His real name was Mirza Muhammad Taraghay bin Shahrukh. But because of his erudition and exploits, he was more popularly known by his fan following as Ulugh Beg, which, in Turkish, can be loosely translated as 'Great Ruler.' And now, here comes the Indian connection. He was a grandson of the great conqueror and king, Tamerlane (1336-1405), the same feared Central

Asian warrior, who invaded northern India in 1398 and ravaged Delhi, which was then ruled by *Sultan* Nasiruddin Mahmud Shah Tughluq (the last ruler of the Tughlaq Dynasty). Babur, who established the Mughal dynasty in India, was a 5th generation descendant of Timur on one side as well as a 12th generation descendant of the mighty Genghis Khan on another side!

Tamerlane To

Jantar Mantar

#STARGAZERS

राष्ट्रदुत

#RESTAURANT & BISTRO

BROWN SUGAR WOWS

with a carefully curated menu that not loomers but also Ger







you think Brown Sugar is all about confectionary and all wrong. For an outlets spread all carved out a niche in the mid segment restaurant and bistro sector. The menu is varied yet wholesome. The prices

Salad is the last thing that you would expect at an eatery associated with 'sugar and spice and all that is nice.' The Saute Vegetable Salad with a dash of olive oil is not only fresh, but just what the dietitian ordered for all weight Garlic Butter, Mushroom and Cottage Cheese Salad.

Food is not only memory but also childhood encapsulated in calories. The Chana Bun, one of the most ordered dish, is reminiscent of days when one tucked away Kabuli Chana with bread in child hood. Brown Sugar version is irresistible and you can ask for it to be customized as per your chili tolerance. The popularity of fried

Kurkure Momos is matched by The Mumbai Central Vada Pav and Crispy Corn chat, a perennial favourite of the Gen Z. So, the perception of Brown Sugar, being a favourite haunt of the vuppies, does not do justice to its menu created to deliver value for money. Anyone of the outlets, spread all over the city must really be your go-to destination, if you are looking for a day out with friends or hosting a Kitty party.

The Fiery Paneer Wrap or the Peshawari Paneer Tikka Sandwich are not only tasty but a meal in a dish, and believe it or not, only for Rs. 200 each. The paneer and veggie overload offsets the carb dose. It's not uncommon to find digital natives preoccupied with their screens and



tune. Hand it to Brown Sugar for delivering wholesome meals with a carefully curated menu that not only serves the Zoomers but also Gen X and senior citizens, who want to chill on their day out. If you thought Brown bread is just another name for a bread with a different tan, then, you are in for a surprise. One of the most fast moving items, the multigrain brown bread with chia, pumpkin, sunflower, sesame and other seeds is like ouying into slices of delight ful satiation. The crust with a springy soft surface, that is both, flavoursome and ful-

some, explains its demand. A hearty meal deserves a closure with some gooev dessert. If desserts are fairy tales of the kitchen. Brown Sugar does well in spinning out delightful, melt in the mouth kind of cakes and desserts. You can find an arti sanal cake for every occasion but the Hazelnut cake takes sweetness to another level. I evokes emotions that are only matched by the iconic Hot chocolate with Brownie. The latter is, of course, the happi

ly ever after, of a meal a Brown Sugar. A good dessert, they say, should make you sing Worry not these ones will also make you dance! The smell of freshly brewed coffee, good food and a comfort zone make a perfec blend at this eatery. If you are in a party mode, then, the easy, relaxed atmosphere a Vaishali Nagar outlet may also invite you to host your annual gala because the out door space, in its backyard

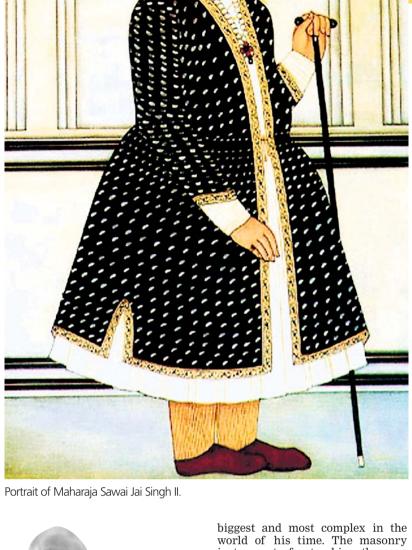
can be all yours with food

catered by Brown Sugar.

