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What is Invisible Intrinsic Gravitational Compression? How it Manifests in Rice Plants?

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Abstract

Gravity is a force of attraction between two masses. The larger the mass, the stronger the attraction. In astrophysics, gravitational compression is a phenomenon in which gravity, acting on the mass of an object, compresses it, reducing its size and increasing the object's density. The intrinsic gravity will cause an object to compress and heat up. The highest pressure is in the core, so that will be the hottest. But eventually the heat will radiate out and cool the object down to the temperature of its surroundings (which in outer space is quite cold). Gravity is traditionally considered a long-range force, but the latest findings show that gravity operates even at short ranges of mass[1].

On the other hand, birth, growth, development, and death of plant has yet left with multiple conundrums that are virtually impossible to decipher with traditional approaches. Interestingly when we begin to incorporate the ideas of astronomy and earth science taking stars, planets, and their formation till death, as an intrinsic gravitating object, and as a continuity in evolution, we found surprisingly that there are parallel regularity/ identical phenomena between a seed - an intrinsic gravitating body at the smaller magnitude, and its formation, differentiation and development, growth, intermediate senescence and finally embracing the death of the plant. Here plant biology has been deciphered for the first time through the lens of intrinsic gravitational compression and subsequent temperature generations in stellar bodies as reflected in earth science

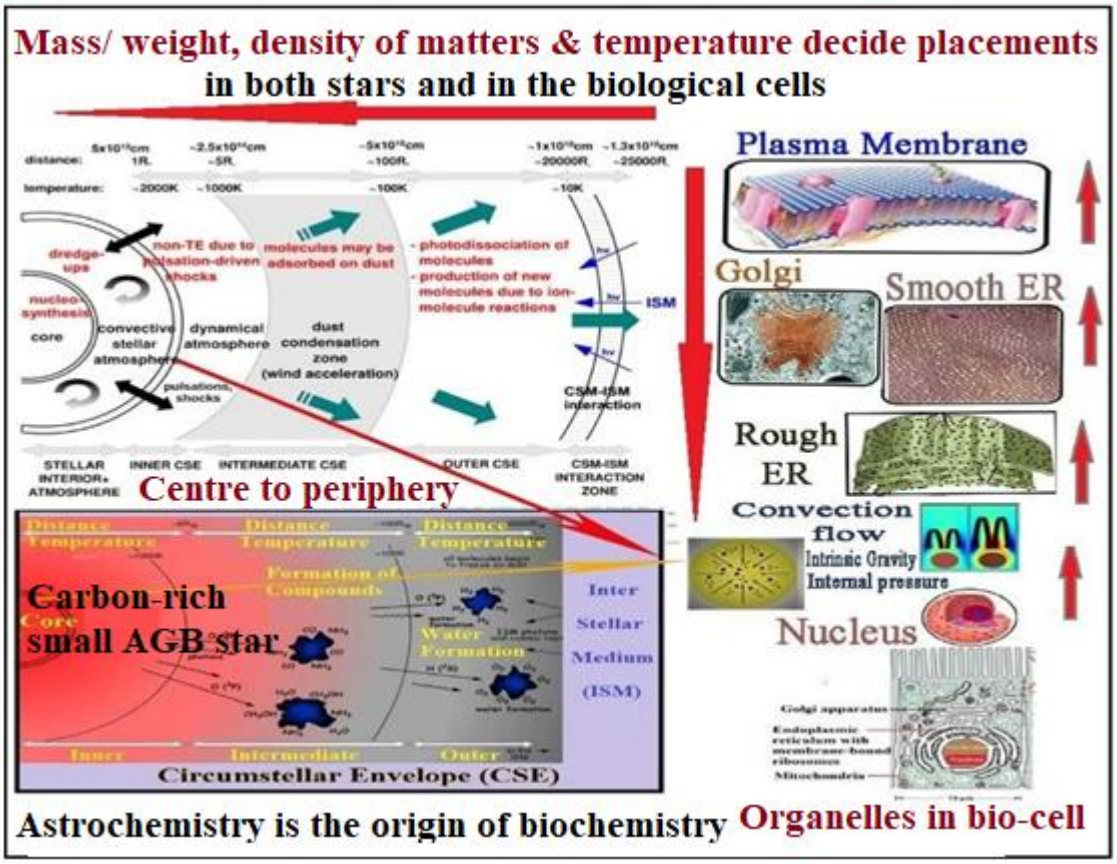
Introduction

Gravitational Compression occurs when a object (like a star or planet) collapses under its own gravity. As material falls inward, it is compressed, which increases both the pressure and temperature at the center due to the gravitational potential energy being converted into thermal energy. Interestingly when we begin to incorporate the ideas of astronomy and earth science taking stars, planets, and their formation till death, as an intrinsic gravitating object, and as a continuity in evolution, we found surprisingly that there are parallel regularity/ identical phenomena between a plant seed - an intrinsic gravitating body at the smaller magnitude, and its formation, differentiation and development, growth, intermediate senescence and finally embracing the death of the plant.

