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SUNDAY
22 February 2026
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National Margarita Day: Raising a Toast to the Classic Cocktail

National Margarita Day, celebrated annually on February 22, honours one of the world's most iconic cocktails, the Margarita. A delightful mix of tequila, lime juice, and orange liqueur, often served with a salted rim, this drink has transcended borders to become a symbol of celebration, relaxation, and social connection. From casual gatherings to upscale bars, Margaritas bring people together with their tangy, refreshing taste. The day is a perfect excuse for cocktail enthusiasts to experiment with flavours, try frozen or flavoured variations, and appreciate the artistry behind crafting this timeless beverage.

#STUDY

Brain Surgery on Monarch Butterflies

It turns out that monarchs' magnetic compass is light-dependent, especially sensitive to wavelengths in the ultraviolet-A/ blue range

Every year, millions of monarch butterflies (Danaus plexippus) embark on one of nature's most astonishing migrations, flying up to 2,000 miles from breeding grounds across the United States and Canada to overwintering forests in central Mexico. How creatures with brains smaller than a pinhead accomplish such precise long-distance navigation has puzzled scientists for decades.

A Navigation System Worthy of Study

For a long time, researchers believed monarchs simply used the sun's position to guide their journey. Indeed, the butterflies possess a sun compass, a system integrated with their internal circadian clocks, that helps them maintain direction throughout the day.

But what happens when the sky is cloudy and the sun is hidden? Surprisingly, monarchs still often continue flying in the correct direction. The answer: they also rely on Earth's magnetic field as a backup compass.

Magnetic Compass and What It Means

In controlled laboratory experiments, scientists placed monarch butterflies in a flight simulator surrounded by adjustable magnetic fields. When researchers mimicked the Earth's magnetic inclination, the angle of the magnetic field, the butterflies reliably oriented southward. When that inclination was reversed, the butterflies reversed their direction as well, suggesting they truly sensed the magnetic field and used it for navigation.

This is not just a simple map like GPS, rather, it operates as an inclination compass, giving the butterflies a sense of direction when visual cues are absent.

So Why "Brain Surgery"?

The phrase 'brain surgery on monarch butterflies' has appeared in discussions and media because scientists sometimes use microscopic surgical tools and tiny electrodes to study neural activity. Monarch butterfly brains are incredibly small, only a few millimeters across, so attaching fine electrodes to record signals or stimulate neural circuits is highly delicate work. Posts on research forums sometimes exaggerate this to brain surgery, but the reality is precise electrophysiological recording at a scale tiny enough to require instruments as fine as human hair.

These experiments aim to pinpoint which neurons respond to magnetic or light cues and how brain circuits integrate that information, a necessary step before we fully understand their navigational 'sixth sense.'

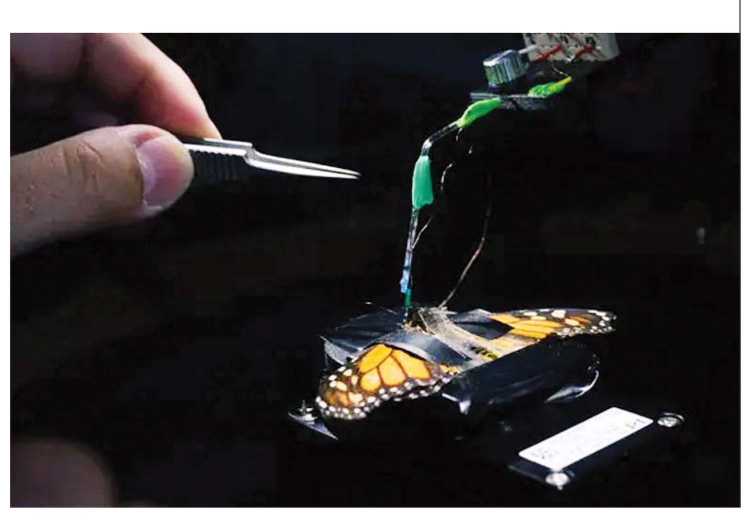
The Role of Light and the Brain

It turns out that monarchs' magnetic compass is light-dependent, especially sensitive to wavelengths in the ultraviolet-A/ blue range. Butterflies exposed only to light above 420 nanometers, excluding these shorter wavelengths, lose their sense of direction and fly aimlessly.

