Speciation model based on Jain theory of *Shriṣṭivāda* and limited intra-species Darwinian evolution

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ABSTRACT

Many theories, philosophical, religious and scientific, abound about the existence of living beings on Earth. Jain philosophy propounds a 'Steady State theory' of living species, called *Shriṣṭivāda*, with fixed number of possible species (termed Yoni), estimated to be 8.4 million and *Kul* types (possibly subspecies) estimated at about 200 trillion. Intra species evolution does not occur according to Jain *Shriṣṭivāda*, i.e. one species does not evolve into another species. This is in contradiction with the generally accepted evolutionary theory proposed by Darwin, where species evolve from one type into another, due to natural selection, depending on the environmental stress and limits of adaptation. This theory has been developed on the basis of the fossil records found in the dated sediment sequences, which has been taken to imply a gradual, multi branch development from unicellular species to humans over the 3.8-billion-year geologic history of life on the earth. There are fundamental differences between the Jain *Shriṣṭivāda* which considers the *karman sharira*, attached to the soul as the prime cause of birth as a particular species and Darwinian evolution which considers physical stress and natural selection as the main factor, responsible for temporal and spatial biodiversity. We recount the basic features of both these theories and make an attempt to incorporate their main features in a 'Chemical dependent formation model of Yonis on earth' and suggest that the fossil record in sediments mimics the availability of Yonis on earth and does not represent a sequential evolution of species.

The proposed model can explain the fixed and limited number of total species based on the law of 'Requirement and Availability' of ingredients and implies (i) place and time dependent formation of yonis of different species determined by the ambient physico- chemical environment, i.e. chemical ingredients in the atmosphere (anoxic to oxic), oceans (injection of calcium, phosphorus etc.), and in earth's surface rocks and physical conditions, e.g. temperature during the past 3.8 billion years. (ii) limited intra-species evolution and (iii) The observed fossil record in sediments reflects the time sequence of yoni types becoming available due to geochemical evolution of the earth. Were the physico- chemical conditions on earth to reverse from oxic back to anoxic, we predict that the fossil sequence which is taken to be 'evolutionary' will reverse into a 'devolutionary' sequence.

1. Introduction:

The presence of a variety of species on Earth is a complex, if not mysterious, phenomenon. Abiotic origin, i.e. origin of life from matter is not established and is a highly improbable, if not an impossible phenomenon. Many philosophies invoke ātmā (soul) or *Brahmn* and ascribe it to an intelligent creator. On the other hand, many scientists consider organisation of self-

reproducing molecules to be responsible for it. Whether *atma* and matter (*pudgal*) are independent entities or not, life seems to be a necessary and inevitable consequence of the laws of nature based on which the earth and the whole universe were formed and are evolving with time.

The best approach to understand life on earth is by a two-step process: origin and evolution. Two theories have been proposed for origin of life: biotic and abiotic. Biotic theories assume that living species, howsoever simple they may be, cannot be produced without pre-existing life, requiring *atma* as an additional entity (real), whereas abiotic theories presume that matter under certain circumstances can organise itself to give rise to complex organic compounds (proteins, nucleic acids etc.) which, in turn, can result in simple cells. Once a cell is formed, the rest is evolution, resulting in more choices, mutations and complexities, eventually leading to evolution of species, from monocellular organisms to humans with a complex neural system. It is an extension of Darwin's original observations on his famous south African trip, over 150 years ago, in which he found species acquiring different physical traits, depending on the prevailing environmental conditions (Behe et al, 1996; Jansma, 2015). It is largely accepted because the fossil records, preserved in sediment sequences, show diversification with time. This evidence cannot be ignored although alternative mechanisms can be proposed to explain the fossil record. The question we will raise in this article is that whether the fossil record reflects the evolution of species or it is a consequence of availability of different chemical ingredients that produced different types of specific *yonis* or suitable receptacles for life as a function of time, and we will produce evidence in the favour of the latter hypothesis.

In this article we review various hypotheses for origination of life and explain the 'apparent' evolutionary sequences, popularly called the tree of life, beginning with a common ancestor of all living beings (see Bhandari, 2015), based on fossil records- from monocellular organisms to complex humans via several abrupt evolutionary steps and extinction events, and propose a new hybrid model, which will be consistent with Jain model of *Shriṣṭivāda*.

2. Theories of origin of life

Theories regarding the origin of species can be grouped in three broad classes: Creationism, Steady State theories and materialistic theories:

1. Creationism:

Vedanta, Christianity and some other philosophies propose that the *Brahmn* or the Omnipotent God created all species in the beginning. We will not discuss this theory further because existence of omnipotent creator who could create the universe by His will, out of nothing, is a topic beyond scientific logic and investigation. Questions about pre-availability of ingredients, reason for doing so (causality) and physical, chemical and biological processes involved arise but need not be explained rationally in creationism, since it is taken as the will of God, involving miracles and supernatural powers and creation of all living and non-living entities of the universe out of nothing.

2. Steady State Theories and its variants

A variety of Steady State theories have been proposed in different philosophies and can be grouped as follows:

(i) Traducianism: Souls generate souls as and when bodies generate bodies by sexual or asexual processes. There are two basic requirements: a material body (yonis i.e. material receptacles or structures) and a conscious, choice making, *karmic* soul (with attached karmas), which makes the body a living entity. Here a soul creates living species of various types one by one, determined by the type of yoni available, rather than creating all the species at once as in creationism.

(ii) Infusianism: The karmic souls preexist in the universe and are infused into the body at the time of conception. In fact it presumes that the universe is packed with infinite number of souls of all kinds, i.e. with different types of karmic matter attached. Type of Karma is the ultimate cause of various species.

(iii) *Shriṣṭivād* is a Steady State theory, proposed in Jain, Bauddha and some Hindu philosophies, and includes the two additional elements (i) fixed number of viable species, always present somewhere, eternal and without origination (ii) existence of infinite number of karmic souls of finite types in the universe. Union of a karmic soul with 'yoni' (appropriate material receptacles or structures) gives rise to a living being, as in infusionism.

Birth is thus possible by association of three components: a pure soul, attached karma and a suitable yoni. Every karmic soul is different, depending on its karma load, and requires a specific type of appropriate yoni to take birth.

To conclude the above discussion we may state that the basic process of birth, according to Jain philosophy is

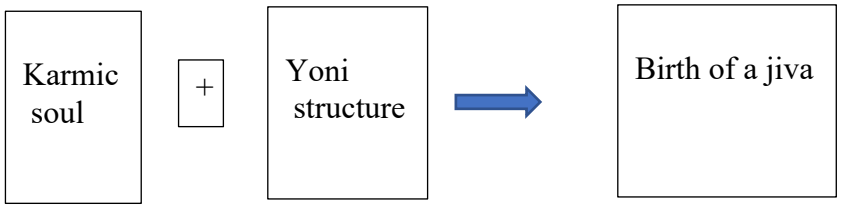


Fig. 1 Schematic showing that a jiva is born by integration of a soul with Karman sharira with a yoni.

Furthermore, *Shriṣṭivāda* is based on four propositions:

1) **Karmic Souls** :There are infinite numbers of independent, Karmic or mundane souls in the Universe.
2) **Fixed number of possible Yonis**: Number of viable, functional species are limited. The maximum number is fixed at 8.4 million.
3) **Eternal existence of yonis**: These 8.4 million species have always existed in the universe, somewhere or the other, not only confined to the Earth, and will always continue to exist, as they do now.
4) **Biotic origin**: Only life (and not non-living matter) can give rise to life. In contrast materialism subscribes to chemical or abiotic origin of life.
5) **No origination**: Life cannot be created form non-living matter. Souls exist as independent reals since eternity (infinite past). Therefore, there is no origination of life, *per se*, i.e. abiotic or chemical origin of living beings out of non-living matter is not permitted.