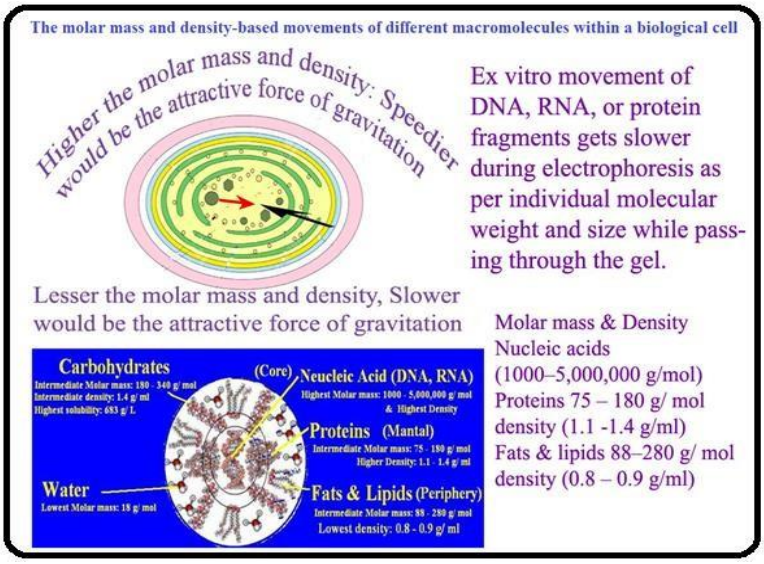
As the diverse and wild combination of subjects is involved in explaining the phenomena, we opt to present the contents episode-wise through graphical abstracts in order to minimize the length of the article and to draw effective attention.

Generation of body heat out of intermolecular collision due to gravitational compression: In all known intrinsic gravitating objects under astronomy and Earth sciences, heat is generated initially through popularly known as ‘Kelvin – Helmholtz mechanism’, where inward gravitational compression of mass and outward thermal pressure due to intermolecular collisions happen. In stars, sustainable heat is generated from nuclear fusion at little advance stage. We are amazed to find a great similarity in various physiological cardinal events in plants and animals from seeds and embryos.

Episode No. 1. Graphical Abstract No.1. Generation of body heat and radiation is a common universal phenomenon in all stellar objects under intrinsic gravity. Elevated body temperature or heat causes molecules of water vapor to condense and deposit as fluids within cells. A Living cell is like a planet within a planet. Fluids could facilitate estrangement from major external gravitational fields out of their neutral buoyancy propert

