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The word *science* is borrowed from Latin *scientia* means "knowledge." This word came to introduce in Spain as *sciensa* and later on in Portugal as *ciencia*. The Arabic word for science is *ilm*, whose verb is *alima* (to know), which is also used in Holy Koran. The word *gna'n* or *vigna'n* are common in the Indian language for science.

Eji be be lochan sarv'ne, vidiya lochan tran; Sapt lochan dharam'na, juvo vichari jan Eji lakh lochan chh'e gna'n'na, jenu va'r na pa'r.

"Every one has two eyes, but the eyes of knowledge are three. O'you! Examine and ponder that the religion has seven eyes, while the science has one hundred thousand eyes with no end."

The *ginans* composed by the Ismaili Pirs and Sayeds may be defined as religious hymns in the different dialects of Indo-Pakistan subcontinent. It deals wide range of themes, e.g., ethics, morality, devotion, rites, stories, history and examples. It consists of enormous treasure of scientific knowledge.

It was a significant feature of the composers of the *ginans* to update their examples in view of the latest reports of scientific progress. For instance, Flavio Gioja invented the Mariner Compass in Italy in 1302, and it rapidly penetrated the Indian territories in the period of the Ismaili Pir Saheb al-Din (1275-1400). In his one *ginan*, he referred to the Mariner Compass as follows:

Eji jin'e seva saheb'dhi na kidhi, unooda kon hawal? Ma'lam na'v huka na jov'e; unooda ehi misa'l

"What will be one's condition who did not adore the Lord? His example is that of a captain (who sails the ship) without watching the Mariner Compass."

The first reported gun with bullet was used in a battle in Italy in 1324 and 1331. It was the period of Pir Sadruddin (1300-1416), who symbolized the gun as under:-

Budh'ni banduk surati'nu chh'e daru, to ginan goli vich barna'ji

(If the) gun of intellect is loaded with the gunpowder of contemplation, then fill the bullet of the knowledge in it."

The soap was not yet introduced in India in the time of Pir Sadruddin (1300-1416), where the clay for cleanliness was in vogue. Accordingly, he imparted in the *ginan*:-

#### Ma'ti lain'e dova ha'th, nahi kar'e to nahi thai pa'k

"Wash hands with the clay, otherwise you will not be cleaned."

Later on, the soap was manufactured for the first time in France in 1320. The French navigators introduced soap in India between 1470 and 1490 in the period of Sayed Imam Shah (1430-1520), and as such, his one *ginan* sounds an example of the soap as under:-

Kari kamari dhoi'e, an'e chh mann sabu lai, tem murakh'ne chh maas lagan samjavi'ye; bhai to'i na mel'e savbhav.

"Wash the black blanket for six months with forty kilograms soap, (even then, it remains black). Likewise, if you will impart the foolish for six months, o'brother! he will never forsake his nature."

It seems that the *ginans* were composed in bulk between 1250 and 1650 during the period of the Ismaili Pirs and Sayeds in India. The period of about 400 years under review was not barren with the scientific inventions and discoveries in the western countries. To have a cursory glance over the progress, the following brief chart will enable the readers to understand the scientific progress during the composition of the *ginans*:-

1245	=	Gunpowder invented.
1286	=	Spectacles invented by Flavio Gioja in Italy
1302	=	Mariner Compass invented by Flavio Gioja in Italy
1440	=	Portable typewriter invented in England
1445	=	Printing Press invented by Gutenberg in Germany
1476	=	William Caxton set up printing press in France
1486	=	Furnace of cast-iron built in France
1493	=	Bicycle invented by Leonardo in Italy
1496	=	Rolling Mill invented by Leonardo
1500	=	Hydrogen discovered by Pere Salsas in Germany
1520	=	Rifle invented by August Kotter in Germany
1540	=	Solar system discovered by Copernicus in Poland
1577	=	Pocket-watch introduced in England
1589	=	Knitting Machine invented by William Lee in England
1590	=	Microscope invented by Jansen in Holland
1593	=	Thermometer invented by Galieo in Italy
1604	=	Silk manufacture began in England
1608	=	Telescope invented by Hans Llippershey in Holland
1619	=	Geometry introduced by Descartes in France
1636	=	Micrometer invented by William Gascoigne
1642	=	Adding Machine invented by Blaise Pascal in France
1643	=	Calculator Machine invented by Blaise Pascal
1644	=	Barometer invented by Torricelli in Italy
1648	=	Nitric Acid discovered by Glauber in Germany

Most of the branches of the science are illustrated as examples and symbols in the *ginans*. To sum up, we will discuss few notions in this context.

1) **ASTRONOMY** is a word derived from the Greek, *astronomos* means "the laws of star." It is also called "the mother of science" and deals with distribution, motions and characteristics of the heavenly bodies. The cosmology is its main branch.

**COSMOLOGY :** The word "cosmology" is rooted from the Greek, *kosmos* means "order." It is the study of the revolutionary character of universe and its origin.