Outdoor catering is another

vertical of Brown Sugar.

but of that, another day!



instruments for tracking the sun, moon, planets and stars were based on the concept of positional astronomy, enunciated by the 2nd Century Greek astronomer, Ptolemy.

It is said that the tracking of celestial bodies from Jai Singh's observatories was more accurate than that in other cities of the world, in those days. They were also the last of their kind since optical instruments, following Galileo's invention of the telescope, took over afterwards all over the world. One particular instrument that

ontaneously elicited 'Oohs' and 'Ahhs' from the foreign visitors to Jantar Mantar was the Vrihat Samrat Yantra. At over 90 feet in height, it was and still is, the world's largest stone Sundial, able to give the time to an accuracy of two sec-

and Mediterranean Europe. As Indian tourists, we, of course, were more fascinated by its grand dry fruits market *'Déjà vu'* is a popular French term signifying a sense of having

Jantar Mantar.

ne particular instrument that elicited 'Oohs' and 'Ahhs' from the foreign visitors to Jantar Mantar was the Vrihat Samrat Yantra. At over 90 feet in height, it was and still is, the world's largest stone Sundial, able to give the time to an accuracy of two seconds. Jai Singh personally designed this mammoth instrument

lains, who taught at St. Xavier's onds. Jai Singh personally designed High School, Jaipur. this mammoth instrument, which The basic tour comprised features a massive triangular gno-Amber, the City Palace and, if time mon, oriented due north, at an angle and inclination permitted, the Royal corresponding to Jaipur's latitude. Cenotaphs and the Albert Hall The gnomon's hypotenuse is perfect-Museum. Of course, the tour was ly parallel to the Earth's axis of always topped by shopping for texrotation, allowing it to cast an accutiles and jewellery, for which Jaipur rate shadow throughout the day, to was justly famous. indicate the time.

the City Palace, which awed the visitors, who chose to stroll through it, was the astronomical observatory, known, in common parlance, as the Jantar Mantar. The founder of the walled city of Jaipur, Sawai Raja Jai Singh, was an extraordinary polymath. Besides being well-versed in the intricacies of royalty of those days like statesmanship, diplomacy and military planning, Jai Singh

ack in the latter half

of the 1950s. I was for-

tunate enough to be

recruited by the fledg-

ling travel agency of

Pandit & Co., located

at Panch Batti in

Jaipur, as a rookie

tourists visiting the

Pink City. The Second

World War had ended just over a

decade ago and Europe, Japan,

China and Russia were still recover-

ing from the aftermath. Most of the

tourists doing the Delhi-Agra-

Jaipur Golden Triangle then were,

therefore, from the US of A, which

had emerged intact due to the two

oceans on either side. I must confess

that I, most probably, was selected

as a guide, not because of my his

torical knowledge of Jaipur but

since I could make out the Yankee

twang, having learnt my English

under demobbed American chap-

One of the side attractions of

and astronomer of repute. His passion for astronomy and the associated application of astrology led him to construct five observed vatories in India, which were the

was a town planner, mathematician

With the instruments located in the observatory in Samarkand, Ulugh Beg composed a star catalogue, consisting of 1018 stars, which corrected quite a few errors in the cata-It was to this instrument that used to particularly conduct my ogue, composed by Ptolemy, that

tourist clients, and proudly chant nad been in use till then. Delving a bit deeper into the hisits dimensions and accuracy, as they craned their necks to take it in. tories of Ulugh Beg and Jai Singh, I My dalliance with tourist guid found some very interesting simiing lasted about a year, following larities. For starters, both were rovwhich I had to push off for IIT. alty About Jai Singh we all know. Sixty years later. I had a moment

