

Biological Concepts in Jainism and Modern Science

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Abstract:

The paper addresses conventional views associated with Jain biological concepts and modern science especially those related to origin of life and its evolution. A good agreement between Jain Philosophy and modern biology is seen. Although the modern science has put forward several hypotheses for origin of life on the Earth, it is not yet able to conceive a universally acceptable model. According to Jain principles, the universe is eternal, not created, has always existed, exists and will continue to exist with its core elements with certain changes in their form on account of ongoing unending exposures and pressures of physical, biological and biochemical processes without formation of new species. Jainism explains the nature of all substances that undergo the process of creation, destruction while maintaining their intrinsic nature. Therefore the question of evolution does not arise. The universe exists by virtue of six vital substances, forming its framework to hold and manage. Essentially the life possesses consciousness, one to five senses, three powers (thought, word, and action) and respiration and undergoes ageing. The seed body is known as *Karman Sarira*; which always remains attached to the soul in the mundane state. All body functions are regulated by the living cells, inbuilt codes and decoding systems. A detailed genesis of subtle *jivas (nigoda)*, fertilization, embryogenesis, organogenesis, allied body descriptions and events are described by Vattakeacharya (2006), in *Mulachar Part-2* and A. Slvarya, (2008) *Bhagwati Aradhana*. Phenotypic and genetic expressions of different characters are expressed as the "law of independent assortment and union". French geneticist H. Frydman has shown that karmas were bound since eternity and play their role through genes in the living body. Even the modern bio techniques like embryo transfer and cloning were known and practiced in ancient India (600BC) as revealed by the transfer of living embryo from the womb of *Devananda*, a Brahmin lady to the mother (*Trisla*) of *Lord Mahavira* (Swetambara tradition). However, death is permanent termination of all vital functions of life and the remains of an organism re-enter the biogeochemical cycle (rebirth). A new concept of "Biocentrism" claiming that scientists need to place biology before all the other sciences to produce a "Theory of Everything" and the modern bio theories of the physical world do not work, until they fully account for life and consciousness.

Keywords:- Jaina Ethics, biocentrism, cell doctrine, embryo transfer, embryogenesis, assortment of genes, yoni, *jiva*, soul, karma, life, rebirth,

Introduction:

Biological, physical, chemical, electrical, DNA, RNA, protein synthesis, spectrum of light rays, memory etc. are some characteristics exhibited by non living materials. Science so far could not infuse sensory character into any non living substance and it is still beyond the reach of scientific techniques. According to science there are some vital characters of a living substance such as

movement, respiration, sensitivity, growth, reproduction, excretion, nutrition and responses. But science is still silent on, sense of feeling, thinking process, memory impressions, consciousness, dreams, purification of soul, doctrine of karma, rebirth, reincarnation, wisdom in the form of *Jnana*, *Charitra*, *Darshana* and finally *Nirvana*. For understanding the origin of life one has to study the several gene less, pre genetic, genetic and post genetic stages of life. Gene's sequence characterization, gene mapping, assortment, infusion and even random assortment, selection of a particular character of gene (and karma) is possible but still no such studies have been possible to understand the nature of karmas as these are beyond the reach of science at present.

Aristotle. (384-322BC) said that all things are a combination of matter and soul,. There are three kinds of souls- the vegetative soul, the animal soul, and the rational soul, with a source of consciousness and reasoning, found only in man. Current understanding considers life as a characteristic of organisms that exhibit all or most of the following characteristics or traits, Hickman, et al. (2000).

Organization: Composed of one or more cells — the basic units of life.

Metabolism: Transformation of energy into cellular components (anabolism) and decomposing organic matter (catabolism).

Growth: Maintenance of a higher rate of anabolism than catabolism.

Adaptation: The ability to change over time in response to the environment.

Response to stimuli: Contraction of a unicellular organism to external chemicals and to complex reactions involving all the senses of multicellular organisms.

Reproduction: The ability to produce new individual organisms, either asexually from a single parent organism, or sexually from two parent organisms.

Homeostasis: Regulation of electrolyte concentration or sweating to reduce temperature of the body

The emergence of life on earth is unknown, although many scientific hypotheses have been formulated. While considering the meaning of life in its living form, other points in relation to its significance, origin, purpose, and ultimate fate should be considered in terms of both philosophy and religion, as to how life relates to existence and consciousness. The systemic definition of life is that all living things are self-organizing and self-producing.

Classification of living organisms-

Modern concept:

The most accepted classification is based on prokaryotic and four eukaryotic kingdoms, Margulis, L& Schwartz, K.V. (1997)

Blooded Animals:

1. Viviparous quadrupeds (mammals)-Eggs are laid within the female body, fertilized inside body and delivered after full gestation period in a form of young one
2. Oviparous quadrupeds (reptiles and amphibians)-Eggs are laid outside the female body and fertilized outside the female body
3. Birds
4. Fishes and
5. Whales

oodless animals:

1. Cephalopods
2. Crustaceans
3. Insects (which included the spiders, scorpions, and centipedes)
4. Shelled animals (such as most molluscs and echinoderms) and
5. Zoophytes

As microbiology, molecular biology and virology developed, non-cellular reproducing agents were discovered, such as viruses and varions. Whether these are considered alive has been a matter of debate; viruses lack characteristics of life such as cell membranes, metabolism and the ability to grow or respond to their environments.