# **BIG BANG THEORY**

The universe (cosmos) in its primordial form was one unit of creation. It was in state of gaseous, known as the primeval atom or primary nebula, wherein the atoms of matter fastly attached. The high and low temperature turned it into a solid matter, or it became a mass of elements joined together. It was in the form of an egg-like ball and was rotating without any order. This nebula subsequently split up into multiple fragments with very large dimensions and masses, so large indeed, that the specialists in astrophysics are able to estimate their mass from 1 to 100 billion times the present mass of the sun.



Bickerton, Chamerlain, Moultan Artheneus, Jaffereys and Jeans have a version of theory that the Presolar Clouds in an egg-form, consisted of gas and dust rotated in space and collided in an accident, resulting the formation of sun, moon, earth, planets, etc. This is known as the Big Bang Theory (the moment of creation). The first physical cosmology was proposed by the French philosopher Rene Descartes in 1644 that the universe was filled with gas in its formative stage. In 1745, another French scientist George Louis Buffon propounded catastrophic theory in universe. In 1755, the German philosopher Immanuel Kant told that the rotation of primordial cloud of gas would have become very flattened as the sun and planets started to form by gravitational accretion. The *ginan* contains the Big Bang Theory in the following words:-

#### Te indo shah upaviyo, an'e ten'e ha'th mahe'n te rakhio ketlik va'r

"The Lord created the cosmic egg and kept it in hands for some times."

It suggests that before the creation, the rotating egg-like solid mass in the space was under the control of God, whose duration is mentioned as *ketlik va'r* (some times). It does not mean few years but million years, which is clearly described in the following lines:-

Eji satr jug ne athavis gadiyu'n, Shah ind utha kar dariya'ji

"The Lord lifted the cosmic egg (under His control) for a period of 17 *jugs* (1,51,20,000 years) as well as 28 *gadis* (27,21,60,000 years)." It means 28,72,80,000 years.

Te indo zulav'e samiji a'pana ha'th , an'e teno kidho bahu vista'r; Ta'r'e samiji na man mahe'n emaj a'aviyu'n, je a'a inda mahe'n thi te karu'n utpati apar'r'e.

"The Lord tossed the egg under His control and enlarged its volume to great extent. Then, an idea flashed to God that He might make uncountable creations from the cosmic egg."

The act of tossing the egg refers to the rotation in space. George Lamaitre pointed out in 1931 that for some reasons a giant blob of matter or a cosmic egg in space exploded like a bomb. This marked the creation of the universe. Lamaitre's idea thus became known as Big Bang Theory. T.C. Chamberline and F.R. Moulton supported the catastrophic theory. According to Hubble, the Big Bang occurred 18000 millions years ago.

Eji kudrat mere saheb'ki dekho, phinn thaki ek ind upai; ind fodi chaud bhaman rachavia, sub jug dhand'e lagga

"Lo! the majesty of my Lord, Who originated an oval out of the foams (primary nebula). He created the universe by bursting the cosmic egg, and made them functioned in all the ages."

The central body is now sun, wherefrom the moon, earth and planets were separated due to an accident in space.

Eji ind'ma'thi tatva jo kida, tenu a'asman sarjiyun'n sa'r

"The sky (a'asman) was created from the matters sprung from the cosmic egg."

The word "*a'asman*" means "sky" and whose Koranic word is *sama* (pl. *samavat*), means "the thing above the earth that casts shadow." Hence, the terms *a'asman* and *sama* do not mean the sky, but actually refer to the planets. The whole universe in which the net of stars and planets is spread covers an area of 3,502,500,000 miles. This covered area was known as sky in olden times.

After the creation of the sun, moon, earth and other planets, the heavenly bodies were at chaos with irregular system.

Cha'r ba'tta khudavand kiya, tam'e suno muniver bhaiji; Ek ba't to jameen a'asman'e suni, tansu jameen a'asman thambaya'ji

"Listen, O' believer brothers! God revealed four commands. The earth and planets heard the first command, and thus the earth and planets became fixed."

Eji jameen a'asman'ku saheb'e a'ankh dikhai, an'e tansu a'aramj paya'ji.

"The Lord cast His eyes on earth and planets, which caused peace (in the universes)."

It suggests that the chaos condition ended in the space and a system for stars and planets came to be regulated, known as the Solar System. According to the scientists, the solar system began almost 4,600,000,000 years ago. It is a system in which our earth and eight planets revolve round the sun under a natural process as per following table:-

# PLANET DISTANCE FROM SUN REVOLUTION ROTATION DIAMETER

Mercury	28,500,000 m.	88 days	58½ days	3030 m.
Venus	67,200,000	255 days	243 days	7516
Earth	9,300,000	365½ days	24 hours	7926
Mars	155,000,000	687 days	24½ hours	4200
Jupiter	506,500,000	11.86 years	10 hours	88680
Saturn	853,000,000	29 <sup>1</sup> / <sub>2</sub> years	10.39 mt.	74500
Uranus	1,698,000,000	84 hours	17.24 hours	32200
Neptune	2,792,000,000	164.8 years	16.3 hours	30700
Pluto	4,580,000,000	248 years	6.4 days	1500

It must be known that the ancient people knew six planets (mercury, venus, earth, mars, jupiter and saturn). Later on, another three planets were discovered as under:-

- 1. Uranus discovered in 1781 by William Herschel
- 2. Neptune discovered in 1846 by Gale
- 3. Pluto discovered in 1930 by Clyde Tombaugh

The rotation of the heavenly bodies infers in the following lines:

Chandr suraj pavan panni, sung chal'e sau janna

"The moon, sun, wind and water walk all together."

