

00:12



SCIENCE ON THE SOLSTICE

Every day, all over the planet and beyond it, scientists try to make sense of the world in which they live. Here we present a composite picture of just one day — 21 June 2006, the Northern summer solstice.

Cerro Paranal, Chile

00:12 UT Morten Andersen is at the control console for Yepun, the fourth telescope in the European Southern Observatory's Very Large Telescope array. He is taking a census of the smallest stars of the Galaxy's most massive young cluster, Westerlund 1.

20:12 (20 June) local time
24°38' S 70°24' W

Bintulu, Malaysia

00:23 UT Diana James Junau, a project officer with the Planted Forests Project at Putra Malaysia University's Bintulu campus on Borneo, measures a molar tooth from one of a series of pig skulls. The skulls were collected as part of a five-year research project into the population biology of the bearded pig (*Sus barbatus*), to determine whether traditional food sources are sustainable when forests are turned into patchworks of cleared land.

08:23 local time 3°10' N 113°02' E

Low Earth orbit

00:26 UT The Hubble Space Telescope begins a 1,344-second near-infrared exposure. Anton Koekemoer of the Space Telescope Science Institute in Maryland will combine these data with subsequent exposures of the same field, obtained throughout the day, as part of the Hubble Ultra Deep Field project. The aim is to find distant galaxies

that were the first sources of light in the primordial Universe.

Oarai, Japan

01:00 UT At a test facility that is part of the JOYO experimental fast reactor, Takafumi Aoyama, a nuclear engineer for the Japan Atomic Energy Agency, consults and calibrates a temperature monitor. The monitor, which works on the basis of thermal expansion, has been developed for use in the reactor's core subassembly.

10:00 local time 36°19' N 140°36' E

Hanoi, Vietnam

01:30 UT Nguyen Van Hanh, a PhD student, shows Bui Xuan Nguyen some egg cells that have been matured *in vitro* for 22 hours. Nguyen needs the cells for his attempt to clone the saola (*Pseudoryx nghetinhensis*), a species of ox that lives only on the Laos-Vietnam border and is one of the rarest mammals in the world. Some of the swamp-buffalo oocytes look good and have clear polar bodies. Nguyen starts to remove the nuclei from the buffalo egg cells while a colleague prepares some saola cells, readying them for fusion around noon.

08:30 local time 21°01' N 105°30' E

Bangalore, India

02:55 UT This little girl, weighing 3.14 kg, is born just before 8 a.m. local time in Manipal Hospital — the first baby for proud mother



and father Rhadhika and Rajesh Sinha, who were still thinking of a name for her when this photo was taken. Hers is one of the estimated 358,522 new human lives starting on 21 June 2006, more than double the number (155,000 or so) ending. The estimated world population stands at 6,523,642,761. Babies born in India can currently expect to live for 63.3 years, some years shy of the global life expectancy of 67.

07:55 local time 12°58' N 77°34' E

Newcastle, Australia

03:15 UT Anne Imenes at Australia's National Solar Energy Centre is testing one of the 200 mirrors intended for the 'solar concentrator'. The experimental array will concentrate 500 kW of solar thermal power on to a reactor 17 metres above the ground, heating it to more than 1,000 °C. The reactor will be installed in July.

13:15 local time 32°53' S 151°44' E

Strait of Johor

03:45 UT Juan Walford and his colleague B. Sivaloganathan of the National University of Singapore are

checking on some six-month-old seahorses, which they are rearing in a floating fish farm off the east coast of Singapore. Their study aims to use the seahorses as living indicators of the marine environment. This morning they find a lot of 'pregnant' males with embryos in their brood pouch, indicating that the juvenile males have successfully reached reproductive age, and that it would be feasible to restock the area.