Jain concept:

Biological science and Jainism have their own individual system of classification. Unlike biological classification all living organisms are described only in one domain in Jain scriptures, whether its plants, animals or microorganisms. In one aspect on the basis of kind of birth (uterine, *smurcchan* and *up-pad*), land, number of sense organs and bio-potentials (*pariyapti*) all *jiva (jivasamas)* are categorized broadly under 98 groups (9-human- beings, 85-*tiranch*, 2-celestial and 2-hellish) in Jainism. In another aspect on the basis of feeling /attitude (*bhava*) the souls are of 14 kinds of *margana* and of 14 stages of spiritual growth (*Gun-sthana*). In the present science all living beings are classified as plant kingdom, fungal kingdom & animal kingdom and further on the basis of their morphology, body structure (internal & external), habit & habitat etc. into phylum, order, class, series, genus, species, varieties. All living beings performs most of the common vital & non vital activities like respiration, feed and feeding, reproduction, excretion, multiplication, locomotion, fear, pleasure, etc.

The body may be of -one sense (touch), two sense (touch & taste), three sense (touch, taste & smell), four sense (touch, taste, smell & vision), five sense-asangi (touch, taste, smell, vision, hearing and without mental development) and *sangi* with mental and emotions development, Ummaswami, A. (1992). Five sense organisms may born either by sex or agglutination, Jain, H.L. (1975) and are aquatic (fish. turtle, crocodile), terrestrial (reptiles, quadruped), and aerial (birds). The quadruped animals may be again of four types - (i) animals with single hoof like a horse (ii) two hoof like an ox, (iii) padded foot like an elephant and (iv) animals with paw like lions. The reptiles may be either with arms like lizard and creepers like snakes. Whereas birds may have skin feathers like bat and, goose.

Based on the type of birth the mobile beings are of eight types.

1. Oviparous. They are born from eggs like birds.
2. Vertebrates- born without placenta.
3. Viviparous. They are born with placenta e.g. cow, humans.
4. Fermentation origin. Worms and bacteria produced in curd, juice etc.
5. Sweat origin. Produced from sweat, e.g. louse ticks etc.
6. Birth by agglutination. Asexual birth like flies, ants etc.
7. Sprouting animals. Produced below earth surface e.g. locusts.
8. Instantaneously manifested body. They are non fetus beings e.g. celestial and infernal beings.

Mobile Jivas

Mobile means *Trasa Jiva* - those that can move at will. They are multi sensed organisms and are divided into the following categories, Todarmal, Pt. (2005), Jindevi, M. (2011).

A. Viklendiriya:

(1) Two sensed beings (*dwi-indriya Jiva*): Two sensed beings have the senses of touch, and taste. e.g. shells, worms, insects, microbes in stale food, termites, etc.

(2) Three sensed beings (*tri-indriya Jiva*): Three sensed beings have the senses of touch, taste, and smell, e.g. bugs, lice, white ants, moths and insects in wheat and other grains, centipedes, etc.

(3) Four sensed beings (*chatur-indriya Jiva*): Four sensed beings have the senses of touch, taste, smell and sight, e.g. scorpions, crickets, spiders, beetles, locusts, flies, etc.

B. Saklendiriya:

(4) Five sensed beings (*Panchendriya Jiva*): Five sensed beings have all the five senses of touch, taste, smell, sight and hearing e.g. human beings, cow, lions, fish, birds, etc.

The following are four sub-categories of the *Panchendriya Jivas*.

- a) Infernal (*Nāraki*) - *Jivas* living in hell,
- b) *Tiryancha* - Non-human beings i.e. elephants, lions, birds, fish, insects, etc.
- c) Celestial (*Deva*) - heavenly beings,
- d) *Manushya* - Human beings.

Among the five sensed beings some have minds, while others do not. Those having a mind are called *Sanjni Panchendriya* and those without a mind are called *Asanjni Panchendriya*.

Immobile Jivas

Immobile means (*Sthāvar Jiva*) - those that cannot move at will, Vattakeacharya (2006). They are one-sensed called *ekendriya* mostly found in plants and are further divided into the following five sub-categories.

(1) *Prithwikäya* or earth bodied: Seemingly inanimate forms of earth are actually living beings and are found in 36 forms e.g. clay, sand, metal, and coral, etc. They have earthly bodies, hence the name *Prithwikäya* which is derived from the Sanskrit term for earth, *Prithwi*.

(2) *Jalakäya* or water bodied: Found in 7 different types of water, e.g. dew, fog, iceberg, rain, etc (*ausa, hima, kohara, motiboonde, chotiboonde, suddhajal and ghanjal*).

(3) *Agnikäya* or fire bodied: Found in 6 different types of fires e.g. Flames, blaze, lightening, forest fire, hot ash, etc (*angare, jwala, lau, moormur, shudhagni, Agni*).

(4) *Väyukäya* or air bodied: Found in 6 different types e.g. wind, whirlwinds, and cyclones, etc (*ghoomtivayu, utkaliroopvayu, mandlakarvayu, gunjavayu, mahavayu, sariravayu-prana, apana. samana, udana, vyana*).

(5) *Vanaspatikäya* or plant bodied: Found in 7 various forms e.g. Trees, plants, branches, flowers, leaves, and seeds, etc. (*moolabeeja, agrabeeja, parvabeeja, kandabeeja, skandabeeja, beejabeeja, sammurchina*).

In Jainism view, life is characterized by soul and is classified in different ways-

Jiva samasa- Collection of entire living beings (organism)/souls is known as *Jiva samasa*. Primarily *Jiva samasa* is of two types

1. *Paryaptak*-The souls possesses all six type of power i.e. bio-potential (food, body, sense organ, respiration, speech & mind) are fully developed are *Paryaptak*. These are of 7 types.

2. *Aparyaptak*- out of six powers if anyone is missing in soul is called *Aparyaptak*. These are of 7 types.