3. :Materialism

There is yet another hypothesis in which matter, under some special conditions, can create organic molecules, essential for life which, in turn, combine to form primitive, simple living cell and, once created, that living entity multiplies, mutates and evolves into different species. As already mentioned, the materialistic theories involve two processes: origination and evolution.further more , origination has two possibilities: Exogenic and Endogenic, that is origin outside the earth, in space or elsewhere and on the earth, respectively. We will discuss them in some detail below:

4.1. Origination of Life

The materialistic theory got a big boost when Miller (Miller and Urey, 1959) in a simple experiment, starting with some simple inorganic compounds like H_2, N_2, CO_2, CH_4, NH_3 and water, and by providing a simple source of energy like an electric spark, created many organic molecules, considered to be the building blocks of life. This is shown in Figure 2.

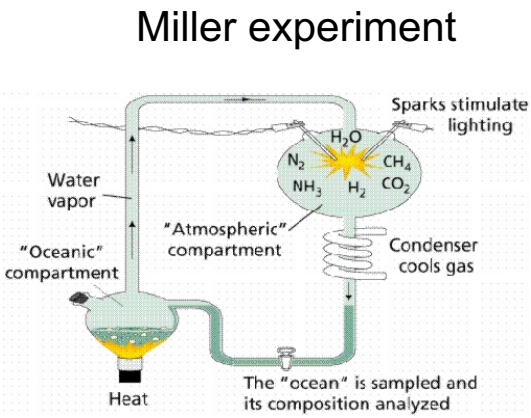
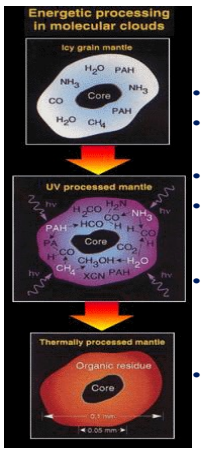


Figure 2: Urey-Miller synthesis which may have formed building blocks of life on Earth in its primitive reducing atmosphere abundant with methane, carbon di oxide, nitrogen, hydrogen ammonia, water etc.

The Urey-Miller synthesis can occur anywhere in the universe, on planets, in interstellar or interplanetary space or in molecular clouds. It may be noted that all the amino acids required by living systems have been identified in carbonaceous meteorite rocks, which have carbon and water, coming from space, implying that these compounds must have been produced in interstellar space. Taking the case of Earth, for example, the first living cell, howsoever improbable, can possibly appear in an organic soup, in ponds scattered over the surface of the earth, or in the oceans. Interstellar molecular clouds (Figure 3, 4), where all these ingredients, including source of energy, in form of e.g. ultraviolet light or cosmic rays is available, are more favourable, thus implying origin of life in space and supporting the theory of *panspermia*. The life bearing grains of rocks can then impinge on earth or other habitable planets and can grow in multiple evolutionary chains.

Earth is the only place in the universe, we know so far, where life exists. Exogenic theories, such as *panspermia*, are based on the presumption that life exists everywhere in the universe and

originated in the interstellar space, in molecular clouds and the seeds of life are then brought to the earth and other planets, riding on meteorites and cosmic dust. Discovery of mineral grains, formed in space, even before the sun came into existence, called 'presolar' grains, and interstellar dust etc., found in meteorites recovered on earth, indicate that a plausible mechanism of transport from interstellar space to earth, without much heating or alteration over billions of years, exists in nature.



Organic molecules in dense Interstellar clouds

- H,C,N, present in abundance
- Abundant cosmic rays, U.V. light, electrons
- Longer time and diverse conditions exist
- Gas and solid phase reactions with ice crystals produce large organic mols. Molecules with up to 10 atoms.
- UV + chemicals(H2O,NH3,PAH,CH4 etc) around ice grains form Organic matter which behaves like glue and the grains stick together
- Amino acids have been identified in Sagittarius B2 interstellar medium in the region of our galaxy

Fig. 3. Formation of large organic molecules, the building blocks of life, is favoured in interstellar clouds because all the ingredients, including sources of energy are available and conditions suitable for chemical gas-grain reactions and grain surfaces etc exist there. PAH are Polycyclic aromatic hydrocarbons.

Endogenic theories presuppose synthesis of living cells on earth, but It must be emphasised that it is extremely improbable tocreate cells howsoever primitive, by chemical processes ,One has therefore to resort to some special mechanisms involving a template or catalytic processes for this purpose or a yoni as discussed in this paper.

Fig. 4. A huge nebula exists in Orion constellation which contains interstellar clouds offering one of the favoured sites for synthesis of life forming large organic compounds by gas-grain-surface chemistry, mentioned in figure 3.

We will again return to this vital question later, but let us first discuss, how a simple cell, if .somehow created, will grow into more complex forms of life, under Darwinian evolution

4.2. Darwinian evolution

The most primitive forms of life found in the oldest rocks on earth are some simple kinds of algae (Cynobacteria). Darwinian evolution presupposes that these are formed by abiotic or chemical synthesis and then the species evolve due to three factors: mutation, heredity and struggle for existence. Natural selection and struggle for existence develops the body organs as required for adaptation and survival in changing environments and this way species get transformed into other types, governed by the environmental stress. Neo-Darwinism, incorporates Mendelian theory of genetic mutations and further strengthens Darwin's hypothesis by providing a mechanism through genetic changes and modifications of genome. The modern synthesis theory incorporates the basic features of Neo-Darwinism i.e. interactions of genetic variations and natural selection (Varsha Shah, 2017). Let us then discuss the data we wish to explain:

1. History of life on Earth and the fossil Record:

The history of life on the earth is well preserved in sediments deposited at the bottom of the ocean. Whatever happens on the earth eventually goes down in the sea with the rivers and gets deposited together with the sediments. Thus we have a layer by layer record of the events on the earth which represents the time sequence, the bottom layer of sediment sequence is the oldest and the uppermost layer represents the current condition. Sometimes these sediments are brought to the surface by tectonic activity and are available for analysis in the laboratories.

Based on fossil records in the sediments which have been dated by different techniques, the palaeontologists have reconstructed the sequence of living species on the earth. The earth accumulated into a planet by impact of planetesimals, 4.6 billion years ago but life started, a billion years later (~3.8 billion year ago) by which time the newly formed hot earth' crust had cooled to hospitable temperatures. The earliest evidence of living cells has been documented in rocks about 3.8 billion years ago in form of monocellular algae and these are believed to evolve into the present day humans. This journey has not been smooth and has been punctuated by periodic and abrupt revolutions and catastrophes (see Sepkoski (1996), for a review). Seven major evolutionary stages and five major extinction events have been documented in the sedimentary records during the biogeologic history of the Earth, and we are already at the verge of the 8th revolution in evolution and 6th extinction event, as listed below:

2. Major revolutions inferred from fossil records

The biodiversity sequence of species after the origin of life progressed through invertebrates, vertebrates, reptiles, avian species and mammals etc., while algae developed into another evolutionary branch involving gymnosperms and angiosperms and to plants. The seven major events are as follows:

1. Abiotic origin of life as mono cellular species: Prokaryotes: 3.5-3.8 billion years ago
2. Multicellular species, i.e. static or *sthawar* jiva
3. Mobile species, i.e. *tras jiva* (Cambrian explosion) 540 million years ago:

4. Avian species
5. Mammals
6. Trees and plants
7. Humans or *sangyani* jiva (*Homosapiens sapiens*): (with mind_ thinking, meditating powers); 200,000 years ago with a unique capacity that by psychological effort and meditation, humans can evolve to the next stage.
8. NEXT anticipated Super humans

This fossil sequence is shown in Figure 5. In fact, the sediment sequence and the various stages are now being classified by the types of fossils that appear, develop and become extinct. It seems that the next, 8th, revolution in evolution is already at an advanced stage. Here we want to point out that severe chemical changes in the atmosphere (for example from anoxic i.e. methane rich to oxic i.e. oxygen rich) in the ocean (from pure water to rich in minerals like calcium, phosphorus and other elements) and on earth' surface (from siliceous to calcic etc.), in addition to physical changes like temperature have taken place which have determined the type of species that will exist or survive at a particular time. Our argument is that if such chemical changes were to reverse in future due to geologic factors, the fossil record will follow and show a reverse trend. Thus evolution cannot be a unidirectional process, as it has so far been. For example, if the atmospheric oxygen is usurped by terrestrial rocks, anoxic environment will prevail and life will return to anoxic bacteria, where it began. Therefore, the chemical environment is the determining factor for the type of species that exist on the earth. Thus Darwinian evolution is not unidirectional, as has been claimed.

