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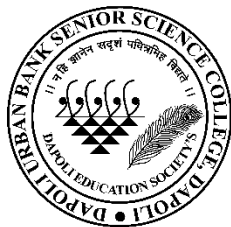
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Rafflesia Arnoldii : The World's Largest Flower



Rafflesia is a genus of flowering plant consisting of twenty-eight species. For example, *Rafflesia keithii*, *Rafflesia kerrii*, *Rafflesia arnoldii*, *Rafflesia hassetii*, *Rafflesia manillana* etc. The most remarkable species is *Rafflesia arnoldii* which is the world's largest single blooming flower. It has a diameter of three feet (0.914 metre) and can weigh between 15 to 24 pounds (6.8 to 10.8 kilograms).

Emblem:

Rafflesia arnoldii is one of the floral emblems of Indonesia. It represents the floral biodiversity and uniqueness. In Indonesian language it is called "Padma raksasa".

Nomenclature:

In 1818 the British governor of Bencoolen currently known as Sumatra was very interested in the diversity of plant life on the island. Sir Thomas Stamford Raffles and Dr. Joseph Arnold made many expeditions into the jungle and discovered this previously unknown plant. Hence it was named *Rafflesia arnoldii* (using the last name of the two explorers).

Scientific Classification:

Domain : Eukaryota
Kingdom : Plantae

Phylum : Anthophyta
Subphylum : Magnoliophyta
Class : Magnoliopsida
Order : *Rafflesiales*
Family : *Rafflesiaceae*
Genus : *Rafflesia*
Species : *Rafflesia arnoldii*

Appearance:

Rafflesia arnoldii is a leather/rubber textured, reddish brown flower freckled with white spots. It has five plump petals with a bowl like centre having an underneath disk. The styles (female parts) or anthers (male parts) are situated underneath the disk. The pistils and stamens are combined together in a central column. The strange thing about this parasitic plant is that it has no visible roots, stem, leaves or photosynthetic tissues i.e. it has no chlorophyll. It is a vascular, parasitic plant. It embeds strands of tissue into its host - Tetra stigma vine and derives its nutrition and water from the host plant.

Reproduction and Pollination:

When *Rafflesia* is in full bloom it emits a repulsive putrid odour of rotten meat. This odour is nature's method of attracting insects to pollinate the plant. Carrion flies are the most common pollinator of *Rafflesia arnoldii*. Pollination tends to be difficult

mainly for two reasons. Firstly, these flowers are unisexual i.e. either male or female. The pollinators need to visit both male and female flowers which are not always in close proximity to each other. Secondly, the flower stays in bloom for a very short period of time – five to seven days. Hence there is a very narrow window of opportunity for pollination. Most of the time this rare floral species remains unobserved inside the roots and woody stems of its host plant. During its reproductive stage a plump cabbage like maroon or magenta coloured bud (about 12 inch or 30-centimetre-wide) forms outside the stem or root of its host plant and takes about nine months to bloom from its seed to pod to flower. The fruits are smooth skinned round berries about 5 inch in diameter filled with smooth flesh and thousands of hard coated minute seeds. Birds and squirrels love to eat this fruit and hence help in the seed dispersal.

Ecotourism:

Many sites where *Rafflesia arnoldii* grows have become popular tourist destinations. As a result of this human disturbance the number of buds blooming per year has decreased to a great extent at many sites.

Threat and Conservation:

Rafflesia arnoldii is becoming an endangered species. One of the main reason is deforestation for commercial logging (both illegal and legal), for growing the plantation crops like rubber and oil palm, for constructing highways, dams etc. Another common reason is ethnobotanical collection (Ethnobotany is the scientific study of a region's plants and how local people use the native plants for medicinal, cultural, religious or other purpose). Efforts are being made to conserve this amazing species. Unfortunately, in spite of great efforts biologists have become unsuccessful in growing this flower by artificial methods.

Hence the only method to conserve this species is to preserve its natural habitat.

Uses:

Rafflesia arnoldii buds are used as an aphrodisiac in traditional medicine. The traditional healers, bomohs and sinsehs boil these buds in water for few minutes, strain and then give the decoction to the pregnant ladies. The decoction promotes smooth delivery and easy recovery during and after childbirth. It stops bleeding and helps in regaining energy and strength. However, since *Rafflesia* has a high concentration of phenols and tannins excessive use of the decoction proves harmful.