**SUN :** The sun, Greek *soune* means "glittering." The sun is a star and self-luminous body, and the central body of the solar system and its immensely superior mass controls the motions of planets and small bodies, which revolve round it. The age of the sun is described 5 billion years. Its diameter is 8,64,000 miles and is the principal source of light in the universe.

Gailileo (1564-1642) discovered the rotation of the sun. Dr. Campbell, an American astronomer discovered that the sun is moving from the south to north. This motion describes as Spiral. Some discovered that the sun is moving towards the star Vega at the speed of 13 miles a second. The *ginans* foretold the moving of the sun in the following words:-

Ugam'e ne a'tham'e tiya'n thi jetali palak ankh'ni pad'e, Tetala sheshtr gau'n suraj chal'e

"The sun moves thousand of villages equal to the duration of the eye-blinks occurring between dawn and dust."

The distance between the sun and earth is described in following words:-

Suraj panch lakh chalis hazar jojan parthami'thi uncho chh'e

"The sun is 5,40,000 jojans above the earth."

According to old Indian calculation, one *jojan* consists of 176 miles, and thus the distance becomes 9,50,40,000 miles. Hazrat Ali had also propounded exactly the same distance through the example of an Arabian horse, vide "ISMAILIS THROUGH HISTORY" (Karachi, 1997, p. 86). Besides, "THE BOOK OF KNOWLEDGE" (New York, 1910) edited by E.V. McLoughlim gives also same distance by an illustration of a jet plane. The modern science shows that when the earth is closest to the sun in the early January, the distance of the sun from earth becomes 9,01,40,000 miles, and when the earth is farthest in early July, the distance becomes 9,50,40,000 miles. It will be safe to conclude that the *ginan* shows the distance occurring in July.

#### **BIG CRUNCH THEORY**

The sun is the most prominent character in our solar system. It is the largest object and contains 98% of the total solar system mass. One hundred and nine earths would be required to fit across the sun's disk, and its interior could hold over 1.3 million earths. The fusion reactions take place in the sun all the time. The heat and light coming from the sun is the result of hydrogen being fused into helium and energy being released in place of the matter lost during this conversion. Each second, the sun converts 564 million tons of hydrogen to 560 million tons of helium. If such an enormous amount of matter as 4 million tons is lost in the sun each second, it means that the sun will be fully consumed at last and would ultimately become small in size; and its collision with other planets would result the Big Crunch. In sum, the theory of Big Crunch states that when the universe is about 50,000,000 times its present age, its expansion will stop. Then, ever so slowly at first, but gaining speed as it goes, the universe will begin to collapse.

The *ginans* term the period prior to the creation of the heavenly bodies as the "*dhandhukar*" (period of darkness), and describes that one another *dhandhukar* will take place in the universe, which obviously refers to the Big Crunch. The *ginans* mention that:-

Eji dhandukar phari duja hove'ga, bhai qiyamat'ke deen mahe'n ji

"One another period of darkness will repeat in the dooms day."

The sun's surface is called "photosphere" in Greek, means "the light of sphere." Its average temperature is about 5500° C (or 10,000° F). According to the *ginans*, the earth will be so close to the sun that it would face absolute temperature of 10,000° F. The *ginans* describe that:-

Soho'so karni'e tiya suraj tap'sh'e, ek din essa av'e

"The sun will (come near the earth and) become hotter with ten thousand rays. One like day will come."

The word "*soho'so karni*" means 100x100 = 10,000 rays (or 10,000° F). The *ginans* further mention that:-

Eji satv'e nej'e suraj a'avash'e, vo deen kem kem hosh'e

Eji a'atash kera tab meh barsenga, jameen te jal jal hovengi

"The waterfalls will ablaze with flames. The earth will be burnt."

Issi tara a'asman dhrujen'ga, bhai jameen a'ajar pave'gi ji

"So fitfully the planets will be shaken, and the earth will be sick with calamity."

Jameen'ko varann esso phiren'ga, bhai tranba varanni hoish'e ji

"The earth will be trapped by such colour that it would become like a copper."

Mer chaleng'e pathar phuteng'e, bhai jamee'n a'a jal jal jai'ji

"The clouds will be trembled and the stones broken. The earth will be engulfed in water."

Ba'r pahor esso pavan chhutego, pann pathar sab ud ud jai'ji

"The hurricane will blast so (terrible) in 36 hours that rocks and stones will be flown."

**MOON :** The moon, Greek *mune* means "satellite." Its age is described for 4 billion years. Its diameter is 2160 miles. It is 2,39,000 miles away from earth. According to the Big Bang Theory, the space accident caused pieces of cosmic egg. The small pieces became the stars and the big as planets. The significant separated planet was the moon, which threw away its one part to a remote distance, which is our earth. It implies that the moon and earth were formerly one body, which had been thrown off from the central body of the solar system. The *ginan* mentions that:-

Eji shashi'ar chandr vir vijogann, teno mando gagantar zul'e

"The moon in the sky suffers (pain of) separation (from the central body), therefore, its mind (or itself) swings in its orbit."

