

### #FELINOLOGY

## Yes, Cats are Liquids

Pet felines seem much less aware of their bodies when it comes to vertical squeezes



Cats are liquids, at least according to a running joke on the internet, where videos abound of supposedly solid pet felines oozing under doors, spilling into vases, and pouring through impossibly small holes. Even Google's artificial intelligence overview says that *kitties* can be classified as fluids.

But do cats think of themselves as liquid-like entities that can slip through nearly any opening? Do they know how tall and wide they are, for example, mental ability scientists call 'body size awareness'?

Peter Pongracz recently visited several homes around Budapest, Hungary, to find out. An ethnologist at Eotvos Lorand University, he's spent years researching the feline mind. He's shown, for example, that like dogs, cats understand what we mean when we point, or even gaze, at something, a complex reading of our body language that eludes many species. But how much do cats know about their own bodies?

A few years ago, Pongracz asked that question of dogs. He and his colleagues brought various breeds into a laboratory room, bifurcated by a wood panel with an adjustable rectangular opening. "Dogs sat on one side, and their owners called them from the other. When the opening was large, the dogs trotted right through. But when it got tight, about as wide as the dogs' chests and half their height at the shoulders, the canines hesitated and stopped. They seemed to know, or at least fear, that they were too big to squeeze through, a clear sign of body size awareness," Pongracz says.

Testing cats proved trickier. Felines are notoriously difficult to study in the lab, as Pongracz himself discovered a while back, when one escaped into an air duct during an experiment. So, in the new study, he tested the animals in their own homes. The



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The *Shradha paksha* is here, and *Hindu* families are doing their rituals as per *shastra*. But do you know that Hindus are not the only people who pay debts to their departed? Other societies do it and ritualistically.

Traditions for appeasement of souls of ancestors after death exist not only in *Bharat* but also in foreign countries. Though this concept is not scientific, at least it is meant to express gratitude unto them. Some foreigners even come to *Bharat* to perform the rituals of *pitradan* and *tarpan* to liberate the souls of their near and dear ones. There are many traditions for this and all have food as the central offering.

### Zoroastrianism (Parsi)

*Parsi* dedicate the last nine days of their year for the liberation of their deceased forefathers. The tenth day is *Pateti*, the beginning of their new year. They believe that the soul is eternal, just as in the *Hindu* culture. In the Holy text, the *Avesta*, they are referred to as '*fravashi*'. It is believed that when there is a famine, it is they who bring water from the lakes in heaven for their descendants on the earth. So, to appease their souls, they perform different rites in the last nine days of the year and culminate it by celebrating the new year, *Pateti*. As fire is their chief deity of worship, *Parsi* worship fire. They offer sandalwood in burning fire. According to a scholar, the word '*pateti*' was actually '*papeti*', meaning the day when one is cleansed of sins. This usually falls in August.

### Roman Catholics

In USA and various Latin American and European countries, there is a tradition of appeasing deceased ancestors in the month of November. Though associated with souls of deceased forefathers, it is celebrated as a festival. This celebration continues from the evening of October 31 and concludes on the night of November 2nd. On the evening of October 31st is Halloween. All Saints' Day is celebrated on 1st November and All Souls' Day on 2nd November. This period is also called the *Holy month* (sacred period).

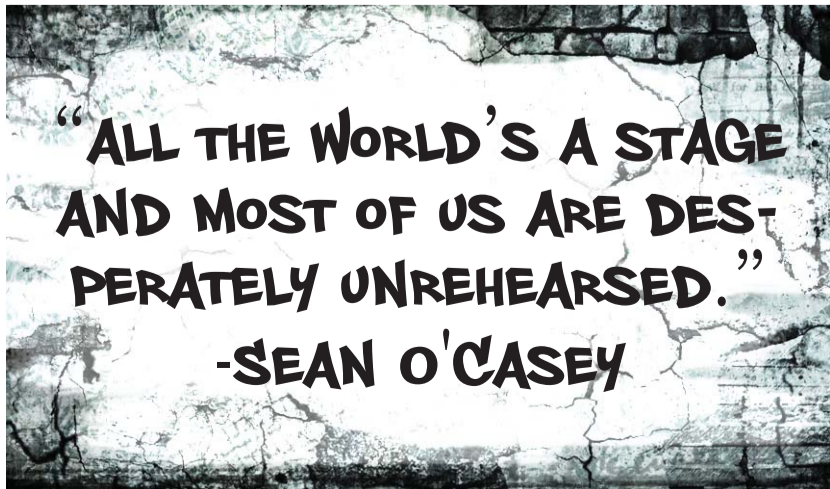
Though this is a festivity from the Christian religion, its roots are linked with the Roman civilisation before Christ when idol worship was practised. The Romans would celebrate a festival called *Lemuria* along with group sacrifice to appease deceased ancestors. They would offer cake and wine and prayers to them in the cemetery.