Thus total 14 kinds are further bifurcated in to 98 classes according to the type of birth takes place by the soul (Hellish, animals, human beings & celestial beings). Each class differentiated in to various categories and so on

Swami kartikkaya (1990) and Acharya Nemichandra Siddanth Chakaravati in Gommathsar (Jivakand) (2008) have broadly described four categories of *Jiva*. They are-

Human beings (9 types)

Sub-human (85 types)

Celestial (2 types)

Hellish (2 types)

Human beings are differentiated into 4 categories according to their availability in *Arya Khand*, *Mlaccha Khand*, *Bhog Bhumi* and *Karam Bhumi*. Each category has two kinds of human beings: (i) *pariyaptaka* and (ii) *apariyaptaka*.

On that basis, there are 8 kinds of human beings which have uterine kind of birth. One special kind of human being born only in *Arya Khand* by *Smmurchhan* (spontaneous generation) process is called *lubbdhi pariyaptaka* (die before attaining bio-potentials).

Sub-human are of two kinds (a) uterine birth (b) *smmurchhan* birth

(a) Uterine birth-These are of 3 types- (1) aquatic (2) terrestrial (3) aerial. Each of them is of two types- *Sangi* (with mind) and *Asangi* (without mind). Their habitats are in *Karma Bhumi*. Likewise *sangi* terrestrial and aerial *jiva* are found in *Bhog bhumi* only. Thus total 16 kinds of uterine birth *jiva* are available in *Karm bhumi* and *Bhog bhumi*.

(b) *Smmurchhan* birth-These are also of 3 types- (1) aquatic (2) terrestrial (3) aerial. Each of them have *Sangi* and *Asangi* category. They are found in *Karma Bhumi* only. So there are a total of 6 type's of *smmurchhan* birth in *Karma Bhumi*.

Two, three and four sensed *Jiva (viklendriya)* are born only in *Karm Bhumi* by *smmurchhan* type of birth. Thus 3 kinds of *viklendriya* are found in *Karma Bhumi*.

One sensed *Jiva (ekendriya)* are classified into 14 classes (*smmurchhan* type of birth) - earth bodied (*prathvikaya*), water bodied (*jalkaya*), fire bodied (*taijaskaya*), air bodied (*vayukaya*). Each of them is found in two forms i.e. subtle (*suksma*) and gross (*badar*). Thus 8 classes in first four type of *ekendriya*. Vegetable bodied (*vanaspatikaya*) is bifurcated into two important categories such as Individual-bodied (*pratayak vanaspati*) and Common-bodied (*sadharan vanaspati*).

Individual bodied (*pratayak vanaspati*) - Each soul has its own gross body. They are of two types.

1. *Aprathisthit* – general body is free from *nigodia badara*

2. *Saprathisthit* – *nigodia badara* are habituating in general body.

Common bodied (*sadharan vanaspati*):- Infinite souls have a common gross body. They are of two types (a) *nitya nigodia* (b) *eitar nigodia*. Each of them is again of two types-subtle and gross. Thus 6 classes are there in *vanaspatikaya*. In this way total 8+6=14 classes of one sensed (*ekendriya*) *Jiva* are found. By sum of all *tiryanch Jiva* in *Karam Bhumi* by *smmurchhan* birth are 6+3+14=23.

On the basis of bio-potential (*pariyapti*) each class has 3 division viz; *Pariyaptak*, *apariyaptak* and *lubbdhi pariyaptak*, therefore 23X3=69 divisions of *smmurchhan tiryanch Karma bhumij Jiva*. By sum of *Bhog bhumij* and *Karma bhumij tiryanch* i.e. 69+16=85 kind of *Jiva* are found which have uterine and *smmurchhan* type of birth.

Hellish (*Narki*) and Celestial (*Deva*):- they are born by instantaneous rise (*Up-pad*). Each have two types i.e. *paryaptak* and *aparyaptak*. Thus 2+2=4.

Therefore in general *tiryanch* (85) +human beings(9) + hellish(2) +*deva*(2) total 98 kinds of *Jiva* (organisms) are found in which all mundane (*samsari*) *Jivasamas* are confined. According to Jain scriptures these *jivasamas* are further classified in to 84 *lakhs yoni* classes and 199.50 *crore kula* families in details.

Nemichandra, A. (2008) has described the mundane soul (*samsari Jiva*) on the basis of two criteria.

Feeling /attitude (*Bhava*) i.e. *Margana*

Spiritual growth i.e. *Gunsthana*

Margana- On the basis of *Bhava* different forms of souls is found. These are of 14 kinds.

Gati (Realm) *Margana* -Hellish, *tiryanch*, human beings& celestial beings

Sense *Margana-*indriya**

Body *Margana* - Immobile being/*sthavar* (earth body, water body, fire body, air body, plant body) and mobile beings (*trasakaya*)

Yoga Margana- physical, mental, vocal activities

Ved Margana (sex desire) - Male, female & bisexual desire

Kashaya (Passion) *Margana*- Anger, ego, pride, deceit & greed

Gyan (Knowledge) *Margana* -sensitive, scriputal, visual, mental & perfect knowledge.

Sanyam Margana- control over sense organ, mind

Darshan (Awareness) *Margana*- *Chaksu*, *Achaksu*, *avadhi* & *kewal Darshan*

Lesya Margana- *krishan*, *neel*, *kapot*, *padam*, *shukla lesya*

Bhavya Margana- *Bhavya*, *Abhayya*

Right faith *Margana*-Full subsidence, Full destruction, Part destruction part operation part subsidence

Quasi passion *Margana* - *no karma*(*hashya,rati, arati, bhaya,purushved etc*)

Food *Margana*-*audarik, vaikriya, aharaka, tejas & karma* aisbody to 14 stages called *gunsthans*

Bio Potential:

Single-sensed organisms possess four bio-potentials (*pariyapti*) — food, body, sense organ & respiration. They lack the other two bio-potentials of speech and mind.

Two, three, four and five sensed irrational souls possess all the bio-potentials except mind. Rational five sensed souls have all the six bio-potentials and are fully developed.