But who was Ulugh Beg? déjà vu. It was in the city of His real name was Mirza Samarkand in south-eastern Taraghay Uzbekistan, some 1500 kms from Shahrukh. But because of his erudi-Jaipur. This time, I was on the other tion and exploits, he was more popularly known by his fan following as side of the fence, as a tourist Samarkand is one of the most Ulugh Beg, which in Turkish can be ancient urban settlements in the oosely translated as 'Great Ruler.' world and an important crossroad or And now, here comes the Indian the fabled Silk Route between China connection. He was a grandson of

peen there or seen that before. I had this feeling when we were being conducted through the Ulugh Beg

Samrat Yantra in Jaipur's Jantar Mantar Observatory.

Astronomical Observatory in Samarkand, constructed between 1424 and 1429 AD, some three centuries before Jai Singh built his The centre piece of the Samarkand observatory is the socalled Fakhri Sextant, which had a radius of 118 feet. This was so large

that a part of it had to be accommodated in a trench. This lower portion of the meridian arc underground is all that remains now of the original massive structure When I saw this huge arc, I was

ruler of the Tughlaq Dynasty). Babur, who established the Mughal lynasty in India, was a 5th generation descendant of Timur on one side as well as a 12th generation descendant of the mighty Genghis immediately reminded of the giant Khan on another side! arc of the Samrat Yantra in Jantar Mantar. Ulugh Beg (1394 - 1449) was sindly in India due to a horrific one of Islam's greatest astronomers during the Middle Ages and famed Uzbekistan, he is revered as a far and wide in Europe and Asia. founder of the nation and the capi-

> nuseum devoted to him. The second notable resemblance between Jai Singh and Ulugh Beg is that both were reputed astronomers and observatory builders of their

Ulugh Beg Observatory.

the great conqueror and king,

feared Central Asian warrior who

Tamerlane (1336-1405), the same

nvaded northern India in 1398 and

ravaged Delhi, which was then

ruled by *Sultan* Nasiruddin

Mahmud Shah Tughluq (the last

Although, Timur is not regarded

tal, Tashkent, features a whole

massacre, in today's

Ulugh Beg is credited with reviving astronomical research in the Islamic world, which had gone into decline after the 13th century. As a child, he wandered through a substantial part of the Middle East and India, as his grandfather expanded his conquests in those

After Timur's death, his succes-

sor, Shah Rukh moved the empire's capital to Herat, leaving the former capital, Samarkand, in charge of his 6-year old son, Ulugh Beg.

turn Samarkand into an intellectual centre. He started off with estab lishing a university, between 1417 and 1420, and invited several prominent Islamic scholars to study and teach there. The *madrasa* building still stands on Registan Square in Samarkand and the colourful Persian style inlay work, that it sports, dazzles the visitors' eyes. But it was to astronomy that Ulugh Beg was most strongly drawn. His interest in the subject had been piqued when, at a young age, he had visited the famous Maragheh Observatory in Iran.

So, Ulugh Beg set about build

ing an observatory at Samarkand with the ambition of providing the most accurate measurements of the position of heavenly bodies Ulugh Beg's observatory was built according to the plans of the Maragha observatory in Iran, which was designed by Nasir al-din al-Tusi. Ulugh Beg's Observatory included the largest quadrant principle device. The building was not tall but was allowed a maximal size for the arc of the circle. This device was carefully oriented, and the arc was scaled very accurately. This device was very versatile. It could accurately measure the sun from the horizon, the altitude of a star and other planets. The duration of the year, period of planets, and eclipses were measured by this device. Ulugh Beg's measurements of planets closely relate to today's

measurement, showing us the phe-

nomenal accuracy of the device. To enable this, a huge masonry sextant was proposed to be set up, with a radius of just over 40 metres. which would make it the largest astronomical instrument' in the world at that time. This sextant was to be housed in a cylindricalshaped building.

