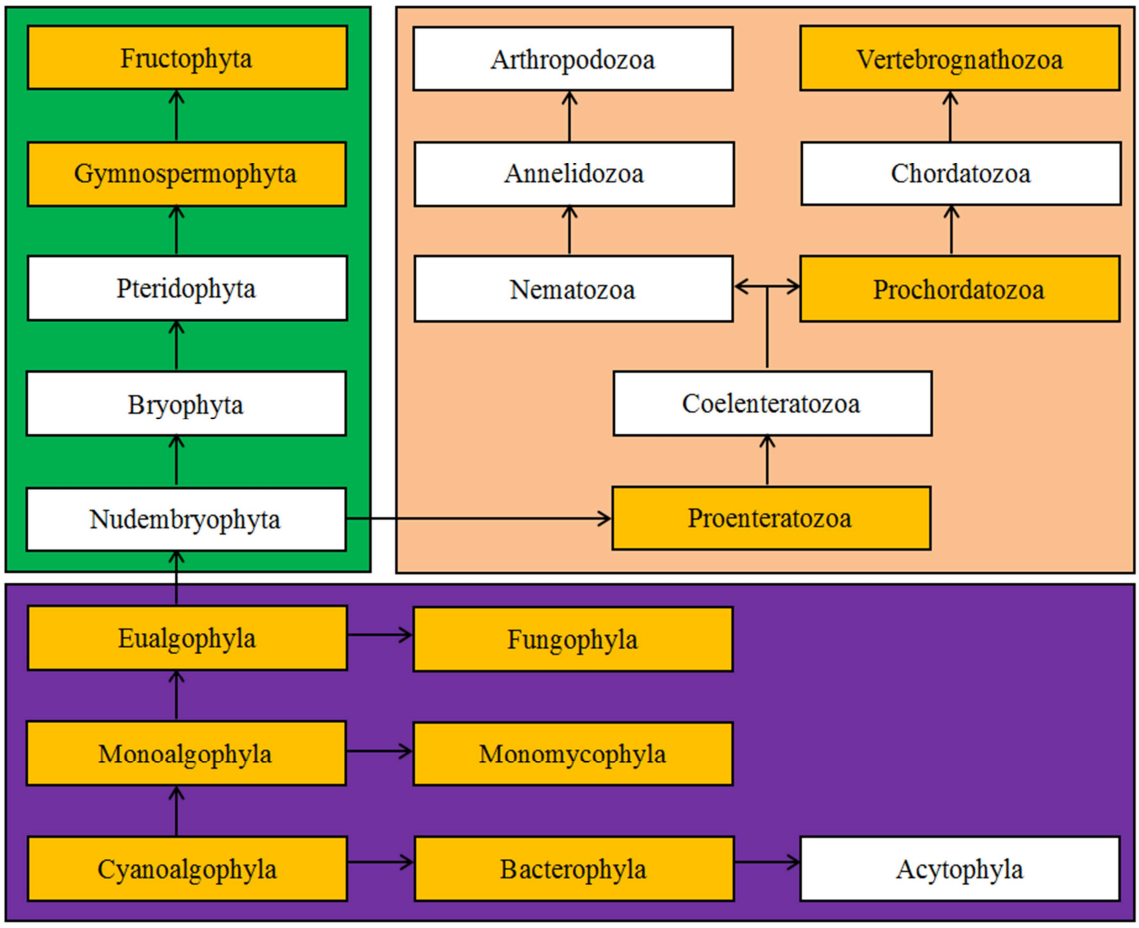

Figure 3. *Evolutionary system of organism divisions.*

I. Regnum Microbia D. L. Fu, J. For. Res., 2005, 16(1): 65.

1. Cyanoalgophyla D. L. Fu & H. Fu, phyl. nov., Micorbia prokaryorum et autotrophiarum, includentes omnino Cyanoalgae et cetera.
2. Bacterophyla D. L. Fu & H. Fu, phyl. nov., Microbia prokaryorum et heterotrophiarum, includentes omnino Bacteria, Mycoplasma et cetera.
3. Acytophyla D. L. Fu, J. For. Res., 2005, 16(1): 65.
4. Monoalgophyla D. L. Fu & H. Fu, phyl. nov., Microbia monocytoeukaryorum vel particytoeukaryorum, et autotrophiarum, includentes omnino synonymia Euglenophyta, Pyrrophyta, Chrysophyta, Xanthophyta et Bacillariophyta, et aliquot taxa (Chlamydomonas, Porphyridium) in Chlorophyta et Rhodophyta.
5. Monomycophyla D. L. Fu & H. Fu, phyl. nov., Microbia monocytoeukaryorum et heterotrophiarum, includentes omnino synonymia Protozoa heterotrophiarum.
6. Eualgophyla D. L. Fu & H. Fu, phyl. nov., Microbia multicytoeukaryorum et autotrophiarum, includentes partim taxa (Chara, Porphyra) in Chlorophyta et Rhodophyta.
7. Fungophyla D. L. Fu & H. Fu, phyl. nov., Microbia multicytoeukaryorum et heterotrophiarum, includentes omnino lichenes et Fungi.

II. Regnum Plantae L. emend. D. L. Fu, J. For. Res., 2005, 16(1): 66.

8. Nudembryophyta D. L. Fu, J. For. Res., 2005, 16(1): 66.
9. Bryophyta, phyl. Plantae archegonirum sed nonvasculares, includentes omnino musci.
10. Pteridophyta, phyl. Plantae archegonirum, vasculares sed nonsperma, includentes omnino filices.
11. Gymnospermophyta D. L. Fu & H. Fu, phyl. nov., Plantae gymnosperma, includentes omnino plantae gymnosperma.