Vital powers (*Paraná*):

Ten physical powers viz; age, respiration, 5 sense organs and 3 *bala* provide *prana* in living organisms.

The vital powers in different kind of organisms are as follows:

Sensed organ	<i>Paryaptak*</i>	<i>Aparyaptak**</i>
One sensed	<i>4 prana</i>	<i>3 prana</i>
Two Sensed	<i>6 prana</i>	<i>4 prana</i>
Three Sensed	<i>7 prana</i>	<i>5 prana</i>
four Sensed	<i>8 prana</i>	<i>6 prana</i>
Five Sensed rational	<i>10 prana</i>	<i>7 prana</i>
Five Sensed irrational	<i>9 prana</i>	<i>7 prana</i>

* **Paryaptaka** -Jiva consist of all 6 type of bio- potentials /powers (food, body, sense organ, respiration, speech & mind)

** **Aparyaptaka (Nivratparyaptaka)**: Missing of any one bio- potential out of 6 bio-potential (until the jiva doesn't obtain all six paryapti)

Jain and biological science classification (A brief comparison):

	Jain Classification	Biological Classification
1.	<i>Jainagam</i> is a complete science	Science is not complete as <i>jainagam</i>
2.	In Jain scriptures all living organisms are divided into two domains-mobile (<i>tras</i>) and immobile(<i>sthavars</i>)	In Biological science all living organisms are divided into two kingdoms-Animal kingdoms and Plant kingdoms
3.	In <i>Jainism</i> , all living beings are classified on the basis of number of sense organs, kind of birth, Land of habitat i.e. <i>karam bhumi</i> , <i>bhog bhumi</i> etc	While in biological science they are classified on the basis of physical characteristics, presumed natural relationship, body structure (internal and external), morphology, features, habits, habitats etc.
4.	Sequential pattern of classification is not found in Jain scriptures as in biology.	In biological science, every individual is broadly classified in a sequence of domain, kingdom, phylum, class, order, family, genus, species, variety etc.
5.	In <i>Jainism</i> classification <i>Bhog bhumi</i> and <i>Karam bhumi</i> , lives have their own characteristics and features	In science there are no any such geographical area (land) identified and differentiated.
6.	Differentiation of organisms on the basis of vital powers (<i>pran</i>), <i>paryaptak</i> <i>aparyaptak</i> and, <i>lubdhiparyaptak</i> are seen in	Biological classification has no such consideration

	<i>Jainism</i> classification.	
7.	According to Jain scriptures <i>Akshay anant</i> (infinite, innumerable) of <i>Jiva</i> (organisms) are in the <i>loka</i> (cosmos) which are known by omniscient (<i>sarvgya kevali</i>) only. however 199.5 lakh crore (kul) families of <i>samsari jiva</i> are mentioned in principle Jain scriptures.	In biological science about 8.7 million species have been estimated and many more are being added every year. About 1.8 million have been given scientific name. Indefinite numbers are still unknown.
8.	Jainism classification is well documented in Jain scriptures like <i>Kashyapahud</i> , <i>Shatkandagam</i> etc 2250 years ago and remained unchanged as it was based on the absolute truth of omniscient.	Biological classification came into existence only 250 years ago & Carlolus Linnaeus (1707-1778) system of classification was followed first later on it was refined time to time by many biologists as it was based on partial sense truth of scientist.

Embryogenesis and organogenesis, Vattakeacharya. (2006).

Fertilization occurs by the union of sperms of the male and eggs from the female in the female reproductive tract within seven days of mating (*yashodhara charitra*) where it remains up to full gestation period of about nine months. A full description revealed the process of embryogenesis stating the size of the embryo during the first month of fertilization, the embryo becomes a lump in the third month, formation of bone and skin in the fifth month, body hair in the sixth month, discomfort and discontent feeling in the seventh month, grows strongly in the eighth and ninth month, and may come out within 7 to 10 months of gestation (Dhavalala). Similarly in another book, by Slvarya, A. (2008) in *Bhagwati Aradhana*, a detailed description by Shital, P. Br. (1994) in *Sahaj-Sukha- Sadhna*, Chullak, J.V. (2002), Vattakeacharya (2006), in *Mulachar Part-2*, Swami, K. (1990) in *Karttikeyanupreksa* mentioned that in 24 hours after fertilization there is a ball (*Kalila*), after seven nights, it becomes a bubble (*budbhuda*) and other full details of embryogenesis, gestational development, parturition and other minute body anatomical descriptions. In fact the body is made

of seven main elements (*dhatuas*) and of seven minor elements (*updhatuas*). They are fluid, blood, muscles, fat, bones, semen, *minji*, *vata*, *pitta*, *sleshams*, *sirras*, (tendon, ligaments, intestines), lubricant, skin, greasy material. There are nine major external openings like two eyes, two ears, two nostrils, mouth, two hands, two legs, hips, back, heart, brain, rectum and reproductive organ (*linga*). There are sub organs like cheeks upper and lower lips, chin, palate, tongue, eye brows. The living body remains in a state of uniform balance through the process of regeneration and degeneration.

The major outlines of the embryo and fetal developments are as follows:

First 10 days--remains in a floating state (*kamal avastha*)

Second 10 days--No movement (*kala avastha*)

Third 10 days-- fixed in the uterus (Implantation-*sthir avastha*)

Second month--soft attachment with the uterine inner wall

Third Month-- Hardness due to bones formation

Fourth month-- muscle development

Fifth month--Organogenesis and development of brain from the mid region, two hands from the upper and two legs from the lower regions.

Sixth month-- Organs development

Seventh month--Skin, hair, nails and discomfort feeling

Eighth month--starts moving in the womb

Ninth month-- grows strongly and commencement of uterine contractions in the end of the month

Tenth month (first week) -- parturition.