Meanwhile, the central brain regions, particularly the central complex, contain networks involved in processing directional information. Modern neural recording studies continue to explore how these networks encode compass cues. Interestingly, earlier research even pointed to the antennae as crucial components of the navigation system: removing or obscuring them disrupts orientation, indicating that critical sensory processing doesn't happen only in the brain.

Why It Matters

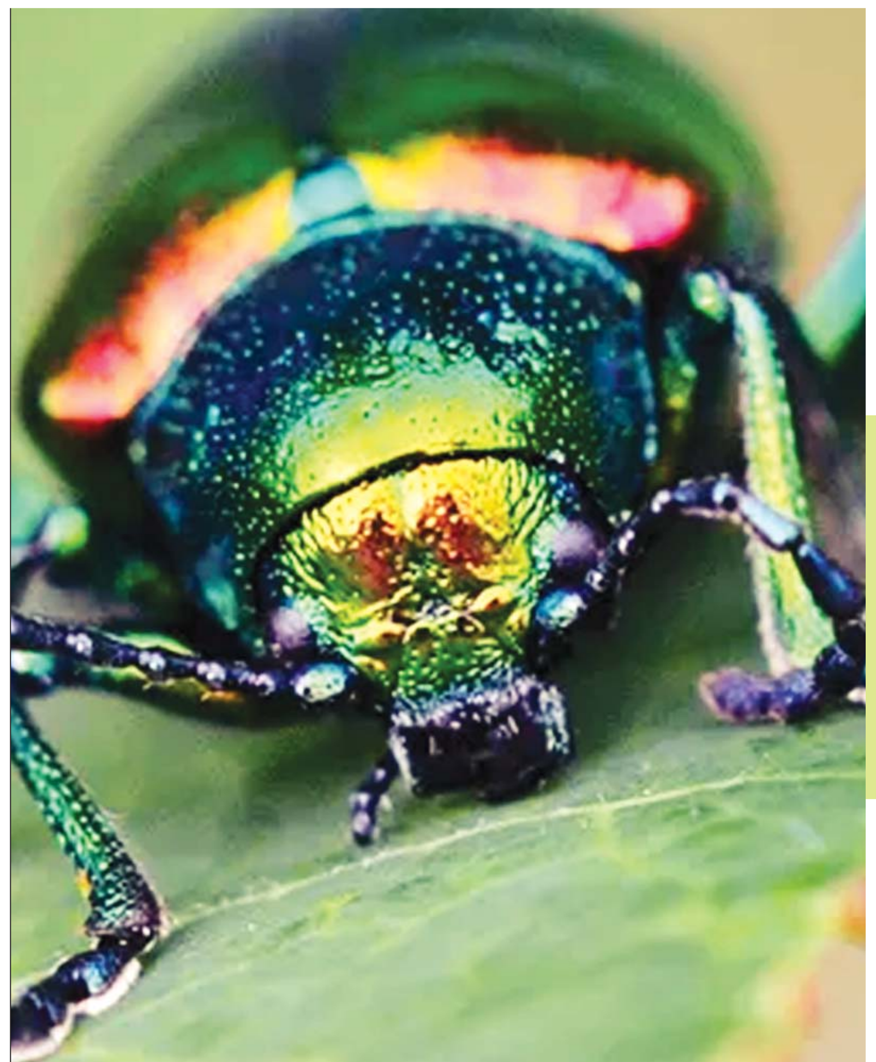
Monarch butterflies are icons of migration, tiny beings traveling incredible distances, guided by instincts wired deep into their neural circuits. As scientists refine techniques akin to microscopic surgery and record brain activity with ultra-fine electrodes, each discovery brings us closer to understanding not just how monarchs navigate, but also how brains, big and small, make sense of the world. There's still much left to explore, and that journey is as fascinating as the monarchs' own.



Eating Poisons and Not Dying!

As some animals evolved to become toxic, they also rewired their bodies to avoid poisoning themselves. The same thing happened to creatures they eat, and others that eat them. The best studied of these adaptations involves changes to the proteins that are normally disabled by the toxins so that they're now resistant.

#NATURE



The Dogbane beetle has gone a step further, storing the toxin in its body and excreting it onto its back for self-defense when it feels threatened.

