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cosmic connections

Astro-tourists – skygazing sightseers – are growing in numbers, and travelling farther afield in their quest to view celestial phenomena, from eclipses and meteors to comets and the Northern Lights. Join them on the heavenly trail in 2009, the International Year of Astronomy.

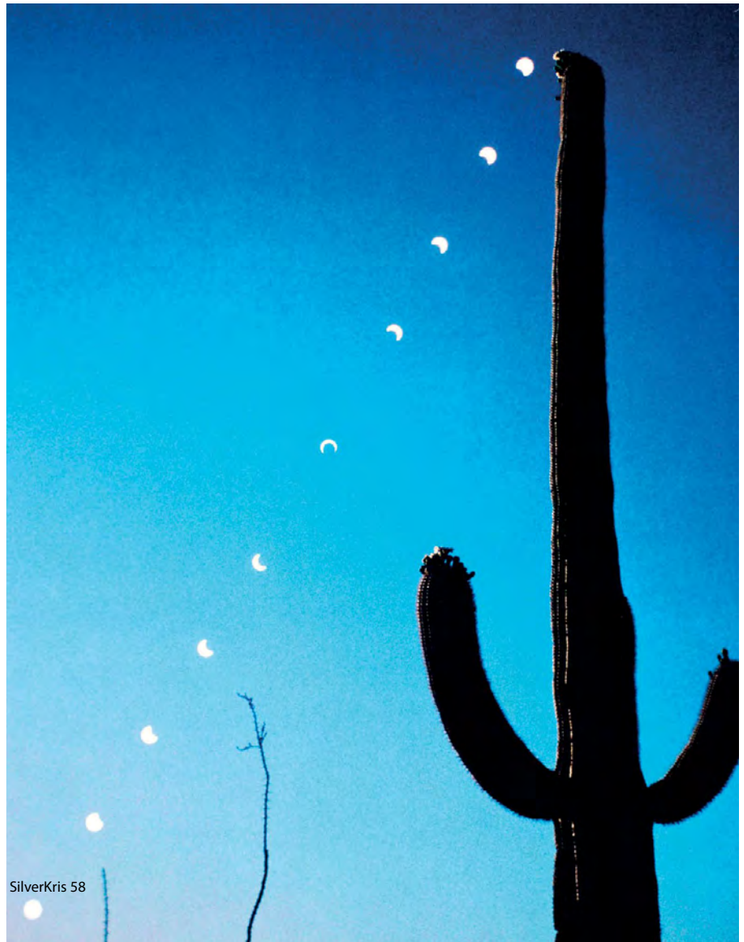
Telescope domes in Hawaii are silhouetted against the sky as Comet Hale-Bopp blazes a trail across the solar system.

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Something happens to a person experiencing a total solar eclipse for the first time. Something about the unnaturalness of the event – the way darkness falls in the middle of a bright, turgid afternoon, and birds return to roost, while the horizon glows eerie orange, or blood red, depending on where you are – makes it an intense, near-spiritual experience.

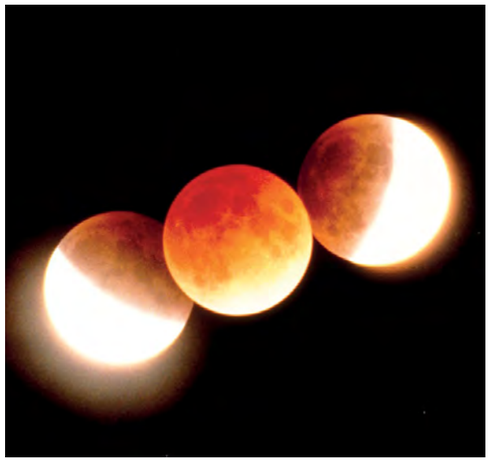
People are moved – they cheer, they weep and are mostly inarticulate when asked to describe how they feel. And a growing number begin their lifelong affair with the cosmos, travelling to all corners of the Earth to recapture that high, again and again.