3. Major Extinction events in this evolutionary sequence:

The change in the number of families identified in sediment sequence show that the following episodic, abrupt massive extinction events have taken place, but the species quickly recovered following the collapse and emergence of new ecosystem:

1. Late Ordovician:: 445 million years ago
2. Late Devonian: 372 million years ago
3. Permian -Triassic extinction: 252 million years ago
4. Late Triassic: 202-237 million years ago
5. Cretaceous -Tertiary extinction: 65 million years ago
6. Next: Anthropogenic, manmade extinction: Now in advanced stage?

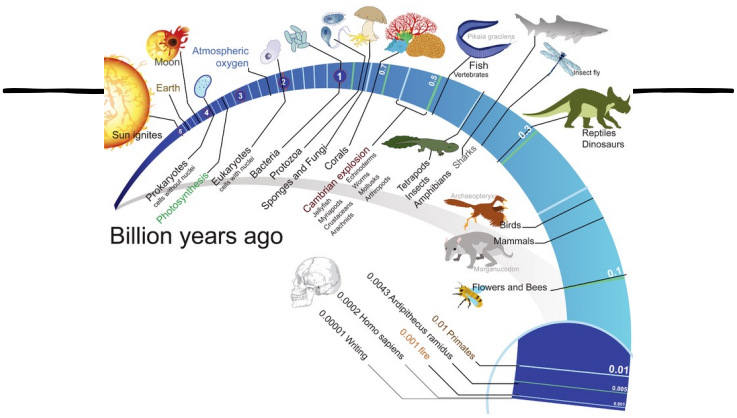


Figure 5. Evolution of species as revealed by records in sediments, since the earth was formed (source: Google, Wikipedia).

A few points can be summarised from the evidence provided by the fossil records

1. Most of the species which were ever born have become extinct, and the same fate awaits the existing species.
2. More species have become extinct than are alive.
3. After every extinction, the species that survive, thrive and become stronger, and at the same time new species evolve, because of radical physico-chemical changes in the environment. Biological diversity follows chemical and physical environment.

In Darwinian evolution, there is no limit to number and type of species, that can exist or evolve into. It simply depends on environmental stress and response of species. There is thus a competition between adaptation and rate of change of environmental conditions.

Those who cannot quickly adapt to environment changes become extinct, as has happened during sudden and intense volcanic events or instantaneous impacts of bolides.

We thus see that biologic evolution, chemical evolution, geologic evolution and atmospheric evolution have been going on simultaneously, hand in hand, throughout the history of the earth, each depending on and influenced by the other. The above discussion provides the basic framework based on which any theory of living species on the earth must be developed.

The question now arises whether Jain *Shriṣṭivāda* is consistent with this kind of record or some modification is required. We should therefore first describe the main features of *Shriṣṭivāda.*

5. *Shriṣṭivāda*

According to Jain view, the Loka is packed with an infinite number of mundane (karmic) souls, which not only occupy the body which takes birth, dies and is born again but has three additional subtle (invisible) entities: (AKT) (Atma+Karman + Tejas sharir) and they are born in one of the already available appropriate yonies (or life sustaining structures). *Karman sharir* is the causal body, which is the cause of all births and *Tejas sharir* is the astral body, the energy body, which manages or sustains the visible, physical body, called *audarik sharair*.

According to Jain philosophy, the *karman* body and *tejas* body accompanies the *atma* when the *audarik* body dies and instantly takes rebirth in a new body. When the *karmas* are totally dissolved, the soul attains nirvana, never to be reborn again; there is no rebirth, thereafter.

In Jain *Shriṣṭivāda*, in contrast to the role physical stress plays for evolution of species in Darwinism, karmic soul, specifically karmas attached to it, is the prime force for type of species one is born into. This results in two-way transformation: both evolution i.e. evolving into a more developed life form and devolution, going into a less developed life form. Number of sense organs and manifestation level of consciousness is taken as the index of development. Higher life forms have better manifestation, i.e. more number of sense organs or higher degree of consciousness compared to the lower life forms. The main difference between Darwinian evolution and Jain *Shriṣṭivād* is the role of karmic soul, whose existence evolutionists deny. Acharya Mahaprajna has mentioned two processes responsible for evolution: *Prayog* (conscious effort by the Self, or one's soul) and *Visrasā* (natural, i.e. by environmental stress).The ultimate result depends on a combination (*misra*) of both conscious effort and natural selection (Samani Chaitanya Prajna, 2017). In the changing environment, under the influence of ambient temperature, pressure conditions and the availability of various *pudgal varganas,* different

types of yonis were formed, giving rise to corresponding species. In this way, environmentally controlled new species kept on being created (Anil Kumar Jain, 2002).

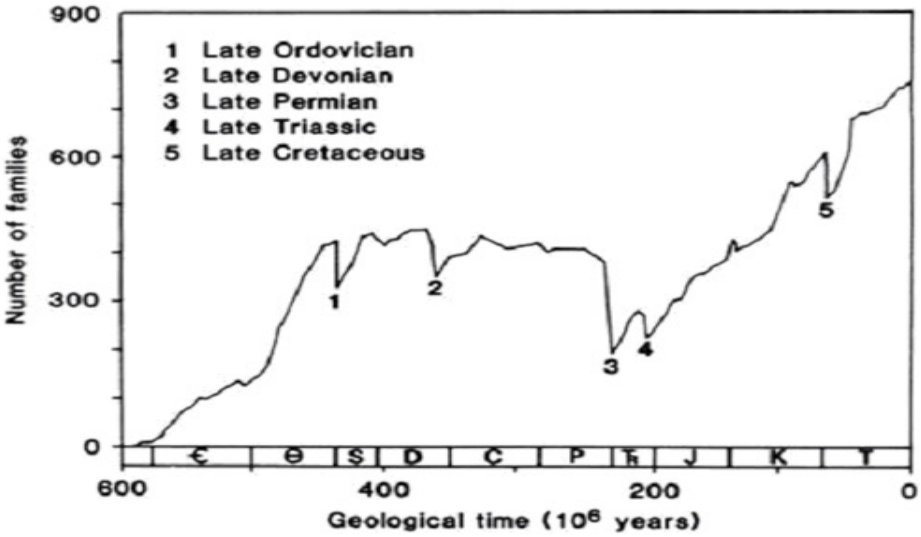


Figure 6: The evolution of life of Earth is punctuated by 5 major and some minor extinction events. The major extinction events on the Earth, shown by abrupt dips, over the past 540 million years are labelled 1 to 5 and the curve shows the number of families as a function of time. (Source: Google). After growing to the large number of species in the history of the earth, we are now heading towards the 6th man-made extinction. This anticipated (6th) extinction is due to anthropogenic and not due to natural causes as happened in the past. The causes are many: industrial waste in form of toxic chemicals is killing the microbes, leading to infertile soil, Bees and birds which are necessary for pollination for plants to multiply are plummeting. Animals have complete dependence on plants, whose number is dwindling because of loss of their habitat due to industrialisation and urbanisation. The perfectly balanced, natural ecological cycles of the Earth is broken due to human activity, leading to gradual extinction of many species.