Yet, unlike the dogs, the cats kept going even after their initial wavering. They eventually pushed themselves through the aperture, even when it was a slit merely half their height. "Unlike dogs," Pongracz says, "cats never stop trying."

Something even more remarkable happened when Pongracz shrunk only the width of the aperture, keeping the height comfortable. No matter how narrow the rectangle got, at the extreme, barely half the width of the cats' bodies, the felines never hesitated. "There was no slowing down at all as they squeezed through," Pongracz says. "They don't use body awareness in this case. They're basically like liquids."

"One explanation may be simple anatomy," says Ivan Khvatov, a psychologist at the Moscow Institute of Psychoanalysis, who has studied body size awareness in various species. "Dogs have a less flexible body," he says, "so they're going to be thinking a lot more about their own measurements when confronted with a hole. Cats are more malleable," he says, "so, they only need to think about their body size in certain circumstances."

### THE WALL



With passage of time, the Church declared this as 'All Souls' Day' and started celebrating it on November 2nd.

### All Saints' Day

On this day, all deceased ancestors and saints are remembered. In fact, it is a public holiday.

### All Souls' Day

On this day, prayers are offered for cleansing of sins of deceased ancestors, known and unknown, who have not attained heaven. In some countries, there is a practice of baking a cake called 'soul cake' to welcome deceased ancestors. These people believe that eating this cake makes deceased ancestors in other regions, happy and peaceful.

### Buddhism

Based on the Buddhist and Tao traditions of China, the ghost festival or *Yulan* festival is celebrated on the 15th day of the 7th month of the calendar between August and September. This is labelled as the 'ghost month.' It is believed that during this period, the souls of deceased ancestors, residing in heaven and hell, return to the earth. Efforts are made by their families to relieve them of their sorrows. As per custom, along with lighting of frankincense and burning of joss paper (created from bamboo paper and symbolising a soul), food (mostly vegetarian) is offered to them. When serving them, a seat is kept for them as if they are physically present there. At night, paper boats and lanterns are released into the water, signifying that ancestors are being shown the way. Most Buddhist countries celebrate this festival with some regional variations.

### Belgium

As it is not a public holiday on All Souls' Day, people here, visit the graveyard on All Saints' Day to offer prayers for their dead relatives and light lamps on their graves.

### Portugal

On November 2nd, the entire family visits the grave of the dead relative and offers prayers. In the evening, children visit homes in a group where they are given cake and sweets.

### Germany

In Germany designs are sketched on cold powder spread on the ground, and graves are decorated with flower garlands. Then, there are group prayers.

### France

In France, at the end of the night church prayer service, people are expected to talk about their deceased ancestors. Thereafter, at their homes, they spread out juices, yoghurt and food delicacies on a new white tablecloth, spread out in the dining room and decorate it. In the nearby fireplace, they burn a big log of wood and retire for the day. After sometime, professional musicians play music to wake them up and bless them on behalf of their deceased ancestors. All the spread of food is then given to the chief musician.



Families bring cooked dishes to places of worship in Cambodia.

# Remembering Ancestors World-over

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In Bharat, as per Scriptures, new moon day (*amavasya*) is a day which is most dear to souls of deceased ancestors.

### #TRADITION

#### Latin America

Brazil, Argentina, Bolivia, Chile, Peru, Uruguay are some of the countries which comprise Latin America. On November 2nd, these people visit the graveyard and offer flowers at the graves of their deceased ancestors.