The skin of the three-striped poison Dart Frog, Ameerega trivittata, contains a cocktail of lethal toxins.

● Bulbul Joshi

Collected from the Colombian Amazon, they had been without food for several days in captivity, then were presented with extremely unappetizing prey: three-striped poison dart frogs (Ameerega trivittata). The skin of those frogs contains deadly toxins that interfere with essential cell proteins.

Six of the royal ground snakes (Erythrolamprus reginae) preferred to go hungry rather than risk the amphibians' poison. The other four intrepidly slithered in for the kill. But before swallowing their meals, they dragged the frogs across the ground, akin to the way some birds rub toxins off their prey, noted biologist Valeria Ramírez Castañeda of the University of California, Berkeley, and her colleagues, who conducted the experiment.

And many get their toxins through food, examples are poison frogs, which devour toxin-containing insects and mites. These frogs include the three-striped poison dart frogs that were fed to the ground snakes.

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For example, insects that grow and feed on milkweed plants, which are rich in toxic glycosides, have evolved sodium-potassium pumps that the glycoside cannot bind to.

But changing a vital molecule can create complications for a creature, says molecular biologist Susanne Dobler of Hamburg University in Germany. In her studies with the large milkweed bug, which feeds on milkweed seeds, she's found that the more glycoside-resistant the insect's pump becomes, the less efficient it is. And that's a problem in nerve cells, where the pump is especially critical. The bug seems to have evolved a way around the problem. In a 2023 study, Dobler and colleagues studied toxin resistance across three versions of the pump made by the creature. They learned that the most functional one, in the brain, is also the most toxin-sensitive one. The milkweed bug must have evolved other ways to safeguard the brain from glycosides, Dobler says.

She suspects that proteins called ABCB transporters are involved. These sit in cell membranes and shunt waste and other unwanted products out of cells. She has found that certain hawk moths use ABCB transporter proteins situated around their nerve tissues to shuttle cardiac glycosides out of cells. Maybe, the milkweed bug is doing something similar.

Dobler is also testing a hypothesis that many insects have ABCB transporters in the membranes of their guts, stopping toxic substances from getting into the body to begin with. That could explain how the bright red onion beetle, which feeds on glycoside-rich lily of the valley, is seemingly unfazed by the toxins and merely excretes them. Its resulting toxic feces have the benefit of repelling predatory ants, Dobler reported in 2023.

For the royal ground snakes, the liver seems to be key. From cell culture experiments, Tarvin's team has evidence that something in the snake liver protects against toxins of three-striped poison dart frogs. The team hypothesizes that the snakes have enzymes that convert the deadly substances into non-toxic forms, much as human bodies do with alcohol and nicotine. A snake's liver may also contain proteins that stick to toxins and render them unable to bind to their targets, essentially mopping them up like sponges. Scientists have discovered such 'toxin sponge' proteins in the blood of some poison frogs, enabling them to resist the deadly toxins they get from their diets.

California ground squirrels seem to use a similar trick to defend themselves against rattlesnake venom, a cocktail of dozens of toxins that destroy blood vessel walls, prevent blood from clotting and more. Ground squirrel blood contains proteins that block some of these toxins, like the proteins that rattlers use to protect themselves, should venom escape their specialized venom glands. The composition of venom differs across snake populations, and evolutionary biologist Matthew Holding of the University of Michigan has evidence that the ground squirrels' antivenom mix is tailored to match the toxins of local snakes.

Such defenses aren't bulletproof. Rattlesnakes are constantly evolving new venoms to overcome the squirrels' defenses, Holding says, and even a rattler will die if injected with enough of its own venom.

That's why animals, even resistant ones, try, as a first defensive step, to avoid toxins. Hence, the frog-dragging behaviour of ground snakes in the experiment, and the practice of some turtles to consume only the belly skin and innards of toxic newts, not the deadly back skin. Even insects like monarch caterpillars that are resistant to cardiac glycosides will, early in their lives, nick the veins of milkweed plants to drain out the toxic fluid before tucking into the plant.

