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I, Shri Dr. S. P. Jagadale hereby declared that the particulars given above are true to the best of my knowledge and belief.

Sign /-
(Dr. S.P. Jagadale, Principal)
(The editor and publisher may not agree with the views expressed in articles.)

Nobel laureate Barbara McClintock

Barbara McClintock (June 16, 1902 – September 2, 1992) was an American scientist and cytogeneticist who was awarded the 1983 Nobel Prize in Physiology or Medicine. McClintock received her PhD in botany from Cornell University in 1927. There she started her career as the leader of the development of maize cytogenetics, the focus of her research for the rest of her life. From the late 1920s, McClintock studied chromosomes and how they change during reproduction in maize. She developed the technique for visualizing maize chromosomes and used microscopic analysis to demonstrate many fundamental genetic ideas. One of those ideas was the notion of genetic recombination by crossing-over during meiosis—a mechanism by which chromosomes exchange information. She produced the first genetic map for maize, linking regions of the chromosome to physical traits. She demonstrated the role of the telomere and centromere, regions of the chromosome that are important in the conservation of genetic information. She was recognized as among the best in the field, awarded prestigious fellowships, and elected a member of the National Academy of Sciences in 1944.

During the 1940s and 1950s, McClintock discovered transposition and used it to demonstrate that genes are responsible for turning physical characteristics on and off. She developed theories to explain the suppression and expression of genetic information from one generation of maize plants to the next. Due to skepticism of her research and its implications, she stopped publishing her data in 1953.

Later, she made an extensive study of the cytogenetics and ethnobotany of maize races from South America.

McClintock's research became well understood in the 1960s and 1970s, as other scientists confirmed the mechanisms of genetic change and protein expression that she had demonstrated in her maize research in the 1940s and 1950s. Awards and recognition for her contributions to the field followed, including the Nobel Prize in Physiology or Medicine, awarded to her in 1983 for the discovery of genetic transposition; as of 2022, she remains the only woman who has received an unshared Nobel Prize in that category.

McClintock began her studies at Cornell's College of Agriculture in 1919. There, she participated in student government and was invited to join a sorority, though she soon realized that she preferred not to join formal organizations. Instead, McClintock took up music, specifically jazz. She studied botany, receiving a BSc in 1923. Her interest in genetics began when she took her first course in that field in 1921. The course was based on a similar one offered at Harvard University, and was taught by C. B. Hutchison, a plant breeder and geneticist.

Hutchison was impressed by McClintock's interest, and telephoned to invite her to participate in the graduate genetics course at Cornell in 1922. McClintock pointed to Hutchison's invitation as a catalyst for her interest in genetics: "Obviously, this telephone call cast the die for my future. I remained with genetics thereafter." Although it has been reported that women could not major in genetics at Cornell, and therefore her MS and PhD—earned in 1925 and 1927, respectively—were officially awarded in botany, recent research has revealed that women were permitted to earn graduate degrees in Cornell's Plant Breeding Department during the time that McClintock was a student at Cornell.

During her graduate studies and postgraduate appointment as a botany instructor, McClintock was instrumental in assembling a group that studied the new field of cytogenetics in maize. This group brought together plant breeders and cytologists, and included Marcus Rhoades, future Nobel laureate George Beadle, and Harriet Creighton. Rollins A. Emerson, head of the Plant Breeding Department, supported these efforts, although he was not a cytologist himself.

She also worked as a research assistant for Lowell Fitz Randolph and then for Lester W. Sharp, both Cornell botanists.

McClintock's cytogenetic research focused on developing ways to visualize and characterize maize chromosomes. This particular part of her work influenced a generation of students, as it was included in most textbooks. She also developed a technique using carmine staining to visualize maize chromosomes, and showed for the first time the morphology of the 10 maize chromosomes. This discovery was made because she observed cells from the microspore as opposed to the root tip. By studying the morphology of the chromosomes, McClintock was able to link specific chromosome groups of traits that were inherited together. Marcus Rhoades noted that McClintock's 1929 Genetics paper on the characterization of triploid maize chromosomes triggered scientific interest in maize cytogenetics, and attributed to her 10 of the 17 significant advances in the field that were made by Cornell scientists between 1929 and 1935.