#### Guatemala

On this day, a stew is prepared from meat and vegetables, and offered at the grave of the deceased. There is a special programme of flying kites, signifying union with the souls of the dead.

#### Mexico

In this country, this is known as the day of the dead, *Al deo de los muertos*, as the original festival was celebrated 3000 years BC and is believed to be that of idol worshippers named 'otzek'. Spain invaded this country and destroyed this tradition. Today, it is celebrated in the mixed Mexican, European and Spanish cultures. Prayers are offered to those who have passed away in childhood, on November 1 and for adults, on November 2.

## Tradition of 'worshipping ancestors' in Asian countries as well

Other than Bharat, in the Asian subcontinent, worship of ancestors in some form or the other is prevalent. In most places, specific actions are performed to invoke deceased ancestors.

#### China

Based on the Han tradition of China and the solar calendar for 2500 years, the *Ching Ming* festival is celebrated in memory of deceased ancestors. This festival is celebrated approximately from 4th to 6th April. First, the graves of the ancestors are cleaned and offered traditional foods. Then, fragrant incense sticks are lit and joss paper is burnt. This is done in China, Taiwan, Malaysia, Hong Kong, Singapore and Indonesia.

#### Japan

Here, it is called the *Bon* Festival. In the Buddhist *Kampuchean* tradition, it is celebrated in honour of forefathers. It is believed that during this period, these souls leave their original places and come to the prayer place in the house of their relatives. The whole family comes together in the ancestral home, cleans the graves of their ancestors and offers incense there. This is celebrated annually for three days between 8th August and 7th September. In Japan, it assumes the form of a 'festival of lights.' The Japanese believe that if lamps are not lit, then their ancestors will find it difficult to find the way to their homes.

During this period, the dance *Bon adori* is performed. The legend underlying this dance is that a disciple of Gautam Buddha, *Mahamugdalyan* (Mokuren) became sad after he saw through divine vision that his dead mother, instead of being liberated after death, was trapped in the

clutches of ghosts. In this state of sorrow, he went to Buddha and asked him how to get her released from their clutches, after which he saw her being released from them. Elated, he started dancing. The tradition of dancing 'bon adori' or 'bon dance' commenced from this juncture.

#### Cambodia

In Buddhist tradition, *Pchum Ben* is known as the 'Ancestors day'. This rite is performed on the 15th day of the 10th month of the calendar as per *Khmer* tradition. This ritual is performed between 23rd September and 12th October, which is declared a public holiday.

In this ritual, relatives and ancestors of upto seven generations are honoured. For a fortnight, every day, cooked food is taken to the place of worship. Balls of rice (*parida*) are thrown into open fields and in the air. Families bring cooked food to places of worship in Cambodia. Every family offers food (cooked rice) to Buddhist monks, as they believe that the merit, so incurred, benefits their deceased ancestors living in the subtle world. These monks remain awake, chanting all night and perform a cumbersome rite for these ancestors.

#### Sri Lanka

Here, as per Buddhist tradition, the dead are offered food on the 7th day, 3rd month and on completion of a year after death. This is called '*Maakadanya*'. In comparison with the merits

incurred by donation of food, those souls are believed to get appropriate things in the respective regions of existence. The family believes that souls, who could not reach these regions, wander and torment living beings through different illnesses and calamities. Hence, Buddhist monks are invited to perform a ritual for protection from such souls.

#### Myanmar (Brahmadesh)

Here the festival is celebrated as a melancholic event, exactly the opposite of what is done in Japan. From morning till night, people cry and wail in their homes. Only those who have lost at least one relative in the past three years are allowed to participate in this condolence meeting. In Myanmar, this festival is celebrated either at the end of August or at the beginning of September, and includes offering of food and clothes.

#### Philippines

In this country, before being made a colony by Spain, the religion of *Animatism*, which believed that a subtle world, equivalent to the earth with souls (which they called *mito*), existed. *Omitos* are souls of our ancestors and influence the life of living beings. The *Pegonaito* function celebrated there is a kind of spiritual event, in which the traditional *shaman* (an individual capable of communicating with souls of the deceased) communicates with souls. This is celebrated on 19th February.