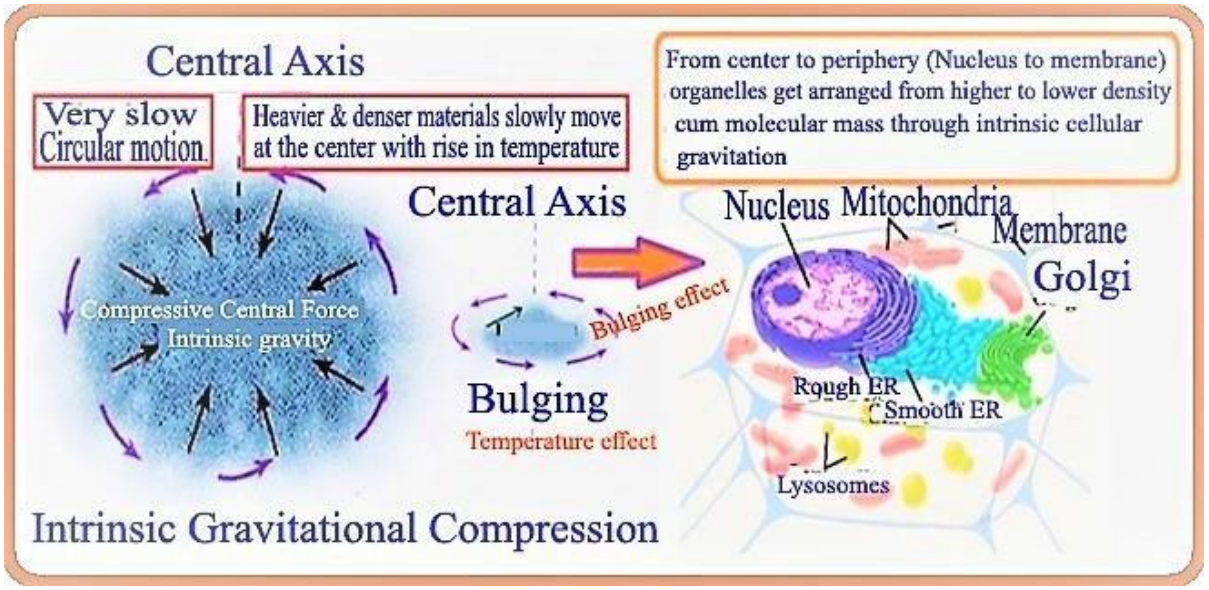


Episode No. 2. Graphical Abstract No. 3. Mass/ weight and density-based gradation from core to periphery (Inter stellar Medium) are available in a star. Temperature drops with distance from core. In the stellar interior atmosphere, convective stellar movements develop including formation of interaction zone of circumstellar and interstellar mediums, that make distinguishing features in inner circumstellar Envelope (CSE), intermediate CSE, Outer CSE. With photodissociation of molecules and production of new molecules due to ion-molecule reactions, it is rightly said that astrochemistry is the origin of biochemistry. Formation of molecules, chemical compounds, water in the circumstellar envelope (CSE) of a star depend on mass/ weight, density, distance from core and fall in temperature in the gathered mass. In the inner, intermediate and outer regions of the circumstellar envelope (CSE) of an AGB star (a carbon-rich small star[2]), temperature goes on decreasing from higher to lower with increase in distance from core to outer region. The presence of elements like Hydrogen (H), Oxygen (O). Carbon (C) and Nitrogen (N) and formation of molecules varies with distance and temperature. In the biological cell, similarly, organelles like rough endoplasmic reticulum (RER), smooth endoplasmic reticulum (SER), Golgi and plasma membrane are placed at a distance from nucleus, as per their mass/ weight and density. Due to higher compression of intrinsic gravity in the nucleus, internal or thermal pressure increases leading to convection flow from nucleus and movement of organelles.

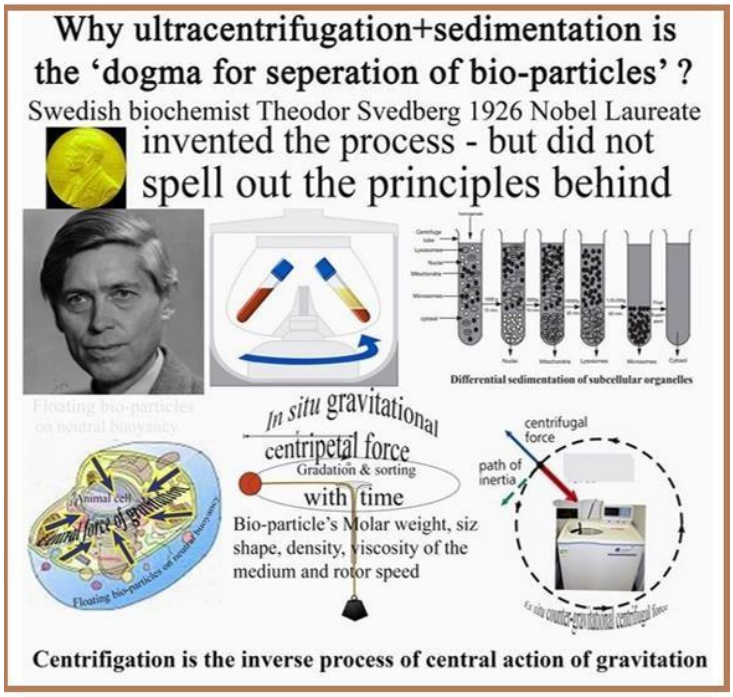


Episode 2. Graphical abstract No 3. Different macromolecules within a biological cell move according to their individual molar mass and density.

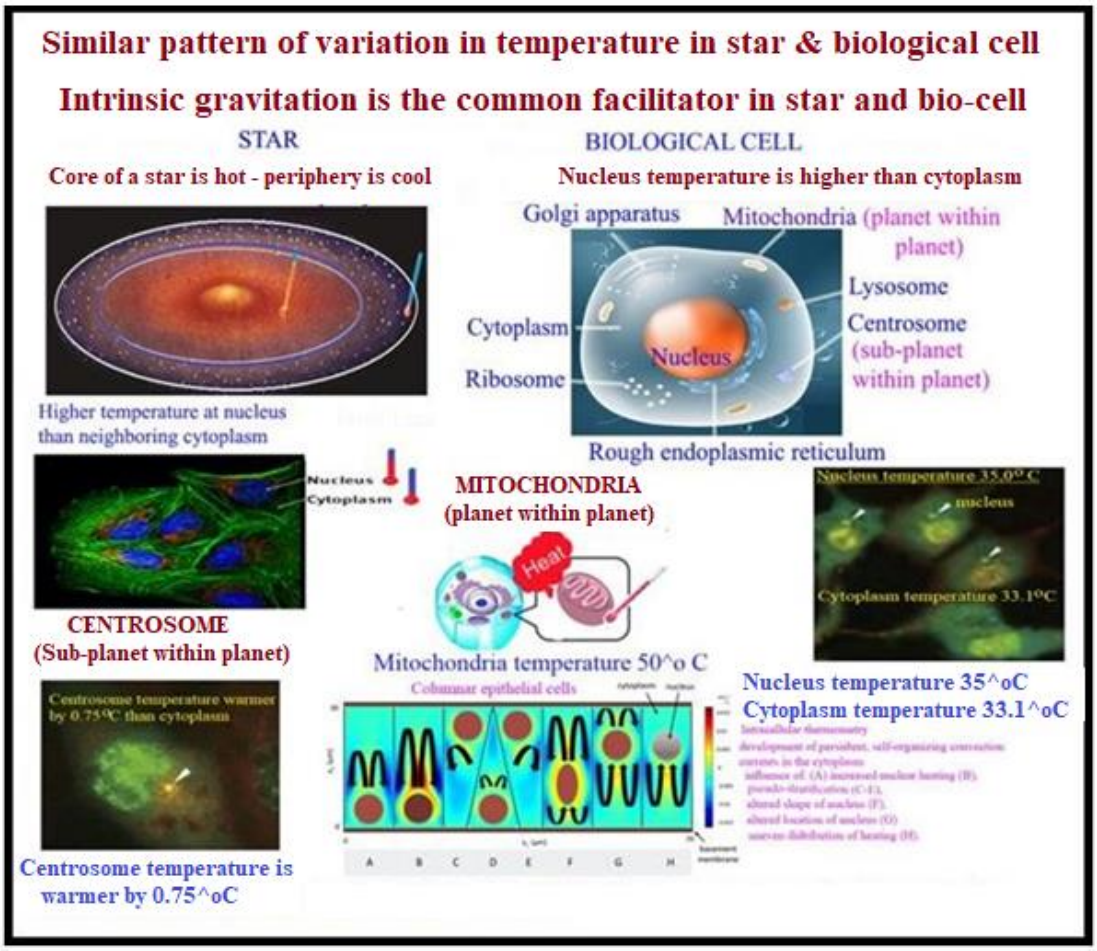
Different macromolecules within a biological cell move according to their individual molar mass and density. The molar mass of nucleic acid is 1000 to 5,000,000 g/mol with the highest density. The molar mass of proteins is 75 – 180 g/mol and density is 1.1 – 1.4 g/ mol. The molar mass of fats and lipids, though 88-280 g/mol, but the density is the lowest, only 08 -0.9 g/ml. Therefore, as the principles of universal intrinsic gravitation, the higher the molar mass and density, the speedier would be the attractive force of gravitation towards the center. Conversely, the lesser the molar mass and density, the slower would be the attractive force of gravity. Nucleic acid occupies the core, proteins remain intermediate, and fats and lipids remain at the periphery, mostly at the cell membrane.