In 1930, McClintock was the first person to describe the cross-shaped interaction of homologous chromosomes during meiosis. The following year, McClintock and Creighton proved the link between chromosomal crossover during meiosis and the recombination of genetic traits. They observed how the recombination of chromosomes seen under a microscope correlated with new traits. Until this point, it had only been hypothesized that genetic recombination could occur during meiosis, although it had not been shown genetically. McClintock published the first genetic map for maize in 1931, showing the order of three genes on maize chromosome 9. This information provided necessary data for the crossing-over study she published with Creighton; they also showed that crossing-over occurs in sister chromatids as well as homologous chromosomes. In 1938, she produced a cytogenetic analysis of the centromere, describing the organization and function of the centromere, as well as the fact that it can divide.

McClintock's breakthrough publications, and support from her colleagues, led to her being awarded several postdoctoral fellowships from the National Research Council. This funding allowed her to continue to study genetics at Cornell, the University of Missouri, and the California Institute of Technology, where she worked with E. G. Anderson. During the summers of 1931 and 1932, she worked at the

University of Missouri with geneticist Lewis Stadler, who introduced her to the use of X-rays as a mutagen. Exposure to X-rays can increase the rate of mutation above the natural background level, making it a powerful research tool for genetics. Through her work with X-ray-mutagenized maize, she identified ring chromosomes, which form when the ends of a single chromosome fuse together after radiation damage. From this evidence, McClintock hypothesized that there must be a structure on the chromosome tip that would normally ensure stability. She showed that the loss of ring-chromosomes at meiosis caused variegation in maize foliage in generations subsequent to irradiation resulting from chromosomal deletion. During this period, she demonstrated the presence of the nucleolus organizer region on a region on maize chromosome 6, which is required for the assembly of the nucleolus. In 1933, she established that cells can be damaged when nonhomologous recombination occurs. During this same period, McClintock hypothesized that the tips of chromosomes are protected by telomeres.

McClintock received a fellowship from the Guggenheim Foundation that made possible six months of training in Germany during 1933 and 1934. She had planned to work with Curt Stern, who had demonstrated crossing-over in Drosophila just weeks after McClintock and Creighton had done so; however, Stern immigrated to the United States. Instead, she worked with geneticist Richard B. Goldschmidt, who was a director of the Kaiser Wilhelm Institute for Biology in Berlin. She left Germany early amidst mounting political tension in Europe, and returned to Cornell, remaining there until 1936, when she accepted an Assistant Professorship offered to her by Lewis Stadler in the Department of Botany at the University of Missouri in Columbia. While still at Cornell, she was supported by a two-year Rockefeller Foundation grant obtained for her through Emerson's efforts.

Most notably, she received the Nobel Prize for Physiology or Medicine in 1983, the first woman to win that prize unshared, and the first American woman to win any unshared Nobel Prize. It was given to her by the Nobel Foundation for discovering "mobile genetic elements";this was more than 30 years after she initially described the phenomenon of controlling elements. She was compared to Gregor Mendel in terms of her scientific career by the Swedish Academy of Sciences when she was awarded the Prize.

Book-
Nobel Vidyanvati (Marathi)
-Chitra Nitsure

Article by
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New kind of blue found in cabbage could replace synthetic food dye

Ice cream made using the new blue pigment

A long search for a natural alternative to artificial blue food colouring may have come to an end, with scientists discovering a blue pigment in cabbage that can do the job.

Blue pigments are rarely found in natural resources like plants and rocks, meaning that most blue products – including sweets, drinks, drug tablets, cosmetics and clothing – have to be made using synthetic blue dyes.

