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# Science Focus

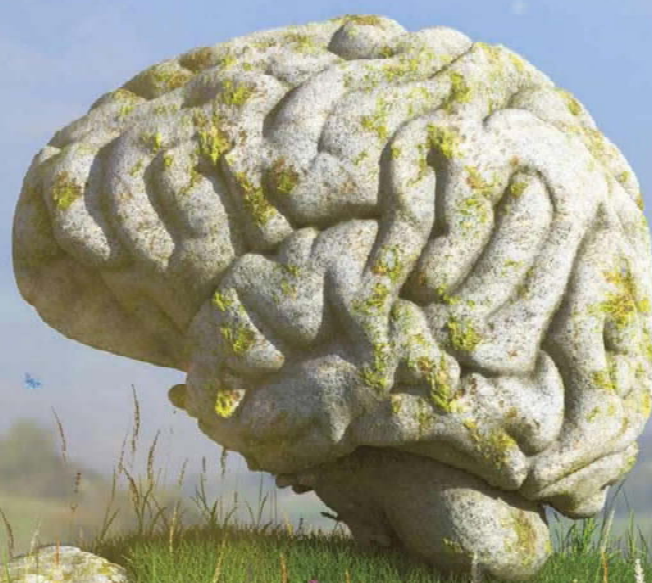
Deciphering the  
**MYSTERIES OF STONEHENGE**

Meet the world's first  
**SLIME MOULD ASTROPHYSICIST**

Is it true that  
**HONEY CURES A COLD?**

## MENTAL TOUGHNESS

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### IN THIS ISSUE

#### **Meditation**

A closer look at the dark side of mindfulness

#### **Armageddon**

Will an asteroid stop the US elections?

#### **Tea**

A scientist's guide to the perfect brew



# × “It is the sweetness that is the common factor across honey, cough medicines and sore throat lozenges”

## SO SHOULD I EAT HONEY, IF I HAVE A COLD?

It is well recognised that syrups, including honey, have a demulcent effect: relieving irritation by forming a film on the throat. Over-the-counter cough medicines emulate this with added sugar, the sweet taste stimulating salivation and mucus secretions that soothe and lubricate the airway.

“It is the sweetness that is the common factor across honey, cough medicines and sore throat lozenges,” says Prof Ron Eccles, who ran the Common Cold Centre at Cardiff University for nearly 30 years. All three will be just as effective in treating cough and sore throat, but not other symptoms.

“The most common and disturbing symptom of URTI in infants is fever, where honey has no benefit, but usual treatments – paracetamol and ibuprofen – are very effective,” says Eccles. Another symptom of the common cold or flu is congestion, and honey will not unblock the nose.

“Painkillers such as paracetamol, aspirin and ibuprofen would be my first treatment for colds and flu,” Eccles recommends, “followed by a hot, tasty drink.”

by AMY BARRETT

Amy is the editorial assistant at BBC Science Focus.



## ANALYSIS

# ASTEROIDS: HOW LIKELY IS IT THAT WE'LL BE STRUCK BY ONE?

It's happened before, so what are the chances of another catastrophic collision with a space rock?

If you believe some recent headlines, an asteroid is threatening to derail democracy by blasting into Earth on 2 November – the day before the US elections. In reality, the space rock, called 2018 VP1, has only a 0.41 per cent (1 in 240) chance of hitting us. And even if it does, it's only around two metres in diameter, so it'll disintegrate in the atmosphere long before it's had chance to ruffle any presidential hairdos.

## CLOSE ENCOUNTERS

As its name suggests, 2018 VP1 was discovered in 2018, and it's just one of around 23,500 'near-Earth objects' (NEOs) being tracked by NASA's Center for NEO Studies (CNEOS).





NEOs are Solar System bodies which have orbits that bring them in close proximity to us (defined as coming within around 200 million kilometres of the Sun). A small number of NEOs are comets, but over 99 per cent are asteroids – rocky objects that are the leftover building blocks from the formation of the Solar System.

To work out the possibility of a NEO hitting Earth, CNEOS calculates the object's orbit around the Sun using data provided by observatories around the world. The more observations CNEOS has of a NEO, the better it can pin down the object's future trajectory.

The asteroids that pose the most risk are classed as 'potentially hazardous asteroids' (PHAs). These are calculated to come within around 7.5 million kilometres of Earth (approximately 20 times the distance from the Earth to the Moon) and are more than 140 metres in diameter. There are currently around 2,100 PHAs on NASA's books.