Episode No. 2. Graphical Abstract No. 4. The compressive central force is due to intrinsic gravitation, very sluggish circular motion forces heavier and denser materials to gradually move at the center (core or central axis) of the cell with a rise in temperature resulting in the bulging effect. Nucleus and other organelles get placed as their individual molar mass and density.



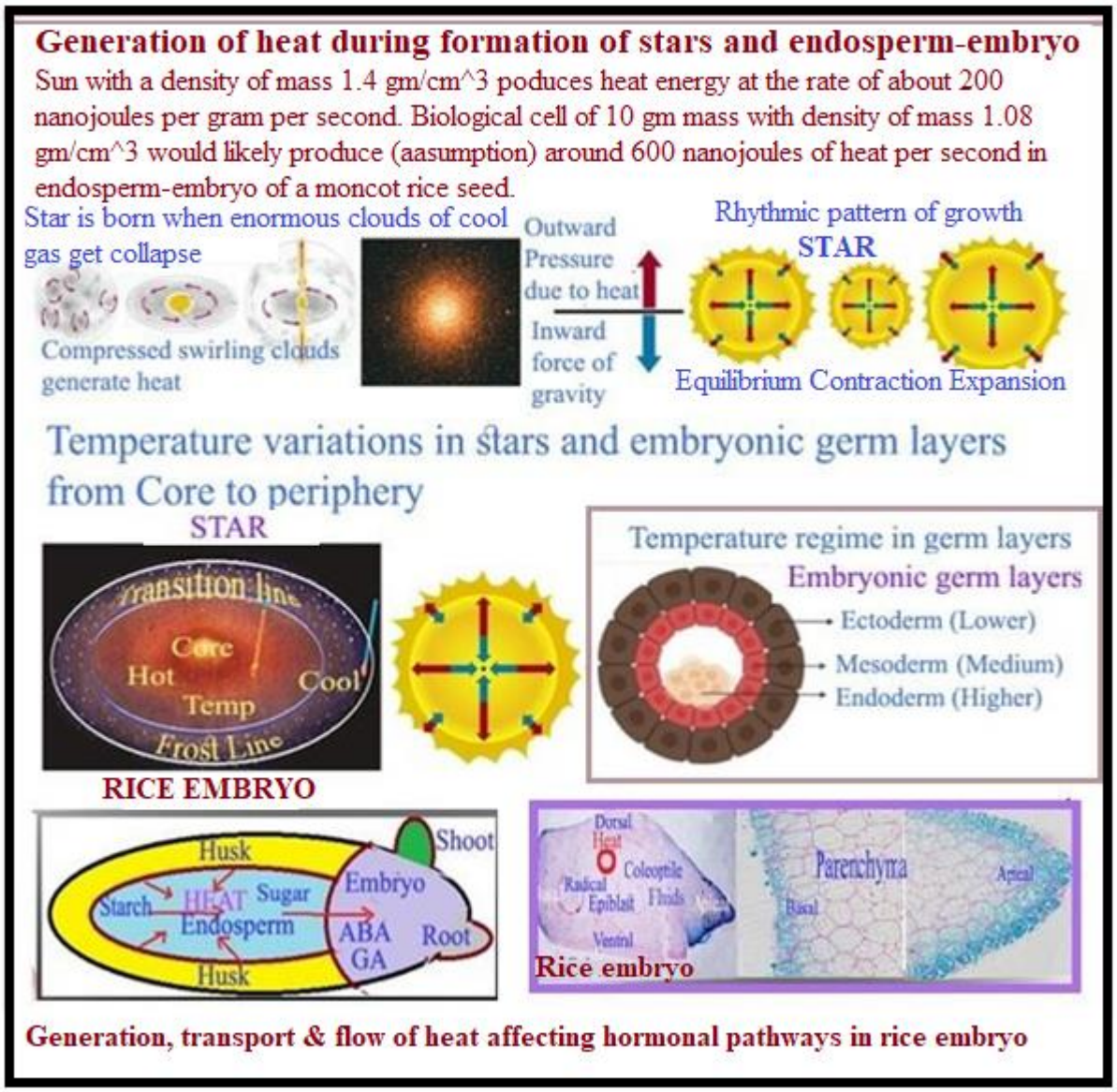
Episode No. 2. Graphical Abstract No. 5. Ultracentrifugation plus sedimentation is the 'dogma for the separation of bio-particles in the biological laboratory. The science behind centrifugation is to unwind through the reverse process of the centrifugation i.e., centripetal or central attraction of gravitation.