### Farm Animal Awareness Week

Farm Animal Awareness Week highlights the importance of recognizing the lives of animals that provide food for us. This week aims to educate the public about the conditions that these animals face and to promote better treatment. Many animals are kept in cramped, unsanitary spaces, which can lead to health problems. The goal is to inspire people to think more about how their food choices impact these animals. This week's key concept is raising awareness about farm animals' welfare. It encourages people to consider more humane options when purchasing food.



The *Matsya Puran* gives a tale to elaborate the importance of this date. It makes a mention of the *Achchhod* lake and river, which presently exist in Kashmir.

अचछोद नाम धरो नु मानवी कल्याण मदी ॥  
अचछोद नाम च चरः विगमिर्निर्मित पुरा  
अमोक्ष नु कलः  
कोके दिवत कस्तुरिकावन्म ॥

### *Matsya Puran*, Chapter 14, Holy verses 2 and 3

Meaning : River *Achchhod* flows where the descendants of *Bhugwan Marichi* reside. She is the adopted daughter of the messengers of ancestors. In ancient times, ancestors had created a lake named *Achchhod*, there. Before that *Achchhod*, the adopted daughter of *Agnishvatta* had performed intense austerities here for a 1000 years.

Kashmir is an ancient state from Bharat. Marichi's son, *Kashyap*, was formerly named *Kashyapappar* or *Kashemart*. The *Matsya Puran* states that at a place called *Sompeth*, the son of Marichi lived, with the messengers of the deceased ancestors of the Deity *Agnishvatta*. With passage of time, *Achchhod*, the adopted daughter of *Agnishvatta*, performed intense austerities for 1000 years. Pleased with her penance, messengers of the deceased ancestors, beautiful and radiant like deities, came to bless her. Enticed by their beauty, she



All Souls' Day offerings in France.

got attracted to an ancestor named *Amavasu*. As this was a sin, *Amavasu* rejected and cursed her. The day that *Amavasu* spurned her sexual passion due to his virtue of 'remaining within his limits' came to be known as *Amavasya*. Ever since, it became the most favourite date, as per *Hindu lunar* calendar, for deceased ancestors.

There is an interesting anecdote related to *piru tarpan*.

As per an ancient story after *Karna*'s death, when his soul reached heaven, he was given ample gold and ornaments as food. He asked Deity *Indra* why he was given gold, instead of food, upon which he replied, "When you were alive, throughout your life, you donated gold, never offered food to your deceased ancestors." *Karna* then expressed ignorance about having to serve food to deceased ancestors. So, he was granted an opportunity to rectify his mistake and was sent back to the earth for 16 days in the fortnight for ancestors. When he returned to the earth, he offered food and water in memory of his ancestors.

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### #PHYSICS

# New 'Dawn' For Superconductivity

Scientists have been pursuing this breakthrough in condensed matter physics for more than a century

In a historic achievement, researchers have created a superconducting material at both a temperature and pressure, low enough for practical applications. "With this material, the dawn of ambient superconductivity and applied technologies has arrived," according to a team led by Ranga Dias, an assistant professor of Mechanical Engineering and of Physics at the University of Rochester.

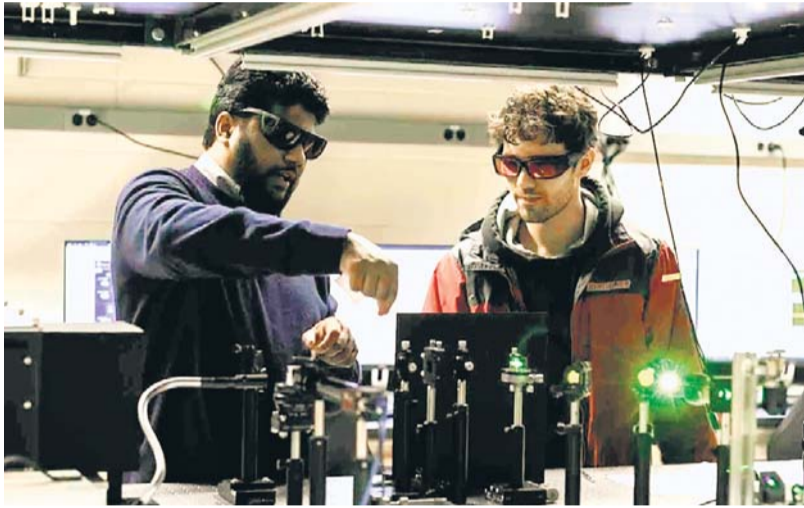
In a paper in *Nature*, the researchers describe a nitrogen-doped lutetium hydride (NDLH) that exhibits superconductivity at 69 degrees Fahrenheit and 10 kilobars (145,000 pounds per square inch, or PSI) of pressure.

