

## #SPACE

### Dim Bulbs

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



Astronomers discovered the first-known exoplanets in the early 1990s, ones often called "pulsar planets." But those worlds orbit 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 very satisfying.

Then planets were found around stars more like our own, "normal" ones stably fusing hydrogen into helium in their cores. But again, nature threw us a curveball: these planets were gas giants-bloated worlds composed mostly of gas, like Jupiter and Saturn, 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 anyone's definition, they're about as un-Earth-like as planets can be.

Eventually, astronomers spotted planets orbiting farther out from their stars, at the right distance and receiving the right amount of light and heat 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-



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 planets like that were found, and statistics were updated.

And until recently, astronomers were missing an other 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, Proxima 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 at least two planets).

Even better, it orbits the star at a distance of about 10 million kilometres. That's close-one fifteenth the distance of Earth from the Sun-but remember, we're talking red dwarf here, and a particularly dinky one. The star is only about 2 percent as luminous as the sun, so the planet gets enough heat to warm it to about negative 20 degrees Celsius. Chilly, sure, but mind you that's if it doesn't have an atmosphere. Without air Earth would be about the same temperature!

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 ubiquity, 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!! (...2)



now what Jattye?" he tried to draw his friend's attention. "Huhh?" "I went for a darshan of Gandhiji today." "Who? Gendo?" "Hanh, Gandhiji." "What was it like?" "I mean... the man seems to be a sadhu." "Seems a sadhu, right? Yes, the fellow has actually done a lot for the country..." "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 spilt all his good actions by pampering and mollycoddling the Muslims, over-indulging them..." "You have hit the nail on its head!"



Gandhi in crowd.

up and keep quiet bhai..." "Bhai! Bro? Shame upon you, no-good burnt-face monkey! You see a brother in me?" Jasoda kept on muttering long after Ratan had started snoring. Next morning the rioting picked up in momentum. 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 Ratnyaa?" Jatin was smiling ear to ear when they met in the evening. Ratan simply nodded. Jaga returned from the paan

## #MOKSHA

shop with a fresh stock of bidis. "Folks have you heard this? Gendo is about to snuff out!" "Who said that?" Ratan was startled. "The newspapers have headlined, it seems, that Gendo has refused to relent in his fasting because there's no let-up in the riots." "Ohh!" "Arre that's bullshit!" Jatin reacted. "Two more days of action at this level and all the Mullas will be shown their place." "Huhh!" Ratan nodded unthinkingly, "but Gandhiji, in such a poor shape, he'll conk out, they're saying..." "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 liquor 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-permeating 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..." "Bastard!" Suddenly the thirst for blood got the better of him. Sitting bolt upright Ratan said, "Come on Jattye." The three of them strode forward. Jaga, Haru and Potla were waiting round the corner, a middle-aged Muslim in their grip. They'd got the better of the man who was walking down the street lost in thought. "Please let go of me bhaji!" the man pleaded. "Let go of you?" Jaga laughed out

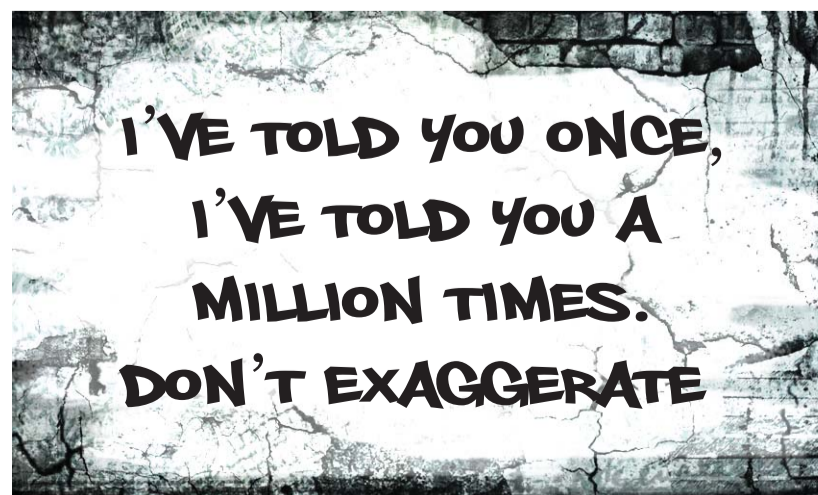


The Enduring Trauma Legacy Of The Partition of India.



Partition riots.

## THE WALL



## BABY BLUES



By Rick Kirkman & Jerry Scott

## ZITS



By Jerry Scott & Jim Borgman



## Feet Week

Feet. They make their place quietly at the bottom of legs. Although they are rather unassuming, feet are vitally important for humans who desire to remain upright! Some people have strong feelings about feet, whether they love them or are a little repulsed by them. But feet have a tendency to be underappreciated, so Feet Week is the ideal time to pay them a little more attention than usual. Proper foot care involves regular washing, trimming nails, wearing comfortable shoes, and keeping them dry. Treat your feet well and they will take you places!