11:45 local time 1°24' N 103°58' E

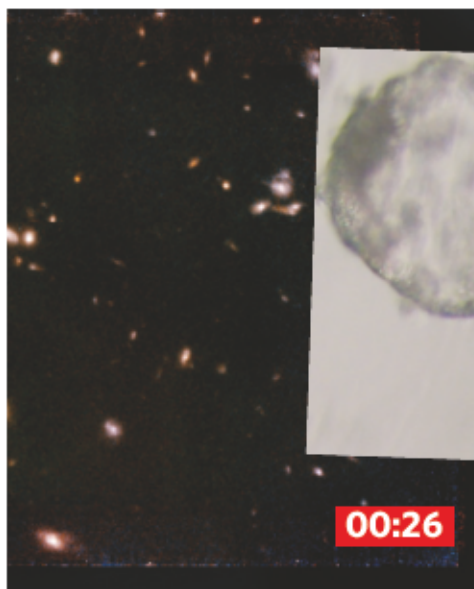
Florham Park, New Jersey

03:47 UT Dan Silver, marketing director for a multinational manufacturer of medical devices, e-mails ProMED-mail with a report that he has translated from a Chinese newspaper. The Internet site (www.promedmail.org) provides information on disease outbreaks and depends on doctors, researchers and health professionals around the world sending in information in this way. The report describes 60 students and teachers who have come down with an undiagnosed febrile illness in Shaanxi, China, since 12 June.

23:47 (20 June) local time
40°47' N 74°28' W

Tokyo, Japan

04:00 UT The hundreds of small mirrors, beam splitters and lenses in Akira Furusawa's quantum-computing lab at the University of Tokyo look like a mess; in fact they



are meticulously organized. One of his students is trying to beat the world record for enhancing the quantum correlation between photons.

13:00 local time 35°43' N 139°46' E

Krasnoyarsk, Russia

04:00 UT At the Sukachev Institute of Forest, Eugene Vaganov and Ernst-Detlef Schulze, visiting from the Max Planck Institute for Biogeochemistry in Jena, Germany, pore over a joint publication on carbon-isotope ratios in wood. They are trying to figure out how to disentangle the contributions of isotopes from photosynthesis, carbon storage, respiration and wood formation when interpreting the isotope patterns found in tree rings.

12:00 local time 56°00' N 92°47' E

New York, New York

04:33 UT In a dark, cramped lab at Columbia University Medical Center a microscope automatically snaps images of live yeast cells as they divide. Joanne Bruno is trying to find out which fluorescently tagged proteins behave asymmetrically during cell division, segregating unevenly between daughter cells.

00:33 local time 40°48' N 73°58' W

Tidbinbilla, Australia

04:35 UT At the Deep Space Network station outside Canberra, a 34-metre radio dish starts to communicate with the Mars Odyssey orbiter, 343.6 million kilometres away. Data will pass between the ground station and the satellite for the next 4 hours 35 minutes.

14:35 local time 35°26' S 148°56' E

Würzburg, Germany

05:11 UT At the wine laboratory of the Bavarian Health and Food Safety

Authority, Norbert Christoph is switching on the sample changer of the 400-MHz NMR spectrometer. The device will determine the deuterium:hydrogen isotope ratio of ethanol and sugar in two Macedonian wines and three apple juices. In less than an hour, the staff of the institute will leave for their annual outing — an excursion by bus to the city and castle of Langenburg. After a visit to the old town, the castle and a vintage car museum they will enjoy some local food and wine. Meanwhile, back in the lab, the NMR wine spectrometer is pulsing at 61.4 MHz every 7 seconds in order to measure the deuterated ethanol molecules.

07:11 local time 49°47' N 9°56' E

Munich, Germany

06:24 UT Martin Hrabě de Angeles enters the German Mouse Clinic at the National Research Centre for Environment and Health. Today he and his colleagues are going to start characterizing new mouse models for bone-related diseases. By the end of the day they will have made a total of 1,636 measurements of characteristics such as bone density, strength and biochemical composition. While gathering these data, they will discuss ways in which models may shed light on the molecular basis of bone diseases.

08:24 local time 48°07' N 11°34' E

Bethlehem, Palestinian National Authority

06:30 UT Moein Kanaan drops off some DNA sequencing reagents for his lab at Bethlehem University. Having an Israeli ID makes it easier for him than for many of his colleagues to move such reagents across the Israel-Palestine border. The next job of the day is to order a

new spectrophotometer called a Nanodrop, an instrument that measures minute amounts of DNA, RNA and protein. Kanaan is trying to squeeze the supplier of the Nanodrop for as big a discount as possible.