Jain theory of speciation, thus propounds that

1. Matter and life are two independent, non- interconvertible 'reals'. Therefore, life can originate only from life (possessing a soul or consciousness) ; Life cannot originate from matter or vice versa.
2. The number of living species in the universe is fixed at 8.4 million. Thus only fixed number of species (YONI or pre-zygote stage) are possible in the universe (Loka).
3. All the species have always existed and will always exist, somewhere in the universe. The living universe, just as the material universe has always been as it is now. Thus it does not subscribe to temporal, sequential evolution of species from one form to another, as Darwin proposed, but in eternal existence of all species for all times.
4. Jainism subscribes to rebirth or repeated embodiment of karmic soul, as a species (within the four realms (*gatis*): *Dev* (deities), *Manushya* (humans), *Tiryanch* (animals) and *Naraki* (hellish beings)) determined by their karmic load.
   We confine here to *humans* and *animal* realms, that inhabit the earth and will not discuss *heavenly and hellish beings* because they fall outside the scope of Darwin's theory of evolution.
5. The main difference between the Jain theory of speciation (Eternalism) and modern theory based on Darwinian evolution is summarised in Table 1.

Table 1 : Comparison of modern theory of Darwinian evolution and Jain theory of karma resulting in evolution as well as devolution.

	Modern theory	**Jain model**
1	Number of species = No limit	Fixed number of species = 8.4 million Number of sub-species *(Kul)* ~ 200 trillions.
2	Darwinian Evolution and catastrophic extinction. Competition between environmental stress and adaptation. Natural selection is the primary mechanism for survival.	Evolution and devolution from one sensed to five sensed beings and vice versa, based on Karma. Karma is the motive force.
3	Abiotic (chemical) Origin	Eternalism " life has always existed as it is and will continue like this"
4	Sequential, multibranch evolution by mutation and diversification beginning with single cell to complex humans as per fossil records (fig. 5); Intra-species evolution is an important mechanism.	Limited Inter-species transformation but no intra-species evolution.

The total types of yonis (species) are distinguished by their colour (*varna*= 5), smell (*gandha*= 2), taste (*rasa*= 5), touch (*sparsha*= 8) and shape (*sansthan*= 5) .These amount to 2000 varieties but these are superficial in the sense that they do not represent species (*prajatis*) but only some external qualities and appearance. Here, we are interested in the number of species (basic yonis), which are given in the third column of Table 2.

The number of these basic yonis are determined by the available material in the universe, i.e. elements, compounds, and their properties, as discussed later.

6. Chemical evolution of Yonis and speciation

It has been difficult to identify a single, unique, defining characteristic which will define life, at symptomatic level. *Shriṣṭivāda* mentions that structurally it is the presence of soul (ātmā, and the accompanying consciousness) which distinguishes a living being from non-living. Pannāvana sutra functionally identifies a living being by the presence of at least one of the ten *sangnās*[1] (desires and emotions). Jains ascribe faculties of perception (*darshan*), knowing (*gyan*), potency (*virya*), bliss, instinct of survival (*Jivatava shakti*), together with many other faculties (*shaktis*) of the soul (see Bhandari, 2015) as essential characteristics of living beings. One essential requirement, generally mentioned in scientific definitions of life is reproduction, i.e. each type of life should be capable of reproducing itself from generation to generation. Jainism, however, does not consider reproduction as an essential characteristic of the living; there could be living entities which do not reproduce. None of them are physical features so a living and a non-living entity cannot be distinguished on a physical basis. However, on symptomatic basis, we see the soul manifest by organising the random or chaotic molecules of the matter of the body in an orderly fashion so much so that its entropy decreases in comparison to its environment (negentropy), with which it is in exchange all the time. It can

[1] Ten *sangnās* are: *āhar* (appetite), *bhay* (fear), *maithuna* (sex), *parigrah* (storage), *krodh* (anger), *māna* (pride), *Māyā* (attachment), *Lobha* (greed), *Loka* (following the tradition) and *Ogha* (involuntary/reflex action).

*Table 2: Category wise yonis (species) and kul * (sub-species)*

Type 1. Molecular structures

Form of life (*sachitta*)	Number of Yonis/ structures or receptacles (species) Total 8.4 million	Basic yonis (probably equivalent to Order) Total=4800	Kul* yonis (sub-species) Total=199.5 trillion#
Solid phase molecular structures	700,000	350	22 trillion
Fluid phase molecular structures	700,000	350	7 trillion
Gaseous phase molecular structures	700,000	350	7 trillion
Energy forms	700,000	350	3 trillion

Type 2: Plants

Form of life (*sajiva*)	Total # of Yonis/structures or receptacles	Basic Yonis	Sub species
Plants	2.4 million	1200	28 trillion

Type 3. Living beings

Form of life (*sajiv*)	Total # of Yonis/structures or receptacles		Sub species
Two sense organisms	200,000	350	7 trillion
Three sense organisms	200,000	350	8 trillion
Four sense organisms	200,000	350	9 trillion
Five sense organism (animals)	400,000	200	Marine:12.5 trillion Avian : 12 trillion Terrestrial: 19 trillion
Five sensed with Neural network (brain), e.g. humans	1.4 million	700	14 trillion

Type 4. Hellish and heavenly beings: having only energy bodies

Form of life (sajiv)	Total # of Yonis/structures or receptacles		Sub species
Hellish beings	400,000	200	25 trillion
Heavenly beings	400,000	200	26 trillion

*Modern taxonomy sequence, based on structure, classifies hierarchy of Life in Domain, Kingdom, Phylum, Class, Order, Family, Genus and Species. Jain Darshan uses functional or *Indriya* (sense organ) based classification of Jiva (Life) in two types: *yoni* (species) and *Kul* (literally meaning family). It is not possible to compare the two classification systems since Kul sometimes is taken to represent subspecies.
#: According to interpretation of some texts e.g. Mulachar, Tathvarthasutrasar and Gommatsar. Some scholars interpret *kul koti* as type of families and the number given in this column is divided by 10 million (see Samani Chaitanya Prajna, 2017). Resolution of this controversy lies out side the scope of this paper and is a topic of further study.

also be defined as ordropy. We prefer to formulate an entropy based definition of life. It can be quantitatively measured, and increases with complexity, from one sensed organisms to 5 sensed organisms with psychological faculties. Higher the complexity, less is its entropy compared to the surrounding with which it is in constant exchange of energy. The living beings derive their energy from the environment, increasing its entropy. However, here we will concern only with four functional requirements of every living being: Input or food, (called *ahar sangna*), metabolic activity (*Tejas* or *astral body*) converting food into energy required for sustaining the body, and excretion or rejection of left overs. The fourth requirement is the presence of at least one sensory organ, e.g. feeling of touch, vital for their survival without which the living organism cannot protect itself. There could be more requirements of physical functions and organs in higher organisms, up to 5 sensed psychological humans. We will argue that number of products in any system depends on availability of ingredients and therefore with limited number of materials (chemicals, elements, organic compounds etc.) available, minimum functional organs can be made only in a limited number, and that determines the limited number of species of various types, listed in Table 2.

6.1. Characteristics and types of life

According to Jain philosophy (Table 2), there are fixed numbers of various types of species and families, classified into 24 major types. Here we confine to 10 such species (1 species of humans with 5 sensory organs and brain, 1 animal (mammals) species with 5 sensory organs+3 with, 2, 3, and 4 sensory organs which will include insects, avian and marine species etc respectively and 5 species with one sensory organ of touch (gases, liquids, solids, plants, and energy forms, called *vāyukāy, apkāy, prithvikāy, teu kāy, and vanaspati kāy*). The other 14, not considered here, include 3 species of dieties (*Devas*), 7 of *Bhavanpati Devas* and 1 of hellish beings (*Narakis*) of 7 hells, because not much is known about them. We thus confine here to the first three categories (molecular structures, plants and creatures), mentioned in Table 2, but the same argument can be applied in other cases.