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Article by

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A gel made from urea has molecules that resemble friendship bracelets



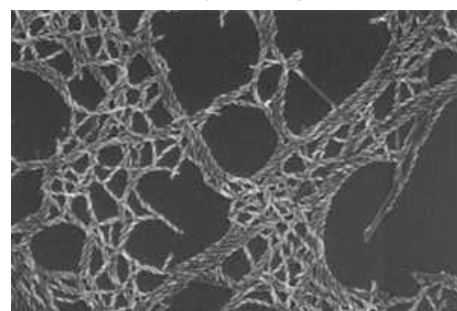
A gel can be made from urea

A gel made from the main compound in urine looks just like a friendship bracelet. It is formed of minuscule fibres that spontaneously form braids and could be used to engineer new medicines. Jonathan Steed at Durham University in the UK and his colleagues created the gel using urea. On a molecular level, the gel assembles itself into four-stranded braids, in two different configurations.

The simplest four-stranded braid is a quadruple helix – similar to the double helix of DNA, but with four strands winding in parallel. The other is in the form of two double helices weaving in and out of one another. “We’ve designed a toy molecule that we can watch forming these rather beautiful braids,” says Steed. Although their molecule was engineered, braids like this can appear naturally. For example, in mad cow disease, fibres of amyloid proteins form braids and clump together.

The team has used similar urea-based gels to produce pharmaceuticals with different properties. “We crystallise new drug molecules within them and sometimes find different crystal packing arrangements,” says Steed. The different resulting structures can alter the drug’s solubility and how much of it reaches a person’s bloodstream after it is taken. The

new molecule is stickier than gels the researchers have previously produced and may help to better control the properties of the molecules they design.



Braids made using urea

“You might imagine a situation where, for example, you can braid fibres in one way and you get something which is ketchup-like and you can braid them another way and you get something that’s like a rubber ball,” says Steed. “If you can produce different microstructures with the same molecule, then you can get materials with different properties.”

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Article by
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Comparative Study of Indirect Taxes before Introduction of Goods and Service Tax Act 2017 & Goods and Service Tax Act 2017

With effect from 1st July 2017, structure of the indirect tax is reformed with introduction of Goods & Service tax. All state & union territories accepted & passed their respective SGST ACT except J & K. On 8th July 2017, J& k also accepted GST Act 2017. Now GST Act 2017 is applicable to all state & union territories.

GST is trying to create common national market. GST has subsumed multiple indirect taxes like excise duty, VAT, Service tax, CST, Luxury tax, entertainment tax, entry tax etc. GST is value added tax levied on supply, manufacture or sale of goods & services. Scope of GST is very wide as compared to previous laws.

GST offers continuous chain of tax credit from Producers, service providers and distributors up to retailers point. It allows taking input credit on goods purchased and services received & set off against tax liability on outward supply of goods & services. Thus GST bears by the only final consumer & from pocket of distributor or producers. They are just middle man to collect taxes & pay to the govt. GST structure is designed in such way that even a single rupee is not born by producers or distributors. This will help to avoid the cascading effect of taxes i.e. tax on tax. In earlier system, there is cascading effect of taxes as VAT did not allow input credit on services & vice versa. The same can be understood better with the help of following example.

Particulars	Manufacture	Distributor	Retailer	Consumer
Cost		100000	111200	160291.2 (135840+24451.20)
Profit		11200	24640	
Sales(Cost+Profit)	100000	111200	135840	
Gst @ 18%	18000	20016	24451.20	
Input Tax Credit	NIL	ITC=18000	ITC=20016	NIL
Paid To Govt=Output Tax – Input Tax	GST = 18000	GST=2016	GST =4435.20	TAX BORNE BY CONSUMER =18000+2016+4435.20 =24451.20
Value Addition & Gst On That	=100000 =100000*18% =18000	11200 =11200*18% =2016	24640 =24640*18% =4435.20	NIL

Under the earlier indirect tax regime, despite of the introduction of the principal of taxation of value added tax in India, certain transaction were subject to double taxation & were taxed as both goods & services.

CENVAT did not include chain of value addition in distributive trade after the stage of production. Even though CENVAT & State level VAT were essentially value added taxes, set off of one against another credit was not allowed as CENVAT was central govt. levy & State level VAT was state govt. levy. This would create Cascading effect.