Co-opting toxins

Many animals also find ways to safely store toxic chemicals they consume and use them for their own purposes. The iridescent dogbane beetle, for example, gets cardiac glycosides by eating its host plants, then shuttles them onto its back for self-defense. "When you somehow annoy these beetles, you can see little droplets appear on their elytra," surfaces on their backs, Dobler says. Through this kind of poison co-opting, some insects become dependent on their host plants for survival. The relationship between the monarch butterfly and the milkweed plant is a prime example, and a prime example, too, of the long reach that such intertwined connections may have. In a 2021 study, evolutionary biologist and geneticist Noah Whiteman of UC Berkeley and a colleague identified four animals that have evolved to tolerate cardiac glycosides, allowing them to feed on monarchs. One is the black-headed grosbeak, a bird that feasts on monarchs in Mexico's mountain-top fir forests where the butterflies fly south to overwinter.

Think of it, Whiteman says: "A toxin that was assembled in a milkweed plant on an Ontario prairie has helped to shape the biology of a bird so that it may safely dine in a forest thousands of miles away." "It's just amazing," he says, "the journey traveled by this small molecule and the influence that it has on evolution."

Three of the four snakes survived, suggesting their bodies were capable of handling the toxins that remained. Researchers detailed the experiment in a preprint paper, which has not been peer-reviewed, posted to EcoEvoRxiv this summer.

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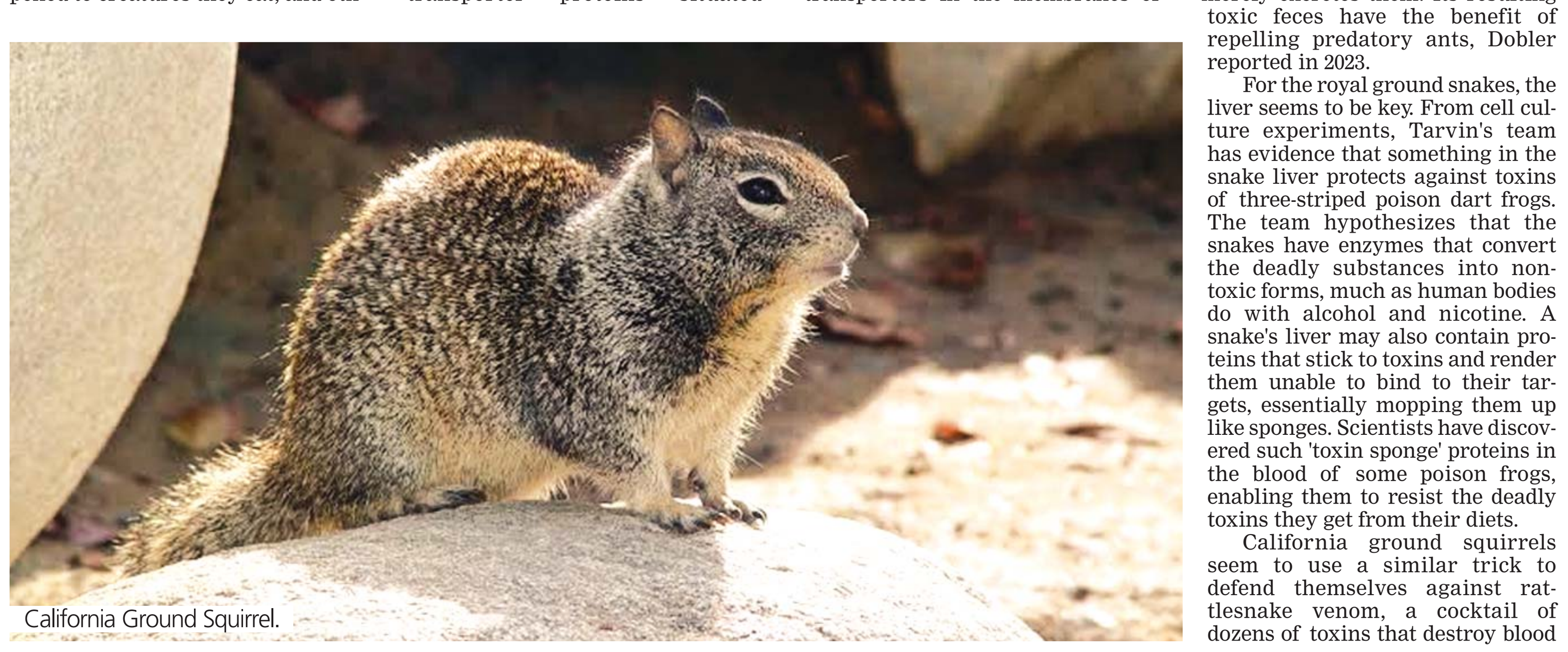


California Ground Squirrel.