12. Fructophyta D. L. Fu & H. Fu, phyl. nov., Plantae fructuum, includentes omnino plantae fructuum vel florum.

III. Regnum Animalia L. emend. D. L. Fu, J. For. Res., 2005, 16(1): 66.

13. Proenteratozoa D. L. Fu & H. Fu, phyl. nov., Animalia proenterica (acoelenterica et acoelomica), includentes omnino Porifera et synonymia Placozoa et Mesozoa.
14. Coelenteratozoa, phyl. emend. nov., Animalia coelenterica sed acoelomica, includentes omnino Cnidaria, Ctenophora, Platyhelminthes, Micrognathozoa, Gnathostomulida et Cycliophora.
15. Nematozoa, phyl. emend. nov., Animalia protostomatirum, pseudocoelomica vel eucoelomica sed nonannelidorum, includentes omnino Nematoda, Rotifera, Gastrotricha, Nematomorpha, Acanthocephala, Nemertea, Priapula, Entoprocta, Ectoprocta, Brachiopoda, Phoronida, Echiura, Sipuncula, Kinorhyncha et Loricifera.
16. Annelidozoa, phyl. emend. nov., Animalia protostomatirum, eucoelomica, annelidorum sed nonarthropodorum, includentes omnino Annelida, Pogonophora, Tardigrada, Onychophora et Mollusca.
17. Arthropodozoa, phyl, Animalia coelomica, protostomatirum et arthropodorum, includentes omnino Arthropoda.
18. Prochordatozoa D. L. Fu & H. Fu, phyl. nov., Animalia coelomica, deuterostomatirum sed nonchordatorum, includentes omnino Chaetognatha, Echinodermata et cetera.
19. Chordatozoa, phyl. emend. nov., Animalia deuterostomatirum, chordatorum sed nonvertebrognathica, includentes omnino Hemichordata, Chordata et Cyclostomata.
20. Vertebrognathozoa D. L. Fu & H. Fu, phyl. nov., Animalia vertebrognathica (vertebralia et gnathica), includentes omnino pisces, Amphibia, Reptilia, Aves et Mammalia.

