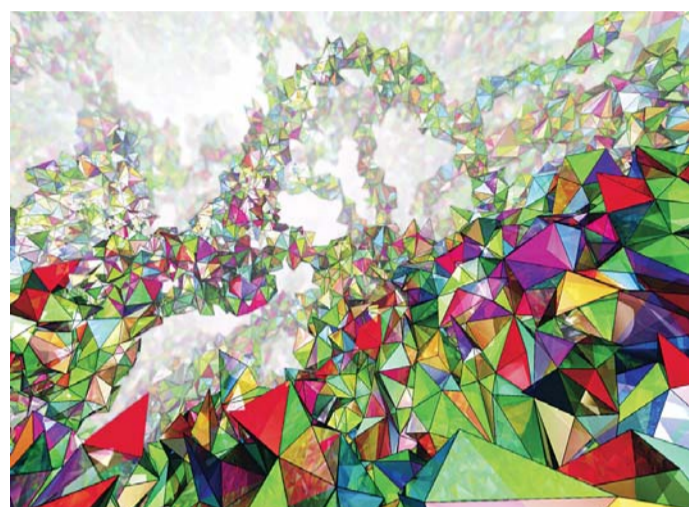


#PHYSICS

"Nothing" Doesn't Exist

When you combine the Uncertainty Principle with Einstein's famous equation, you get a mind-blowing result: Particles can come from nothing.



What is nothing? This is a question that has bothered philosophers as far back as the ancient Greeks, where they debated the nature of the void. They had long discussions trying to determine whether nothing is something. While the philosophical facets of this question pose some interest, the question is also one that the scientific community has addressed.

It's Nothing, Really

What would happen if scientists took a container and removed all the air out of it, creating an ideal vacuum that was entirely devoid of matter? The removal of matter would mean that energy would remain. Much in the same way that the energy from the Sun can cross to the Earth through empty space, heat from outside the container would radiate into the container. Thus, the container wouldn't be truly empty.

That's where things become counterintuitive. It turns out that nothing isn't nothing.

The Nature of "Nothing"

The laws of quantum mechanics are confusing, predicting that particles are also waves and that cats are simultaneously alive and dead. However, one of the most confusing of all quantum principles is called the Heisenberg Uncertainty Principle, which is commonly explained as saying that you cannot simultaneously perfectly measure the location and movement of a subatomic particle.

While that is a good representation of the principle, it also says that you cannot measure the energy of anything perfectly and that the shorter the time you measure, the worse your measurement is. Taken to the extreme, if you try to make a measurement in near-zero time, your measurement will be infinitely imprecise.

These quantum principles have mind-bending consequences for anyone trying to understand the nature of nothing. For example, if you try to measure the amount of energy at a location - even if that energy is supposed to be nothing - you still cannot measure zero precisely. Sometimes, when you make the measurement, the expected zero turns out to be non-zero. And this isn't just a measurement problem; it's a feature of reality. For short periods of time, zero is not always zero.

When you combine this bizarre fact (that zero expected

energy can be non-zero, if you examine a short enough time period) with Einstein's famous equation $E = mc^2$, there is an even more bizarre consequence. Einstein's equation says that energy is matter and vice versa. Combined with quantum theory, this means that in a location that is supposedly entirely empty and devoid of energy, space can briefly fluctuate to non-zero energy - and that temporary energy can make matter (and antimatter) particles.

Quantum Foam

Thus, at the tiny quantum level, empty space isn't empty. It's actually a vibrant place, with tiny subatomic particles appearing and disappearing in wanton abandon. This appearance and disappearance has some superficial resemblance to the effervescent behaviour of the foam on the top of a freshly poured beer, with bubbles appearing and disappearing - hence the term "quantum foam."

The quantum foam isn't just theoretical. It is quite real. One demonstration of this is when researchers measure the magnetic properties of subatomic particles like electrons. If the quantum foam isn't real, electrons should be magnets with a certain strength. However, when measurements are made, it turns out that the magnetic strength of electrons is slightly higher (by about 0.1%). When the effect due to quantum foam is taken into account, theory and measurement agree perfectly to twelve digits of accuracy.

Another demonstration of the quantum foam comes courtesy of the Casimir Effect, named after Dutch physicist Hendrik Casimir. The effect goes something like this: Take two metal plates and put them very near one another in a perfect vacuum, separated by a tiny fraction of a millimetre. If the quantum foam idea is right, then the vacuum surrounding the plates is filled with an unseen flurry of subatomic particles blinking into and out of existence.