There are bones-300, joints-300, *nadi*-900, small *nadi*-700, muscles-500, vessels net work-4, muscular ropes-2, organs-7, *kandra*-16 (large blood vessels in the chest region), *seeramoola*-6, kinds of skin-7, number of cells-eighty *lacs crores* (8×10^{15}), *Kaleyak*-7, hair- 8×10^{15} , brain one *anjali* (250-300 grams), *sthoori*-3, implantation points-107, *asraya* of fecal matter-7, *peestha* of intestines-16, body orifices-9, *medha dhatu*, formation of semen (one *anjali*) takes 30 days, fat content in muscles (500-700grams), bile and cough-6 *anjali* (1-1.5 litres), blood-4litres, urine-4litres, fecal matter-5.5 kgs., nails-20, teeth-32, eyes disorders-96, body ailments-56899584, Vattakeacharya (2006).

Various types of bone-joints which are called *SAMGHAYANs*, number of ribs, position and weight of various parts representing Anatomy of Human body are discussed. There are also some references about embryology, Tandulveyaliya. Payanna (2008). Reproductive systems and the abilities of men and women are also described in literature.

Development of body constituents (major elements-*dhatu*): The digested food in the form of liquid (*rasa*) in the intestines is absorbed and converted in to *raktta* (blood) within 8-9 *kastha* (157 *pala*) after remaining in the form of *rasa* for the same period. The other constituents of the body in the form of various forms are converted from blood to meat, meat to *maida*, *maida* to bones with bone marrow, to semen and from semen to *praja* (offspring's). Similarly minor elements (*updhatu*) in the form of *vata*, *pitta*, *slesma*, *siras*, tendon, ligaments, catgut, lubricants, skin and digestive juices are formed subsequently. The body of all living beings to the smallest unit are all made up of combinations of physical particles (*skandha*) constituting a net work of subtle channels (*nadi*), winds (*prana*) and essences (*bindu*), Swami, K.(1990).

The Jain and modern views do not reveal much difference during the process of development of embryo and organs (embryogenesis and organogenesis) as revealed by the following table.

Summary of Developmental Time course of human embryo			
Stage	Week after fertilization	Days after fertilization	Event
Pregnancies: <input type="checkbox"/> development of parents	4th week develop-ment of parents	24	Parents' primordial germ cells (PGCs) begin their migration to parents' gonads
Blastogenesis	1st week, embryo is unilaminar	1	Fertilization
		1.5-3	1st cleavages, move to uterus
		5	Free blastocyst in uterus

		5-6	Hatching, start implantation
2nd week, embryo is bilaminar		7-12	Fully implanted
		13	Primary stem villi and primitive streak appear
3rd week, embryo is trilaminar		16	Gastrulation begins, notochord forms
		18	Primitive pit, neural plate, neural groove
		20	First somites, primitive heart tube
4th week		22	Neural folds fuse, pulmonary primordial,
		24	PGCs begin migration, Cranial neuropore closes, optic vesicles and pit form
		26	Caudal neuropore closes, arm limb buds
		28	Leg limb buds, more brain, eye/ear devel.

Organogenesis	5th - 8th weeks	29-56	
Phenogenesis	9th - 38th weeks		

Modern Biological Concepts

The cell doctrine: The familiar idea that the cell is the basic unit of life is known as the cell doctrine. In the first place the cell doctrine states that the life exists only in cells. However, in a very exact sense includes not only the cell but some of its smaller components, such as genes and chromosomes. With the advancement of modern cytological tools there seem to be relations between structure and function called the principle of complementary, that the biochemical activities of cells occur within, and indeed are determined by, structures organized in a definite way. There are two primary types of cells. Prokaryotes are cells without a nucleus and other membrane-bound organelles, although they have circular DNA and ribosome as in Bacteria and Archaea. In prokaryotes, cell division occurs through a process of fission in which the DNA is replicated, and then the two copies are attached to parts of the cell membrane. The other primary type of cells are the eukaryotes, which have distinct nuclei bound by a nuclear membrane and membrane-bound organelles, including mitochondria, chloroplasts, lysosome, rough and smooth endoplasmic reticulum, and vacuoles as in animals, plants and fungi, though most species of eukaryote are microorganisms, Gardner, E.J. (1972)

Germ Cells: Germ cells are essentially involved in reproduction. The most well known examples of this type of cells are gametes in which the sperm and eggs come together to create a zygote which can develop into a fetus. All germ cells carry the germ line, the genetic material which an organism can pass on to its offspring. In humans, these cells are haploid, meaning that they carry only half the number of chromosomes necessary to create an organism. When germ cells from two different people meet, their haploid genetic material combines to create diploid cells which can replicate themselves through cell division, ultimately turning in to a baby forming the male and female internal and external genitalia.

Genotypic Sex: Genotypic sex is determined by the type of sex chromosomes an individual receives from the parents. The sex chromosomes establish the blue print for genotypic sex, autosomal genes cannot alter this blue print drastically in most higher vertebrates, but they may be responsible for the variations in the expression of phenotypic sexuality that are observed in most higher animals including man.