These synthetic dyes are typically made from petrochemicals, leading to concerns about their environmental impact and safety as food additives.

Scientists have spent decades searching for natural alternatives. Now, Pamela Denish at the University of California, Davis, and her colleagues have found a pigment in red cabbage similar to the artificial food colouring Brilliant Blue FCF or E133.

This natural blue pigment – a type of anthocyanin molecule – is only present in small amounts in red cabbage.

However, the researchers found they could make larger quantities by treating the dominant red-coloured anthocyanins present in red cabbage with a specially designed enzyme that turned them blue.

The team used the new blue pigment to make blue ice cream, doughnut icing and sugar-coated lentils. These products maintained their blue colour while being stored for 30 days in ambient conditions.

Safety testing must be performed before the natural blue dye can be used in foods, but Kumi Yoshida at Nagoya University in Japan, one of the study authors, says it is unlikely to have adverse health effects. “Red cabbage anthocyanins have a long, long history in our diets,” she says.

The reason why the colour blue is so uncommon in nature is because complex molecular structures are required to absorb the right wavelengths of light to give a blue appearance, says Rebecca Robbins at the Mars Wrigley Global Innovation Canter in the US, who was also involved in the study. “It takes quite a [few] specific molecular features,” she says.

Journal reference: Science Advances, DOI: 10.1126/ sciadv. abe7871

Article by
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Is Ratio Analysis Best Tools Of Management Accounting?

What Is Ratio Analysis?

Ratio analysis is a quantitative technique of gaining imminent into a company's liquidity, profitability, and operational efficiency by studying its financial statements such as the balance sheet and income statement. Ratio analysis is a foundation of fundamental equity analysis.
It is powerful tool to measure short and long-term solvency of a company. It is a tool to measure profitability and managerial efficiency of a company. It is an important

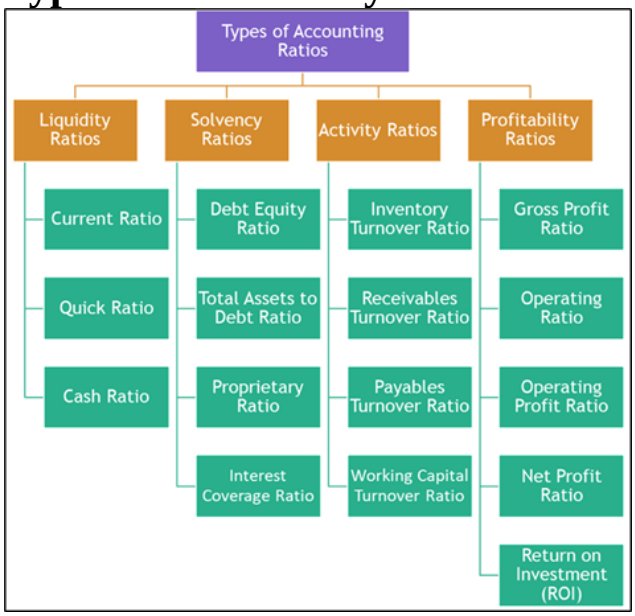
tool to measure operating activities of a business. It helps in analyzing the capital structure of a company.

What Does Ratio Analysis?

Investors and analysts utilize ratio analysis to evaluate the financial health of companies by scrutinizing past and current financial statements. Comparative data can reveal how a company is performing over time and can be used to estimate likely future performance. This data can also compare a company's economic standing with industry averages while measuring how a company masses up against others within the same sector. Investors can use ratio analysis easily, and every numeral needed to calculate the ratios is found on a company's financial statements. Ratios are assessment points for companies. They evaluate stocks within an industry. Likewise, they measure a company today against its past numbers. In most cases, it is also significant to understand the variables powerful ratios as management has the flexibility to, at times, alter its plan to make its stock and company ratios more smart.

Generally, ratios are typically not used in isolation but rather in combination with other ratios.