Outside the tiny gap, all waves can fit without restriction. However, inside the gap, only waves that are shorter than the gap can exist. Long waves simply cannot fit. Thus, outside the gap, there are waves of all wavelengths, while inside the gap there are only short wavelengths. This basically means that there are more kinds of particles outside than inside, and the effect is that there is a net pressure inward. Thus, if the quantum foam is real, the plates will be pushed together.

Over the years this Research institute of Tonk has been encouraging, nurturing and furthering the cause of advancement of Arabic and Persian studies by acting as a repository of invaluable manuscripts and ancient reference material. These delicate priceless possessions I saw were meticulously updated and preserved scientifically. Manuscripts at APRI (Maulana Abul Kalam Azad Arabic Persian Research Institute) are believed to be the original treatises, stands out for a very high quality of its illustrated manuscripts scripted in Arabic, Persian and Urdu languages. It consists of over 8000 manuscripts, 28188 printed books, 674 farmans and 65000 judgements files of shariat court of Tonk state; assortments of other objects coins, weights, calligraphic art of which an exceptional specimen work is named "Khat-i-Nakhoon" or the letter crafted by finger nails. The world largest size Quran is exhibited

A Work Of Art



CV Vaidyanathan

!!! Coincidence !!!

Coincidence is a recognised element in "real life" all of us have anecdotes about those times when by mere coincidence we stumbled on to some wonderful experiences. I visualised a game of cricket played some sixty years ago, was then barely eleven years of age watching my school St Xavier's playing an exciting game where our only expectation, a sterling all-around performance from Shamsheer Khan. Most boys enjoyed surrounding him during break sessions minutely observing his cricket attire and expression. This was put to practice thoroughly at our colony street cricket. Shamsheer for me was similar to a matinee idol, its impact and presence can never fade.

Intellectual Curiosity

Internet search engines of the present era to gather with application of web browsers and print media reconnected me to Shamsheer early this year and met him a fortnight ago after exactly "SIXTY YEARS" at Banasthali 'Newai railway station about seventy miles from Jaipur. Senior then in school days by eight years no chance of recog-



Ghaliob on Namda: The Namda collection displayed in the institute shows a specific form of work that involves the pasting of the white Namda pieces on a black one. The results in a creating an image or inscription on it. This image shows the eminent Urdu poet Mirza Ghaliob on a Namda wall hanging.

nising each other both turned septuagenarians embracing warmly on equal terms, grateful that we made this far and optimistic about future. Times have changed most of us are living decades longer than once we did, staying fitter, healthier, sharpening our wisdom years than ever before, the most pleasing observation which I instantly noticed the transformation with the changing trends over decades. We both car-

#BRILLIANCE

ried screen touch smart mobiles, adored stylish motor sport caps, my stuff packed securely in the rolling carbon suitcase unlike the steel trunk and hold baggage of the past. Developing social connections and further taking chances on reaching out to old acquaintances years after school certainly boosts emotional well-being. Services like internet search engines with application for instance web browser, print media allow to stay connected. Miracle did happen when my blog "Student days in Jaipur" got posted in the columns of indiaothepast.org, and Shamsheer from his ancestral home town Tonk in State of Rajasthan called me for the first time we could establish contact almost 60 years later.

Tonk a native place of Shamsheer Khan was a princely state of India at the time of British Raj, situated about 100 km south of Jaipur. The first ruler of Tonk was Nawab Mohammad Amir Khan from the Tarkani tribe his origin near today Afghanistan. He was a military general in the service of Yashwantrao Holkar of Maratha Empire. Amir Khan received State of Tonk from Maratha Empire. Shamsheer Khan is the direct descendant of the first Khan ruler; his father Sahibzada Sardar Muhammad Khan was an ICS officer served during his civil service career as Collector and District Magistrate in 1931 of Junagadh and also was Diwan, President of State council of Junagadh later he was also collec-



Building of Arabian Persian Research Institute Tonk.