Jain philosophy considers *vāyukāy, apkāy, prithvikāy,* and *teu kāy*, which must be translated as gaseous, fluids, solids and energy bodied organisms in its classification scheme. In comparison, modern medical science recognises only two states of living beings: alive and dead (non-living), but Jain doctrines mention a graded sequence from non-living to living termed as *Jad* (*Ajiva*), *Nirjiva*, *Achitta*, *Sachitta*, and *Sajiv*. *Jad* has no potential of ever being converted into the other catagories, but several stages exist between *Achitta* to *Sachitta*, having an increasing degree of consciousness (*chitta*), all being interconvertible from one form to another, till a soul enters *sachitta* and makes it living (*sajiva*). When the soul leaves the body, it becomes *Nirjiva.* This sequence is based on increasing orderliness (or increasing negentropy) as has been discussed elsewhere (Bhandari, JASP-2). In this classification presented here, *sachitta* and *sajiva* are distinctly different. For the sake of clarity and for understanding the functional behaviour, we can divide all these forms in 4 catagories:

1. Achitta: chaotic or random, unordered, but potentially organisable, molecular structures

2. Potentially or feebly *Sachitta* : ordered molecular chains but without a stable independent structure:

3. *Yoni*: Fully developed *sachitta* structure, a receptacle suitable for a soul to enter and capable of sustaining and growing a body (*aharak sharir*) by supplying all its requirements. In case of bisexual reproduction, it can be considered as a pre-zygotic stage. Here we assume that different Yonis produce different species i.e. as many yonis, as many species.

4. *Sajiv*: Presence of soul in the structure makes it alive.

Samhita is one which possesses *chitta* or consciousness (order) and Achitta means random or

devoid of consciousness. Thus we have entities with different levels of consciousness: Sajiv, Sachitta , Achitta, and Nirjiva, which represent inter-transformable states. A grain of wheat for example illustrates this sequence: Sprouted grain is sajiv, Dry grain is *sachitta* i.e. capable of becoming a yoni and therefore called *yonibhut*, Crushed grain – *achitta* means it can never become a yoni.

6.2. Available material in the Universe

.We now discuss the availability of various types of materials in the universe Big Bang is the most favoured theory for the origin of the universe. A few nuclei, H, He, Li are synthesised in the nuclear processes that occurred in the Big Bang universe but the heavier elements, beyond carbon, were synthesised in stellar nucleosynthesis, in large stars (Burbidge, Burbidge, Fowler and Hoyle, 19757); see Bhandari, 2017 for a popular account). These nuclei combined later with electrons, due to electromagnetic forces and formed elements and then molecules under suitable conditions by electro chemical bonding and, in turn, formed inorganic compounds, minerals, and aliphatic and aromatic organic compounds. The number of elements so produced due to nuclear reactions in Big Bang and stellar nucleosynthesis are limited. In all we have only 92 stable elements from Hydrogen to Uranium, but there may be some more unstable elements going up to atomic number 118, with about 2000+ isotopes, which eventually give rise to 3000+ minerals, several thousand compounds, both organic and inorganic, dozens of gaseous species, some liquids and rest all solid rocky matter under thermal and pressure conditions prevailing on the earth at different times. These make up the Earth, atmosphere, oceans, etc. and is the total material available from which formed the large organic compounds which act as the building blocks of life, the basic ingredients required for living species. As such all the 92 elements in nature are required for sustaining human body but the most important elements (abundance by mass) are Oxygen (65%), Carbon (18%), Hydrogen (10%), Nitrogen (3%), Calcium (1.5%) and Phosphorus (1%). On trace level, Potassium, Sulphur, Sodium, Chlorine, Magnesium and Iron also play a vital role.

6.3. Chemicals required for life processes

Once, ringed organic molecules are formed, processes like polymerisation, lead to formation of suitable chain compounds like peptides, proteins, amino acids, enzymes, sugars, chromosomes, RNA, DNA etc. required for life to form and sustain. We recount here some of the common chemical processes leading to these complex molecules.

Dehydration is the main process by which polymerization generally occurs. In this process, one H^+ ion is removed from the amino terminus, and an OH^- group from the caroboxylic terminus and the two combine to form one molecule of water. A chain consisting of 15 or fewer amino acids is called a peptide chain which in turn can form longer polypeptide chains. A protein is a chain of amino acids. A polypeptide chain commonly forms a spiral structure, called α-helix that has positive helicity and contains amino acids. Another common protein structure is the β structure, in which two or more parallel or antiparallel chains are stabilized by hydrogen bonds between chains. Proteins form tissues. Globular proteins, which include the vast group of catalytic proteins called enzymes, contain alternating α helix and β structure.

In coenzymes, the core usually is a metal ion. Chelates (cytochromes, a group of enzymes) are compounds that can grab and hold for future release an atom or group of atoms. Polymerization of amino acids on the primitive Earth may have taken place on the beaches, where the tide would have caused alternating wetting and desiccation, and where UV radiation from the Sun can

provided the energy needed to break and form chemical bonds. It is believed that all sorts of proteins, including enzymatic proteins, formed and were carried to the ocean by the waning tide. The ocean thus became a sort of "primordial soup" in which the concentration of organic compounds may have reached 10^{-4} molar. It seems that the ancient beaches, inlets, bays, and ponds of the world were suitable places where life could have emerged. The ordering of amino acids in protein chains is arranged by nucleic acids, the repositories of genetic information. The nucleic acids, RNA (ribonucleic acid) and The dominant gases in the earliest atmosphere were (in order of abundance) CH_4 (methane), H_20, N_2, NH_3 (ammonia), and H_2S. Life probably originated when methane was still the dominant gas in the atmosphere. That is suggested by the famous Urey-Miller experiment discussed above (Fig. 2).

It is to be noted that only a limited number of molecules are formed in this reaction, no matter how long one waits. This is easily understood because the number of input compounds and types of environmental conditions are limited. Thus we see that a limited number and types of ingredients and limited environmental combinations, can result in only a limited number of processes, governed in turn by the few rules of combinations based on electrical bonding, determined by the forces of nature, and lead to only a limited number of products.

It should be emphasised that no living cells were synthesised in the Urey-Miller experiment howsoever much time was given. Taking clue from Jain *Shriṣṭivād*, we can say that living cells were not formed because the molecules could not organise themselves to form Yonis. Jain model requires a *sachitta* yoni and an appropriate soul for synthesis of a cell. Urey-Miller process produces material (jad) products, not suitable for a soul to occupy to make them alive. Thus forming a living cell is a complex, multistage, highly improbable process: Supply of basic material ingredients are required, and then this matter should organise into a suitable structure, the structure should become a sachitta yoni by incorporation of chitta, and then becomes sajiv, by incorporation of an appropriate soul.

Following the above arguments, we propose that it is for this reason that number of yonis suitable for sustaining life is also limited, and is estimated at 8.4 million in Jain and Hindu scriptures.

Every living being needs energy for various processes that sustains it. The Earth has two sources of energy available: external energy (i.e., the Sun) in form of photons and internal energy which can be chemical or thermal.