Although 145,000 PSI might still seem extraordinarily high (pressure at sea level is about 15 PSI), strain engineering techniques, routinely used in chip manufacturing, for example, incorporate materials held together by internal chemical pressures that are even higher.

Scientists have been pursuing this breakthrough in condensed matter physics for more than a century. Superconducting materials have two key properties, electrical resistance vanishes, and the magnetic fields, that are expelled, pass around the superconducting material. Such materials could enable power grids that transmit electricity without the loss of up to 200 million megawatt hours (MWh) of the energy, that now occurs due to resistance in the wires.

Previously, the researchers reported creating two materials, carbonaceous sulphur hydride and yttrium superhydride, that are superconducting at 58 degrees Fahrenheit/ 39 million PSI and 12 degrees Fahrenheit/ 26 million PSI, respectively, in papers in *Nature* and *Physical Review Letters*.

Given the importance of the new discovery, Dias and his team went to unusual lengths to document their research and head off criticism that developed in the wake of the previous *Nature* paper, which led to a retraction by the journal's editors. That previous paper has been resubmitted to *Nature* with new data that validates the earlier work, according to Dias. The new data was collected outside the lab, at the Argonne and Brookhaven



National Laboratories, in front of an audience of scientists, who saw the superconducting transition live. A similar approach has been taken with the new paper.

Hydrides, created by combining rare earth metals with hydrogen, then, adding nitrogen or carbon, have provided researchers a tantalizing 'working recipe' for creating superconducting materials in recent years. In technical terms, rare earth metal hydrides form clathrate-like cage structures, where the rare earth metal ions act as carrier donors, providing sufficient electrons that would enhance the dis-

sociation of the H2 molecules. Nitrogen and carbon help stabilize materials. Bottom line is that less pressure is required for superconductivity to occur. So, this time, Dias looked elsewhere along the periodic table.

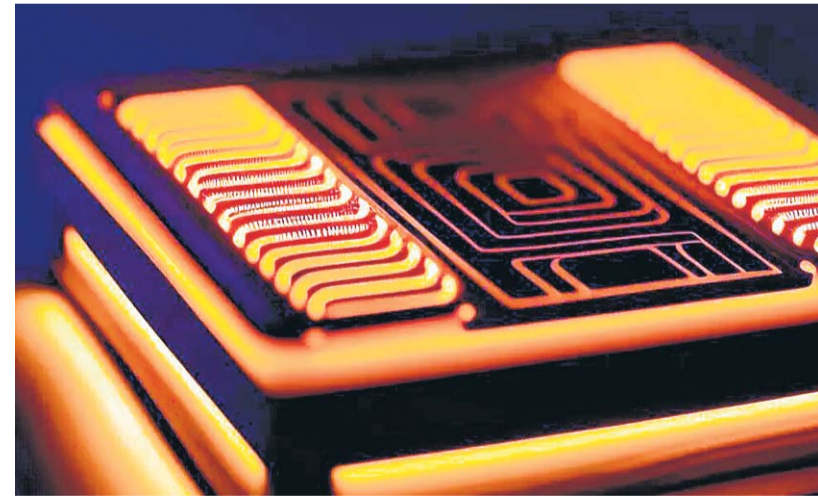
"Lutetium looked like a good candidate to try," Dias says. It has highly localized, fully-filled 14 electrons in its f orbital configuration, that suppress the phonon softening, and provide enhancement to the electron-phonon coupling, needed for superconductivity to take place at ambient temperatures. "The key question was, how are we going to stabilize this to lower the required pressure? And that's where nitrogen came into the picture."