The ginans propounds that the moon acquires its light from the sun as follows:-

Chanda suraj'ki jayotaj pav'e, nav lakh tara sab enum'e av'e

"The moon acquires light from the sun, including nine hundred thousand stars.

**EARTH** : The earth, Greek *orthe* means "surface." It is 13,00,000 times smaller than the sun. It moves round the sun in 365 days, 5 hours, 48 minutes and 46 seconds. It rotates on its axis in 23 hours, 56 minutes and 4.099 seconds at the speed of 1035 miles per hour. The earth moves round the sun at the speed of 18 miles in a second or 15,55,000 miles in 24 hours in 365 days, 5 hours, 48 minutes and 46 seconds, making a journey of 600 million miles on every year. The rotation of earth is also mentioned as under:-

Eji moman dharati, moman panni, moman pavan julaya

"The believers are (steadfast like) earth, water and wind who are swinging."

**GEOLOGY** is the study of earth and its origin. Different theories have been advanced as to the age of the earth. In 1862, Lord Kelvin estimated 30,000,000 years. In 1896, Poulton counted 50,000,000

years. In 1899, Sir Archibald Geikie declared its age for 100,000,000 years. Sollas in 1909 made it 150,000,000 years. The *ginan* gives 53,28,000 years age of the earth as per following lines:-

Eji dharati jadant'e jug pa'nch gaya, evo nil gayo dhandhukar

"Five *jugs* passed away in the creation of the earth (and with it), the entire period of darkness (in the universe) disappeared."

According to the *ginans*, there were four *jugs* (periods), known as Karta (17,28,000 years), Treta (12,96,000 years), Duapur (8,64,000) and the present Kaljug (4,32,000 years), making 43,20,000 altogether. Its average is 10,08,000 years, and by adding it in the sum total, it becomes 53,28,000 years for the estimated period of above mentioned five *jugs*.

# **THEORY OF EVOLUTION**

The modern theory of creation claims that the growth of human on earth was through the process of the Evolution Theory. The evolution process has been defined into ten stages in the *ginans*, known as the "Das Avatar" which had been woven in fables and folks. For illustration, the following lines propounds the theory of evolution:-

Eji panni'ki bhirmandal phulo'n ki chhaya're piya; so varnna varann pind nipaya.

"The earth was watery (then) the flowers (means vegetations) made their shades. Hence, the body came into existence one after another stage."

It implies that there was water on earth, which paved the period of vegetable kingdom. When the vegetation shaded the earth, the single-celled organisms surfaced out, and it was followed by the animal kingdom. Thus, the mankind came into existence stage by stage through the process of evolution theory.

**MINERALOGY** : It deals the study of the rocks and mountains, including the origin, composition and properties of inorganic chemical substances, known as metals. According to the *ginans*:

Pathar'me hira upana, hir'e me hua la'l.

"The diamond is produced in the stone, and the ruby originates from the diamond."

The ginans further describe:-

Sip'ku bhi ehi panni bund hoti, tinka dekho nipana moti

"The conch was a drop of water, which ultimately became a pearl."

Besides, the purity of gold is mentioned in the following words:-

Son'e son'e kit na lag'e med'e bhaiv'e jo so varas mitti mah'e khoji dharo

"O'my brothers! the gold cannot be rusted if it is unearthed in the dust after a hundred years."

The ginans mentions about the silver as under:-

Khann khod kar rupa lav'e, kas chadiya vina mul na pav'e

"The silver is brought after mining, and without heating in the fire, it gets no price."

The method of testing the diamond and pearl is given in the following lines:-

Eji hira parakhi'e erann ghann'su; ratan parakhi'e punan chand jot.

"Test the diamond with the (strokes of) hammer on an anvil, while the pearl should be tested in the light of full moon."

**STAR**: The star, Greek *ster* means "self-illuminous." The stars are arranged in groups, each group is known as galaxy. It has been discovered that about 7000 stars are visible by eyes, 2,00,000 are seen through camera, 800 millions with telescope and 30,000 millions by the world largest telescope of Mount Wilson Observatory in California. The Dutch astronomer, Kapteyn estimated 40 billions stars in our galaxy. The latest calculation suggests 20,19,10,00,000 stars in our galaxy including planets. If each star is seen in a minute, it will take 38,40,000 years to see all of them.

According to the ginans:-

Chanda suraj nirmala, donu a'ad ja'tr'e, tara a'ab janniyo, sarv'e mahe'n tant're

"The moon and the sun are (from the) prime matter, and both are an inceptive root. The stars however sprouted in the space – all are from one substance."

Chand suraj saheb'e noor nipaya, nav lakh tara'nu tej ho

"The Lord blazed the sun and moon, including (illumination of) nine hundred thousand stars."

It is said that some stars are 200 times bigger than the sun. Betegeus, a star has an energy of 3000 more than the sun. Rigel equal to 18000 suns. Schoradus shines 300,000 times more than the sun.