Sex Ratios: Three different types of sex ratios are generally expressed as primary at the time of fertilization, the secondary at the time of birth and the tertiary at the time of procreative age, Nalbandove, A.V. (1970)

Somatic Cells: Cells which do not carry the germ line of an organism are called somatic cells. The bulk of the cells in your body are somatic cells. Somatic cells are diploid, containing all of the information needed to make an organism, and many of them have special tasks to perform. Most living organisms are made up of cells that contain a substance called deoxyribonucleic acid (DNA) containing four chemicals adenine, thymine, cytosine, and guanine (A, T, C, G) as extremely thin, coiled strands in the cell. Each cell in the body contains about 6 feet of DNA thread, for a total of about 3 billion miles of DNA inside. Genes are made of DNA, and different patterns of A, T, G, and C code for the instructions for making things the body needs to function (like the enzymes to digest food or the pigment that gives colour to the eyes). As the cells duplicate, they pass this genetic information to the new cells. DNA is wrapped together to form structures called chromosomes. Most cells in the human body have 23 pairs of chromosomes, making a total of 46. Individual sperm and egg cells, however, have just 23 unpaired chromosomes. One received half of chromosomes from mother's egg (XX) and the other half from father's sperm cell (XY). A male child receives an X chromosome from his mother and a Y chromosome from his father; females get an X chromosome from each parent. Because you have a pair of each chromosome, you have two copies of every gene (except for some of the genes on the X and Y chromosomes in boys, because boys have only one of each). Some characteristics come from a single gene, whereas others come from gene combinations. Because every person (genome) has about 25,000 different genes, there are an almost endless number of possible combinations! Now look, when 25,000 different types of genes can result in almost endless number of possible combinations, then what would happen in a situation when different types of countless(infinite) character carrier subtle karmas(Jain concept) take part in such unions of male(XY) and female (XX) living beings.

Carrying of messages within the cell (Genetic code): A piece of gene is a coded message which is read by the cell. This message is eventually translated into a particular kind of protein, or enzyme. A message, of course, has a beginning and an end. According to the Jain Philosophical point of view karmas are much smaller, stronger, non structural beyond any measurement entities than genes. But are infinite in number and carry all sorts of innumerable (countless) characters of expression and impression. These character may be expressed within the present life, in off springs, different generations even after death and reincarnation from one generation to the subsequent generations. These are in fact life impressions and the main source of inheritance. We think consequents to the various methods of *yogic* purification exercises of *sadhana* and *mantras*, the *karmana sarira* can influence the genome by operating on molecular levels or even at subtle levels to decide and modify the genome and DNA sequence, Bhandari, N. (2010)

Changing Genes (Mutation): A person can be born with gene mutations, or they can happen over a lifetime. Mutations can occur when cells are aging or have been exposed to certain chemicals or radiation. Fortunately, cells usually recognize these types of mutations and repair them by themselves. Other times, however, they can cause illnesses, such as some types of cancer. If the gene mutation exists in egg or sperm cells, children can inherit the gene mutation from their parents. When the mutation is in every cell of the body (meaning a child was born with it), the body is not able to "repair" the gene change.

Induced Mutations: Sometimes scientists alter genes for on special purpose and have altered the genes through genetic engineering in plants/animal cells to produce other plants/species with special characteristics, such as an increased resistance to disease and pests or the ability to grow in difficult environments.

Gene less theory: Woolf son, A. (2000) proposed that development of life went through three distinct stages the gene less, the pre-genetic and the genetic ages and then goes on to depict when and how the gene less world existed. He further stated the laws of chance and complexity to describe the space of all possible worlds, all possible organisms and all possible life forms and as such genes may, in fact, be neither necessary nor essential for life and thus there is a possibility to have gene less cell division. Life without genes is quite different to any other popular concept of science. Christine, K. (2011), generated simple. Non living model "cells" and established a symmetric division- the process by which a cell splits to become two distinct daughter cells, possible even in the absence of complex cellular components, such as genes. The new modeling techniques seem to suggest that simple chemical and physical interactions within cells, such as self assembly, phase separation, and partitioning can result in seemingly complex behavior like a symmetrical division, even when no additional cellular machinery is present. Furthermore, the fact that the rudimentary process of cell division, (excluding cell differentiation and a pyramid of cell functions, can occur in the absence of genetic material is indeed a scientific possibility but will be in contradiction to Jain concepts as livingness and non livingness are basically two different identities and cannot be changed to each other.

Heredity and Jain concept:

The developmental stages in the animals form senses point of views from one sense to five senses beings are nothing but biological evolution. Heredity is the passing of genes and *Karmas* (Jain concept) from one generation to the next. Heredity helps to make you the person you are today depending upon the nature of genes or *karmas* you inherit from your ancestors according to the law of selection and independent assortment of characters located in the genes or karmas. Heredity plays an important role, but your environment (including things like the foods you eat and the people you interact with) also influences your abilities, interests and full expression of individual characters. A person can have changes (or mutations) in gene/karmas that can cause many issues for them. Sometimes changes cause little differences, like hair color. Other changes in genes/karmas can cause other problems. Genes or karmas can be either dominant or recessive. Dominant genes show their effect even if there is just one mutation in one copy of that gene pair; the one mutation "dominates" the normal back-up copy of the gene pair.

Modern concept:

One possibility for how life began is that genes originated first, followed by proteins. The other alternative being that proteins came first and then genes. However, since genes and proteins are both required to produce the other, the problem of considering which came first is like that of the "chicken or the egg". Most scientists have adopted the hypothesis that genes and proteins arose

independently. Therefore, a possibility, first suggested by Francis, C. (2002), was that the first life based on RNA which has the DNA-like properties of information storage and the catalytic properties of some proteins. This is called the RNA world hypothesis, and it is supported by the observation that many of the most critical components of cells are composed mostly or entirely of RNA.

Soup theory: Life is a soup of RNA - DNA-molecules that have been mixed into soup after soup until it lands on a planet that has one more molecule which brings it to life or at least a one cell capable of reproduction of itself. Robert, S. (1987) has summarized the "primordial soup" theory of Oparin, AI. (1952)] in its "mature form" as follows:

The early Earth had a chemically reducing atmosphere. This atmosphere, exposed to energy in various forms, produced simple organic compounds ("monomers"). These compounds accumulated in a "soup", which may have been concentrated at various locations (shore lines, oceanic vent etc.). By further transformation, more complex organic polymers – and ultimately life – developed in the soup.