Printed image of the Kaaba building in Mecca, Saudi Arabia.

tor of Ratnagiri now in Maharashtra State. The third ruler of Tonk state Nawab Muhammad was exiled by the Britishers to Benaras who being academic took with him Thirty Nine scholars and Fifteen scribes, efficiently used his days in collecting valuable Arabic and Persian manuscripts during twenty years of exile. This outstanding experience laid an indirect foundation of renowned "Institute of Maulana Abul Kalam Azad Arabic Persian Research" in Tonk. The state government of Rajasthan in 1978 created a special status of independent Directorate granting adequate funds to preserve priceless manuscripts and encourage research. The objectivity of the Arabic and Persian institute of Tonk is to preserve the original documents



updated and preserved scientific-ly. Manuscripts at APRI (Maulana Abul Kalam Azad Arabic Persian Research Institute) are believed to be the original treatises, stands out for a very high quality of its illustrated manuscripts scripted in Arabic, Persian and Urdu languages. It consists of over 8000 manuscripts, 28188 printed books, 674 farmans and 65000 Judgements files of shariat court of Tonk state; assortments of other objects coins, weights, calligraphic art of which an exceptional specimen work is named "Khat-i-Nakhoon" or the letter crafted by finger nails. The world largest size Quran is exhibited at APRI whose page length is 10 feet 5 inches, width 7 feet and 6 inches, written with pen width of 3mm; it's each page has 41 lines contains 64 pages and weighs 250 kg binding decorated with silver corners.

and providing such manuscripts to the scholars who come here to further their research. Starting with very little science, philosophy or literature of his own the Arabian Muslim who brought with him from desert a keen sense of intellectual curiosity a voracious appetite for learning from Hellenic, Persian, Aramaic and Indian for wisdom, literature and science. The Arabs rose out of semi barbarous land and touched the heights of intellectual and spiritual glory world wide.

Treasure Of Knowledge

For almost five to six centuries upto 1300AD in every walk of life the Arabs were on forefront of world civilisation; their taste in living, in standards of conduct, in commerce were exemplary. They took to learning from everywhere, made the rich heritage of Egypt, Syria, Greece, Persia, Spain and India their own possession. The light shed at Kuffa and Basra in Iraq reached the corners of the world. It is significant to mention here the initial intellectual contributions from Al Kindi an Arab, Al Farabi a Turk and Ibn Sina a Persian.

Since Arabs not only assimilated the ancient lore of Persia and classic heritage of Greece but could adapt and add further by study and research in medicine, astronomy, mathematics, law, geography, theology and various sciences; for had the researchers of Aristotle, Galen and Ptolemy been lost the world would have never seen the treasure of immense value and knowledge.

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Former Vice President Mohd. Hamid Ansari visiting the Maulana Abul Kalam Azad Arabic Persian Research Institute, in Tonk.



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fortunate to meet Sz Abdul Moid Khan former Director of APRI a scholar of immense international repute whose vision and efforts revitalised this art of preservation of historical documents at APRI. I am also grateful to the Director of APRI Sahibzada Dr Saulat Ali Khan a distinguished scholar of Arabian and Persian literature who is possessed with intellectual curiosity, zeal for learning with the sole motive to support and develop intellectual growth of researchers at APRI to explain in detail personally historic documents.

This to me was truly a matter of "Coincidence" that I happen to visit Tonk for the first time despite being a resident of Jaipur initially for 38 years I owe this wonderful experience to Capt (Para trooper) Sahibzada M. Shamsheer Khan. | | | | writearabi@rashtradoot.com

International Ideas Month

International Ideas Month is all about realizing the value of an idea, no matter how silly it might seem at first. If there's something you have been mulling over for a while, an idea you've had but not really thought of making it reality, then this month is the time to get your great idea rolling. Some of the biggest, most impressive things in our modern world - be that huge, lumbering buildings or complex, shiny smartphones - started as an idea. Without ideas, we wouldn't have any of the cool stuff we have in the world today.

#LIFESTYLE

Transform Your Outdoor Space

Quick tricks to give your garden a boost.

For lazy afternoons in the sun and long evenings socialising, there is no better time to enjoy your garden than the summer months. Make the most of the warm weather by creating a beautiful space to relax in and be the envy of friends and family, whether that's with blankets of vibrant flowers or an impressive focal point.

Keen to create an amazing garden before Summer is in full swing? Transform your space from so-so to sensational in no time with these quick and clever ideas.

These simple tricks should be all the inspiration you need.

Think Big

One large shrub or tree can instantly make your garden feel more settled and mature. Go for the biggest you can afford - reputable nurseries will offer a guarantee. If there's a wholesale nursery in your area, you may be able to grab yourself a bargain



ing your containers, always remembering that less is more. If they are different sizes, or you're using a variety of plants, make sure they're all made of the same material - coloured resin or galvanised steel for a modern, urban look, or weathered terracotta for a more traditional garden.

To make a bold statement, plant up three identical containers with the same plants - you

plant into each basket, remember to water it (ideally adding a splash of tomato food) and that's it.