Under the earlier indirect tax regime, Business man has to face number of taxes at a time while doing business.

All these deficiencies in earlier system are removed in GST Structure & tries to make it simplified.

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*Article by
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Robotics

Robotics is an interdisciplinary sector of science and engineering dedicated to the design, construction and use of mechanical robots. Our guide will give you a concrete grasp of robotics, including different types of robots and how they're being applied across industries.

What Is Robotics?

Robotics is the intersection of science, engineering and technology that produces machines, called robots that replicate or substitute for human actions. Pop culture has always been fascinated with robots examples include R2-D2, the Terminator and WALL-E. These over-exaggerated, humanoid concepts of robots usually seem like a caricature of the real thing. But are they more forward thinking than we realize? Robots are gaining intellectual and mechanical capabilities that don't put the possibility of a R2-D2-like machine out of reach in the future.

What Is A Robot?

A robot is a programmable machine that can complete a task, while the term robotics describes the field of study focused on developing robots and automation. Each robot has a different level of autonomy. These levels range from human-controlled bots that carry out tasks to fully-autonomous bots that perform tasks without any external influences.

As technology progresses, so too does the scope of what is considered robotics. In 2005, 90 percent of all robots could be found assembling cars in automotive factories. These robots consist mainly of mechanical arms tasked with welding or screwing on certain parts of a car.

Today, we're seeing an evolved and expanded definition of robotics that includes the development, creation and use

of bots that accomplish tasks like exploring the planet's harshest conditions, assisting law enforcement, streamlining surgical procedures and undertaking rescue missions.

Robotics Defined

While the overall world of robotics is expanding, a robot has some consistent characteristics:

1. Robots consist of some sort of mechanical construction. The mechanical aspect of a robot helps it complete tasks in the environment for which it's designed. For example, the Mars 2020 Rover's wheels are individually motorized and made of titanium tubing that help it firmly grip the harsh terrain of the red planet.
2. Robots need electrical components that control and power the machinery. Essentially, an electric current a battery, for example is needed to power a large majority of robots.
3. Robots contain at least some level of computer programming. Without a set of code telling it what to do, a robot would just be another piece of simple machinery. Inserting a program into a robot gives it the ability to know when and how to carry out a task.

We're bound to see the promise of the robotics industry sooner, rather than later, as artificial intelligence and software also continue to progress. In the near future, thanks to advances in these technologies, robots will continue getting smarter, more flexible and more energy efficient. They'll also continue to be a main focal point in smart factories, where they'll take on more difficult challenges and help to secure global supply chains.

The robotics industry is filled with an admirable promise of progress that science fiction could once only dream about. From

the deepest depths of our oceans to thousands of miles in outer space, robots will be found performing tasks that humans couldn't dream of achieving alone.

Types of Robotics

Mechanical bots come in all shapes and sizes to efficiently carry out the task for which they are designed. All robots vary in design, functionality and degree of autonomy. From the 0.2 millimetre-long "RoboBee" to the 200 meter-long robotic shipping vessel "Vindskip," robots are emerging to carry out tasks that humans simply can't.

There are five distinct types of robots that perform tasks depending on their capabilities. Below is an outline of these types and what they do.

Pre-Programmed Robots

Pre-programmed robots operate in a controlled environment where they do simple, monotonous tasks. An example of a pre-programmed robot would be a mechanical arm on an automotive assembly line. The arm serves one function to weld a door on, to insert a certain part into the engine, etc. and its job is to perform that task longer, faster and more efficiently than a human.

Humanoid Robots

Humanoid robots are robots that look like or mimic human behaviour. These robots usually perform human-like activities (like running, jumping and carrying objects), and are sometimes designed to look like us, even having human faces and expressions. Two of the most prominent examples of humanoid robots are Hanson Robotics' Sophia and Boston Dynamics' Atlas.

Autonomous Robots

Autonomous robots operate independently of human operators. These robots are usually designed to carry out tasks in open environments that do not require human

supervision. They are quite unique because they use sensors to perceive the world around them, and then employ decision-making structures (usually a computer) to take the optimal next step based on their data and mission. One example of an autonomous robot is the Roomba vacuum cleaner, which uses sensors to roam freely throughout a home.