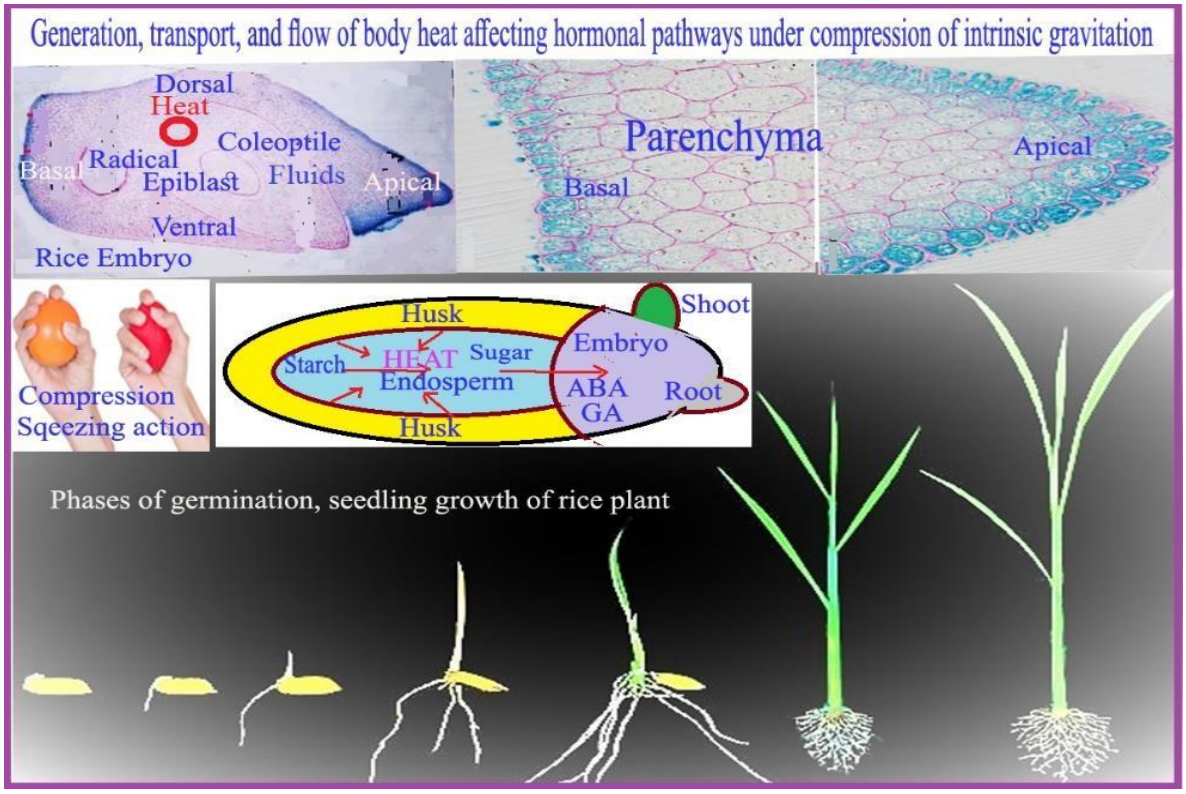
Episode No. 2. Graphical Abstract No. 6.: Intrinsic gravitation is the common facilitator for generating temperature in stars and in biological cells due to the great continuum of mass in the universe. Cells are like planets within the planet. The core of the star is of higher temperature. Away from the core temperature gets lower. Similarly, studies elsewhere showed that the temperature of the nucleus is 35^0C whereas the temperature of the cytoplasm is 33.1^0C. Centrosome (sub-planet within planet) temperature is warmer by 0.75^0C than the cytoplasm. Mitochondria away from the core due to nutrient providing behave as an independent organ like a planet within a planet. Temperature goes high up to 50^0C [2, 3.]