Instant Meadow

Here's the ultimate in labour-saving gardening: you can now create a beautiful wildflower meadow as simply as rolling out a carpet. Instead of waiting to sow seed in Spring or Autumn, simply peg down a mat of biodegradable felt, studded with seeds of some 20 different flowers. The felt acts as a barrier to competing weeds, especially thuggish grasses, allowing the flowers to get a head start.

Quick Colour

Pelargoniums are the instant gardener's best friend, bulking up quickly to fill the garden with colour all Summer long. In a new garden, concentrate them in key spots to give a 'full garden' feel while the rest of your planting catches up. They're easy to find in garden centres, but a specialist nursery will offer a much more exciting range of colours and forms.

Easy Herb Garden

Go to the supermarket and fill your basket with growing herbs. Then, instead of watching them wilt away plant them in a window box. Nine times out of 10, they will thrive, even if you sometimes forget to water them.

Screen Stars

Hide eyesores with some clever planting. For a small area, a few pots of bamboo will offer rapid screening - not too dense or light-limiting, but evergreen and pleasing to the ear and the eye. And if you don't need screening at a lower level, you can remove the bottom leaves to reveal the bamboo's brightly coloured stems.

Where space is at a premium, nothing is lovelier than pleached trees. You can buy them already trained into a variety of shapes - cubes or oblongs or highly space-efficient flat screens.



by buying a large shrub in full flower.

Quick Break

Do you need to mark a boundary or divide a long, thin garden into 'rooms'? You can put up sections of small-squared trellis, draping it with fast-growing annual climbers such as black-eyed Susan or runner beans. This can give you the chance to experiment with bold colour - try the dazzling sky-blue morning glory Ipomoea tricolor 'Heavenly Blue'.

Add Structure

When planning a garden, begin with evergreens - these will be the backbone, creating structure throughout the year. Repeating the same plant, such as box balls or columns of yew, makes a pleasing framework so showier plants can strut their stuff.

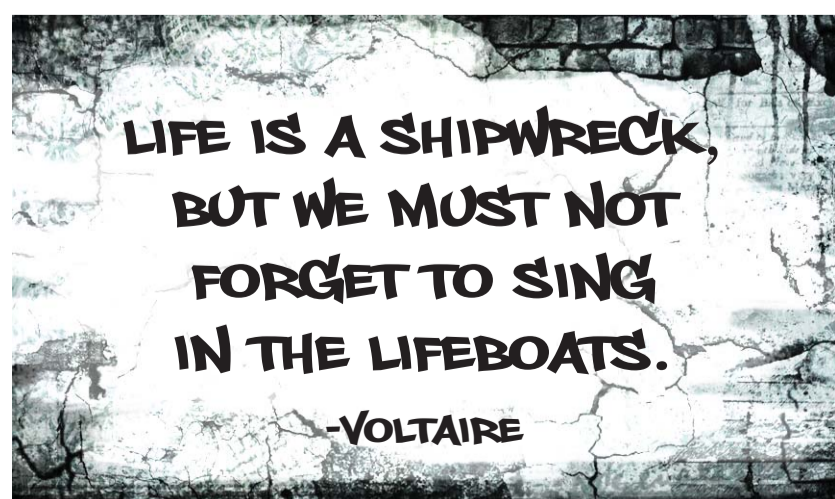
Evergreens can be showstoppers, too - let's not forget the glossy, plate-like leaves of Fatsia japonica, the gorgeous blooms of camellias or the striking silvery spears of Astilachathamica. And they needn't even be green: the hugely versatile pittosporums are available in a range of gold and silver, creamy or purple shades.

