राष्ट्रदुत

Dim Bulbs

Most planets in the galaxy orbit stars you can't even see



ble nature with a lack of

stature; they're the most com-

mon kind of star in the galaxy

outnumbering all other stars

by more than two to one. By

comparison the sun is a rare

behemoth, in the top 20 per-

In 2008 the MEarth project

started up, studying 1,200 red

dwarfs with small telescopes

to look for tell-tale signs of

planets. In 2009 MEarth found

its first exoplanet: GJ1214b. a

super-Earth-a planet bigger

than Earth but smaller than

Neptune-orbiting the nearby

red dwarf GJ1214, about 47

Earth-ish exoplanets orbiting

red dwarfs have been found.

And in February 2023 as-

tronomers published a new

study in the journal Astronomy

and Astrophysics that looked

specifically at red dwarfs very

close to the sun; they observed

three fourths of all faint red

dwarfs within about 30 light

vears of us, nearly 350 such

stars. Thirty-three new planets

were found, and dozens of pre-

viously discovered ones were

in particular discovered in the

new survey is called Wolf

1069b. It orbits a very small red

dwarf, just one sixth the mass

of the sun. The planet is likely

about the same size as Earth.

and a little more massive.

Even better, it orbits the

star at a distance of about 10

million kilometres. That's

close-one fifteenth the dis-

tance of Earth from the Sun-

but remember, we're talking

red dwarf here, and a particu-

larly dinky one. The star is

only about 2 percent as lumi-

nous as the sun, so the planet

gets enough heat to warm it to

about negative 20 degrees Cel-

sius. Chilly, sure, but mind you

mosphere. Without air Earth

would be about the same tem-

that's if it doesn't have an at

As an example, one planet

light-vears from Earth.

cent of stars by mass.

ered the firstknown exoplanets in the early 1990s, ones often called bit a dead star and are lethally zapped by high-energy radiation to boot. For those of us hoping to find more clement Earth-like worlds, that wasn't verv satisfving.

Then planets were found around stars more like our own, "normal" ones stably fusing hydrogen into helium in threw us a curveball: these with no solid surface to speak of-orbiting so close in to their stars that they're cooked to temperatures of well over a thousand degrees. We call these "Hot Jupiters." and although they qualify as planets under anvone's definition.

as planets can be. Eventually, astronomers spotted planets orbiting farthe right amount of light and neat to potentially possess bodies of liquid water on their surfaces-if they had surfaces. With current techniques we can't know much more about them than their size and mass.

but that can be used to find

their density, which is impor-

they're about as un-Earth-like

tant. Iron is much denser than rock, which is denser than water and air. So knowing a planet's overall density can tell you in principle if it's more like Earth or Jupiter. Handy. As time went on more plan ets like that were found, and

statistics were updated. And until recently, astronomers were missing another important piece of the planetary puzzle: red dwarfs. These featherweight stars range up to about half the mass of the sun. They're smaller, cooler and much fainter than the sun as well; some shine less than 1 percent as brightly. Replace the sun with a red dwarf of that size, and Earth would freeze as solid as Pluto.

These characteristics make them hard to study. They're dim. The closest star to the sun in the entire universe, Proxi ma Centauri, is a fairly typical red dwarf, but it's so faint you need a decent telescope to see it at all (and it's known to host

The planet is only a little over 30 light-years from us, implying Earth-sized planets around extremely small red dwarfs are common; the galaxy is 120,000 light-years across, so if planets like this were rare you wouldn't expect to find one so close. And, because of their ubiq

uity, this means red dwarfs likely host more planets than all other kinds of stars in the galaxy combined! Impressive, especially for such dim bulbs.



Ratan and his chums returned to action big time, complete with sten guns. From the rooftops, on the streets, wherever they were, they kept firing towards the Muslim shanties. After almost three hours there was a lull in the firing. The police and military forces had arrived and by afternoon things were quiet again. Vans with loudspeakers were blaring that, unless the riots came to a stop, Gandhiji would cease to be. He would end his life.

Gandhiji's priceless life is in your hands today!!



Ratnottama

now what Jattye?" he friend's attention. shan of Gandhiji "Who? Gendo?"

"Hanh, Gandhi." "What was it like?" "I mean... the man seems to be a "Seems a sadhu, right? Yes. the

fellow has actually done a lot for the

"That's what I hear. So many times he has been incarcerated and been to the jail. So much suffering he has put up with..