Poison Frog.

#MOVIES

When Mr. & Mrs. '55 Quietly Changed Hindi Cinema

By the end of the year, Mr. & Mrs. '55 stood at 4th place in box-office earnings, a remarkable achievement for a film once written off as frivolous

On 29 April 1955, at Swastik Cinema, Mumbai, a film premiered that no one quite knew how to judge. It wasn't treated like a serious cinematic event. Some dismissed it as an absurd comedy, others called it a waste of money and time. Few could have imagined that this very film would go on to become a cult classic and one of the defining works of Guru Dutt. That film was *Mr.& Mrs. '55.*

An Unusual Beginning

At the time of its release, Guru Dutt was not yet the towering auteur he would later become. In fact, Mr. & Mrs. '55 was almost not considered a 'proper' film at all. Its tone was light, its humour sharp, and its ideas dangerously modern. Critics were unsure. The premiere response was lukewarm, filled with a polite curiosity rather than excitement. The common refrain was: "Let's see what the public says." Little did they know.

Beauty, Redefined

The film starred Madhubala, whose beauty was already legendary. Yet, Guru Dutt did something radical. This was not merely a film that worshipped her looks, it questioned the very idea of beauty.

The film was undeniably hero-centric, and another beautiful woman was deliberately placed in a side role, almost as if the film was teasing the audience: "You think you know what beauty is, but you really don't." Beauty here was layered with intelligence, independence, and vulnerability.

Bold for Its Time

In an era dominated by Raj Kapoor's romantic idealism and Dilip Kumar's tragic intensity, Guru Dutt carved his own space. Mr. & Mrs. '55 tackled taboo themes, particularly modern marriage, women's rights, and contractual relationships, wrapped in humour and romance. The story revolved around a contract marriage: a practical arrangement between two strangers that gradually, and quite unexpectedly, turns into genuine love. The idea itself was bold, even unsettling, for a conservative society. Yet, Guru Dutt presented it with such warmth and wit that it felt revolutionary rather than offensive.

Abrar Alvi's concept of modern marriage gave the film its edge, offbeat, intelligent, and far ahead of its time.

Casting Choices and Creative Risks

Interestingly, Guru Dutt initially wanted to cast a new actor for the male lead. Sunil Dutt was among the first choices considered. But fate intervened, and Guru Dutt decided to play the role himself, an understated, charming performance that became iconic. Supporting performances added sparkle, especially Johnny Walker, whose comic timing elevated the film's humour, and Beena Rai (often referred to as Baneeta Bhatt), who balanced glamour with grace.

Music That Took Over the Streets

While critics hesitated, the songs told a different story. The music of Mr. & Mrs. '55 became wildly popular due to:

- O. P. Nayyar's vibrant compositions
- Lyrics by Majrooh Sultanpuri
- Voices of Mohammed Rafi and Geeta Dutt

Together, they created melodies that lingered far beyond the cinema halls. The soundtrack played on radios, in homes, and on the streets, slowly pulling audiences into theatres.