The recent discovery indicates the number of the stars equal to the size of the sun are more than 40,38,20,00,000. The Orion star among them is 22,00,00,00,00,00,00,00,000 times bigger than the sun. Besides, Arcturus has over 100, Capella over 150 and Antares over 1000 times the luminosity of our sun. In 1937, Mount Wilson Observatory in California recorded a star bigger than the sun, named Nova Pulus, whose rays reached the earth in 1937 after seven million years. In sum, God has created not one but countless suns in the universe. According to the *ginan*:-

Eji sava lakh suraj bahar av'e, tar'e ra't nahi din huva

"When incalculable suns would spring out, there will be no night, but day."

Chando suraj jug mahe'n sa'r, eva anant shahji'i jadiya apa'r

"Indeed, the sun and moon are (visible) in the world, but God has created innumerable like it."

Few words must be mentioned about the telescope, whose invention gave new life to the study of the astronomy. Galileo, the professor of Mathematics in the University of Padus in Italy invented telescope on January 7, 1610. It admitted about 100 times as much light as the unaided human eyes. The eyes can see an object clearly at the distance of 10 inches. With the help of the telescope, the eyes can see an object of 100 inches at the distance of 10 inches. Long before the invention of the telescope, its theory was expounded in the *ginan* as follows:-

Saheb aftab'ku avaz karenga, to najik avengo bhai'ji; Tab sad chasham'su suraj dekhong'e, jiyar'e farman thiya illahi. "The Lord will shout to the sun, and it will begin to approach (the earth) o'brothers. When the God commands, you will see the sun at the span of 100 time eyes."

2) **PHYSIOLOGY** is a word derived from Greek, *physiologikos* means "natural study." The French physician Jean Fernel was first to use the word "physiology" in 1552 in modern sense. It deals the study of human organs.

**EMBRYOLOGY :** The term "embryo" is derived from Germany, *embryon* means "unborn young." It is the study of early development of organism in the human during the first 8 weeks as embryo and then from 8 to 38 weeks as fetus. The German physician Von Baer discovered in 1827 that the size of the embryo in very early stage is 95 to 117 micromilimeters.

The natural process of the birth of a baby during nine months in mother's womb is clearly mentioned in the *ginans* in following terms:-

1 <sup>st</sup> month	=	nirmal neer	=	absolute water or sperum
2 <sup>nd</sup> month	=	paltaviya kheer	=	congealed (mingled liquid)
3 <sup>rd</sup> month	=	ragat'na gotta	=	lumps of congealed blood
4 <sup>th</sup> month	=	nav gotta	=	nine lumps
5 <sup>th</sup> month	=	fat'e fut'e	=	fertilization (ovum)
6 <sup>th</sup> month	=	jiyot prakash'e	=	soul is breathed
7 <sup>th</sup> month	=	saput dhat'ni kaya	=	body formed out of sperum
8 <sup>th</sup> month	=	astaki jog	=	limbs in motion
9 <sup>th</sup> month	=	nav duar mugata	=	nine pulses in action

Thus, a baby is born after nine months. The average period of delivery is 280 days, but the duration of pregnancy is 266 days (38 weeks) or it is the age of a baby. How a baby remains in mother's womb? Its picture is drawn in the following lines:-

Ho jir'e pranni, jiyar'e tu'n girbha'sthan vasanto, tai'e tu'n hato ginan vanto? und'e und'e mustak upar charann, evi evi kashati bhog'vato're



"O soul! Didn't you know when you were in uterus (for nine months)? You were held down with legs coiled up to the forehead. You passed through such miseries."

The size of few human organs has also been described as follows:-

char angar mukh'no pa't (jaw of 2 inches), pa ha'th'ni kaleji (liver of 9 inches), ekvis ha'th'na a'ntarda (small and large intenstines of 63 feet), batris da'nt (32 teeth), nav nadi (nine pulses), bohoter kotha (50 minor limbs, 6 major limibs and 16 limbs in trunk), transo sa'th ragu kaya'na bandh (360 bones to join body's muscles), sol sandha (16 chief joints), ekvis mannka (7 tarsal bones in feet and 14 in fingers), chaud angar'nu fefaru (lung of 7 inches), ba'r angar'ni jib (tongue of 6 inches), nav angar'nu dil (heart of 4½ inches), sa't angar'ni tilli (spleen of 3½ inches), tran angar pittu (gall-bladder of 1½ inches), sava ha'th akhand ha'th (spinal cord of 3 feet and 9 inches). (NB: one angar means ½ inch and one ha'th means 36 inches)

The structure of the body is mentioned in the following lines:-

Upar a'aliyo chamado, mahe'n nas jaria'na bandh

"The outer part is coated with skin and within a net of blood vessels."

The organs of body and their functions have been narrated in beautiful words, whose few examples are given below:-

A'a mathu'n mukh a'ankh na'k'nu na'r te ekaj chh'e, an'e tena jujava kida chh'e a'kar; Ten'e nich'e ek kothi sirajia, tiya'n jai te sarv'e nar're

"The alimentary canal (gullet) of the head, mouth, eyes and nose is one, but different in designs. Below it (gullet), a chamber (stomach) has been formed, where lead all gullets."

Te mah'e ka'n'ne thekann'e ka'n didha, an'e matha'ne thekann'e kido matha'no a'kar; Ka'n te sambarva'ne kaj'e sirijiya, teno avaj thai chh'e matha minjar.