Teleoperated Robots

Teleoperated robots are semi-autonomous bots that use a wireless network to enable human control from a safe distance. These robots usually work in extreme geographical conditions, weather and circumstances. Examples of teleoperated robots are the human-controlled submarines used to fix underwater pipe leaks during the BP oil spill or drones used to detect landmines on a battlefield.

Augmenting Robots

Augmenting robots, also known as VR robots, either enhance current human capabilities or replace the capabilities a human may have lost. The field of robotics for human augmentation is a field where science fiction could become reality very soon, with bots that have the ability to redefine the definition of humanity by making humans faster and stronger. Some examples of current augmenting robots are robotic prosthetic limbs or exoskeletons used to lift hefty weights.

Reference:

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Article by -

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Threat of Nuclear waste



Almost a decade after Japan's Fukushima Dai-ichi Nuclear Power Plant was destroyed by the Tohoku-Oki earthquake and tsunami, which caused the release of radioactivity into the ocean like never before, radiation levels have dropped to safe levels in all but the waters nearest to the closed power plant. Currently, fish and other seafood captured in waters further than all but a restricted region have been identified to be well within the country's stringent limits for radioactive contamination. However, a new threat is present and has been burgeoning daily in the number of storage tanks on the land around the power plant, which contains contaminated wastewater. An article published in the Science journal on August 7th, 2020, analyzes a few of the several radioactive elements included in the tanks and recommends that there is more work to be done to comprehend the possible threats of discharging wastewater from the tanks into the ocean.

The researcher is more worried about the greater than 1,000 tanks located on the grounds of the power plant, which have been loaded with cooling water and groundwater that have become contaminated via contact with the reactors and their containment buildings. Advanced cleaning processes have helped eliminate several radioactive isotopes and measures to deflect groundwater flows around the reactors have immensely reduced the amount of contaminated water being collected to below 200 metric tons per day.

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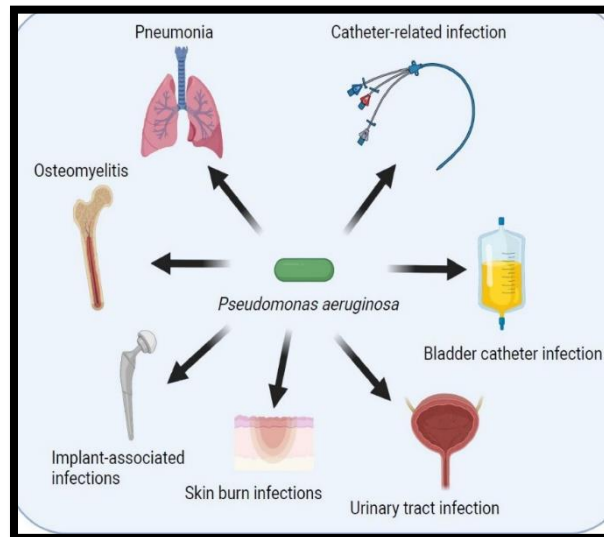
<https://www.azocleantech.com/news.aspx?newsID=27817>

Article by -

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Pseudomonas aeruginosa



P. aeruginosa is a common organism in the soil and in water and it can also be found on plants and animals. It is an aerobic, saccharolytic, non-spore forming gram -negative bacillus measuring 0.5 to 0.8 μm by 1.5 to 3.0 μm .⁵ *Pseudomonas aeruginosa* commonly produces two soluble pigments: pyocyanin, which gives colonies a blue color and pyoverdin, also known as the fluorescent pigment, which is a yellow-green or yellow-brown pigment. When a strain of *P. aeruginosa* produces both pyoverdin and pyocyanin, the resulting colonies have a blue-green color. This organism may also produce other water-soluble pigments such as pyorubrin or pyomelanin which give colonies a red or brown color, respectively.

In 1882, Carle Gessard (1850-1925) first isolated *Pseudomonas aeruginosa* from wound infections of soldiers whose bandages had a blue and green color. Walter Migula (1863-1938) first proposed the genus *Pseudomonas* in 1894. *P. aeruginosa* have been shown to cause variety of diseases. Infection can be acquired from community and from stay in a healthy care

facility. Typical community acquired infection includes skin and soft tissues infection. It causes infection in bloodstream, urinary tract, respiratory tract. Patients who are particularly susceptible to infection with *P. aeruginosa* are those who have burns, cystic fibrosis or mechanical ventilator. 10% of hospital acquired infections. Patient to patient spread and direct patient contact with environmental reservoirs including respiratory equipment, sinks, taps.