Create a Focal Point

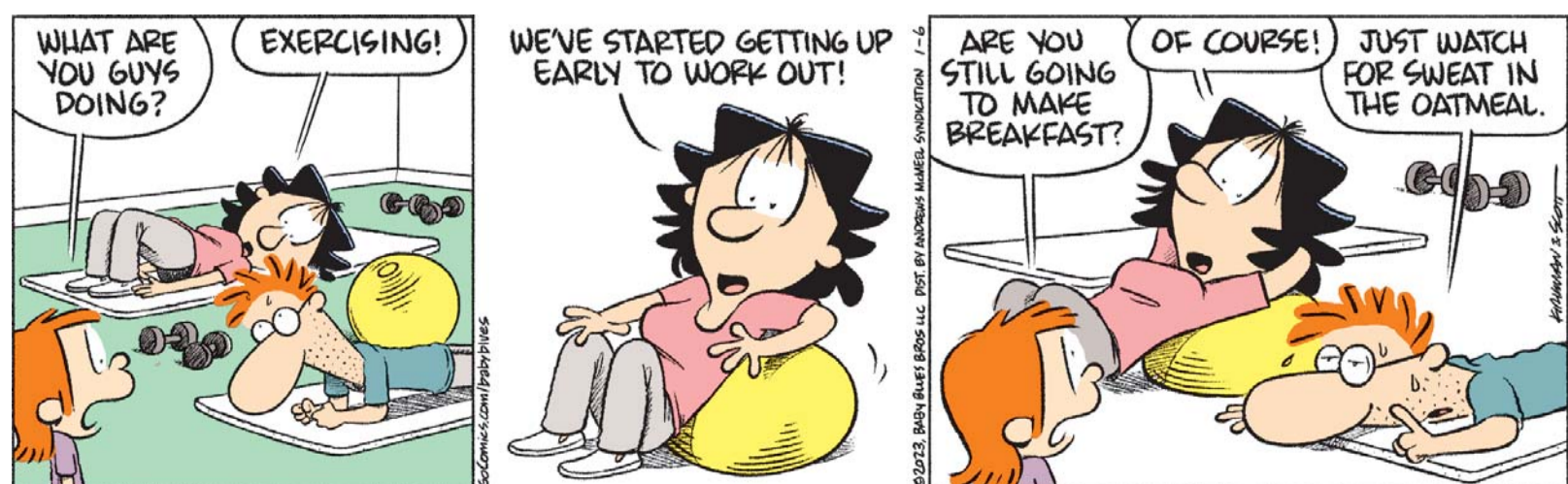
A strong feature will add impact and draw the eye away from any less-perfect areas of your garden. A dramatically planted container works well - especially in a small garden - and the larger the container, the less often you'll have to water it.

As an alternative, try group-

THE WALL

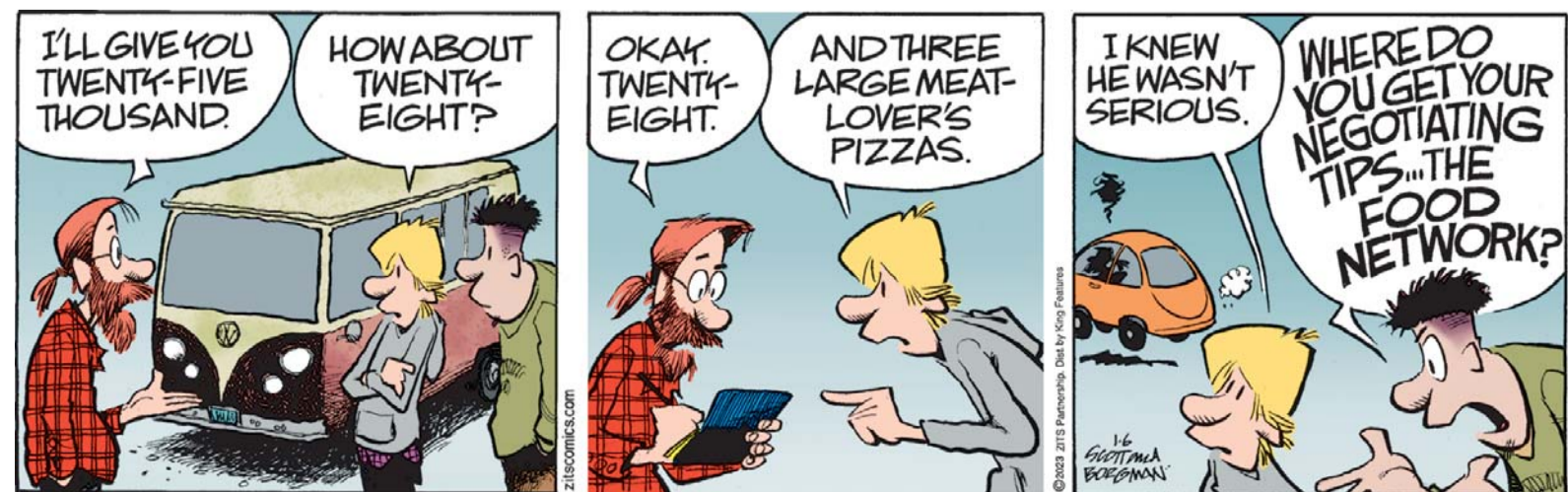


BABY BLUES



By Rick Kirkman & Jerry Scott

ZITS



By Jerry Scott & Jim Borgman