"Within (the body), the ears are placed at auditory zone, and the brain is located in the skull. The ears are formed to hear, whose (waves of) noise are sounded (through motor nerves) in the brain."

Eji ma's tuchha keri khapati, transo sa'th sandanni, Vis khubi nakh'e su'n jadi, evi karigari tari kaya'ni

"The body is built by muscles (supported) with 360 bones. The nails are embedded with twenty skills. This is an artefact of your body."

**OSTEOLOGY**: Its word comes from Greek *osteon* means "bone." It deals the study of the bones. According to the above *ginan*, there are 360 bones in human body. The modern science claims only 207 bones, but the *ginans* add another 153. The *ginans* distribute 360 bones as follows:- teeth (32), socket of the teeth (32), nails (20), phalanges (60), long bones (20), back bones (45), bones of breast (14), ribs (24), sockets of the ribs (24), tubercles fitting into the sockets (24), bones of the neck (15), base of the long bones (4), heels (2), ankles (4), wrist (4), fore-arms (4), legs (4), knee-caps (2), elbow-pans (2), hollow bones of thighs (2), hollow bones of arms (2), shoulder-blades (2), collar (2),

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It implies that the teeth (32), sockets of teeth (32), nails (20), phalanges (60) and 9 out of 14 of breast (total 153) have not been included in modern count of 207 bones.

jaw (2), bone constituting nose (1), temples (2) and cranial pan-shaped bones (4)).

**ANGIOLOGY** : It deals the study of the arteries and capillaries of human body, known as the blood vessels, which have been divided into three following groups:-

- a) ARTERIES : These are tubes carrying blood from the heart to other parts of body. The smallest arteries are called arterioles.
- a) CAPILLARIES : These are the thinnest arteries, connecting the main arteries with the veins. It is so thinner that if placed one by one, it will make a line of 60,000 to 72,000 miles, or it will wind the earth 2<sup>1</sup>/<sub>2</sub> or 3 times.
- c) VEINS : They carry the blood from various parts of the body back to the heart. The thinnest veins are called venules.

With the modern scientific appliances, the following photo of the arteries is reproduced:-



From the above picture, one can see that the shape of the arteries is not less than that of the small vessels. Pir Sadruddin disclosed in the following line the minimum quantity of the arteries (vessels) in human body:-

#### Eji sol'e sol'e sahestr bedali're

Means the body contains "*sol'e sol'e sahestr*" vessels or 16x16x1000 = 12,56,000 arteries. Pir symbolized the arteries as the vessels, and the modern medical science also terms it as the "blood vessels."

The following is the picture of the capillaries of the body:-



The above picture shows that the capillaries look like the small fish. Pir Sadruddin disclosed in the following lines the minimum quantity of the capillaries (fish) in human body:-

Eji athoter soho mahe'n machhali

Means the body contains "*athoter soho*" or 78x100x100 = 78,00,000 fish or capillaries.

**HISTOLOGY** : It is the branch of physiology. It claims that William Harvey discovered the circulation of blood in the body in 1628 in England. The modern research further indicates that the heart pumps 8-9 pint or 4<sup>1</sup>/<sub>2</sub> to 5.1 liters blood per minute. The circulation of blood is sounded in the following lines:-

Mahe'n pavan, mahe'n panni, tara rida'ma sinchan'har

"Wind and liquid (blood) are within (the body) and watered in your heart."

The ginan also indicates the quantity of blood in the following line:-

Sava gado ragat'no

"(The body contains) blood of one and quarter pitcher."

The modern medical science also admits that about 1.32 gallons (5 liters) of blood are in the body weighing 132 pounds (60 kilograms). The heart can make this amount of blood circulate in the body easily within a minute. Blood is a liquid that is created to give our bodies life. As long as it circulates within the body, it warms, cools, feeds and protects by cleansing the body of toxic substance.

## **CHEMICAL VALUE OF BODY**

The body contains minimum of 15 out of 109 elements that so far have been identified, viz. oxygen, carbon, hydrogen, nitrogen, calcium, phosphorus, sulfur, chlorine, fluorine, potassium, sodium, magnesium, iron, silicon and iodine.

The body contains fat to make 10 soaps, one tea-spoon sugar, ten gallon water, iron to make one small nail, calcium to white-wash a cage or a small room of 10x6 feet, phosphorus to make 1000 matches, magnesium of little bit salt, sulphur to drive away the flies at one time, carbon to make 900 leads for pencils or 13 bags of coal. The *ginan* mentions:

Eji kaya're gadh taro khub baniyo hai, pa'nch tantav enu mul

"Your body is well built, but its value is mere five elements."

3) **AGRICULTURE** is an oldest profession of human beings. The *ginans* laid certain important instructions to the followers, who professed in agriculture, whose examples are given below:--

Eji bhom join'e vadi'j vavo, to vadi tanna phal pamo

"Cultivate the field after inspecting the land, so that you can procure fruits according to the (condition of the) field."

Til ne sarsav vaviy'e, tenu tel te mur'e

"Cultivate sesame and mustard, whose oil lies in the roots."

Beej na bov'e te phal kiyan'thi jov'e, kacha kai per'e pakasho

"How can one find the fruit without sowing seeds? How can the raw (seeds) are procured?"

