

Origin of Life

Lecture 1, Course: GMR-121
Zoology II (Evolution and Ecology)
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Origin of Life: A Historical Account

Spontaneous Generation

- Due to uncritical observation > Life appear suddenly
 - Insects, worms and even fishes, birds and mice arise directly → Spontaneous Generation → From slime, manure, soil, mud and other non living material
- Lots of article shows
 - Emergence of insect and flies > manure, soil, mud etc.

Origin of Life: A Historical Account

- Ancient teaching of India, Babylon and Egypt
 - Based on religious legends and beliefs
 - Spontaneous creation of life→ Manifestation of the creative powers of gods
- Thales (624-547 B.C.)- Support Spontaneous Creation
 - Life originated from a matter which is always living
 - Auto-formation involved, not need of any creative god powers

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- Democritus (450-370 B.C.) Materialistic Approach
 - Spontaneous creation is possible without any unexplainable mystic force
 - Originating matter consisted of small particles (atom)
 - Origin of life involves the accidental and ordered union of slime and water with atoms

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- Plato (427-347 B.C.) and Aristotle (384-322 B.C.), Idealistic Approach
 - Giving importance to some kind of immortal mystic force
 - Not only life originated spontaneously in the past, but also originating even today
 - Production of grasshopper, many other insect and even mice and toad from rainy spell
 - These were not to multiply from eggs or any other means, but to originate from the earth.

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- The great **Basil** (Middle of 4th century)
 - Believed that origin of life and all its events happened under a divine command
 - Whole of the middle ages dominated by the theory of spontaneous generation
- Large number of workers support strongly the idealistic approach of spontaneous creation

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- Middle of 17th century
 - The dispute between mystical doctrine and materialism started again
 - Again no body doubted the validity of spontaneous generation
- More extensive and accurate experiment
 - Later started shaking the faith of people about authenticity of spontaneous creation

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- Francesco Redi (1626-1698 A.D.)
 - First to put experimental refutation against spontaneous creation
 - Showed that the white maggots in meat are the larvae of the flies and nothing else
- Interestingly, he also support the spontaneous creation of life in some other cases

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- Leeuwenhoek (1632-1732) and Needham (1713-1781)
 - Experiments demonstrate again the spontaneous generation of microbes
- Spallanzani (1729-1799)
 - Appearance of microbes in earlier experiment is due to incomplete sterilization.
 - Also said with proper sterilization and care no living matter can appear

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- Orthodoxy of the Scientist
 - In spite of such brilliance of Redi and Spallanzani
 - Subsequent scientist are not ready to give up the concept of spontaneous generation
 - Avoid the discussion by saying that the experiment of Redi and Spallanzani were not foolproof

Origin of Life: A Historical Account

- Louis Pasteur (1822-1895)
 - Has irrefutable evidence on the formation of microorganisms
 - Also explained the errors in previous experiments
 - Concluded that production of microbes from various broths and solutions of organic substances was simply impossible
- All the above efforts does not solve the problem of the question in hand

There was a great challenge before the biologists of the last and the first half of the present century to provide solution to this very basic problem. It should realized that, if at all, there was any beginning of life on earth or any other planet, the simplest of living objects should have arised from the non-living matter. Therefore, primary spontaneous generation of life is entirely logical and necessary.

Origin of Life: A Historical Account

- Beginning of 20th century, two views of origin of life
 - The spontaneous generation of the simplest life is not a regularly occurring phenomenon, but extremely rare and is therefore not verifiable
 - Completely denies the genesis of life itself, and assumes that emergence of earthly life took place due to transport of seed from other worlds
 - N.B. The seed may be considered as eternal of living forms repositories

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- Possible mechanism of origin of life
 - Some set of special condition existed sometime in the past which were specially favorable for the genesis of life.
 - Such special conditions are no longer available on earth such as
 - Electrical charges, Ultraviolet light, Special forces of chemical nature and corpuscular radiation of radioactive elements

Origin of Life: A Historical Account

- Oparin (1957). Origin of life. Abiogenic Formation
 - Abiogenic formation of hydrocarbons, led to the formation of protein like compounds and then to colloidal system, capable of stepwise improvement in order to give rise to life.
 - N.B. The primary formation of organic substances on earth was accepted everywhere, particularly after the discovery of hydrocarbon in the atmosphere of other planet

*Thank
You*