Nitrogen, like carbon, has a rigid atomic structure that can be used to create a more stable, cage-like lattice within a material and it hardens the low-frequency optical phonons, according to Dias. This structure provides stability for superconductivity to occur at lower pressure. Dias's team created a gas mixture of 99% hydrogen and 1% nitrogen, placed it in a reaction chamber with a pure sample of lutetium, and let the components react for two to three days at 392 degrees Fahrenheit.

The resulting lutetium-nitrogen-hydrogen compound was initially a 'lustrous bluish colour,' the paper states. When the compound was then compressed in a diamond anvils cell, a 'startling visual transformation' occurred, from blue to pink at the onset of superconductivity, and then to a bright red non-superconducting metallic state.

"It was a very bright red," Dias says. "I was shocked to see colours of this intensity. We humorously suggested a code name for the material at this state 'reddmatter,' after a material that Spock created in the popular 2009 *Star Trek* movie." The code name stuck.

The 145,000 PSI of pressure required to induce superconductivity is nearly two orders of magnitude lower than the previous low pressure created in Dias's lab. "A pathway to superconducting consumer electronics, energy transfer lines, transportation, and significant improvements of magnetic confinement for fusion are now a reality," Dias says. "We believe that we are now at the modern superconducting era."

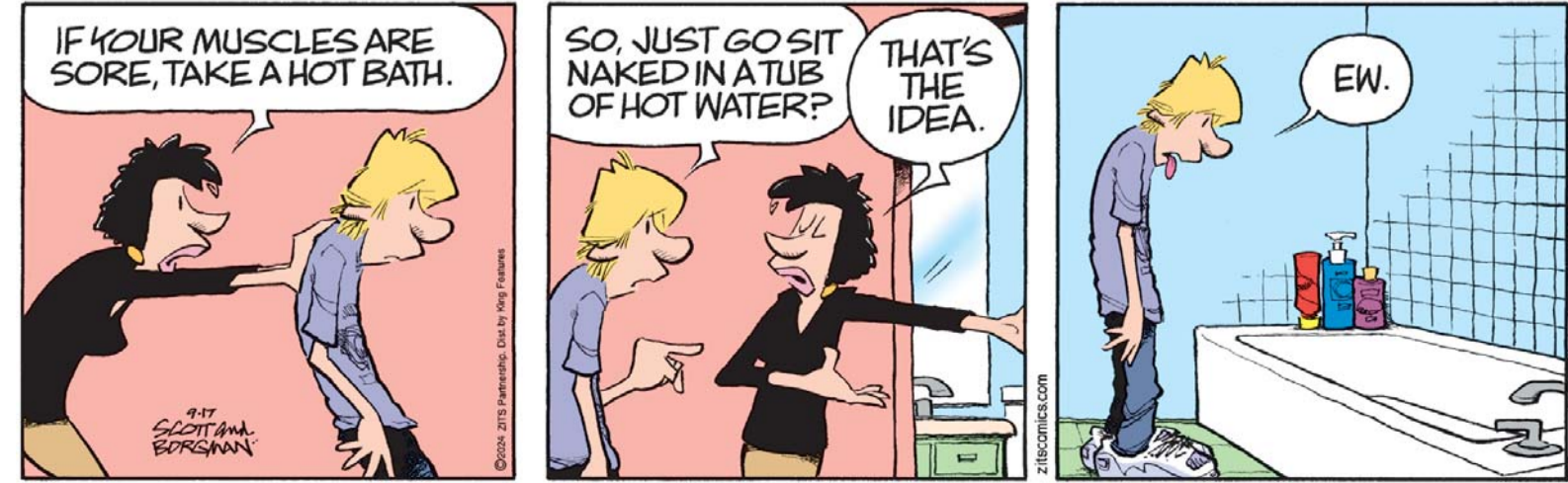


### BABY BLUES



By Rick Kirkman & Jerry Scott

### ZITS



By Jerry Scott & Jim Borgman