As soon as the early atmosphere of the Earth began forming, photolysis-the dissociation of molecules by light- began splitting H_2O into H (which escaped) and O (which went to oxidize CH_4 to CO_2). In a short time, all CH_4 was transformed into CO_2. At the time, the sky was red, and the Sun was bluish. The earliest photosynthesizing organisms had to use that kind of optical spectrum. The descendants of those earliest photosynthesizers may be the modern extreme-halophile archaebacteria, which use only chloropbyll-a. Cbloropbyll-a uses red light (peak absorption at 680 nm) and blue light (peak absorption at 440 nm). Earth, however, had abundant liquid water. In the presence of water, CO_2 reacted with silicates to form carbonates. As CO_2 was removed from the atmosphere, the sky turned blue. Then Chlorophyll-b was adopted, which uses blue light (peak absorption at 490 nm). The prokaryotic Prochlorophyta and all higher photosynthesizers use mixtures of chlorophyll-a (70%) and chlorophyll-b (30%).

We now describe some details about the role of various elements and different types of chemical reactions, leading to life forming molecules, like nucleotides, aminoacids, sugars, RNA, DNA

etc. Life is based on the properties of carbon and nitrogen, each of which can assume eight oxidation states (from C^{4+} to C^{4-}; from $N^{3+}$to N^{5-}). The major component elements of living matter are, in order of abundance, O, C, H, N, Ca^{+}, P, K^{+}, S, Na^{+}, Cl^{-}, Mg^{2+}, and Fe.

The amino acids are a family of relatively simple organic compounds characterized by a common, monovalent NH_2-CH-COOH group, with side groups attached to the C of the CH segment. Amino acids can link to each other by dehydration. DNA (deoxyribonucleic acid) are polymers consisting of nucleotides. A nucleotide consists of a pentose sugar with a PO_4 group attached to the 5' -C in the pentose ring (meaning the carbon in position 5), and one of the four bases (adenine, cytosine, guanine, and uracil in RNA; adenine, cytosine, guanine, and thymine in DNA).

The pentose sugar is ribose in RNA and deoxyribose in DNA. The difference is that the DNA pentose has an H attached to the carbon in position 2 instead of an OH as in RNA. The bases are ring structures that are either single (pyrimidines) or double (purines). The purine bases are adenine and guanine; the pyrimidine bases are cytosine and uracil in RNA, and cytosine and thymine in DNA.

Phosphorus is present as apatite, which is quite stable in the terrestrial environment. For phosphorus to go in protein chain requires reducing conditions that existed on the initial Earth environment. Incidentally the core of the earth contains not only Ni and Fe but also P, S and C. Reduced phosphorus compounds occur as NiFeP and are known to be present in asteroids.

Sugars are readily formed from the polymerization of formaldehyde (HCHO).

If the base is adenine, the nucleoside is called adenosine, and the nucleotide is called adenosine monophosphate (AMP). The addition of a second -PO_3 group makes AMP into ADP (adenosine diphosphate), and the addition of a third -PO_3 group makes ADP into ATP (adenosine triphosphate). Bond energy between the first and second phosphate groups is 0.33 eV, and that between the second and third phosphate groups is 0.32eV. These bonds are weak because the negative oxygen ion in each bound PO_3 group strongly repels its equivalent in the next group and therefore these bonds can be broken by simple hydrolysis. This is the reason that nature has chosen ATP as the molecule responsible for storing and releasing chemical energy.

The formation of primitive RNA is particularly critical, because RNA can be autocatalytic, which means that it can catalyze its own duplication without the help of enzymes.

Carbohydrates are molecules consisting of C, H, and O atoms. The fundamental carbohydrate is glucose ($C_6H_{12}O_6$). Lipids are a family of substances that include carboxylic acids (also called fatty acids) and their complexes, glycolipids and phospholipids. Thus we see that all the important chemicals required for life can be formed in a simple way, but yoni is a structure which cannot be easily made, and without yoni, a living species cannot be created.

6.4. Fixed number of species

We will now show that the above constraints allow only a limited types of species, mentioned as 8.4 million in Jain, Bauddha and Hindu darshan, and point out various difficulties in Darwinian evolution (Darwin, 1862) of species within the framework of *Shriṣṭivād.*

The proposed model is based on the following three conditions:

(i) **The number of available raw ingredients** (organic molecules, or the so called building blocks of life) are limited, because the chemical elements occurring in nature and the number of ways they can combine are limited in addition to the constraints posed by laws governing their synthesis in nuclear reactions, i.e. nucleosynthesis, and subsequent formation of various compounds by laws of electrovalency.

(ii) **The minimum number of functional organs** required by various types of living organisms. We have shown that a minimum of four organs of input, metabolism, excretion and sense of touch, working in mutually synchroneity are required for the most elementary organism. This number increases significantly for advanced creatures like mammals and humans (Figures 5).In Jain darshan these requirements are termed as Paryapti. A maximum of six parayptis are required for a highly developed living beings, like humans: 1. ahar (food),2. sharir (body),3. indriya (sensory organs, minimum one of touch, i.e. skin and maximim 5, i.e. touch, taste (tongue), smell (nose), optical (eyes) and sound (ears)),4. shasochawas (breath), 5. bhasha (vocal) and 6. mana (mind).

(iii) **The mechanism of birth of living species**. For example, in case of humans, modern medical science assumes a two body process involving a male and a female, whereas in Jain darshan the birth is a five body problem, involving a soul, a karman sharira, a suitable yoni fertilised by the union of a male and a female parent.

We first discuss the fixed number of species8.4 million, no more, no less) or their families (Table 2) exist and the factors responsible for limiting this number. If we follow the dictum that 'whatever can happen will happen', then such types of species must have simultaneously existed when the universe was formed or from the very beginnIf the universe is beginningless and endless as in Steady state theories, then, the species are also eternally .existent in the universe

It seems a reasonable proposition, considering that

1. the number of elements (92) and compounds (several thousands) that exist in nature is fixed,
2. The environmental conditions on different habitable planets can only vary between a limited types (see e.g figure 8 for earth), because the types of atmospheric constituents (gases) are fixed.
3. The number of organs required by different species required for living beings to sustain are also limited in number, as discussed above.

Another fundamental feature of Jain theory of speciation is that it propounds natural creationism, and not divine creationism or Darwinian evolutionism. It implies that all these 8.4 million species have always existed in the universe, somewhere or the other, and will remain so, whereas the fossil record implies that the species have evolved from a monocellular organism like algae through a evolutionary chain of organisms to humans.

Thus there are four main differences between Jain philosophy and modern theories as listed in Table 1.

Two illustrative examples can be given in support of fixed number (8.4 million) of species (Yonis), in view of the limited number of ingredients available. A crude but apt example is the kitchen:

It is well known that only a fixed, and not unlimited, number of edible dishes (product) can be prepared from a limited number of grocery items (availability). In the light of this example, since number of ingredients for production of yonis are limited, only a fixed number of yonis can be formed.

The second case is the classification of crystals of minerals in which each point group defines a so-called (geometric) crystal class. In general infinite three-dimensional point groups are possible. However, the crystallographic restrictions result in there being only 32 crystallographic point groups. Similarly, symmetry or repetition of something in space and/or in time, limits the options. There are translational and rotational operations by which the motif can be repeated. Additionally, there are symmetry planes (reflection planes, or mirror planes, inversion symmetry, reflection symmetry, etc.). In crystals, the rotation axes can only be two-fold, three-fold, four-fold or six-fold, depending on the number of times that a motif can be repeated by a rotation operation. Thus, in crystals symmetry axes of order 2, 3, 4 and 6 are possible resulting in only 32 point groups. Thus, only a fixed numbers of functional yonis can arise from the limited number of ingredients and rules of formation of structures etc.

Take for example vayukayik jiva: only about a few hundred types of gaseous molecules are available which can form molecular chains according to the laws of electrochemical bonding (valence etc.).This turns out to be 350 basic yonis (Table 2), excluding superficial characteristics like colour, smell, taste, touch, etc. according to Jain philosophy, considering universal environments and physical conditions of temperature and pressure. The same number i.e. 350 basic yonis are given for simple life-forms of liquids, solids and energy bodied jivas which reduces to 200 for jivas with 2, 3 or 4 sensory organs, which require more organs. In case of humans, with psychic capabilities, a larger variety of 7000 basic yonis is mentioned (Table 2). The reason for this increase requires further study.