Types of Ratio Analysis



(https://www.examrace.com/Study-Material/Commerce/Accounting-and-Audit/Types-of-Ratios-YouTube-Lecture-Handouts.html)

The various kinds of financial ratios available may be broadly grouped into the following six types, based on the sets of data they provide:

1. Liquidity Ratios:

Liquidity ratio measure a company's ability to pay off its short-term debts as they become due, using the company's current or quick assets. Liquidity ratios include the current ratio, quick ratio, and working capital ratio.

2. Solvency Ratios:

It is also called as financial leverage ratios, solvency ratio compare a company's debt levels with its assets, equity, and earnings, to evaluate the likelihood of a company staying afloat over the long haul, by paying off its long-term debt as well as the interest on its debt. Examples of solvency ratios include: debt-equity ratios, debt-assets ratios, and interest coverage ratios.

3. Profitability Ratios:

These ratios convey how well a company can generate profits from its operations. Profit margin, return on assets, return on equity, return on capital employed, and gross margin ratios are all examples of profitability ratios.

4. Efficiency Ratios:

Also called activity ratios, efficiency ratio evaluate how efficiently a company uses its assets and liabilities to generate sales and maximize profits. Key efficiency ratios include: turnover ratio, inventory turnover, and days' sales in inventory.

5. Coverage Ratios:

Coverage ratios measure a company's ability to make the interest payments and other obligations associated with its debts. Examples include the time interest earned ratio and the debt service coverage ratio.

6. Market Prospect Ratios:

These are the most commonly used ratios in fundamental analysis. They include dividend yield, P/E ratio, earning per share (EPS), and dividend payout ratio. Investors use these metrics to predict earnings and future performance.

Why Is Ratio Analysis Important?

Ratio analysis is important because it may represent a more correct representation of the status of operations for a company. Consider a company that made $1 billion of revenue last quarter. Though this seem perfect, the company strength have had a unconstructive gross profit margin, a decrease in liquidity ratio metrics, and lower pay envelope compared to equity than in preceding periods. Stagnant numbers on their own may not fully explain how a company is performing.

References:

- https://www.investopedia.com/terms/r/ratioanalysis.asp
- https://www.investopedia.com/terms/l/liquidityratios.asp.
- https://www.investopedia.com/terms/e/efficiencyratio.asp
- https://www.tutorialspoint.com/accounting_basics/management_accounting_ratio_analysis.htm#:~:text=Advantages%20of%20Ratio%20Analysis,capital%20structure%20of%20a%20company.

Article by
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HOD, Department of Commerce

Cloud Computing

What is cloud computing?

Cloud computing is the on-demand delivery of IT resources over the Internet with pay-as-you-go pricing. Instead of buying, owning, and maintaining physical data canters and servers, you can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider like Amazon Web Services (AWS).

Who is using cloud computing?

Organizations of every type, size, and industry are using the cloud for a wide variety of use cases, such as data backup, disaster recovery, email, virtual desktops, software development and testing, big data analytics, and customer-facing web applications. For example, healthcare companies are using the cloud to develop more personalized treatments for patients. Financial services companies are using the cloud to power real-time fraud detection and prevention. And video game makers are using the cloud to deliver online games to millions of players around the world.

Benefits of cloud computing

Agility -

The cloud gives you easy access to a broad range of technologies so that you can innovate faster and build nearly anything that you can imagine. You can quickly spin up resources as you need them–from infrastructure services, such as compute, storage, and databases, to Internet of Things, machine learning, data lakes and analytics, and much more.

You can deploy technology services in a matter of minutes, and get from idea to implementation several orders of faster than before. This gives you the freedom to experiment, test new ideas to differentiate customer experiences, and transform your business.

Elasticity-

With cloud computing, you don't have to over-provision resources up front to handle peak levels of business activity in the future. Instead, you provision the amount of resources that you actually need. You can scale these resources up or down to instantly grow and shrink capacity as your business needs change.