Other notable celestial events have also contributed to the rise in astro-tourism – the branch of travel that caters to those with an interest in astronomy. In August last year, hundreds of stargazers gathered under the night skies of the Highlands of Scotland to witness the annual Perseids meteor shower, while another lot of enthusiasts headed for the island of La Palma, one of the Canary Islands in the Atlantic Ocean. At the height of the event, spectators were treated to fireworks of 'shooting stars' – tiny, fast-moving particles that lit up the night sky every few seconds. One space.com writer who witnessed an earlier meteor shower, the Leonids, described his experience: "We looked up. We felt fragile. Vulnerable. As though we might fall into the very sky we were watching… Astronomy was reduced to feelings and sensations. No theories, no jargon, no big thoughts. Just one of the coolest things we had ever seen."



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FROM LEFT: A multiple exposure image of an annular solar eclipse and a partial lunar eclipse.
ABOVE: The Aurora Borealis appears as a shimmering green veil in the skies above Manitoba, Canada.

Astro-tourists come from the world over – anecdotal evidence suggests Britain, the US, Canada and Japan in particular – but their reactions are the same – deep excitement and a reverent connection to the universe.

While meeting fellow enthusiasts from around the world is part of the appeal, sky gazing can be done in your own backyard as well. You can view lunar eclipses, which occur a few times a year, catch meteor showers or look out for five of the eight planets orbiting the Sun. All you need is darkness (the fewer lights the better), patience and tips from enthusiasts or dedicated websites. Even a pair of binoculars may not be necessary – when meteor-viewing, for example, the naked eye is enough.

You could start by joining a local amateur astronomy group. Such groups often organise guided sky-watching get-togethers. Log on to www.space.com/nightsky and www.astronomy.com for advice.

But if you're a social celestial chaser, happy to end up anywhere from Mongolia to Macedonia, meeting equally passionate travellers, check out these sites for tours and excursions: www.astronomicaltours.net, www.solareclipsetrips.com or www.earthandsky.co.nz/mt_john_tours/mt_john_tours.html

Here are four of the most popular celestial occurrences and the best locations to catch the action. >>

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A time lapse image of a Leonid meteor shower among stars, lighting up the sky like a spectacular fireworks display.

Phenom Meteor showers

What it is A meteor is the bright streak of light in the sky that's produced by the entry of cosmic debris into Earth's atmosphere at extremely high speeds. When a group of meteors is observed to radiate from one point in the sky, it is known as a meteor shower.

When and where to see it One of the most popular is the annual Perseids shower, which peaks this year between August 12-13, with up to 60 outbursts an hour. They can be seen across the globe, but the Scottish Highlands, the Greek Islands and the Canary Islands are popular Perseids hangouts.

Another meteor shower to catch would be the Leonids. These have produced some of the most spectacular displays in history, but they are periodic in nature, with enhanced activity occurring approximately every 33 years. This year's Leonid meteor shower is forecast to appear from November 17-18 with 100 to 500 meteors an hour. The Indian subcontinent has an advantage this year, but countries all over the world will be able to see the meteors.

Phenom Aurora Borealis

What it is These natural coloured light displays, also known as Northern Lights, are visible in the night sky, particularly in the polar zones. They occur in the atmosphere and are hence meteorological phenomena, not astronomical. They are caused by the collision of charged particles from the Sun with gases in the Earth's atmosphere. Aurora Australis (Latin for 'of the south') is its southern counterpart. The result is a spectacular spiral curtain of lights, usually in green or red, dancing across the sky.

When and where to see it The best places are near the magnetic poles. For the Aurora Borealis, this would mean high northern latitudes – places such as Alaska, Canada, Scandinavia, and Iceland – while Antarctica would provide the best views of the Aurora Australis. The best viewing times for both are the months around the equinoxes, which occur in March and September. More information at www.spacew.com/www/aurora.php >>

PHOTOGRAPHY: PHOTOLIBRARY / GETTY IMAGES / CORBIS

trivia alert!