Intrinsic and Extrinsic Gravitation and Rice Plants

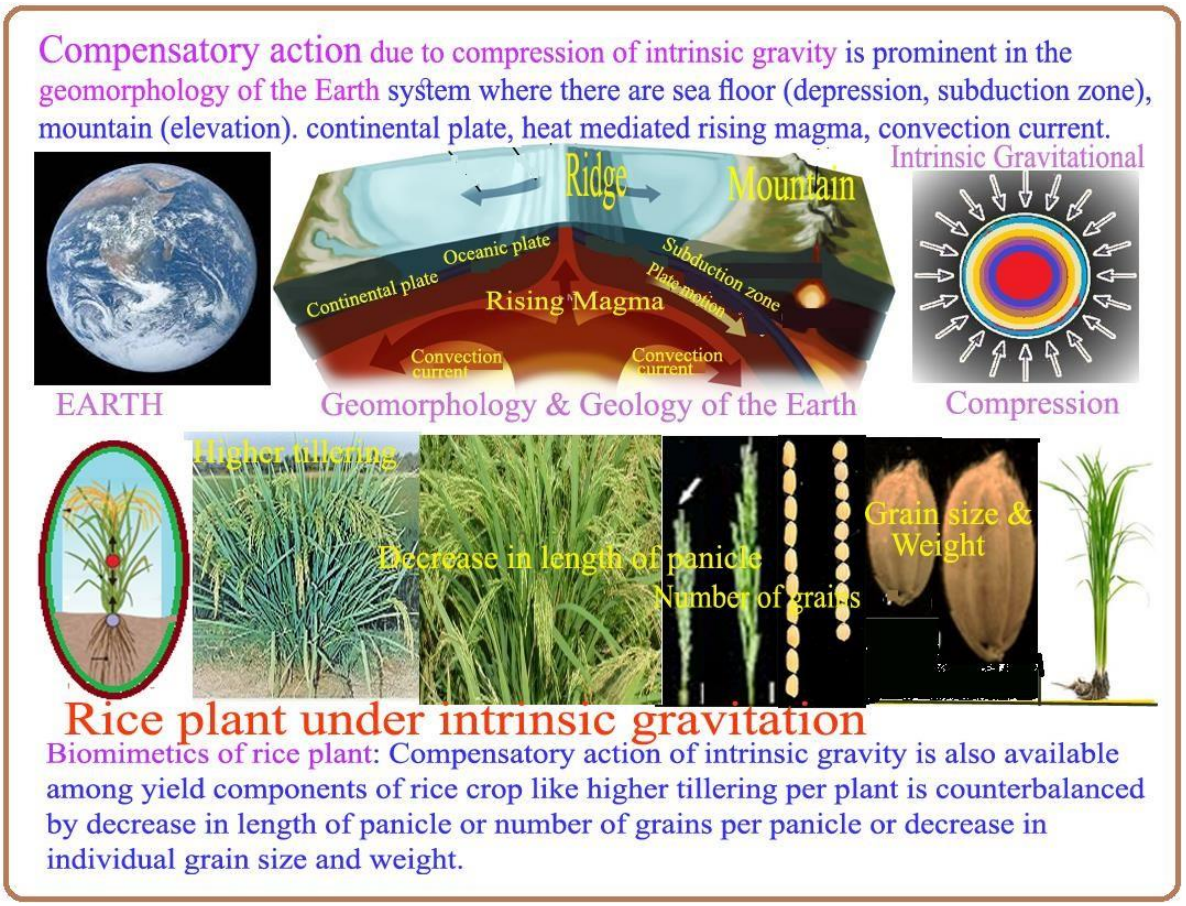
The plant grows on the soil of the earth. The intrinsic gravity of the plants is therefore required to interact with the earth's extrinsic gravity. So growing plants means an interaction of biological cells with Earth.



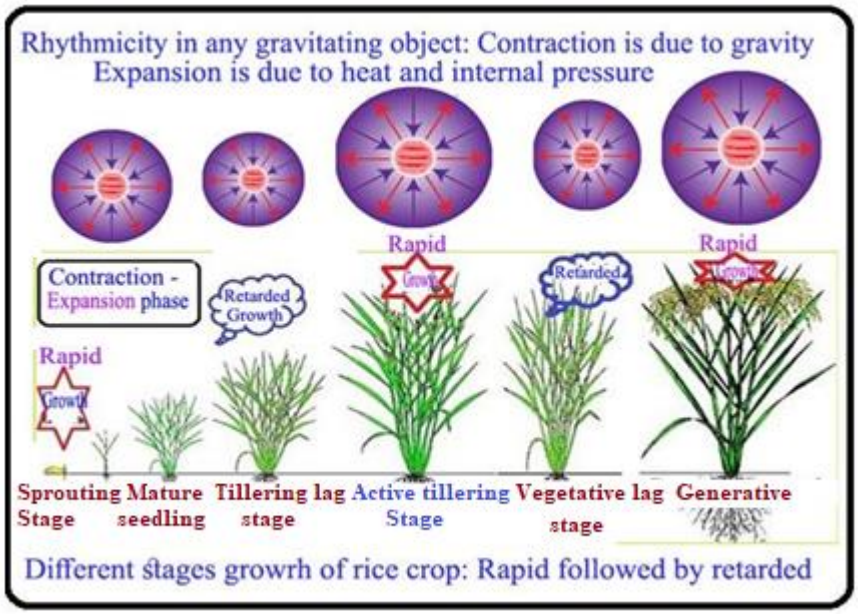
Episode No. 3. Graphical abstract No. 7. Generation of heat during formation of stars and embryos in animals and monocot rice seed.