Cost savings -

The cloud allows you to trade fixed expenses (such as data canters and physical servers) for variable expenses, and only pay for IT as you consume it. Plus, the variable expenses are much lower than what you would pay to do it yourself because of the economies of scale.

Deploy globally in minutes -

With the cloud, you can expand to new geographic regions and deploy globally in minutes. For example, AWS has infrastructure all over the world, so you can deploy your application in multiple physical locations with just a few clicks. Putting applications in closer proximity to end users reduces latency and improves their experience.

Types of cloud computing -

The three main types of cloud computing include Infrastructure as a Service, Platform as a Service, and Software as a Service.

Each type of cloud computing provides different levels of control, flexibility, and management so that you can select the right set of services for your needs.

Infrastructure as a Service (IaaS)

IaaS contains the basic building blocks for cloud IT. It typically provides access to networking features, computers (virtual or on dedicated hardware), and data storage space. IaaS gives you the highest level of flexibility and management control over your IT resources. It is most similar to the existing IT resources with which many IT departments and developers are familiar.

Platform as a Service (PaaS)

PaaS removes the need for you to manage underlying infrastructure (usually hardware and operating systems), and allows you to focus on the deployment and management of your applications. This helps you be more efficient as you don't need to worry about resource procurement, capacity planning, software maintenance, patching, or any of the other undifferentiated heavy lifting involved in running your application.

Software as a Service (SaaS)

SaaS provides you with a complete product that is run and managed by the service provider. In most cases, people referring to SaaS are referring to end-user applications (such as web-based email). With a SaaS offering, you don't have to think about how the service is maintained or how the underlying infrastructure is managed. You only need to think about how you will use that particular software.

Cloud services

AWS has more services, and more features within those services, than any other cloud provider, including compute, storage, databases, networking, data lakes and analytics, machine learning and artificial intelligence, IoT, security, and much more.

Cloud solutions

AWS provides a comprehensive portfolio of solutions that help you solve common problems and build faster using the AWS platform. Every AWS Solution comes with detailed architecture, a deployment guide, and instructions for both automated and manual deployment.

Reference:-

What is Cloud Computing (amazon.com)

Article by -
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Carbon Capture Technology

Net-zero means that all greenhouse gas emissions from a region, city, county, business or building are balanced by an equal reduction. This is not the same as carbon negative, which implies that more carbon is eliminated than is emitted, or zero-carbon, which indicates that no carbon or other greenhouse gases are generated. Net-zero refers to situations where greenhouse gas emissions are still occurring but are being balanced off by other actions. The most recent carbon capture and storage technology developments involve new ionic liquids that are excellent at absorbing CO_2.The molecular structure of two-dimensional 'ionic' liquids enables greater rates of CO_2 absorption.

Liquids used for editing are thought to be more ecologically friendly and provide more exact control in the chemical engineering processes. Carbon capture and storage produce additional gasoline. Technically, CO_2 can be changed into fuel. There are other ways to do this, but they are challenging in terms of cost and effort. Carbon capture also boosts production processes. Chemicals and plastics such as polyurethanes, which generate soft foams like those found in mattresses, can be produced using CO_2. Many analysts believe carbon capture is the only method for reducing global warming emissions in "hard-to-abate" industries such as steel or cement production. Carbon capture should be seen as a temporary solution and given careful examination to achieve net-zero targets.