Genetic Engineering: The frontier between "good" and "bad" genetic engineering depends on whether or not the embryo is considered to be "animate". "If the embryo has a soul, then it is endowed with a human (with *karmaśarīra*) as well as biological life and any attack on its integrity is seen as a crime" says French geneticist Frydman, H. (2004). That is to say that even geneticists and religious books both believe in karmas playing role through genes in this gross body. However, there is no concept of a soul in the modern science for a living entity. The soul is an essential component of all living entity including cells and even subtle organisms according to Jain view point. The *jīva* is conscious, formless, characterized by *upyoga*, attached to karma, the enjoyer, the pervader of bodies (large and small). Furthermore, the soul is a non structured identity able to enter/penetrate through any material including cells, tissues, organs, bones and body as it is *Asankhayatpredesi*. Moreover, the soul possess the ability of elasticity (*agurulagutva guna*) and thereby the soul is adjusted and modified according to the shape and size of body as achieved by fruit of *nam Karma* and also the soul is spread throughout the body in every cell, organ or component organel of the living body.

Gene Therapy: It is a promising field in medical or bio- research. In gene therapy, researchers try to supply copies of healthy genes to cells with variant or missing genes so that the "good" genes will take over. Viruses are often used to carry the healthy genes into the targeted cells because many viruses can insert their own DNA into targeted cells. But there are problems with gene therapy. Huge scientific efforts like The Human Genome Project and related projects have completed a map of the entire human genome (all of the genetic material on a living thing's chromosomes), but it will take many more years to find out what each gene does and how they interact with one another. However, karmas cannot be eradicated by gene therapy as karma and genes are altogether different identities. *Karmas* are subtle in nature whereas genes are not subtle. However, both are character (*guna*) carrier but there is no relationship between them as *karmas* remain attached with the soul unless the soul is liberated. Two kinds of genes are recognized 1.structural gene – which code for the synthesis of a great variety of cellular polypeptides 2.regulator gene-which do not code for any protein and governed by karma of the soul. Their function is to regulate the functioning of structural

gene. This regulatory gene is nothing but is a sort of *karma* which regulates the functioning of structural gene and synthesizes polypeptide protein (hormones/enzymes) which control entire functioning of living system. *Karma* of a person cannot be changed by altering DNA (genetic engineering) because karma are associated with *atamapradesha* and control functioning of structural gene through regulatory gene.

Cloning: Formation of clones (Identical twins) from germ cells or somatic cells, Jain, G.C. (2012). Cloning may be either reproductive or somatic, depending upon the resource cells used. In reproductive cloning the mature blastocysts to produce more embryos are used and mostly done in Vivo or in Vitro fertilizations or by non surgical aspirations of blastomeres from a mature blastocyst. The aspirated blastocysts are hatched in to full grown blastomeres after treating with culture media and placing them in the BOD incubator for a certain period of time. The blastomeres (clones) may either be stored frozen or transferred in to synchronized recipients for the production of identical twins. Another most common cloning method, known as "somatic cell nuclear transfer"(SCNT) or simply "nuclear transfer, (NT)" requires two kinds of cell. One is a somatic cell, which is collected from the animal that is to be cloned (known as the "genetic donor"). A somatic cell is any cell other than a sperm cell or egg cell, and contains the complete DNA, or genetic blueprint, of the animal it came from. For cloning purposes, somatic cells are typically obtained by a routine skin biopsy performed by a veterinarian/human surgeon. The other kind of cell required for cloning is an egg cell, which is collected from a female of the same species (known as the "egg donor"). In the lab, a scientist extracts and discards the nucleus of the egg cell, which is the part of the cell that contains the egg donor's genes. The scientist then inserts the somatic cell from the genetic donor into the egg and "fuses" the two with electricity. The resulting fused egg contains the genetic donor's DNA. However, Clones are not identical from behavioral point of view. However they look identical from phenotypic and genotypic point of view. This is all because all living cells have soul and the soul is never without karma. I have observed myself that a homozygous twin or even clones from somatic cells behave differently. Cloning give rise to identical species even then their *karma* is different:-By means of cloning technology or by vegetative reproduction so many offspring/ progenies are developed. Every individual possesses his own karma. Innumerable (infinite) *nigodia jiva* are there in one common body but each *jiva* has its own *karma*.

Stem cells: Stem cell researcher Robert, L. (2009) hopes to save thousands of lives, doing what is "right" that involves working with therapies based on human stem cells. The blind shall see again; the paralyzed shall walk again; the hemophiliac shall not bleed anymore. In fact, the US business magazine Fortune called him "the standard-bearer for stem cell research, Jain, G.C. (2013).

Embryo Transfer in Ancient India:

'*Swetambaras*' believed that *Mahavira* (600BC) was first conceived in the womb of one Devananada, a Brahmin lady. The embryo was later transferred to the womb of '*Trisala (Kalpa Sutra)*' as the gods thought that *Tirthankaras* were not born in *Brahmin* families, Jacobi, H. (1884 Retrieved 2007). Though '*Digambaras*' do not subscribe to this story of transfer of embryo in case of Lord *Mahavira*. The description of embryo transfer not only revealed the process of embryo transfer but also described the various stages of its development up to full gestation period resulting in to a normal

birth, Wolfgang, L. (2012). However, it is fascinating to know that such techniques were known to ancient people (600BC) which are even not known to many bio scientist/veterinarians today in the present arena. However, the genesis did not reveal the scientific ideology as the attributes of the person (*Tirthankara*) lies in the inheritance of genes rather than to non genetic operations through the transfer of fetus. In such situations the mother of *Mahavira* served as a surrogate mother and not as a donor (genetic mother) for transferring high genetic material of *Tirthakaras*. Similar work of embryo transfer in dairy animals including cloning, and I.V.F. was done and reported by, Jain.G.C. (1989, 1990, 2012, 2013). As a matter of fact the genetic material lies in the male and female gametes. The uterus of the mother provides only the nourishment to the fetus through the placenta connected to the mother and is in no way, responsible for transferring the genetic material. Veterinarian Dr. Wolfgang L. (2012) of Walsenburg found the description of embryo transfer in Jains in ancient India.