09:30 local time 31°42' N 35°12' E

Copenhagen, Denmark

06:37 UT Erik Born of the Greenland Institute of Natural Resources is writing to the Danish Ministry of Justice for a permit to export and re-import two crossbows and a tranquilizer gun that he wants to take to Canada. He hopes to use the equipment to take skin biopsies from walrus on Baffin Island in August and to attach satellite transmitters to some of the animals.

08:37 local time 55°41' N 12°36' E

Low Earth orbit

06:46 UT On board the International Space Station, Jeffrey Williams photographs a 19-km-diameter crater in the Australian outback that is more than 515 million years old. The snapshot, the first of three Williams will take today, is part of a series of Earth observations that the station does for a variety of different scientific projects.

Frederiksberg, Denmark

07:10 UT At a supermarket run by the Danish Department of Human Nutrition, six overweight families collect food and drink for the next couple of days. This is part of Diogenes, a six-month dietary-intervention trial sponsored by the European Union. All the products are supplied to the volunteers free of charge, and the bar codes on the food items are used to declare nutritional information, which is registered by a computer linked to

the barcode scanner at the checkout. Two families complain that the researchers are out of fresh chicken breasts.

09:10 local time 55°25' N 11°34' E

Tsukuba, Japan

07:24 UT At the KEK B factory, birds are singing despite the overcast day. The electron and positron beams in the accelerator are colliding with a brightness that far outshines any other accelerator facility. The factory's Belle experiment has so far recorded more than 500 million pairs of B mesons. Like many at the facility, Jasna Dragic is analysing the large data sample and preparing a talk on the latest results, which she will present at the International Conference on High Energy Physics in Moscow. Her colleague Ruslan Chistov is impatiently waiting for final approval from Belle spokespersons to submit a manuscript to *Physical Review Letters* reporting the discovery of two new particles.

16:24 local time 36°09' N 140°04' E

Prague, Czech Republic

07:27 UT Catherine Staessen of the Flemish-speaking Free University of Brussels has just made her presentation at the annual conference of the European Society of Human Reproduction and Embryology. She has analysed the limited trial data available so far on the value of screening embryos created by *in vitro* fertilization for chromosomal abnormalities before they are implanted. She concludes that there is no evidence that screening increases a woman's chance of having a healthy baby. "You have a beautiful approach but the wrong answers!" complains Yury Verlinsky, director of the

01:30

00:26

03:45



10:02



10:05



Reproductive Genetics Institute in Chicago and a pioneer of preimplantation genetics. "Abnormal human embryos are an obvious fact, so if you remove those, how can there be no benefit?" Staessen's response: do the trials and prove to me it works.

09:27 local time 50°04' N 14°26' E

The Alexander/Zomar stream, Israel

08:05 UT Lior Asaf of the Arava Institute for Environmental Studies in Israel and his Palestinian partner Nader Al Khateeb of the Water and Environmental Development Organization in Bethlehem are measuring the flow of a stream using an electromagnetic velocity meter. The work is a part of a project to estimate the pollution from different sources that ends up in the Alexander/Zomar stream, which crosses the boundaries between Israeli and Palestinian lands.

11:05 local time 32°21' N 34°57' E

Kunming, China

08:35 UT Weizhi Ji is preparing to view several rhesus-monkey embryos and cloned blastocysts obtained by *in vitro* fertilization under a confocal microscope at Kunming Primate Research Center. He is interested in comparing indicators of gene activation in the cells that go on to form the embryo itself and those that form the placenta and amniotic membranes.

16:35 local time 25°04' N 102°42' E

Peradeniya, Sri Lanka

08:40 UT Kapila Dahanayake, a geologist at the University of Peradeniya, is analysing a sample of water and sediment from the tsunami of December 2004 that was preserved in an empty *arak* bottle

found in a flooded house. The sediment contains microplankton typical of the deep ocean and has a particular distribution of grain sizes. They are very like the sediments found at a depth of 1.5 metres in a nearby well, which supports the idea that those sediments too were laid down by a tsunami.