"But that one failing! He has spoilt all his good actions by pampering and mollycoddling the Muslims, over-indulging them...' "You have hit the nail on its

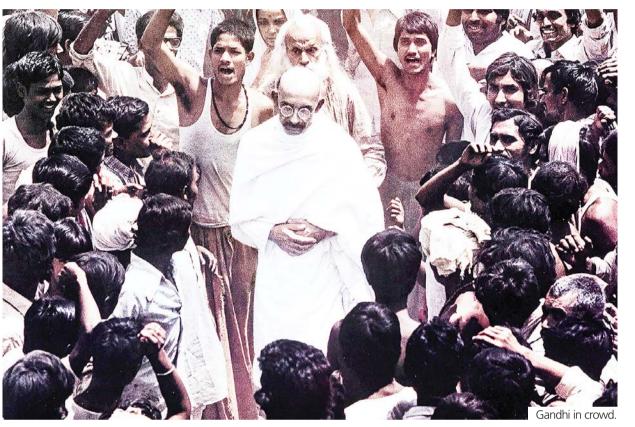
One by one the others joined them. In no time the place was abuzz with food from Bipin's Stall and bottles of country liquor. Downing the liquid in rapid succession they were quite a boisterous "Follow me, Ratnya?" Jatin slurred, "this..."

"Gendo is fasting, let him. He won't kick the bucket in a day or two, will he? Old bones are sturdy he'll last. Meanwhile, in two days we'll clear out all the ragheads. won't we?"

"Yes Jatve, spot on...

"Yeah... g-i-v-e mee.. Ratan could not walk straight when he reached home. "Why?" Jaosoda came at him like a bull at a gate, "Why are you back here? Was there no space for you in Chandravali's love nest?"

"Shut your trap Jasoda! "The frigging bastard won't let me be in peace.. Maa-go!" Ratan flopped in his bed and murmured, "Q-u-i-e-t Jasoda! Shut



"Bhai! Bro? Shame upon you, no good burnt-face monkey! You see a

after Ratan had started snoring. Next morning the rioting picked

Ratan and his chums returned to action big time, complete with sten guns. From the rooftops, on the streets, wherever they were they kept firing towards the Muslim shanties. After almost three hours there was a lull in the firing. The police and military forces had arrived and by afternoon things

were quiet again Vans with loudspeakers were blaring that, unless the riots came to a stop, Gandhiji would cease to be. He would end his life. The peaceniks took out a procession. The violence started to wane.

"That was quite a blast, wasn't it Ratnya?" Jatin was smiling ear to ear when they met in the evening. Ratan simply nodded.

Jaga returned from the paan

Partition riots.

shop with a fresh stock of bidis. "Folks have you heard this? Gendo 'Who said that?" Ratan was star-

"The newspapers have headlined, it seems, that Gendo has refused to relent in his fasting because there's no let-up in the riots.

"Arre that's bullshit!" Jatin reacted. "Two more days of action at this level and all the Mullas will be shown their place." "Hunh!" Ratan nodded unmindfully, "but Gandhi is in such a poor

shape, he'll conk out, they're say-"Arre forget it! Rumour - that's all it is. Come, let's have a toast." "Well then, let's go."

Ratan joined Jatin to open a iquor bottle long before sunset. The tumult in the morning had left him

exhausted. A few drops of hard core liquor might just be the tonic. But Gandhiji? There's something about him... a halo. He had touched the heart of thirty crore men and women. Ardently they cried out, "Mahatma Gandhi ki jai!" All-per vading emperors and powerful lords had not succeeded in intimidating him. Mahatma Gandhi!

At this point Madhu ran up to them. "Hey guys, come fast! I've cornered one of them...'

Suddenly the thirst for blood got the better of him. Sitting bolt upright Ratan said, "Come on The three of them strode forward. Jaga, Haru and Potla were waiting round the corner, a middle

aged Muslim in their grip. They'd

walking down the street lost in

got the better of the man who was

thought. "Please let go of me bhai!" the man pleaded. "Let go of you?" Jaga laughed out



The Enduring Trauma Legacy Of The Partition of India.

"Why? Are you my wife's prother, saala? Does your sister leep with me?

In silence Ratan went up to the nan and grabbed him by his hand. Agitation tinted the blood that was oursing through his body. Blood Unless he spilled blood his head

"Who'll twist the knife in - you? atin asked. Ratan nodded, "Yes." "How many will this be in your

Maybe a score and half..." "Well then, go on. Get over with

"You'll kill me?" The man wailed out, "Please let go of me baba - I mplore vou! Believe me. I have a son at home who is critically ill - I came out only to buy some medicine "Shut up!"