But there was a catch. The type of bricks, then available, did not have the strength to support such a tall building. This problem was solved by constructing part of the sextant underground, in a ditch, roughly 2 meters wide. This allowed the size of the sextant to be maintained, without the cylindrical building housing it to be unstably high. Since the building was located on a hill, 21 metres above the ground, the underground portion could be accommodated without causing waterlogging problems.

He managed to measure the azimuth to within three arc minutes, correlate these data with sidereal time, and connect them to a position in the sky relative to the ecliptic. He also measured the angular distances covered by the planets, each year, which match modern values to within several arc seconds. Ulugh Beg determined the

Ulugh Beg, founder of the Observatory, in a contemporary Timurid painting (1425-1450).

studied Hindu astronomy at

Benares and, as a part of his post-

doc work (as it is referred to these

days), built the three small observa-

tories at Ujjain, Mathura, and

Benaras. Ujjain, as it may be

recalled, was a hub for astronomical

and mathematical studies in

ancient times and home to scholars

like Varahamihira (6th Century).

Brahmagupta (7th Century) and

observatory in 1724, he took the help

of Vidyadhar Bhattacharya, a

Bengali brahmin architect, well-

versed in Shilpa Shastra. The

designs were further improved for

the Jaipur observatory, the construc-

tion of which started in 1728 with a

few instruments and was expanded

by Jai Singh and Ulugh Beg's 300-

vear-old catalogue was updated. The

results were published as a set of

astronomical tables named Zij

Muhammad Shahi, in honour of the

Mughal King, Muhammad Shah,

Ulugh Beg's scientific expertise was

not matched by his skills in gover-

nance and diplomacy. During his

short reign, he failed to establish his

power and authority. As a result,

other rulers, including his family

took advantage of his lack of con-

trol, and he was subsequently over-

thrown and assassinated by his own

son, Abd al-Latif in 1449. The obser-

vatory was destroyed and dozens of

talented astronomers and mathe-

maticians were driven awav. It was

only in 1908 that the Russian archae-

ologist, Vassily Vyatkin, uncovered

the remains of the observatory

Today, the foundations and the

buried part of the marble quadrant

are all that are visible of the origi-

nal vestiges of the Fakri sextant,

and the cylindrical building hous-

park, that houses the remains of

Ulugh Beg's observatory, I marveled

at how the pursuit of astronomy

connected researchers from vastly

different geographies and times,

which has enabled mankind to

explore the regions of space beyond

rajeshsharma 1049@gmail.com

As we wound our way out of the

ing has been reconstructed.

our home planet.

However, unlike Jai Singh,

Planetary tables were prepared

to what we see today by 1735.

successor to Aurangzeb.

For building the larger Delhi

Bhaskaracharya (12th Century).

length of the tropical year as 365d 5h 49m 15s, which has an error of +25s, making it more accurate than the estimate of Copernicus, which had an error of +30s. Ulugh Beg also determined the Earth's axial tilt as 23;30,17 degrees in sexagesimal notation, which in decimal notation overts to 23.5047 degrees.

Ulugh Beg's astronomical tables became almost as famous as those of Ptolemy and they formed the basis of most subsequent catalogues Maharaja Sawai Jai Singh II of

Ulugh Beg Madrasa was an important centre of astronomical study in Central Asia.

or building the larger Delhi observatory in 1724, he took the help of Vidyadhar Bhattacharya, a Bengali brahmin architect, well-versed in Shilpa Shastra. The designs were further improved for the Jaipur observatory, the construction of which started in 1728 with a few instruments and was expanded to what we see today by 1735.

The Fakhri sextant, as it was called, had 70.2 cm divisions, which represented one degree. There were also marks every 11.7 mm to show one minute and 1 mm marks that represented five seconds. These markings turned out to be extremely accurate, matching up closely to the calculations found today. The building, housing the sex-

tant, was made up of three stories. The first story comprised the staff quarters. All observations were made from the second and third stories, which had many arches to look through. The roof of the observatorv was flat, allowing instruments to be utilized on top of the building.