14:10 local time 7°15' N 80°34' E

Bellville, South Africa

08:45 UT At the South African National Bioinformatics Institute, Winston Hide analyses a set of mutations in HIV that have resulted from treatment with the antiretroviral drug nevirapine, used to prevent transmission of the virus from mother to child. He then leaves for the airport to pick up his collaborator Harukazu Suzuki, who has spent 21 hours getting to South Africa from the RIKEN Genomic Sciences Center in Yokohama, Japan. On the way, he drives through shacklands and past HIV-awareness posters, and jockeys for space with horse-drawn carts.

10:45 local time 33°56' S 18°38' E

Robledo de Chavela, Spain

08:55 UT As Mars sinks in Australia's western sky, it rises in the east for Spain. A Deep Space Network 34-metre dish near Madrid, almost identical to the one outside Canberra, takes up the job of bringing home data from Mars Odyssey. This includes data relayed through the satellite from the Spirit rover, currently encamped for the winter on a north-facing slope in the Columbia Hills of Gusev Crater.

10:55 local time 40°30' S 4°14' W

In transit, Frankfurt to Manila

09:00 UT In a plane somewhere over the Indian Ocean, the chairman

of the Intergovernmental Panel on Climate Change, R. K. Pachauri, is on his way to a meeting of the Asian Development Bank. He picks up an e-mail from the vice-president responsible for sustainable development at the largest retailing organization in the world. The two men met less than a week ago in Iceland. The message includes an invitation to a meeting next month where 150 senior corporate leaders will discuss climate change.

Mauna Loa, Hawaii

09:00 UT The average concentration of carbon dioxide in Hawaii's air on 20 June has just been calculated: 383.63 parts per million. The data from Mauna Loa constitute the longest record of direct measurements of CO₂ in the atmosphere.

23:00 (20 June) local time
19°32' N 155°35' W

Ambohimiravavy, Madagascar

09:23 UT At the summit of Ambohimiravavy (2,310 m), Martin Callmender and his team from the Missouri Botanical Garden in St Louis are collecting plants on the unexplored and hard-to-reach massif.

12:23 local time 14°12' S 49°6' E

Western Pacific Ocean

09:50 UT A measuring device that has been moored to the bottom of the ocean bobs to the surface, ready to be picked up by Randolph Watts and Kathleen Donohue, from the University of Rhode Island, and their team on the *Melville*, a ship operated by the Scripps Institution of Oceanography. The surfacing instrument (a 'current and pressure recording inverted echo sounder', or CPIES, pronounced 'sea-pies') contains two years of data on the

conditions in this cold mixed-water region. Picking up these devices is usually straightforward. This time, however, the surfacing CPIES has inadvertently turned off its relocation radio and strobe-light, and the sea is covered in pea-soup fog. It takes five hours to find it and haul it safely aboard.

23:50 ship's time 39°31' N 148°20' E

Alexandria, Egypt

10:02 UT School students from Alexandria gather in the plaza of the new Bibliotheca Alexandrina to measure Earth's circumference using the method that Eratosthenes pioneered nearly 2,000 years ago. Eratosthenes — the third director of the original library of Alexandria — observed that, on the solstice, the Sun's reflection could be seen at the bottom of a well on Elephantine Island, near Aswan, and must thus be directly overhead. By measuring the length of a shadow on the same day near Alexandria, he was able to calculate Earth's radius geometrically. Today, children in Alexandria are making one measurement while children near Eratosthenes' well in Aswan make the other; they compare results in a videoconference. "We did it! We measured Earth's circumference!" the Alexandrians shout out when the calculations come good.

13:02 local time 31°13' N 29°57' E

CERN, the border of Switzerland and France

10:05 UT Having spent much of the morning finishing a paper for next week's European Particle Accelerator Conference in Edinburgh, Mike Lamont takes the lift down to the 27-km tunnel of the Large Hadron Collider. Pasted on its wall, the lift has a large schedule for football's



10:04

World Cup; graffiti indicate, surprisingly, that it is about to be won by Morocco. In the evening, a beer outside a bar in St Genis beckons — but so does work on a second paper for the Edinburgh meeting.