In summary a fixed number of species (8.4 million, in all) under all the environmental conditions existing all over in the universe are possible as stipulated in Jainism, depending on supply of various chemicals to fulfil the basic needs of sense organs (1 to 5) without which the species cannot be born or survive. This is a probabilistic, environment dependent mechanical calculations of producing viable yonis or receptacles for soul. The basic requirement of input(food), output (excreta), sense organs from 1-5 senses and the maximum number of 92 elements which exist in nature and the various compounds which make the environment reducing or oxidising, or supply of water and other nutrients (phosphorus, energy, e.g.) puts a severe limit on the number of species which can self-sustain or can take birth.

6.5. Chemical evolution of the atmosphere

Chemistry of atmosphere, oceans and earth rocks changed as the earth cooled due to geologic evolutionary changes. In case of metamorphism in rocks, the same elements in different set of physicochemical conditions produce different set of minerals. if the temperature-pressure conditions during the history of earth have changed, the elements of pre-existing minerals get mobilized and form new set of minerals. The same thing holds true when the set of environmental conditions change due to asteroid/cometary impacts or due to volcanism or magnetic reversals or ice ages etc. Equally important is the question of the energy received from the Sun, since it is believed that the sun was much fainter in the beginning (Archean period) compared to the present, pushing the earth into periodic glaciation (Catling and Zahnle, 2020). The various elements required for life become active and form different set of tissues or cells or, in Jain parlance, different types of yonis, possible under the prevailing physico-chemical

conditions.

The environmental changes had a significant effect on the types of species existing on earth and .their survival We therefore discuss changes in the atmosphere, and surface rocks. The atmosphere was anoxic when the earth was formed 4.5 billion years ago and was rich in methane, ammonia, carbon di oxide, water, hydrogen etc. Methanogens are responsible for the high abundance of methane on the early earth. Negligible amount of free atmospheric oxygen in the beginning continued for a long time and oxygen became abundant, half way over the history of the earth, about 2.3 billion years ago, with the advent of Great oxidation event. The major jumps in the atmosphere composition (partial pressure) of methane, carbon di oxide, nitrogen and oxygen are shown in figure 8 (Catling and Zahnle, 2020). Nitrogen concentration in the atmosphere varied only slightly, but photosynthesis, escape of hydrogen, and spread of land plants brought in major jumps in oxygen abundance and conversion of methane in to CO_2. The thermal state of the atmosphere (in degrees Kelvin) changed bringing in major glaciation events on Earth

Combining the fossil data with the thermal conditions on the earth reveals major events shown in Figure 9. It may be noted that the Cambrian explosion in number of species witnessed about 540 million years ago may be a consequence of major chemical changes and availability of some elements necessary for formation of muscles, which gave rise to mobile species. Thus we come to the conclusion that the history of life on earth as revealed by the fossil records has occurred in synch with environmental chemical changes, and may be as a consequence of such changes.

The conclusions from the above discussion is that

(i) With limited number of ingrediants (chemicals) available, and with minimum requirement of organs required for living organisms, only limited yonis can form.Whether it agrees with the numbers given in Table 2 requires further study.

(ii) The types of yonis (or species) at different times in the geologic history may be determined by the chemical evolution of the earth's environment and may mimic the fossil sequence in sediments. It does not necessarily reflect the inter-species evolution.

6.6. Shriṣṭivāda with intra- species evolution:

Considering the above data, which are based on well documented observations, we now propose a hybrid model, a modified *Shriṣṭivād*, by including limited intra-species evolution but without inter-species evolution. This implies that a species can evolve from one type into another within its *Family* or *Genus*, but cannot, due to physical stress, evolve into another type of species, outside of its *family/genus*.

6.7. Alternative to Darwinian evolution

Another basic data to be explained is the fossil record in sediments and for this purpose we propose the following in light of the Jain theory of birth, which requires appropriate yonis: Yonis are physical, non -living, *achitta* structures, but can become *sachitta* and *sajiv*, capable of providing everything a particular species requires for sustenance and development.

1. Fossil sequence in sediments is nothing but reflects and mimics the chemical evolution of the planet, Earth in our case. To begin with the earth had methane-rich reducing

environment in which only some single cell species (blue algae) could exist and survive. With further changes in the environment and as oxygen and other elements, like phosphorus, calcium etc required for new species became available, multi cellular species, animals, birds, plants, trees and humans came into existence. In reality it is the chemical evolution of the earth providing a suitable structure for birth of a particular species to take place, rather than this species evolving itself from single cell to multicellular species etc. in the sequence given above.

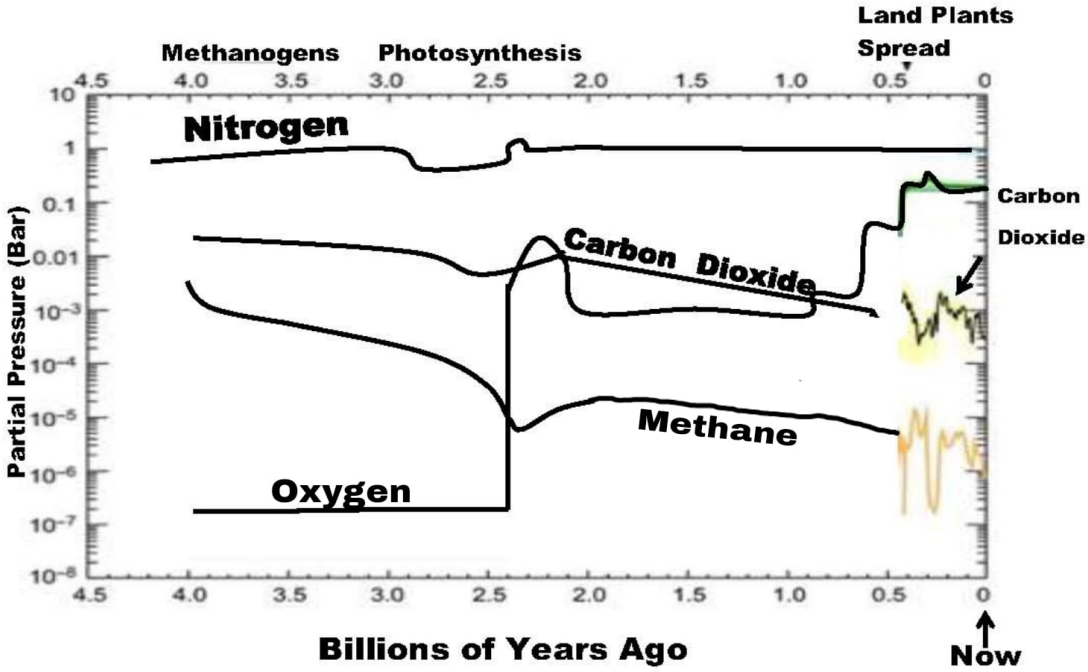


Fig. 7. Partial pressure of O_2 CO_2 and CH_4 in the earth's atmosphere estimated as a function of time (from Catling and Zahnle , 2020). Uncertainties in these curves have been ignored for the purpose of discussion here and the reader may refer to the original paper by Catling and Zahnle (2020). The Great Oxidation Event, by which the atmosphere changed from reducing to oxidising occurred about 2.3 billion years ago.