Just then a voice floated across from a loudspeaker being played rom a van: "Gandhiji is in a critical

Ratan pricked up his ears. Jatin ooked towards the van, "Hey, what are thev saving?" "Gandhiji's priceless life is in

your hands today..." the voice was faint but the words were clear. "If vou don't stop killing, Gandhiji will not return to life. Stop now - and

esterday he had visited that I One Man. Short of height, dark of complexion, an octogenarian with a halo about him. A man like the Ocean, like the Himalayas, like the Sun. Boundless his sacrifice; immense his patience, unending hi hope. Forgiveness, compassion, truth, love, ahimsa - he defined all

bring Gandhiji back to life.. The voice receded in the dis-"Go on, finish the job at hand Ratnya," Jaga spoke, "or leave it to

Ratan looked at the man. Instantly the man smiled. "You're determined to kill me, Baba?" "Abey why are you showing your teeth?" Potla rudely demanded. "Kill me," the man said. "But don't forget, killing me means stabbing Gandhiji."

"Shut up!" Jaga roared, "not a word more... Still the man went on, "Listen to me Baba, now I'm not speaking for myself. Don't kill me - let Gandhiji "Enough! Don't want to hear the

devil quote scriptures - hold your "Kick the rascal!" "Go for it Ratnya!" 'What's holding you Ratnya??'

"Go go go... Unexpectedly Ratan turned around. He stood in front of the Muslim guy and said in a deter mined voice, "No." "Meaning?!" Jatin was stupefied

'What're vou saving Ratnva? "You heard me right Jatye - I'll let



"Yes, I'll let this fella go Jatye. If

you try to stop me, you'll have to fell

"Have you gone out of your

mind?!" Jatin couldn't make head or

Ratan didn't reply. Instead he

The two of them took a few steps

Without a pause in his walk

After escorting the fellow to the

Soon the night set in. The curfew

tail of it. "What's the matter. I say?"

addressed the man, "Come Mian, let

you're letting him off? Hey Ratnya?'

Ratan said, "Don't call out to me."

safety of the main street Ratan

hour started. The roads emptied

out. From the lane they could make

out that the military trucks and

police vans were whizzing around

the city. Some light escaped the win-

dows of neighbouring houses. A

handful of faces peeped out now and

then. Swiftly, a dopey silence

engulfed the habitat. The city

seemed to be drained of vigour. The

quented her rounds of the room.

By Rick Kirkman & Jerry Scott

night deepened.

me take you to the high road."

"Ratnya! Hey bugger!"

child, his progeny. He did not punish one for the failings of another. The punishment due to everyone he placed on his own head - a crown of The night deepened and dark-

leaf through the album of his life. Alcohol, meat, women, neglect of a wife like Jasoda, butchery, rioting and killing more than a score of lives... And that enlightened Old Man? He had won the country, the world, in the brief bracket of a life-

At daybreak Ratan rose from his

grinned at him, then wondered, 'Why. vou're not even angry!" "Feeling unwell, are you? So you're missing your Chandravali Brigade! Care for a cup of tea?"

liquor. Such good fortune!" She

"What? Nothing!" Ratan respond-

'Today you didn't down bottles of

Jasoda left to get the tea. Today Ratan was happy to see Jasoda. Amazing! Something was the

matter with him surely. He just could not bring himself to stab the man! One man's life is so precious People were correct about him. They worry for him, to protect him. To save his life, they appeal to all and sundry, even to strangers!

Yesterday he had visited that One Man. Short of height, dark of complexion, an octogenarian with a halo about him. A man like the Ocean, like the Himalayas, like the Boundless his sacrifice immense his patience, unending his truth, love, ahimsa - he defined all these virtues

Magician, he was! He had crazed

yellow gaslights on barren roads thirty crore men and women who chanted in unison 'Gandhiji Ki Jai! parted a ghostlike ambience. The /ictory for Gandhiji!' He has made Jasoda noticed the worry lines them fearless, and independent. on her husband's visage and fre-Yesterday he saw his Ram with his own eyes. It was all rubbish, he was Out of the blue she even asked no one's enemy. He was ajatshatru,

him, "What's the matter with you, his enemy had yet to be born.

not headed towards that sun. He was thinking only of the sun fasting in a dilapidated house in Beliaghata. Ratan would go to him and lay down the bundle of his sins at his feet and pray to him, "Oh sun! Please end the fasting soul within me and light up the inner soul so far deprived of light...