12:05 local time 46°14' N 6°03' E

Amundsen-Scott station, Antarctica

10:54 UT After his daily 20-minute walk across the frozen polar plateau from the new elevated South Pole station to the Dark Sector Lab, Denis Barkats transfers 90 litres of liquid helium and 40 litres of liquid nitrogen into the cryostat for the BICEP telescope (for Background Imaging of Cosmic Extragalactic Polarization). The telescope makes use of the long, cold Antarctic nights to gather up as many photons as possible from the earliest days of the Universe. The liquids keep the array of 98 polarization-sensitive bolometers at the telescope's heart at a temperature of 250 millikelvin. The outside world isn't quite that cold — just -65 °C. And the atmosphere in the station is positively festive as the 64 'winterovers' celebrate midwinter night. In three months exactly, the Sun will rise again.

22:54 local time 90° 5' 0"

Culham, UK

10:55 UT Dragoslav Ciric coaxes the first pulses of deuterium through the Culham Science Centre's new neutral beam injector, which will eventually be used to heat plasmas in the Mega Amp Spherical Tokamak (MAST), a nuclear-fusion experiment run by the UK Atomic Energy Authority. Until now, MAST has relied on two injectors on loan from the Oak Ridge National Laboratory, but these use

11:00
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1960s technology and deliver only short beam pulses of just a quarter of a second. By mid-July, researchers should be ready to investigate the effect of high-power, long-pulse injection on MAST plasmas.

11:55 local time 51°39' N 1°14' E

Ny-Ålesund, Svalbard

11:05 UT Ruth Müller, Franciska Steinhoff and Max Schwanitz, researchers at the Franco-German AWIPEV base, head out to sea in a zodiac to measure light intensity in the water. AWIPEV's scientists work on all aspects of the environment, releasing balloons to measure ozone levels in the stratosphere and diving into the sea to pull up sediment samples. The light-intensity measurements are part of a project to assess the influence of ultraviolet radiation on algae in the Arctic Ocean.

13:05 local time 77°34' N 23°42' E

Bangalore, India

11:25 UT Mylswamy Annadurai, project director for Chandrayaan-1, India's first mission to the Moon, sits down with two of his engineers for a final check of the spacecraft simulator systems they will be taking to the United States in two days. There they will be used to check the interfaces for two US instruments that will be included in the mission. The spacecraft is due for launch next year.

16:55 local time 12°58' N 77°34' E

Borneo, Indonesia

12:00 UT Chairul Nidom, a virologist at Airlangga University's tropical-disease centre in Surabaya, Java, visits the Orangutan Rehabilitation Center in Palangkaraya to collect blood and trachea swab samples from

orangutans. The trachea swabs will be tested for influenza viruses, including bird flu, and tuberculosis. The blood sera will be analysed for hepatitis viruses. It's the end of a busy day for Nidom, who began by giving an 8 a.m. lecture to veterinary students in Java on animal welfare, followed by an afternoon lecture to vets in Palangkaraya on the H5N1 bird-flu virus in chickens, pigs, wild birds and humans.

20:00 local time 2°16' S 113°55' E

Nouragues Station, French Guiana

12:10 UT Following the station's temporary evacuation after two murders by illegal gold miners last month, work is beginning again under the permanent protection of the gendarmes. The tapir team is recovering photos from the 22 trap cameras set in 9 square kilometres of forest. The ONCFS, France's office for hunting and wild fauna, wants to compare the tapir densities in regions where they are hunted, and in the undisturbed region of Nouragues.

09:10 local time 4°05' N 52°40' W

Oxford, UK

12:25 UT Overheard at lunch in a neuroscience lab: "They've only had 27 applications and they're supposed to fund ten of them. I really like those odds."

13:25 local time 51°45' N 1°15' W

Worldwide

12:26 UT At the moment of the solstice, the Sun is as high as it gets above the plane of the Equator.

Ewa Beach, Hawaii

12:35 UT Gerard Fryer is fast asleep in the trailer behind the Pacific Tsunami Warning Center when his



15:22

pager starts bleating. Twelve thousand kilometres away an earthquake has been picked up by seismometers. He pulls on his clothes and runs to the operations building to discover that Dailin Wang, the scientist on watch, has already located and measured the earthquake: it was in the Nicobar Islands and of magnitude 5.9. This is not large enough to create a tsunami, so they send a message saying so.