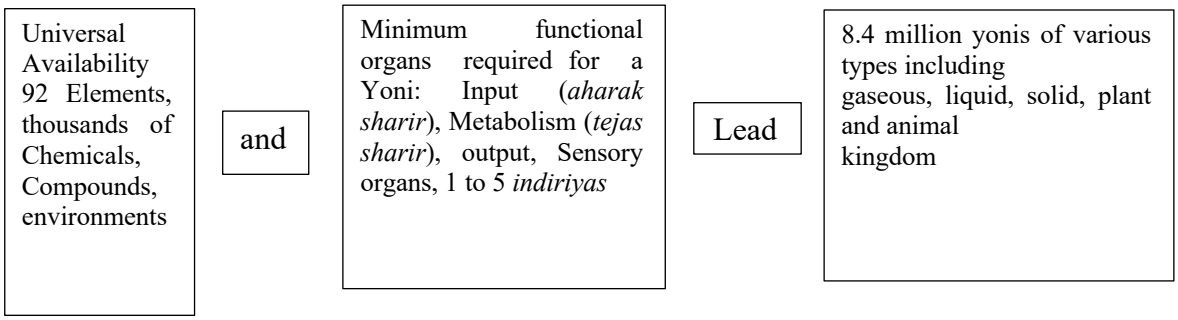


Fig. 8. Schematic shows that the formation of a fixed number of yonis (right) depends on the ingredients available and organs required.

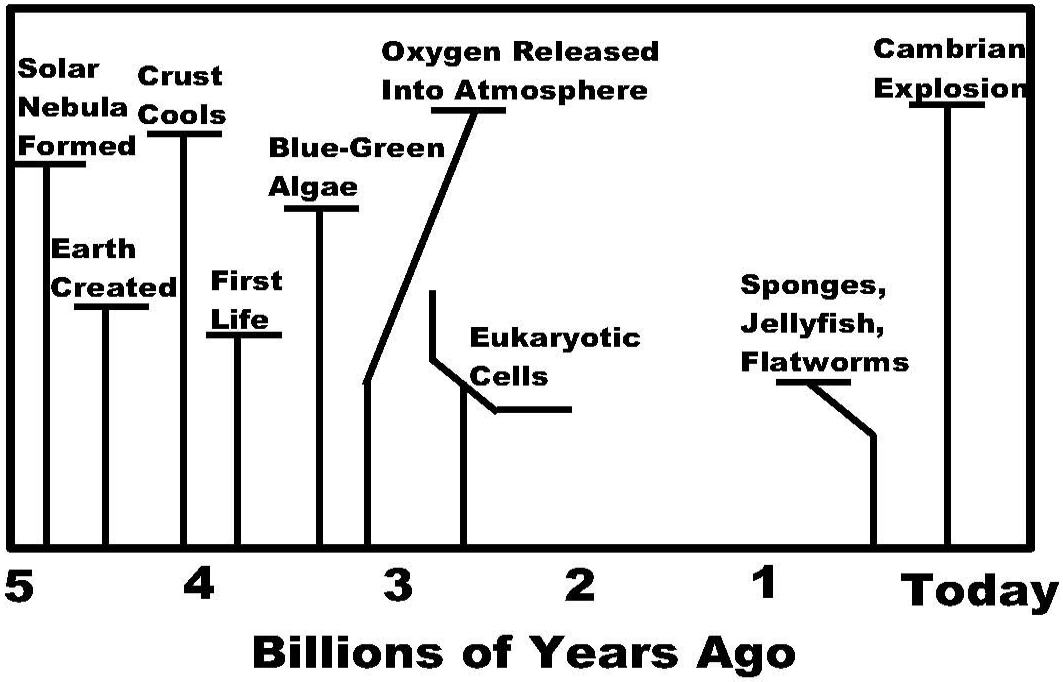


Figure 9. Major events in geological, biological, and environmental history of the earthsince it was formed 4.5 billion years ago from solar nebula. The earth had reducing atmosphere in the beginning, as shown in Fig. 8, when life originated (from Catling and Zahnle , 2020).

2. fossil record can be understood if the environmental conditions evolve in such a fashion such that only a certain type and number of species can find suitable conditions of birth and survival. The fossil record mimics the chemical evolution of the earth and gives a false impression of evolution of species.
3. Darwinian evolution is valid to a limited extent in intra-species evolution but not in inter-species evolution. For example a bird can grow a long or short beak or large or small wings and evolve or devolve into each other, by Darwinian principle of natural selction and survival of the fittest by struggle for existence, but cannot convert into a mammal, which not only requires evolution of certain existing organs, but all together new organs. Supply of chemicals which produce strong muscles (calcium for bones and marine shells; phosphorus for muscles, ATP etc.) and a suitable yoni is required for such a transformation.
4. Neo-Darwinism through genetic changes can also be understood as a consequence of chemical evolution of the earth environment.

An overview of post-Archean physical (temperature) and chemical evolution of earth reservoirs in the context of biological evolution show that nitrogen may have tracked O_2 levels due to an oxidative weathering and denitrification source of N_2. Methane was oxidized as O_2 rose but could have been protected subsequently under an ozone layer, depending on post-Archean CH_4 sources. The secular decline of CO_2 is attributed to geological carbon cycle induced by decreasing solar luminosity. Cenozoic glaciations have been determined to occur at a global mean temperature below ~20°C. Archean glaciations suggest a more conservative 25°C upper limit. Low CO_2 during the Phanerozoic correlates with glaciations, such as Carboniferous-Permian events, 335 to 256 Ma ago. Precambrian greenhouse gases must have also fluctuated.

Here we follow the discussion of Catling and Zahnle (2020) in which they have summarized the changes in the atmospheric composition from Archean to the present (Fig. 8 and 9).

The above propositions would require further observational proofs and evidence and much work is required before it becomes a viable and acceptable model. If supported by chemical evolutionary history of the earth as the dominant cause, this can resolve the major issues related to Jain and modern theories of living species. Available chemical and physical conditions can activate corresponding genes and can give rise to new yonis, in which appropriate souls (with *Karman* and *Tejas shariras*) can descend and occupy to give rise to new species, which will mimic the fossil records.

7. Conclusions

We show in this paper that intra-species (without inter-species) Darwinian evolution, i.e limited *vikāsvād*, and Jain *Shriṣṭivāda*, in which formation of various types of yoni's depends on the availability of basic material ingredients, can best explain the fossil records in terrestrial sediments over the geologic history of the earth. We follow the Karma based model, described in the Jain texts, according to which when a karmic soul enters an appropriate yoni, it give rise to birth of a *jiva*.

Karmic soul+ Yoni = jiva

One of the main features of *Shriṣṭivād* is the fixed number of species, which we explain by proposing that types of yonis are limited because of limited types of ingredients available in the universe and minimum organs required for various species. The proposed speciation model leads to the following corollaries:

1. Various species are born in a three step process: (i) formation of an appropriate yoni, (ii) descent of a karmic soul into it, and (iii) Based on its compatibility with the yoni's characteristics, it grows into a particular species.
2. Darwin's evolutionary sequence reflects the sequence of formation of different types of yonis with time on Earth, which in turn reflects the physical and chemical evolution of environmental conditions, supply of ingredients etc. This sequence apparently mimics the evolutionary sequence seen in fossil records. This model does not sunscribe to gradual, multi-pronged, evolution of single cell algae, ultimately to humans as seen in the fossil record.
3. Limited intra-species evolution, within the same species under environmental stress occurs but inter-species evolution, from one species to another, is not possible.
4. Karmic matter plays an important role in evolution as well as devolution from one sensed organism into 5 sensed organism (jiva) and vice versa. Thus evolution is not a one-way process from lower to a higher animal but can occur either way depending on the karmas.
5. It so happens that the physico-chemical conditions on the earth have changed in such a manner that it apparently appears that species are sequentially evolving, whereas in fact, only yonis (which are non-living structures) evolve as the supply of nutrition and ingredients changed on earth, with time due to geochemical and astronomical events.

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