For the past 150,000 years, man has gazed skyward in fascination and awe. Here are some fast facts that reflect this profound interest in the cosmos beyond.

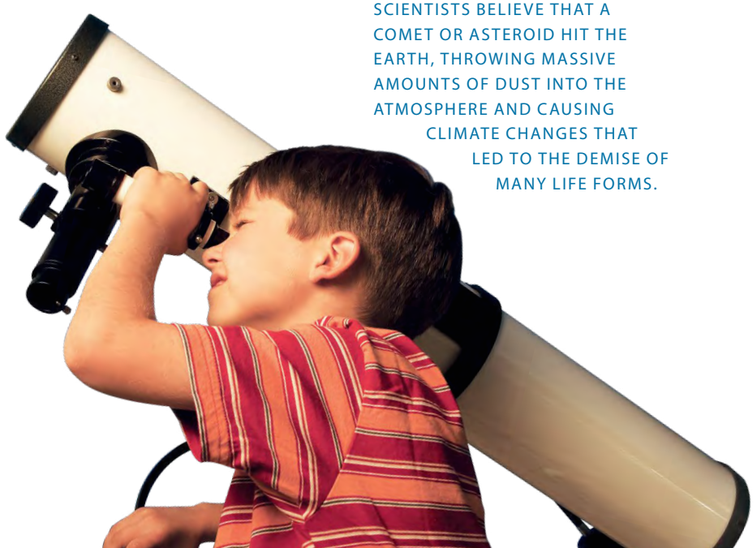
1 IN A WORLD FIRST, NEW ZEALAND'S 'STARLIGHT RESERVE', A NATIONAL PARK IN THE SKY, IS LIKELY TO BE GRANTED WORLD HERITAGE STATUS BY UNESCO. THE PRESTIGIOUS ACCOLADE RESERVED FOR INTERNATIONAL SITES OF NATURAL OR CULTURAL IMPORTANCE HAS NEVER BEEN GRANTED FOR A SECTION OF SKY. THE BASIS? THAT IT'S ONE OF THE FEW PLACES LEFT ON EARTH WHERE IT'S STILL POSSIBLE TO SEE AN ENTIRE STARLIT NIGHT SKY THAT'S NOT DROWNED OUT BY LIGHT POLLUTION OR AFFECTED BY FACTORY SMOKE.

2 THE EARLIEST RECORD OF A SOLAR ECLIPSE COMES FROM AN ANCIENT CHINESE DOCUMENT CALLED SHU CHING. HISTORIANS BELIEVE THAT THE ECLIPSE REFERRED TO MIGHT HAVE BEEN VISIBLE FROM CHINA AROUND 2134 BC.

3 ALTHOUGH AS MANY AS FOUR BILLION METEORS ENTER THE EARTH'S ATMOSPHERE EACH DAY, MOST ARE NOT SIGNIFICANT ENOUGH FOR ANYONE TO NOTICE.

4 IN CHINA AND INDIA, PEOPLE USED TO BELIEVE THAT A DRAGON WAS RESPONSIBLE FOR ECLIPSES. IN CHINA, THEY RESPONDED BY CREATING A COMMOTION WITH DRUMS AND ARCHERS SHOOTING ARROWS INTO THE SKY TO FRIGHTEN THE DRAGON AWAY. IN INDIA, PEOPLE IMMERSED THEMSELVES IN WATER UP TO THEIR NECKS IN THE BELIEF THAT THIS ACT OF WORSHIP WOULD HELP THE SUN OR THE MOON DEFEND ITSELF.

5 THE CHICXULUB IMPACT CRATER IN MEXICO'S YUCATAN PENINSULA WAS FORMED 65 MILLION YEARS AGO, AROUND THE TIME DINOSAURS BECAME EXTINCT. SCIENTISTS BELIEVE THAT A COMET OR ASTEROID HIT THE EARTH, THROWING MASSIVE AMOUNTS OF DUST INTO THE ATMOSPHERE AND CAUSING CLIMATE CHANGES THAT LED TO THE DEMISE OF MANY LIFE FORMS.