02:35 local time 21°19' N 158°07' W

Rockville, Maryland

13:05 UT Jeffery Taubenberger is packing up his office and lab at the Armed Forces Institute of Pathology ready for his move to the National Institutes of Health, where he will set up a research programme on flu pathogenesis. He is also in the process of analysing initial sequence fragments from pre-1918 human influenza cases obtained by screening autopsy lung tissue samples for influenza A with a DNA amplification protocol. This should allow him and his colleagues to determine in the long run whether any parts of the pre-1918 human flu virus were carried forward into the pandemic virus of 1918.

09:05 local time 38°58' N 77°02' W

Worldwide

14:00 UT The Interacademy Panel on International Issues, representing the world's national science academies, releases a joint statement on the teaching of evolution. The statement urges parents and teachers to provide children with the facts about the origins and evolution of life on Earth.

Manhica, Mozambique

14:05 UT After getting back from the World Health Organization



15:30

office in Maputo where he was planning a meeting on the introduction of possible malaria vaccines in Africa next year, Betuel Sigaúque, a doctor and public-health worker, is catching up on e-mails when he's interrupted by bad news. The generator in Tãninga, one of the outlying areas involved in Sigaúque's malaria research, is misbehaving, and someone will have to go out there and bring research materials back to the main lab in Manhica.

16:05 local time 25°24' S 32°48' E

Atlantic Ocean

14:35 UT A float that spends most of its life drifting well below the water pops to the surface off the northwest of Ireland and transmits a burst of data to a satellite. It is one of 2,447 floats in the Argo system, which travel the world mapping out currents and measuring water temperatures. The satellite sends the data down to a ground station outside Toulouse, France. An



16:43



16:59

automatic program at the British Oceanographic Data Centre in Liverpool pulls the data across, checks the quality, reformats and passes them on to one of the three international Global Data Assembly Centres, where they are merged with data from all the other nations that contribute to the Argo programme.

15:35 local time 56°12' N 11°15' W

Pika Camp, Canada

15:22 UT As the clouds lift from the mountain peaks of the Yukon, Sarah Trefry sets off to a nearby boulder field to record the vocalizations of collared pikas (*Ochotona collaris*). Her work is part of a study into the effects of rapid climate warming on the dynamics of alpine ecosystems. Although the past winter was one of the warmest on record, the late spring snowdrifts are melting slowly and the alpine meadows are only just beginning to show the first signs of summer life.

08:22 local time 61°08' N 138°10' W

South Atlantic Ocean

15:30 UT The *Polarstern* is on her way south to the Southern Ocean to perform a study of overwintering mechanisms of krill and other organisms. The crew and scientists are using the few daylight hours to prepare the plankton nets. This is not so easy in a force 8.0 and with six-metre waves.

15:30 ship's time
46°29' S 07°31' E

Stockholm, Sweden

15:45 UT Tomas Nyman of the Structural Genomics

Consortium (SGC) lab at the Karolinska Institute is enjoying his afternoon coffee, eating fresh strawberries and cream on the sunny balcony outside the lab. The working day in Stockholm will soon be over, although the sun will continue to shine for a good five hours. The other two SGC laboratories, in Oxford and Toronto, will continue to operate into the Swedish night. By the time the Canadians end their day, the SGC will have deposited structures for ten human proteins in the Protein Data Bank.

17:45 local time 59°17' N 18°04' E

Atlanta, Georgia

16:20 UT At the Centers for Disease Control and Prevention, Fred Tenover is dismayed by the outcome of his latest study. His team has been looking at the automated systems that identify antimicrobial-resistant bacteria. Tenover has just found that several of the systems fail to identify the strains of multidrug-resistant *Staphylococcus aureus* and *Enterococcus faecium* that are known to be resistant to linezolid. If labs can't detect these strains, they will tell doctors that a patient's infection should respond to the drug, when it might not. This is not the 20th wedding anniversary present that Tenover was anticipating.

12:20 local time 33°43' N 84°23' W

Sutherland, South Africa

16:42 UT At dusk on the high plateau of the Great Karoo Desert, staff astronomers Encarni Romero Colmenero, Nicola Loaring and Fred Marang carefully align the 91 individual segments of the South African Large Telescope's 11-metre mirror. Tonight's scientific programme has been designed to test the instruments and subsystems

of this fledgling observatory. They will be looking at a gravitationally lensed quasar, black-hole candidates in the Galactic bulge, dynamic winds from Wolf-Rayet stars and giant radio galaxies.