Nilo za'd na vadi'ye pranni

"Never cut a live tree."

Lunniyo khetr na toi'ye, tena par lok has'e sab koi

"Never scare birds in the harvested field. The people and other will laugh on it."

Paka phal ati swad hai, raja kar'e tis'e bhav;

kacha panju bahiy'e, to tat'khann fer'e sav're

"The ripe fruits are very tasteful, and the king also rewards its price. If the unripe fruits are presented, the king returns it at once."

4) **PHYSICS** represents a basic physical science. Its subject matter ranges from the study of the motions and structure of stars to the study of the internal structure of atoms and their nuclei.

The theory of evaporation infers in the following lines:-

Jem chamakpann'ne lodha'ni prit chh'e, tem panni'ne asaman'su prit chh'e

"The magnet loves iron, and similarly the water is gravitated towards the sky."

Panni to pradic'shanna kar'e, chakar veg'e panni chad'e, farta farta gagan mah'e gaya.

"The water revolves and evaporates in a spiral speed and reaches in space after elevation."

The reflection of light is explicitly seen in the following lines:-

Eji jem shashiar akash'e chanda, tem kot kot kumb jal mah'e dekho

"As the moon is in its orbit in the sky, you can also see billion (of moons) in the bowls of water."

Sir Isaac Newton presented the theory of the gravity. It is pressing on every square inch of human body with a weight of 15<sup>1</sup>/<sub>2</sub> pounds. The *ginans* expounded in the following beautiful ways:-

Eji Pankhadia jo hov'e to shah'ne jai milu'n, shu'n karu maro pindado na ha'th

"I can go to behold the Lord provided I have the wings. Alas! my body is not in my control?"

5) **CHEMISTRY** is the study of elements and their combination. The Greek word *chemeia* means "art of making gold by hands." Its other name was *alchemy* in Arabs, means "liquid."

It may be noted that the British coin contains 7.5% copper. In France 10%, in Iran 25% and India 12% copper. If more than 10% copper is mixed, it is rusted very soon. The coin minted with the combination of copper and lead also becomes counterfeit. The real coin contains 4% silver and 1% copper. The *ginan* also mentions:-

Eji tan'bu sisu lai'ne bheriy'e, teni mohor je thai; chovat'e chadi te nahi chalsh'e, khoti koi ha'th'e na soi

"Make alloy of copper and lead (to mint a coin). The coin prepared (from it) will not be acceptable publicly (because) nobody touches the counterfeit coin."

Pital bhi sona tol hai, an'e te sona sarikho dhikalai Tene ek til agan'me bahi'ye, to tat'akshann karo thai

"The brass is akin to gold and seen alike. If it is heated on fire for a while, it will become black at once."

Ja'n lagi para mah'e gandhak hov'e, ta'n lagi deh to kesa sohav'e; Jab ve gandhak nikal jav'e, tab ve sara ja hatha'j a'av'e

"As long as the sulphar is in the mercury, how its shape becomes sharp? When the sulphur is isolated, then a lot of (mercury) comes in hand."

Kanchan kasanni shir rah'e, te agan'mahe'n pes'e bahu va'r; Jem jem ghaha hathoda shir sah'e, tem tem roop apaar're

"The trial hovers upon the gold, which has to remain in fire for a long hour. The more it bears the strokes of the hammer, the pure form is gleaned from it beyond limit."

Sona rupa to saach hai, an'e dij'e agan'ki kas; Pann ba'j rasainn galiy'e, to kem kari hov'e ras're

"The gold and silver are worthy (metals) to be heated on fire. If other metal is melted, how can it get the liquid state?

The tinstone is mined at first. It is heated in Reverberating or blast furnace, so as to take out the sulphur and make the tin pure, which is called "white-tin" or *tarva* in Indian languages. The *ginan* makes its mention as follows:-

Tarva dekho tam'e ehi bhava, mah'e kaasal'thi mul na pav'e; Rupa kera mul'j pav'e, mahe'thi kaasal jo khoi gamav'e.

"Look at the white-tin in such manner. It generates no value due to internal filth. It can procure price of a silver provided its filth is drained off."

Eji jessa tal'mah'e tel hai, tem ka'th mah'e agan

"The wood contains fire as the oil in sesame."

6) **GEOMETRY** means "measurement of earth." While quoting the examples, the *ginans* also sounded with the following geometrical notion:-

Baki lakadi jitani kahiy'e, chhaya tisaki bhi banki lahiy'e

"The more the wooden stick will be crooked, you will find its shadow equally crooked."

Til'bhi teer jo banka jav'e, titana had'thi tafavat pav'e

"If an arrow is shot (on the target) a little bit zigzag, it will also result equal volume of difference."

7) **HYGIENE** covers the study of health. The Ismaili Pirs emphasized upon following significant points in particular:-

Chaturai chokhai'i rahevo bhai

Cleverness is to observe cleanliness, o' brother."

Nirmal thai ne jami'e sa'r

"Eat after having bathed."

Parbhat'e uthi'ne paka'j thavu

Mati la'ne dhova haath, nahi kar'e to nahi thai paak

"Wash hands with the clay, otherwise you will not be cleaned."