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Phenom Comets

What it is The Greeks called them aster kometes ('long-haired stars') – that's how they look with their long yellowish and bluish tails blazing behind them as they torpedo across the sky. Made of gas ice, water ice, rock and dust, they remain in the sky for a while as whitish fuzzy balls after the tails fizzle out.

When and where to see it Scan the sky often enough and you might just spot a comet. Astronomers are constantly watching the night skies for a 'dinosaur killer' (a reference to the theory that a comet or an asteroid destroyed the dinosaurs) because of the danger that they pose to Earth.

One of the most famous is Halley's Comet, the only naked-eye comet certain to return within a human lifetime. It comes close to the Sun (perihelion) once every 75-76 years. It is due to return in mid-2061. This year brings Comet Christensen, which will be brightest on July 6, but it can be viewed only with the help of a telescope. More information at www.ast.cam.ac.uk/~jds

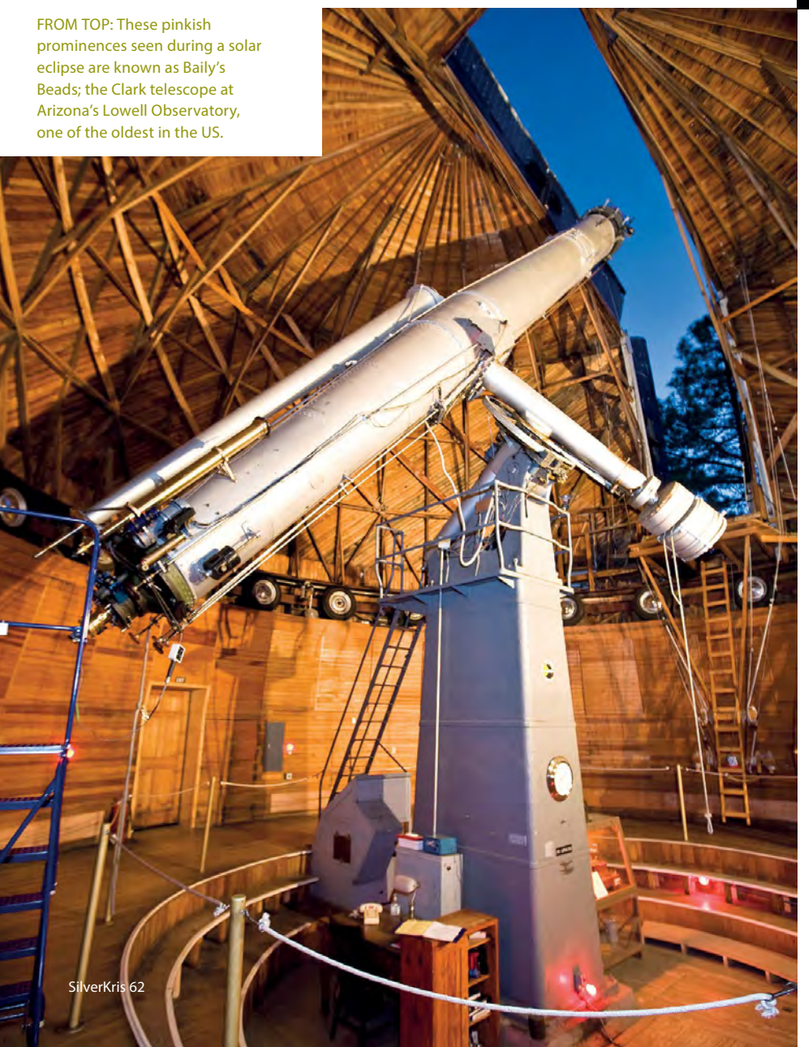


Phenom Solar eclipses

What it is The Moon comes between the Earth and the Sun, obscuring the Earth's view of the Sun, turning day into night. As the Moon moves in its orbit, its shadow travels across the daytime side of the Earth, tracing out a route called the eclipse path. If you stand in this path, you see a total solar eclipse, when the Sun is blocked out completely. But when the Moon passes in front of the Sun and covers it only partially, leaving a ring of light around it, it is called an annular solar eclipse.