From 'Okay' to Outstanding

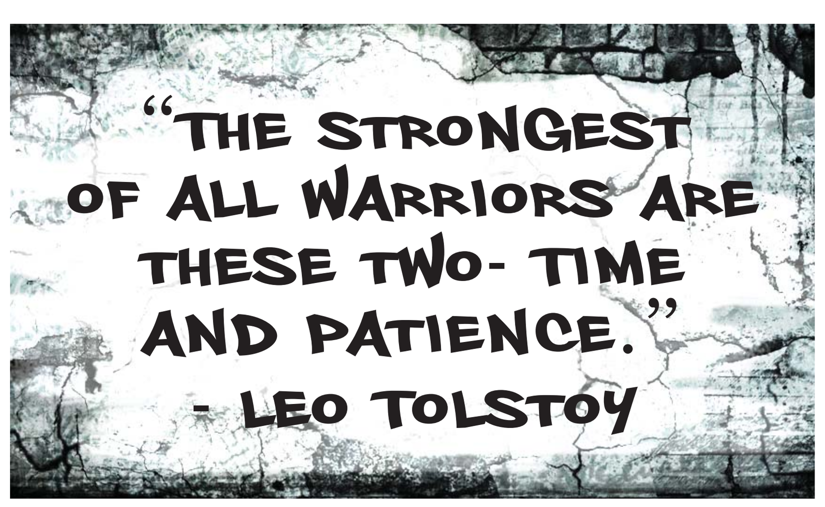
Commercially, the film surprised everyone. By the end of the year, Mr. & Mrs. '55 stood at 4th place in box-office earnings, a remarkable achievement for a film once written off as frivolous. More importantly, it earned something rarer: lasting relevance. Its offbeat plot, playful yet profound storytelling, inventive direction, and unforgettable music turned it into a romantic musical hit and, eventually, a cult classic.

The Quiet Revolution

What premiered as a modest, almost underestimated film on 29 April 1955 became a turning point. Mr. & Mrs. '55 proved that comedy could be intelligent, romance could be progressive, and cinema could question society while still entertaining it.

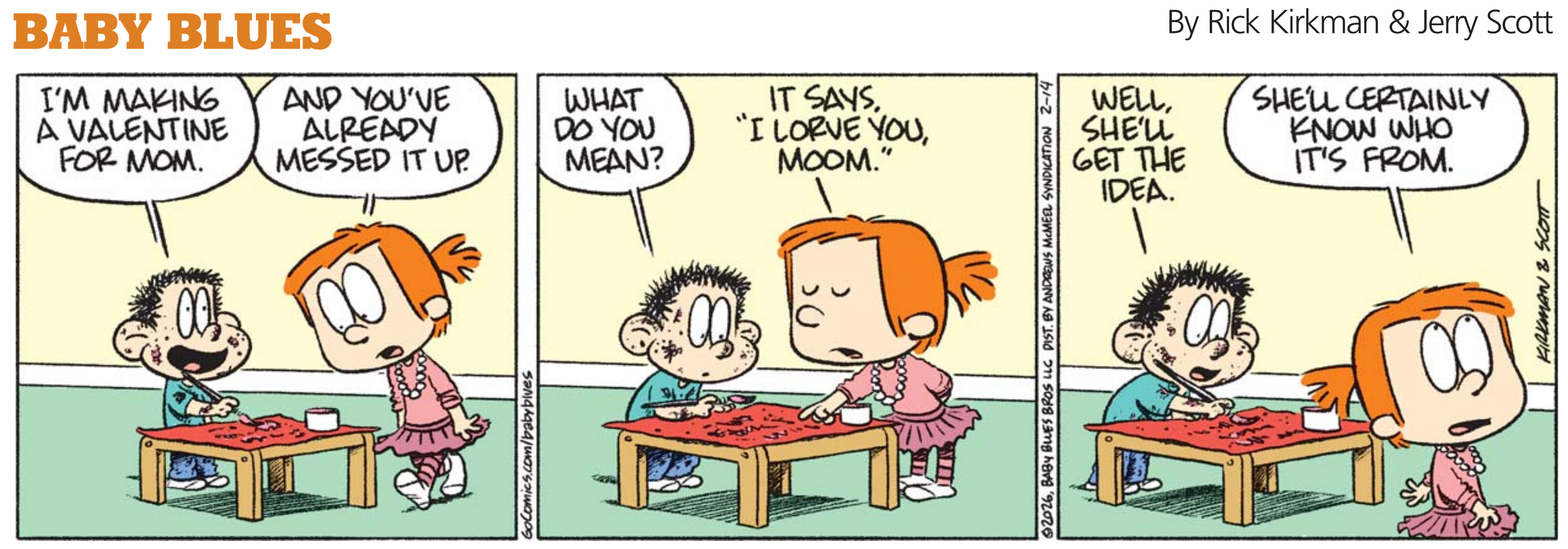
Guru Dutt didn't shout his revolution, he smiled, sang, and let the audience discover it on their own. And that made all the difference.

THE WALL



BABY BLUES

By Rick Kirkman & Jerry Scott



ZITS

By Jerry Scott & Jim Borgman