#### SIZE MATTERS

A 140-metre-wide asteroid could devastate an area the size of the UK, says Dr Paul Chodas, director of CNEOS, "but even small asteroids can cause significant damage". For example, the Chelyabinsk meteor, which took astronomers by surprise when it exploded above Russia in February 2013, was caused by an asteroid only 20 metres wide. The shock wave

**ABOVE** Smaller asteroids aren't a threat, as they'll burn up in our atmosphere

from the explosion was powerful enough to cause 1,500 indirect injuries, mostly due to flying glass from shattered windows.

The smallest asteroids, such as 2018 VP1, are extremely common, says Chodas. "A two-metre object hits the Earth every couple of months." But these aren't a concern, because they burn up in the atmosphere.

"The time between impacts gets exponentially longer as you go to larger asteroid sizes," says Chodas. Asteroids the size of the Chelyabinsk one are estimated to enter the Earth's atmosphere, on average, once every 80 years. "Once you go up to the size of PHAs – 140 metres – you can expect an impact, on average, only once every 20,000 years," says Chodas. And asteroids of the size that killed the dinosaurs – roughly 10 kilometres wide – happen around once every 100 million years. But Chodas says that these probabilities can't be used to predict when the next impact will happen. "It doesn't happen like clockwork," he says.

So what proportion of NEOs have we discovered? By looking for NEOs in the night sky – visible to telescopes as moving dots of light – and keeping tabs on which are newly discovered, and which have been spotted before, CNEOS scientists are able to estimate the total population of NEOs. Chodas says that they've so far found about 95 per cent of one-kilometre-wide asteroids and larger, and around ❷





◆ 40 per cent of asteroids measuring 140 metres wide and larger.

The Chelyabinsk NEO managed to sneak past telescopes because of its small size (the smaller the object, the fainter it is), and because it came from the direction of the Sun, which made it impossible to see against the glare. But the larger, more threatening asteroids can be seen further away, says Chodas, and this gives us more chance of spotting them in the night sky, hopefully providing us with “years or decades” of advance warning. This should give scientists enough time to prepare what’s known as a ‘deflection’ mission, which aims to nudge the trajectory of the incoming asteroid so that it misses the Earth – by ramming a spacecraft into the asteroid, for instance.

There is still a possibility, says Chodas, that a large asteroid could take us by surprise if it was on an orbit that only brought it into close proximity with the Earth very rarely. In such a case, we might only have a few months’ warning – too short for a deflection mission, but perhaps enough time for a ‘disruption’ mission, where the asteroid is blown up by, for example, firing a nuclear device at it.

“But we’re driving down the chances of this happening by continually scanning the skies, and by making our telescopes more sensitive so that they can see asteroids that are farther out,” says Chodas.

In the end, it all comes down to what we choose to worry about. The odds of a sizeable asteroid catching us unaware are so small, says Chodas, that there’s plenty of other bad stuff out there that’s more likely to happen to us. “The threat of an asteroid impact doesn’t keep me awake at night,” he says.

**ABOVE**  
A trail from the near-Earth object that exploded over Chelyabinsk in 2013

—  
by JAMES  
LLOYD  
*James is the staff writer at BBC Science Focus.*

## COMMENT

# MEDITATION: CAN IT DO MORE HARM THAN GOOD?

People use meditation to ease depression and anxiety. But can it actually worsen mental health?

**M**editation has escaped both the religious cells of monks and nuns and the labs of scientists. An increasing number of people are using meditation apps to deal with mental health problems, such as depression and anxiety. Although there is no clear estimate of how many people are practising meditation, last year one single app had close to 40 million downloads.

But now my new study, which reviews over 40 years of the science of meditation and mindfulness-based therapies, suggests that these practices can also lead to negative effects in about 8 per cent of individuals – from increases in anxiety, depression and stress, to unusual experiences like hallucinations.

This sounds counterintuitive, given the thousands of scientific studies exploring the positive effects of meditation. But this study also indicates that scientists have been aware of these problems for a long time. In 1977, the American Psychiatric Association published a statement recommending that research on meditation should evaluate both its usefulness and its dangers. And ancient meditation manuals, like the Buddhist *Dharmatrāta Meditation Scripture*, likewise indicate that if meditation is not carried out properly, the mind can become unstable, restless or confused.

What does this mean to the millions of people using meditation to alleviate everyday stress and anxiety? Not to mention the increase in schools using meditation-based programmes with children. Is it possible that some of them may experience more harm than good? The new evidence from this and other recent studies shows that this is a real possibility.

Meditation techniques were developed to stimulate altered states of consciousness: to experience oneself in a different way, or even to challenge the ‘ordinary’ self. These experiences were not expected to always be pleasant or blissful. For example, there are meditation practices common to various religious traditions that recommend visualising one’s death, or even finding a rotting corpse and focusing on its decomposition. This