Urinary tract infections are a serious health problem affecting millions of people each year. Catheterization of urinary tract is one of the most common factor which predisposes the host to complicated UTIs. *P. aeruginosa* has a tendency to form biofilms on the surface of urinary catheters. Biofilms are resistant to antimicrobial agents as well as to host defense mechanisms and hence are difficult to eradicate. Biofilms contribute towards pathogenicity of *P. aeruginosa* as these often lead to persistent and recurrent infections. Bacterial keratitis is one of the most important serious lesions in pathology

due to the recurrence and it's complications, and one study indicates that there is One eye loses daily in world due to the use of contact lenses, *P. aeruginosa* is one of the most important factors that cause microbial keratitis, which leads to corneal ulceration, which if not treated can lead to a loss. The inflammation of the cornea caused by *P. aeruginosa* is characterized by the rapid tissue damage and that this injury can lead to corneal perforation, iris damage, lens opacity. The infection of the cornea with bacteria is rapid and often results in vision damage due to the scar that occurs in the cornea. Infection by *P. aeruginosa* occurs in bronchiectasis, bronchiectasis is defined as chronic dilation of one or more bronchi. This causes poor mucus clearance and susceptible to bacterial infection. *Pseudomonas aeruginosa* is an opportunistic pathogen, affecting only those with impaired lung defences, such as patients with cystic fibrosis, other forms of bronchiectasis and severe chronic obstructive pulmonary disease. In cystic fibrosis *P. aeruginosa* infection leads to a deterioration of pulmonary function and ultimately respiratory failure and death.

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Article by:
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Negative Energy

Negative energy is a mysterious concept in the world of physics that appears to be more suited to the pages of a science fiction novel than in real life.

Considering the universe to be approximately uniform, one can show that the total negative gravitational energy in it would exactly cancel out the total positive energy represented by matter. Hence the universe as a whole has zero total energy in it.

The great Albert Einstein said, how could the world around us be so random that even with physics, it would be impossible to make any prediction about it with certainty?

I must implore you before going to read further, keep your mind open to new concepts and thoughts, because in the world of quantum mechanics, rigidity of thought and imagination, has absolutely no place.

In 1928, British physicist Paul Dirac formulated and describe how one electron could have either positive or negative kinetic energy. This was the first time physics had indicated towards the existence of negative energy. But how could energy ever be negative. And if negative energy did exist, why don't we see or feel its presence? Dirac stated that in nature, the quantum states of positive energy are exactly balanced out by the quantum states of negative energy. As such, the net effect remains zero, and so we are unable to see or feel the effects of negative energy in normal everyday conditions. However, he did propose that if an ideal vacuum could be created wherein all effects of positive energy were eliminated, then the presence of the Dirac Sea and therefore of negative energy could be verified.

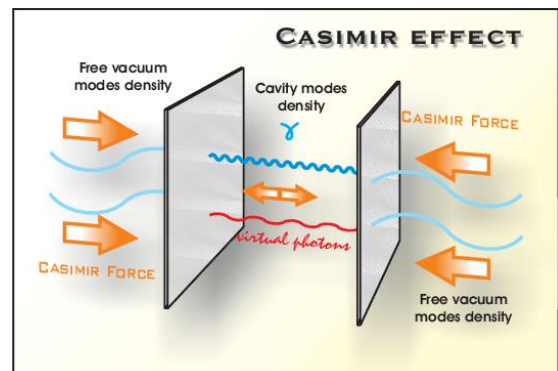
But the creation of an ideal vacuum seemed impossible at the time, and so the existence of negative energy could not be proven. This cast a large shadow of doubt on the very concept of negative energy.

Dutch physicist Hendrik Casimir, through an innovative experiment, was able to show that it was in fact real and very much present.

Casimir Effect

Casimir argued that if the effects of gravity and electromagnetism were nullified, a nearly pure vacuum would be created within which, the effects of negative energy would manifest in an observable manner.

In his experiment it was observed that two metal plates kept apart by some distance of separation in vacuum and just attached with earthing wires, spontaneously



moves closer to each other and superimpose on each other.