References

https://www.azocleantech.com/article.aspx?ArticleID=1620

Article By
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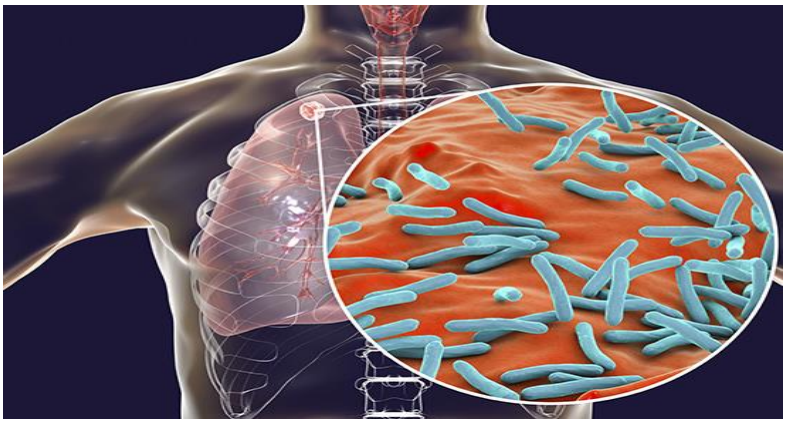
Mycobacterium Tuberculosis



Introduction

Tuberculosis (TB), one of the oldest recorded human afflictions, is still one of the biggest killers among the infectious diseases, despite the worldwide use of a live attenuated vaccine and several antibiotics. New vaccines and drugs are needed to stem the worldwide epidemic of TB that kills two million people each year. To rationally develop new antitubercular agents, it is essential to study the genetics and physiology of M. tuberculosis and related mycobacteria. It is equally important to understand the M. tuberculosis-host interaction to learn how these bacteria circumvent host defenses and cause disease. The approaches described in this review identify M. tuberculosis genes that are or are potentially involved in virulence. In the future, some of these genes and the proteins they encode, as well as newly discovered ones, should provide new bacterial targets that can be used for creating vaccines and drugs as well as more selective diagnostic reagents. To help the reader better understand the context for these approaches, a summary of various aspects of TB is presented initially, including a history of the disease, its clinical manifestations, as well as host and bacterial responses during infection.

History of Tuberculosis

TB can present in various forms, including one that attacks bone and causes skeletal deformities. Hard tissues like bone can be preserved for thousands of years, allowing the almost certain identification of individuals with bone TB who died more than 4,000 years ago. The frequency of unearthed skeletons with apparent tubercular deformities in ancient Egypt suggests that the disease was common among that population. The discovery of similarly deformed bones in various Neolithic sites in Italy, Denmark, and countries in the Middle East also indicates that TB was found throughout the world up to 4,000 years ago. The origin of M. tuberculosis, the causative agent of TB, has been the subject of much recent investigation, and it is thought that the bacteria in the genus Mycobacterium, like other actimomycetes, were initially found in soil and that some species evolved to live in mammals. The domestication of cattle, thought to have occurred between 10,000 and 25,000 years ago, would have allowed the passage of a mycobacterial pathogen from domesticated livestock to humans, and in this adaptation to a new host, the bacterium would have evolved to the closely related *M. tuberculosis*. Specifically, it has been hypothesized that *M. bovis*, which causes a TB-like disease in cattle, was the hypothetical evolutionary precursor of M. tuberculosis .This hypothesis is now considered doubtful in the light of new data, since it was formulated before the genomes in the M. tuberculosis complex, including the human and animal pathogens *M. africanum, M. microti, and M. canetti,* as well as *M. tuberculosis* and *M. bovis*, were characterized by DNA TB, as described in the next section, can present in various forms, including one that attacks bone and causes skeletal deformities.

Hard tissues like bone can be preserved for thousands of years, allowing the almost certain identification of individuals with bone TB who died more than 4,000 years ago. The frequency of unearthed skeletons with apparent tubercular deformities in ancient Egypt suggests that the disease was common among that population. The discovery of similarly deformed bones in various Neolithic sites in Italy, Denmark, and countries in the Middle East also indicates that TB was found throughout the world up to 4,000 years ago.

Symptoms

Although your body can harbor the bacteria that cause tuberculosis, your immune system usually can prevent you from becoming sick. For this reason, doctors make a distinction between:

1. Latent TB. You have a TB infection, but the bacteria in your body are inactive and cause no symptoms. Latent TB, also called inactive TB or TB infection, isn't contagious. Latent TB can turn into active TB, so treatment is important.
2. Active TB. Also called TB disease, this condition makes you sick and, in most cases, can spread to others. It can occur weeks or years after infection with the TB bacteria.