When and where to see it The next total solar eclipse, on July 22 this year, will be a truly spectacular event with maximum duration reaching 6 minutes and 39 seconds over a specific point in the Pacific Ocean. With a path that's 285km wide, the solar eclipse will start off the coast of India and end in Polynesia. The key locations to observe totality are Mumbai, Chengdu, Chongqing, Wuhan, Shanghai and Japan's Ryukyu Islands. A partial eclipse can be viewed from most of East Asia, Indonesia and the Pacific Ocean. Details on http://eclipse.gsfc.nasa.gov/SEmono/TSE2009/TSE2009.html

FROM TOP: These pinkish prominences seen during a solar eclipse are known as Baily's Beads; the Clark telescope at Arizona's Lowell Observatory, one of the oldest in the US.



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chasing the sun

In Turkey, TAN CHUNG LEE donned special eyewear to witness her first total eclipse of the sun.

In 2006, I found myself in the town of Hacibektas, Cappadocia, in Turkey's Central Anatolia region, an area renowned for its lunar landscape of weird and wonderful rock formations, cave dwellings and churches.

I was travelling with a solar eclipse expedition group on a quest that had begun a year earlier with an experience of a partial eclipse in Tunisia. That experience had made me curious about a total solar eclipse, leading eventually to my trip to Hacibektas.

I was not alone. There were hundreds of people pouring into the town, and most were headed for its highest summit. People were jostling for the best position and as a novice chaser, I simply sat where I could find an empty spot. Veteran eclipse chasers were setting up telescopes fitted with protective solar filters and swapping notes with friends from earlier trips.

First contact

All of us were armed with the mandatory eclipse shades – with aluminised Mylar film – which we'd picked up locally. Without them you could cause permanent damage to your eyes. By blocking out everything except light from the Sun, the shades would offer a clear view of the Moon moving across the Sun.

The day was bright and warm – it was some time past noon. Like everyone else, I sat staring at the glaring Sun through the eclipse shades for what seemed a long time. Then it happened – a little nibble on the upper right hand corner of the Sun. The Moon had finally made what is called 'first contact', when the edge of the Moon kisses the outer rim of the Sun. It was 12.50pm. There was a ripple of excitement among the crowd – the eclipse had begun.

Darkness falls

Over the next hour before totality occurred, the shadow of the Moon crept slowly across the Sun, gobbling it up so that it appeared to be taking on the phases of the Moon itself – first, a half-moon shape, then a crescent, and later, just a sliver of light. As the eclipse progressed, twilight seemed to fall. It was also getting colder. I was shivering.

At 2pm, the Moon broke up the remaining circle of sunlight into a row of pinkish prominences, known as Baily's Beads – the result of the Sun's surface light shining through the Moon's mountain peaks. The shadow of the Moon on the Sun was now clearly visible; a few seconds later, only a tiny light was left, radiating like a diamond. A split second later, the diamond ring disappeared as the Moon completely engulfed the Sun. The only sign that the Sun was hiding behind the Moon was the corona, a crown of smudged light. I could make out the craters of the Moon.

As darkness descended, the birds stopped chirping. The sky took on the colours of sunset. A hush fell over the crowd. The Moon began to fill out the Sun completely, erasing its edges. There were squeals of delight and a countdown started. In a fleeting 10 seconds, totality occurred – the sky had turned pitch black. Cheers, whoops and applause erupted. It was time to remove the shades to look at the total eclipse with the naked eye (now safe to do) and to take in our surroundings. I saw the street lights come on automatically over Hacibektas and I could see stars in the sky.

Someone spotted Venus – the first planet you see in the sky when night falls, and then Mercury. It was truly night, but the time was just three minutes after 2pm. It felt surreal.

And that was the point of no return for me. As an astro-tourist, I now look forward to more journeys to come – however remote the places may be – to recapture that feeling.





REPORTING BY TAN CHUNG LEE

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