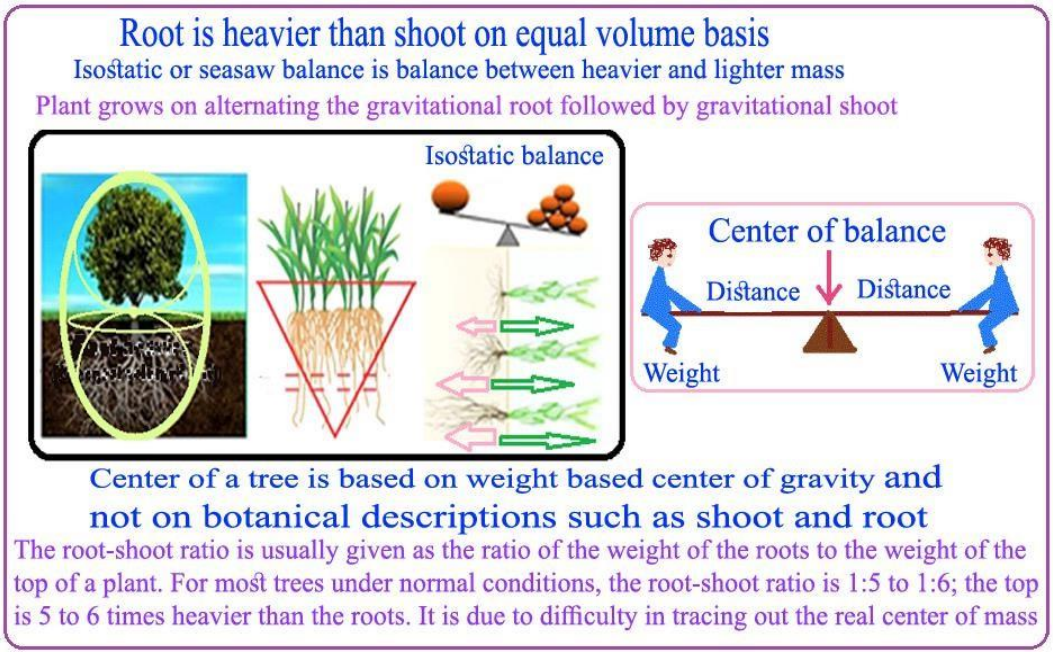
Episode No. 3. Graphical abstract No. 8. Generation, transport, and flow of body heat affecting hormonal pathways under compression of intrinsic gravitation.



Episode No. 3. Graphical abstract No. 9. Earth, a gravitating body is not round. Compensatory action due to compression of intrinsic gravity is prominent in the geomorphology of the Earth system where there is seafloor (depression, subduction zone), mountain (elevation), continental plate, heat-mediated rising magma, convection current, and so on. In describing biomimetics of the rice plant, similarly, compensatory action of intrinsic gravity is also available among yield components of rice crop like higher tillering per plant is counterbalanced by decrease in length of panicle or number of grains per panicle or decrease in individual grain size and weight.

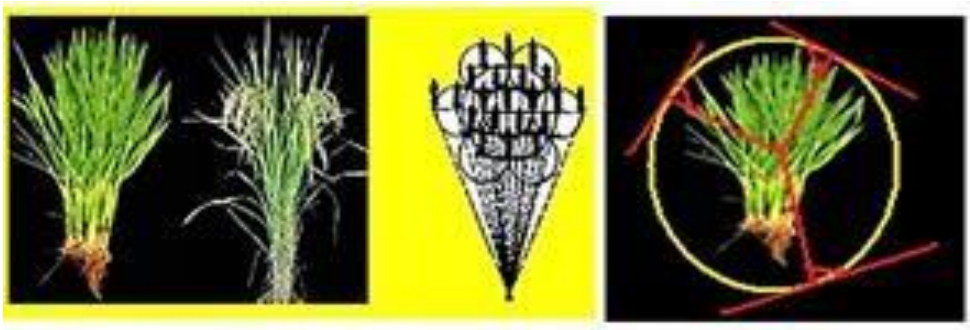


Episode No. 3. Graphical abstract No. 10. There is always a rhythmicity in any intrinsic gravitation body in the universe. Contraction is due to gravity and expansion is due to heat and internal pressure. Rapid followed by retarded growth is thus available at different stages of rice crops. Rhythmic pattern of illumination is available in star, an intrinsic gravitating stellar body.