Signs and symptoms of active TB include:

- Coughing for three or more weeks
- Coughing up blood or mucus
- Chest pain, or pain with breathing or coughing
- Unintentional weight loss
- Fatigue
- Fever
- Night sweats
- Chills
- Loss of Appetite

Tuberculosis Treatment

Your treatment will depend on your infection.

1. If you have latent TB, your doctor will give you medication to kill the bacteria so the infection doesn't become active. You might get isoniazid, rifapentine, or rifampin, either alone or combined. You'll have to take the drugs for up to 9 months. If you see any signs of active TB, call your doctor right away.
2. A combination of medicines also treats active TB. The most common are ethambutol, isoniazid, pyrazinamide, and rifampin. You'll take them for 6 to 12 months.
3. If you have drug-resistant TB, your doctor might give you one or more different medicines. You may have to take them for much longer, up to 30 months, and they can cause more side effects.

Tuberculosis prevention

To help stop the spread of TB:

1. If you have a latent infection, take all of your medication so it doesn't become active and contagious.
2. If you have active TB, limit your contact with other people. Cover your mouth when you laugh, sneeze, or cough. Wear a surgical mask when you're around other people during the first weeks of treatment.
3. If you're traveling to a place where TB is common, avoid spending a lot of time in crowded places with sick people.

References

- https://www.webmd.com/lung/understanding-tuberculosis-basics.
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC164219/

Article by:
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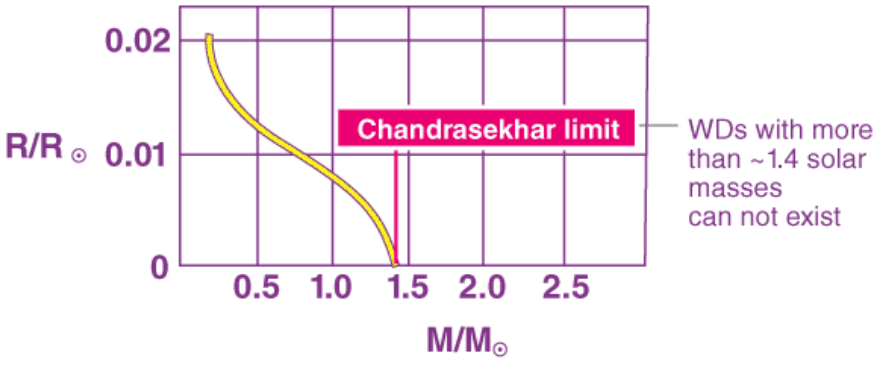
Chandrasekhar Limit



Did you know that stars die! When stars run out of hydrogen, the nuclear fusion reactions at their core stop and become unstable and collapse. It is important to note that not all stars collapse the same way. Massive stars explode into a supernova and then collapse into neutron stars, or black holes. We know this because of the work of astrophysicist Subrahmanyan Chandrasekhar. Chandrasekhar was an Indian-born scientist who spent 50 years at the University of Chicago. He is most famous for coming up with the theory that explains the death of the universe's most massive stars. Before Chandrasekhar, scientists assumed that all stars collapsed into white dwarfs when they died. Chandrasekhar limit is the famous prediction done by Subrahmanyan Chandrasekhar.

What is Chandrasekhar Limit?

The utmost mass that a white dwarf star that's stable can have is known as the Chandrasekhar limit. E.C. Stoner and Wilhelm Anderson pointed it out in their papers and termed it after Subrahmanyan Chandrasekhar, an Indian astrophysicist who made major independent discoveries on improving the preciseness of computation.

The scientific community ignored the limit at the start as it would legitimize the existence of black holes (technically unrealistic at this turn-off time). Due to the pressure of electron degeneration, the white dwarf stars oppose its gravitational collapse.