Ulugh Beg used this gargantuan instrument to undertake a complete revision of the earlier catalogue of stars and compile a precise stellar catalogue of 1,018 stars, called the Zij-i-Sultani, which was written in Persian and published in 1437. Ulugh Beg's Star Catalogue was the first to have been published since the *Almagest*, written by Ptolemy.

Jaipur (1688-1743) was greatly influenced by the works of the scholars of the Samarkand school and extended their work. Apart from Ulugh Beg, whom he followed, he mentions names of the Iranian astronomer, Nasir al-Din al-Tusi, and others

Jai Singh preferred to use

masonic instruments, some of which he himself designed rather than metallic ones. He improved the Ulugh Beg by employing an equatorial gnomon, which can measure time at a constant rate of the spin of Jai Singh built observatories in

Delhi, Jaipur, Banaras, Mathura and Uijain. The idea behind building a number of observatories at different locations in the northern India was to make the same observations from different places, and thus, reduce the errors introduced, due to the limits of resolution of

Initially, Jai Singh, who had first

#GLOBAL WARMING

Why July 21 was the warmest day on record?

In a statement, Carlo Buontempo, C3S Director, said, "What is truly staggering is how large the difference is between the temperature of the last 13 months and the previous temperature records. We are now in truly uncharted territory and as the climate keeps warming, we are bound to see new records being broken in future months and years."



unday (July 21) was the warmest day on Earth, according to the Copernicus Service (C3S). The daily global average tempera-Celsius, breaking the previous record of 17.08 degree Celsius, set on July 6, 2023. Last year was the first time ever that the daily global average temperature crossed the 17 degree Celsius mark. In

statement Buontempo, C3S Director said, "What is truly stagger ing is how large the differ ence is between the tempera ture of the last 13 months and uncharted territory and as the climate keeps warming, we are bound to see new records being broken in future months and years. Here is a look at what caused this record-breaking daily global average temperature

What led to the Record-breaking Temperature?

n he main driver behind the extreme warming is the increasing greenhouse gas concentrations in the atmosphere. Greenhouse gases like carbon dioxide and methane, and water vapour trap the Sun's energy in the Earth's system before it over large parts of Antarctica escapes to space, causing warming. Since the industrial like burning fossil fuels such as coal, oil, and gases have released unprecedented levels of such gases. As a result, the planet has warmed rapidly especially in recent decades.

In 2023, greenhouse gas concentrations reached the highest levels ever recorded in the atmosphere, according to C3S and the Copernicus Atmosphere Monitoring temperatures.

Service (CAMS). Carbon diox ide concentrations in 2023 were 2.4 parts per million (ppm) higher than in 2022, concentrations increased by 11 parts per billion (ppb). Apart from this, above-average temperatures have also contributed to warmer daily average global C3S. However, warmer tem peratures in Antarctica, at this time of the year, are not

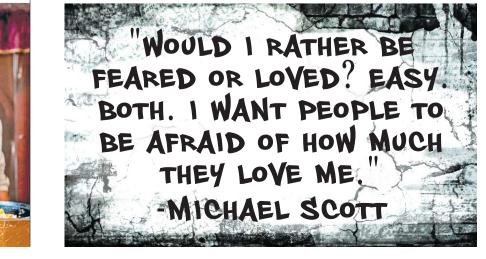
The continent is also wit nessing below-average sea ice extent, leading to much above average temperatures over parts of the Southern Ocean This also has played a role in raising the global average

What happens next?

A global average tempera ture is expected to further increase and peak around for a few days and then go down, but with possible further fluctuations in the coming weeks. So far, 2024 has been on track to become the warmest year. breaking the record of 2023. which was 1.48 degree Celsius warmer than the average of the 1850-1900 pre-industrial level and 0.17 degree Celsius warmer than 2016. Since June 2023, every month has now been ranked as the planet's hottest since records began compared with the correspon ding month in previous years.



THE WALL



BABY BLUES



INFRARED CAMERA, NIGHT-VISION GOGGLES, DUCT TAPE, TWO BAGS



By Rick Kirkman & Jerry Scott BIGFOOT EATS



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By Jerry Scott & Jim Borgman