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The night deepened and darkened. Lying in his bed Ratan started to leaf through the album of his life. Alcohol, meat, women, neglect of a wife like Jasoda, butchery, rioting and killing more than a score of lives... And that enlightened Old Man? He had won the country, the world, in the brief bracket of a lifetime.

Everyone in the country was his

Lying in his bed Ratan started to

The night rolled on, towards sun-

bed. He searched through his house and pulled out every piece of hand



them into a bundle. Jasoda was still not up. Ratan cast a silent look at her and stepped out of the house.

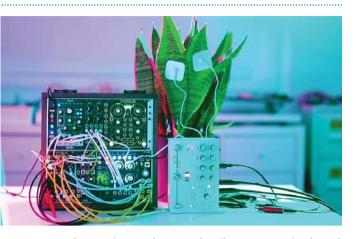
The sky had not yet lit up, but the curfew hours were over. A handful of souls had stirred out on the streets here and there. A few cars had set out for some destination. Ratan took full strides eastward That's the direction from which a red sun would rise. But Ratan was



#BOTANY

Plant Patch

The earlier growers can identify plant diseases or fungal infections, the better able they will be to limit the spread of the disease and preserve their crop



infections-and salinity.

In testing, researchers found the patch was able to detect a viral infection in tomatoes more than a week before growers would be able to detect any visible symptoms of disease.

"This is important because the earlier growers can identify plant diseases or fungal infections, the better able they will be to limit the spread of the disease and preserve their crop," says Qingshan Wei, an assistant professor of chemical and biomolecular engineering at North Carolina State University and corresponding author of a paper in Science Advances.

"In addition, the more quickly growers can identify abiotic stresses, such as irrigation water contaminated by saltwater intrusion, the better able they will be to address relevant challenges and improve crop yield."

The technology builds on a previous prototype patch, which monitors volatile organic compounds (VOCs) emitted by plants to detect disease. Plants emit different combinations of VOCs under different VOCs that are relevant to specific diseases or plant stress, the sensors can alert users to specific problems.

"The new patches incorporate additional sensors, allowing them to monitor temperature, environmental humidity, and the amount of moisture being 'exhaled' by the plants via their leaves," says co-corresponding author Yong Zhu. professor of mechanical and aerospace engineering. The patches themselves

are small-only 30 millimetres long-and consist of a flexible material containing sensors

and silver nanowire-based electrodes. The patches are placed on the underside of eaves, which have a higher density of stomata-the pores that allow the plant to "breathe" by exchanging gases

The researchers tested the patches on tomato plants im greenhouses, and experiment ed with patches that incorpo rated different combinations of sensors. The tomato plants were infected with three dif ferent pathogens: tomato spor ted wilt virus (TSWV); early blight, which is a fungal infection; and late blight, which is also exposed to a variety of abiotic stresses, such as overwatering, drought conditions

lack of light, and high salt concentrations in the water. The researchers took data from these experiments and plugged them into an artificial intelligence program to determine which combina tions of sensors worked most effectively to identify both dis

ease and abiotic stress. "Our results for detecting all of these challenges were promising across the board. Wei says. "For example, we found that using a combination of three sensors on a patch, we were able to detect TSWV four days after the plants were first infected This is a significant advanmally begin to show any phys

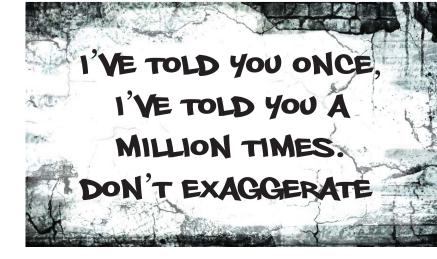
10-14 days." The researchers say they use. First, they need to make the patches wireless-a relatively simple challenge Second, they need to test the patches in the field, outside of greenhouses, to ensure the patches will work under real world conditions.

ical symptoms of TSWV for

This could be a significant help to address food security challenges in a meaningful



THE WALL



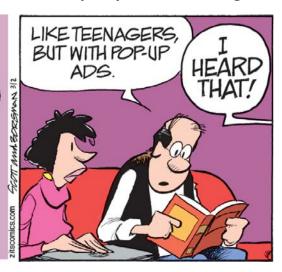
BABY BLUES



ZITS







By Jerry Scott & Jim Borgman