Parbhat'e nahi'ne bahar nisariy'e

"Take bath at morning before going out."

Ahar ghanero kari pet na bhariy'e Harv'e pet'e vira honshaj tha'she

"Never eat in excess to over-fill the stomach. O' brother! the light stomach will procure consciousness."

Hindata chalta khavu nahi

"Never eat while swinging and walking."

Botiyu'n chatyu'n kenu'n khavu nahi

"Never eat crumbs of food left by others."

It must be known that the first water filtration plant had been built in 1829 in London to filter the Thomas River water, and gradually the water filtration system became vogue in the world. The *ginans* imparted long before that:-

Vann gariyu'n na pivu'n pani

"Never drink unfiltered water."

Duniya pal rakho jal tussa, pa'ni chann'i piyo

"The life is momentary, so keep some water with you. Drink the water after filtration."

8) **BIO-ELECTRICITY** is also called Bio-Engery. The human body is formed by five roots (or elements), viz. earth, water, fire, air and space or ether. The electricity known in the west as Bio-Electricity, which is generated from muscles, veins, bones, etc governs these roots. These five roots are called in the *ginans* as *pa'nch maha bhoot*. The Greek philosopher Aristotle discovered only four roots, which were followed by the Arabs, known as *arba-i anasir* or *al-arkanul araba*. According to the *ginans*:-

Pa'nch tantav'no putalo, sami raj'e gadiyo gha't

"The Lord formed the body in five roots."

Pa'nch tatava'no pind nipayo, an'e kudarat'e kido khel'ji

"It is a game of the nature that a body was created by five roots."

The following table will enable to understand these five roots or elements:-

ELEMENT GINAN'S TERM ARABIC TERM QUALITIES

Earth	prathavi	kha'k	bone, skin, hair, flesh, etc.
Water	jar	a'ab	blood, saliva, sweat, urine, etc.
Fire	tej	a'avish	appetite, thirst, sleep, etc.
Air	vayu	ba'd	respiration, walking, spreading, etc.
Space	a'akash	••••	vacum parts

These roots ultimately revert to the originating place after the death, making the body void of elemental qualities.

# 9) **PREDICTIONS**

Besides, the *ginans* contain rich informations on the prediction, in which the following are significant:-

Tiyar'e avarda ochhi upaj'sh'e, tiyar'e juth jash'eji

"The age limit will reduce when the lie will be in vogue."

Tiyar'e anant vanaspati nahi phal'e, istri nahi prasav'e bal

"The uncountable vegetations will not grow and (even) the women will not conceive babies."

Eji Arabi bhakiya sami bol'sh'e, te sanbar'e juv'e sa'ri jahan

"The Lord shall address in Arabic language, and the whole world will listen and watch it."

The act of listening is provided only by radio, while both the listening and looking are facilitated in the television. The above lines of the *ginan* refer to the live-telecast of Imam's speech in Arabic for the world people, most possibly it would be followed by his manifestation in the world.

# 10) **Miscellaneous**

The following miscellaneous topics are worth noting for study:-

## **NUCLEAR WAR**

The word "atom" is derived from Greek, *atomos* means "indivisible." It is a unit particle of a chemical element. It was originally thought to be indivisible. The discovery of electron in 1897 by J.J. Thomson that the electron, a particle with a mass almost 2000 times smaller than the lightest atom, suggested that it might be a constituent part of atoms. The chemical elements have been numbered according to the weight of their atoms. Hydrogen, with its single proton has the atomic number (Z) = 1. The next atom is Helium (Z = 2) having two protons and two neutrons, whose weight (A) is four times that of Hyderogen. This is followed by Lithium (Z = 3; A = 7), Beryllium (Z = 4; A = 9) etc., upto Uranium (Z = 92; A = 238) which is the heaviest atom found in nature.

The misuse of atomic energy results a mass disaster in the world. The atomic bombs dropped in the final year of World War II on Japan revealed to the whole world the tremendous power hidden in the atom. It caused hundred of thousands of people to lose their lives and inflicted lifelong physical damage on many of the survivors. The *ginans* foretold its terrible effects in the following lines:-

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"One day a gas will gush out, resulting the mountains and rocks flying."

Sava bhar'ki sakh pade'gi, jal to agan ka barse'ji

"When a ball of one and half unit (of weight) will be bombarded, it will shower fire."

The *ginan* indicats in the following lines that the sun and moon will be invisible due to the utter smoke spread in the world:-

Eji chand suraj do'i chhipe'ga, hove'ga dhandukar

"Both sun and moon will disappear and will occur a period of the darkness."

Besides, the following lines are also interesting for other topics:-

Sa't samudar'nu pani te sa't ta'd parthami'thi unchu chh'e

"The water of seven oceans is seven palm-trees higher than the earth level."

Kam kirodh shaher luntia, tena haday mah'e thi agan utha'sh'e

"The lust and anger have plundered the body, making the fire (blood-pressure) flared in his heart."

Phulada ma chuntish bhora maheshari, enn'e phulad'e chh'e jiv

"O' foolish man! never pick the flowers, as these flowers contain (invisible) worms."

Compiled on 13<sup>th</sup> December, 2003

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