Chandrasekhar limit is established at a point when the mass at which the pressure from the degeneration of electrons is not able to balance the self-attraction of the gravitational field. The limit that has been established these days is 1.39 M⊙.

Explanation:

Pauli's exclusion principle gives rise to a phenomenon of quantum mechanics termed as **Electron degeneracy pressure**. Electrons cannot have the same state or the minimum-energy level. This is because they are **fermions**.

A spectrum of energy levels exists, and electrons should be distributed throughout them. When the electron gas is compressed, the amount of electrons in a specific volume increases, and so does the energy level of the band that has been occupied. Thus, to produce the electron degeneracy pressure, pressure must be applied for the compression of the electron gas as their energy increases when compressed. Electron capture occurs when that pressure is so great that the electron goes into the nuclei.

Application of Chandrasekhar Limit

- When the nuclei of lighter elements fuse into the nuclei of a heavier one, the resultant heat is what keeps the core of the star from collapsing. The core will become condensed and hotter when collapsed as the exhaustion of the nuclei will take place.
- As getting energy through fusion is impossible in the case of iron ions, a dangerous circumstance occurs when iron amasses in the core. If the star is less than 8 solar masses, it will sooner or later reach a mass level lower than the Chandrasekhar limit.
- Stars that have more mass will be converted into a black holes as the pressure due to the electron degeneration will keep them from collapsing until the density is extremely high. Neutrinos are released when through electrons capturing electrons are captured by the protons. The released neutrinos take away the energy that was created due to the decreasing potential energy (collapse of the core). The energy is around 1046 joules.

What is Chandrasekhar Unit?

Chandrasekhar unit explains the maximum mass of a white dwarf star which is equivalent to 1.44 solar masses. The star turns into a neutron star or a black hole when the limit exceeds.

Article by:
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Department of Physics

Shoebill Bird (Balaeniceps rex)

Kingdom : Animalia

Phylum : Chordata

Class : Aves

Order : Pelecaniformes

Family : Balaenicipitidae

Genus : Balaeniceps

Species : Rex

Information:

The shoebill may have been known to Ancient Egyptians, but was not classified until the 19th century, after skins and eventually live specimens were brought to Europe. John Gould very briefly described it in 1850 from the skin of a specimen collected on the upper White Nile by the English traveller Mansfield Parkyns. Gould provided a more detailed description in the following year. He placed the species in its own genus Balaeniceps and coined the binomial name Balaeniceps rex. The genus name comes from the Latin words balaena "whale", and caput "head", abbreviated to -ceps in compound words. Alternative common names are whalebill, shoe-billed stork and whale-headed stork. Shoebills are large, prehistoric-looking birds which haunt freshwater marshes and swamps in East Africa, thus fondly referred to by many as the “king of the marshes”.There is a single species of Shoebill, Balaeniceps rex, and although they are sometimes incorrectly referred to as a stork, they are more closely related to pelicans. The Shoebill can be found in freshwater swamps in Africa from South Sudan to Zambia.The shoebill is classified as Vulnerable, meaning the species is at high risk of becoming extinct. Estimates suggest there are only between 3,300 and 5,300 mature individuals left in the wild, and populations are on the decline. Their future is in jeopardy due to hunting, nesting disturbance, habitat loss, and drought caused by climate change. Shoebills are also threatened by illegal live bird trade, with high mortality during capture, transit, and captivity.

Reference:

https://www.birdlife.org/birds/shoebill/

Article by:
Mr. Sujit Temkar
Department of Zoology


मुंबई विद्यापीठ
UNIVERSITY WITH POTENTIAL FOR EXCELLENCE
Best College Award
Academic Year 2016-2017
Rural Area
is conferred upon
Dapoli Education Society's
Dapoli Urban Bank,
Senior Science College
Dapoli, Dist – Ratnagiri 415 712
in recognition of valuable academic achievements and participation of the college teachers in the university system through various mechanism of the University.
Mumbai, 26th January, 2018