From Figure 3 it can be find that three kingdoms of organisms toke three different evolutionary routes in divisions. Five divisions of Kingdom Plantae evolved in unidirection, which could be called monochotomous evolution. Eight divisions of Kingdom Animalia evolved in two directions, which could be called dichotomous evolution. Seven divisions of Kingdom Microbia evolved in multiple directions, which could be called multichotomous evolution.

4. Evolutionomy

Evolutionomy is a new science to study the evolutionary taxa, evolutionary laws and evolutionary system. Mainly studying the evolutionary laws, reflecting the evolutionary processes scientifically, establishing evolutionary system and explaining the evolutionary mysteries, Evolutinomy is different from Taxonomy or Systematics based on the affinities or phylogenetic relations [10].

Using Evolutionomy the mystery of Cambrian explosion of life can scientifically be answered. The ancestors of eight divisions of Animalia all lived and multiplied in the same niches of ocean, intense and brutal competitions for survival lead to that their body structures rapidly evolved for getting more nutrition and almost all these divisions (except for Vertebrognathozoa) could be evolved within a shorter period of geologic time (Cambrian).

5. Conclusion

The evolutionary continuity principle is a new basic principle of organism evolution, which could scientifically overcome the limitations of being partial and subjective in the tree of life or phylogenetic system and provided scientific basis for Evolutionomy, a new science of organism evolution.

Based on the evolutionary continuity, organism evolutions could be divided into two basic forms: vertical evolution and horizontal evolution and the evolutionary courses could be scientifically reflected by the new method of trichotomous classification and the new evolutionary taxa established using the principle.

The new evolutionary taxonomical system of organism divisions was established based on the evolutionary continuity principle, which includes 20 divisions in three kingdoms, and 11 of those divisions are new, such as Monoalgophyla D. L. Fu & H. Fu, Fructophyta D. L. Fu & H. Fu, Proenteratozoa D.L.Fu & H. Fu, Prochordatozoa D. L. Fu & H. Fu and Vertebrognathozoa D. L. Fu & H. Fu. Some new evolutionary courses are clarified such as Kingdom Animalia originated from Nudembryophyta of Kingdom Plantae, not from Protist or Protozoa as general cognized. Some evolutionary mysteries are first scientifically answered such as the origin of viruses and the mystery of Cambrian explosion of life.

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References

[1] C. R. Darwin. "The Origin of species". http://www.talkorigins.org/faqs/origin.html. 1859.

[2] A. Nasir, K. M .Kim, and A. G. Caetano. "Giant viruses coexisted with the cellular ancestors and represent a distinct supergroup along with superkingdoms Archaea, Bacteria and Eukarya". *BMC Evol Bio*, vol. 12. pp. 156, 2012.

[3] M. Jalasvuori and J. K. Bamford. "Structural co-evolution of viruses and cells in the primordial world". *Orig Life Evol Biosph*, vol. 38, pp. 165-181, 2008.

[4] J. Durzyńska and A. Goździcka-Józefiak. "Viruses and cells intertwined since the dawn of evolution". *Virology Journal*, vol. 12, pp. 169, 2015. DOI 10.1186/s12985-015-0400-7.

[5] D. L. Fu. "Embryos — the evolutionary boundary of kingdoms of organisms". *Journal of Forestry Research*, vol. 16, no. 1, pp. 65-66, 2005.

[6] R. H. Whittaker. "New concepts of kingdoms of organisms". *Science*, vol. 163, pp. 150–160, 1969.

[7] L. Y. Liu and G. M. Zheng. "General zoology". Beijing: Higher Education Press, 1997. [in Chinese]

[8] S. X. Chen and S. Y. Chen. "The taxonomy of kingdoms of organisms". *Acta Zoot Sinica*, vol. 4, no. 4, pp. 1–11, 1979. [in Chinese]

[9] G. H. Zhu. "International code of botanical nomenclature". Beijing: Science Press, 2000. [in Chinese]

[10] D. Z. Li (translator). "Plant systematic, A phylogenetic approach". Beijing: Higher Education Press, 2012. [in Chinese]