Mahatma Gandhi.

loud, "Why? Are you my wife's brother, saala? Does your sister sleep with me?" In silence Ratan went up to the man and grabbed him by his hand. Agitation tinted the blood that was coursing through his body! Blood! Unless he spilled blood his head might burst! "Who'll twist the knife in - you?" Jatin asked Ratan. "No, Yes." "How many will this be in your count of heads?" "Maybe a score and half..." "Well then, go on. Get over with it." "You'll kill me?" The man wailed out. "Please let go of me baba - I implore you! Believe me, I have a son at home who is critically ill - I came out only to buy some medicine for him..." "Shut up!" Just then a voice floated across from a loudspeaker being played from a van: "Gandhiji is in a critical condition..." Ratan pricked up his ears. Jatin looked towards the van. "Hey, what are they saying?" "Gandhiji's priceless life is in your hands today..." the voice was faint but the words were clear. "If you don't stop killing, Gandhiji will not return to life. Stop now - and

bring Gandhiji back to life..." The voice receded in the distance. "Go on, finish the job at hand Ratnyaa," Jaga spoke, "or leave it to me." Ratan looked at the man. Instantly the man smiled. "You're determined to kill me, Baba?" "Abeey 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 live!" "Enough! Don't want to hear the devil quote scriptures - hold your tongue." "Kick the rascal!" "Go for it Ratnyaa!" "What's holding you Ratnyaa?" "Go go go..." Unexpectedly Ratan turned around. He stood in front of the Muslim guy and said in a determined voice, "No." "Meaning?" Jatin was stupefied. "What're you saying Ratnyaa?" "You heard me right Jattye - I'll let this man walk."

"Nope." "Yes, I'll let this fella go Jattye. If you try to stop me, you'll have to fella me first." All the others moved back a few steps. "Have you gone out of your mind??" Jatin couldn't make head or tail of it. "What's the matter, I say?" Ratan didn't reply. Instead he addressed the man, "Come Mian, let me take you to the high road." The two of them took a few steps forward. "Bah! Won't you even tell us why you're letting him off? Hey Ratnyaa?" "Ratnyaa! Hey bugger!" "Without a pause in his walk Ratan said, "Don't call out to me. After escorting the fellow to the safety of the main street Ratan headed home. Soon the night set in. The curfew 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 windows of neighbouring houses. A handful of faces peeped out now and then. Swiftly, a doze silence engulfed the habitat. "The city seemed to be drained of vigour. The yellow gaslights on barren roads imparted a ghostlike ambience. The night deepened. Jasoda noticed the worry lines on her husband's visage and frequently her rounds of the room. Out of the blue she even asked him, "What's the matter with you, go?" "What? Nothing!" Ratan responded. "Today you didn't down bottles of liquor. Such good fortune!" She grinned at him, then wondered, "Why, you're not even angry?" "Feeling unwell, are you? So you're missing your Chandravali Brigade! Care for a cup of tea?" "Get it." 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 Sun. Boundless his sacrifice; immense his patience, unending his hope. Forgiveness, compassion, truth, love, ahimsa - he defined all these virtues. "Magician, he was! He had crazed thirty crore men and women who chanted in unison 'Gandhiji Ki Jai! Victory for Gandhiji!' He has made them fearless, and independent. Yesterday he saw his Ram with his own eyes. It was all rubbish, he was no one's enemy. He was ajatshatru, his enemy had yet to be born.

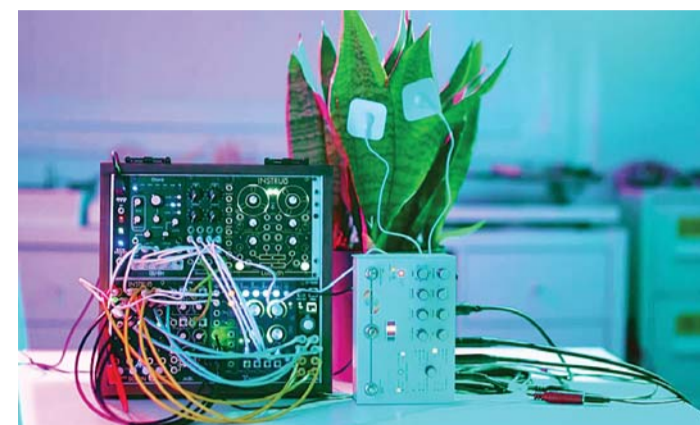


Partition 1947.

## #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



An electronic patch applied to the leaves of plants can monitor crops for different pathogens-such as viral and fungal infections-such as drought or salinity. The researchers tested the patches on tomato plants in greenhouses, and experimented with patches that incorporated different combinations of sensors. The tomato plants were infected with three different pathogens: tomato spotted wilt virus (TSWV); early blight, which is a fungal infection; and late blight, which is a type of pathogen called an oomycete. The plants were also exposed to a variety of abiotic stresses, such as over-watering, 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 combinations of sensors worked most effectively to identify both disease 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 advantage, since tomatoes don't normally begin to show any physical symptoms of TSWV for 10-14 days." The researchers say they are two steps away from having a patch that growers can use. First, they need to make the patches wireless-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. This could be a significant help to address food security challenges in a meaningful way.