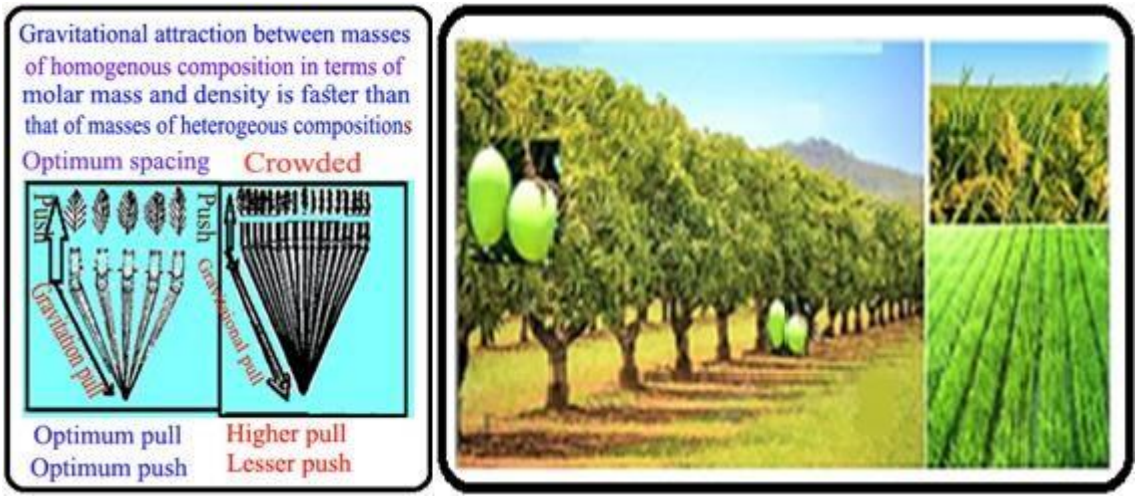
Episode No. 3. Graphical abstract No. 11. The root-shoot ratio is usually given as the ratio of the weight of the roots to the weight of the top of a plant. For most trees under normal conditions, the root-shoot ratio is 1:5 to 1:6; the

top is said to be 5 to 6 times heavier than the roots. It is due to difficulty in tracing out the real center of mass. The center of a tree is based on a weight-based center of gravity and not on botanical descriptions such as shoot and root.



Episode No. 3. Graphical abstract No. 12. Individual rice plants in a bunch develop in an orchestrated manner with the middle one taller. The neighboring plants attract each other as if they are situated within the sphere of an individual's gravity barrier. The angle between the tangent and radius from the common center of intrinsic gravity remains equal due to the action of intrinsic gravity. It is generally argued that surface tension is responsible for forming a spherical water bubble, as a sphere tends to occupy the minimum surface area. It however failed to satisfy me on witnessing many observed facts from nature. For example, traditionally rice farmers put two to three rice seedlings in a bunch while transplanting in the main field, keeping 15-25 cm isolation between bunches. After the end of the vegetative phase or at the end of the reproductive phase, one can notice that the canopy of three seedlings coalesces and forms a single top-round canopy. Why does the middle one get taller than the neighboring two on synchronization? All rice plants are of the same age and same genetic constitution. Nutrient availability is also the same for all plants since they are in the same spatial zone of the soil. Bending of plants towards the source of light under indoor conditions or the effective spectral region triggering phototropism in between 350-500 nm i.e., the blue region of the spectrum is also not found to be beyond the threshold limit under such open field conditions. After studying various biological phenomena meticulously, it is therefore felt that without the presence of an invisible force, such spherical geometry is beyond any possibility. How do unconnected seedlings develop in an orchestrated manner with a common understanding that the middle one will be finally taller than the plants positioned on its side? It cannot be due to surface tension, as these plants are not interconnected physically. Let us think that the two neighboring plants attract each other as if they are situated within the sphere of an individual's gravitational field or within a gravity barrier. The position of centers of such individual self-gravitating entities goes on changing with a consecutive accumulation of mass.

Roots are denser than shoots on an equal volume basis. A rice plant in the vegetative phase was photographed. The angle between the tangent and radius from the common Centre of self- gravity remains equal due to the action of self-gravity. The vacant space towards the root would be filled up during the next phase of growth out of isostatic balance. Of course, there may be some variations due to the local perturbing effect. Thus, it is clear that self- gravitational attraction pulls down the canopy of the neighboring plants to a single spherical entity with a taller plant in the middle. This cannot be due to surface tension.



Episode No. 3. Graphical abstract No. 13. Homogenous accretion is a phenomenon often used in astrophysics where elements having similar composition, molar mass, and density, the mutual gravitational attraction becomes at a faster rate. Heterogenous accretion means different composition and the mutual attraction gets slower. A mango tree of one ton, for instance, requires 6-meter inter-plant spacing whereas an annual plant of 500 grams like rice requires 15-20 centimeter spacing for optimum growth and productivity. Plant spacing thus seems linked with intrinsic and extrinsic gravitational forces with larger spacing for plants having higher mass and lesser spacing for plants of smaller mass. The interspecific allometric relationship between stand mass and plant population density is an important topic to an agriculturist. We wish to add plant spacing and the law of gravitation which would be an unfamiliar combination for agriculturists. Here we wish to project a common but so far unnoticed phenomenon on the existence of action of self (intrinsic) and its interaction with extrinsic (earth's) gravity on living organisms.

Conclusion

The first author is pursuing the topic for last 36 years from 1988 and finally came out with the conclusion that self-gravity or intrinsic gravity is the major investigation gap in life science[5,6]. Astrophysical and geoscience principles of intrinsic gravitation on various biological phenomena from cellular to organism levels are reported elsewhere. It is expected to be successful in defining various intricate issues on yet to be resolved in plant physiological processes, if viewed in proper perspective. As the subjects are alien to plant sciences, the intelligent reader should apply their ingenious mind while understanding the concept.

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