According to the uncertainty principle, an area of nothingness (a vacuum), can be full of an infinite number of microscopic particles known as virtual particles. These particles pop in and out of existence, appearing and disappearing randomly.

As there is only a small space present in between the metal plates, a limited number of particles having negative energy are able to manifest there. This causes a small pressure on the metal plates due to the associated wave of each particle to act from inside out.

Comparatively, a much larger number of particles with negative energy are able to manifest in the external space around the metal plates. Their associated

waves together apply a much larger pressure in the outside-in direction, resulting in the two metal plates being pushed closer until they come in contact.

Since the entire system was originally in a state of zero energy and no positive energy was introduced into it, the energy expended in doing the work of moving the plates together must be negative. Thus, the Casimir effect proves the existence of negative energy density in a vacuum.

In Modern Physics, Blackholes, Wormholes, Warp Drive etc are few examples which highlight the importance of negative energy in the modern times.

Thus, negative energy is a proven fact in physics that is known to exist all around us and everywhere in the Universe. This concept has found several applications in theoretical physics and may very well be the key for unlocking interstellar space travel one day.

Article by:
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African grey parrot- Talking and mimicking bird on the planet



The medium-sized African grey parrot is an interesting companion due to its capacity for speech and sound mimicry. Owners of African greys usually say that their animals frequently speak in context and exhibit a high emotional awareness. The African grey parrot is noted for being extremely intelligent, earning them the nickname "The Einsteins of the Bird World," in addition to being a top talker. The African grey parrot is well-known reputation among bird enthusiasts as one of the most skilled talking and mimicking birds on the planet. This intelligent bird is beloved by both bird keepers and inexperienced birders alike. Everyone is familiar with the African grey parrot. With references to the bird in biblical times, this parrot is one of the oldest psitticine species kept by humans. This parrot maintains its high level of appeal because to its understated attractiveness and no-nonsense attitude. The African grey appears to be a medium-sized, dusty-looking grey bird at first glance, almost like a pigeon. However, close examination shows a brilliant red tail,

sensitive orange eyes, and a stunning scalloped pattern to its plumage.

Native Region / Natural Habitat-

In its habitat in West and Central Africa, African grey parrots typically live in savannas, coastal mangroves, woodland, and the boundaries of forest clearings. Despite being referred to as the Congo African Grey, the bigger African grey subspecies really has a considerably wider natural range in Africa, including the southeast Ivory Coast, Kenya, and Tanzania. A smaller area that includes southern Guinea and the western edge of the Ivory Coast is home to the Timneh African grey. In the wild, they primarily eat fruits, leaves, seeds, and palm nuts

Care & Feeding-

The African grey is frequently seen as the poster bird for parrot intelligence with good reason; in addition to having a propensity for amassing a big vocabulary, African greys also exhibit an ability for understanding the meaning of words and phrases. African grey parrots are more prone to deficiency in vitamin-A/beta-

carotene, and therefore benefit from eating vegetables high in beta-carotene, such as cooked sweet potato and fresh kale. Vitamin-D deficiency is another concern, especially for greys on a poor diet. Offering a balanced, pelleted diet, such as Nutri-Berries, for the main diet of an African grey helps prevent vitamin and mineral deficiencies. A grey that consumes a pelleted diet generally does not need vitamin supplements added to its food.

Personality & Behavior-

Most bird keepers believe that only an experienced bird enthusiast should keep a grey. They are complex parrots, highly sensitive, and more than a little demanding. They are also charming and brilliant, but this match of sensitivity and brains can lead to behavioral issues. They are creatures of habit, and even a small change in routine can make a sensitive grey unhappy. They are prone to plucking and chewing their feathers, among other bad habits. Anecdotally, the TAG has a hardier attitude and may be better for households with a lot of people coming and going. The CAG prefers a little less chaos.

Speech & Sound

Much of the grey's appeal comes from its talking ability. It is among the best talkers in the parrot family, able to repeat words and phrases after hearing them just once or twice. This bird reaches full talking ability around a year of age, and most individuals become capable mimics much earlier.

Health & Common Conditions

African greys are especially susceptible to feather picking, calcium deficiency, vitamin-A and vitamin-D deficiency, respiratory infection, psittacosis and psittacine beak and feather disease (Pbfd).

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Article by

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मुंबई विद्यापीठ



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Mumbai, 26th January, 2018