Similar description of embryo development was found in another book, *Vedic 'Grabha-Upanishad*, says that in 24 hours after fertilization there is a formation of ball (*Kalila*), seven afternights, it becomes a bubble (*budhuda*). In yet another text in *Sanskrit*, "Tandulaveyaliya, (2008)" ("Instructions on the existence of man before and after birth") is written : "that the yoni (ovaries) of women spontaneously arise and perish 400,000000 to 900 000 000 primordial follicles the precursor of eggs. While in modern science, the number reported is between 400,000 (four million).

Biocentrism:

Robert, L. (2009) proposes a biocentrism theory (A New Theory of the Universe) which ascribes the answer to the observer rather than the observed and argued that biology should replace physics as the foundational science in our understanding of the universe.

Biocentrism states that life and biology are central to being, reality, and the cosmos , the life creates the universe rather than the other way around. It asserts that current theories of the physical world do not work, and can never be made to work, until they fully account for life and consciousness. Biocentrism claims that scientists will need to place biology before the other sciences to produce a theory of everything, Aaron, R. (2009).

Robert, I, Berman, B. (2009). was of the opinion that consciousness conceives, governs, and becomes a physical world. It is the ground of our Being in which both subjective and objective reality come into existence Biocentrism shatters the reader's ideas of life, time and space, and even death. At the same time, it releases us from the dull worldview that life is merely the activity of an admixture of carbon and a few other elements; it suggests the exhilarating possibility that life is fundamentally immortal, Modi, M.B. (2014).

The startling discovery that the world was not flat challenged and ultimately changed the way people perceived themselves and their relationships with the world. "If the earth were really round," it was argued, "Then the people at the bottom would fall off." The whole of Western natural philosophy is undergoing a sea change again, forced upon us by the experimental findings of

quantum theory. At the same time, these findings have increased our doubt and uncertainty about traditional physical explanations of the universe's genesis and structure.

Male and female dominance:-A scientific reporting event:

Overall, males are seen as more skillful than females, Deaux, K., Emswiller, T. (1974). Why more males than females are found in occupations requiring the highest levels of intellect, Leharke, R. (1972). This book discusses theories relating to the evolution of higher mental processes, and their implications stating that higher human intelligence arose out of a mutation, or series of related mutations, on the X-chromosome, Lehrke, R., Gordon, W.(1997) The present concept put forwarded by Leharke is in full agreement with the Jain Philosophy (*Digambaras* traditions) believing that only male can attain full level of intelligence in the form of *Kevallya Jnan* and finally *mukti* (liberation) of soul. Besides there is a great variations and differences of expression of physiological and sports norms and vital body functions between males and females confirming sex linked characteristics.

Summary:

The paper discusses the correlation between Jain Principles and modern science. The universe is immortal, eternal and not created nor sustained by any one. The soul is a living substance (*chetana darvya*) and is in two forms the pure (*muktta*) and impure (*sansari*). The *karmana sarira* is a sort of diary of *karmas* and soul. The law of independent assortment, selection and union decides the expression of various characters through the karmic code.

The body may be of one sense (touch), two sense (touch & taste), three sense (touch, taste & smell), four sense (touch, taste, smell & vision), five sense-*asangi* (touch, taste, smell, vision & hearing) and *sangi* with development of skill.

Science so far is not able to ascertain the existence of soul-the living substance of having a unique characteristics of feeling(sense) of touch, eating, smelling, vision, hearing and on top of it the most important being the power of thought ,thinking process, expression, *Darshna, Gyna and Charitrra*. Science so far justifies these functions as of various vital sensory organs which do not seem. The living organisms are classified as stationary (non motile) and probationary (motile). The non motile are generally of plant origin whereas motile are of animal origin. Whereas, Jivas are constitution of complex amalgamation(*Jiva samasa*) of soul, *karma*, body, force and *prana* (and respiration) and may found in the form of uni and multi sense bodies like air, earth, fire, water, plants, animals, human and in subtle forms of *nigoda*. The states in which jivas are found is known as *Marganas* which are of 14 kinds viz., *gati, indriya, kaya, yoga, veda, kasaya, jnana, samyama, darsana, leshya, bhavya, samyaktva, sangya* and *aware*.

Phenotypic and genetic expressions of different characters are expressed as per the law of independent assortment and union of Karmas (Karmasomes) in the present, past and future lives depending upon the dominance and excessiveness in different species of plants and animals. The science of embryogenesis, embryo transfer, cloning, and in Vitro fertilization wee well developed in

Ancient India as evidenced by the transfer of foetus from a Brahmin women to the Mother Trishla of Lord Mahavira.

Woolf son, A. (2000), gave Life three new distinct ages- the gene less, the pre-genetic and the genetic ages and then goes on to depict when and how the gene less world existed. Leharke, R. (1972) was in full agreement with the Jain Philosophy (*Digambaras* traditions) believing that only male can attain full level of intelligence in the form of *Kevallya Janan* and finally *mukti* (liberation) of soul.

Death is the permanent termination of all vital functions of life processes in an organism or cell. Based on its karma, a soul undergoes transmigration and reincarnates in various states of existence like heavens or hells, or as humans or animals. There is nothing mightier in the world than karma. It is supreme and is responsible for the phenotypic and genetic expressions in a living being.

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