18:42 local time 32°23' S 20°49' E

New York, New York

16:43 UT The American Museum of Natural History has invited the press 'behind the scenes' to preview a snakes and lizards exhibition. Postdoc Jack Conrad is showing off a slab of orange sandstone collected from the Gobi Desert that contains the delicate, 84-million-year-old skeleton of a recently discovered lizard species. The grey-banded kingsnake vanishing up curator Darrel Frost's sleeve, meanwhile, is neither an exhibit nor a piece of research; it's a pet.

12:43 local time 40°47' N 73°58' W

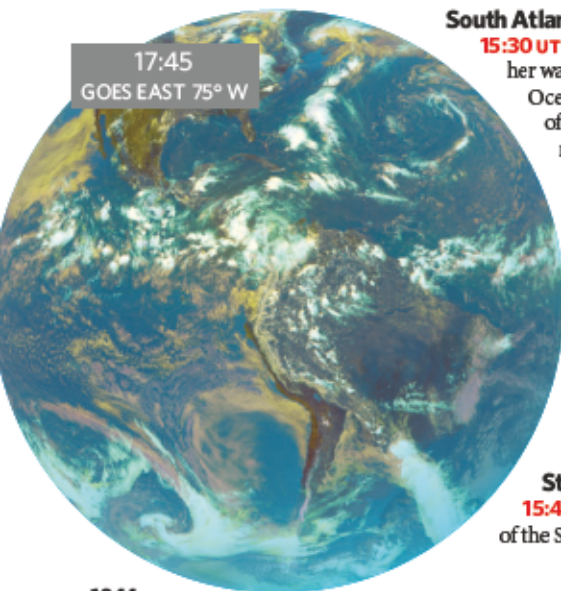
Yellowstone National Park, Wyoming

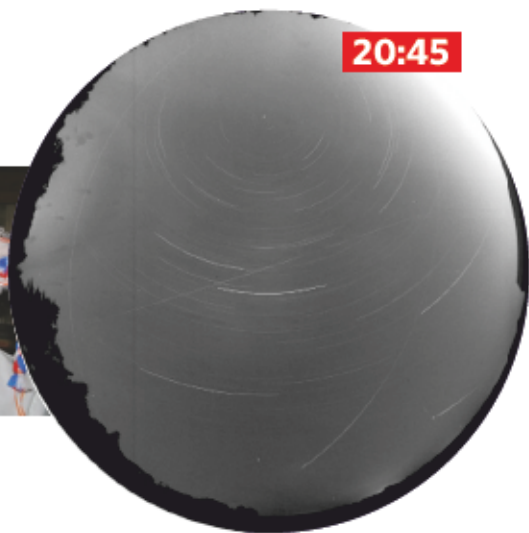
16:59 UT In Amphitheater Springs, Tim McDermott and graduate student Dana Skorupa remove samples of algae from water that can reach 72 °C. The researchers, based at the Thermal Biology Institute of Montana State University, will extract messenger RNA from the algae for use in microarrays. They are studying which genes get turned on or off in June, when levels of visible and ultraviolet light reach a peak, and the algae die off in a big way.

10:59 local time 44°48' N 110°44' W

Ambo, Peru

17:00 UT An international team of scientists sponsored by the National Geographic Society is deep inside a cave, partway up a cliff that overlooks Ambo — some 2,000 metres up in the Andes. Bruce

17:45
GOES EAST 75° W



Shockley of the American Museum of Natural History is excavating a partial skeleton of a large sabre-toothed cat; 20 metres below him, Rodolfo Salas of Lima's Natural History Museum discovers the jaw of a new sloth. French colleagues map the labyrinth known locally as Jatun Uchco, the 'profound hole'. Later, on his way to an Internet café, Shockley gets "caveman dust" all over the people sharing his taxi.
12:00 local time 10°08' N 76°12' W

Muscat, Oman

17:03 UT In her office at Sultan Qaboos University, botanist Annette Patzelt finishes for matting the draft manuscript of the Oman Plant Red Data List. The book contains detailed information about the conservation status of 262 Omani plants; it is the first such register in the whole of the Arabian peninsula.
21:03 local time 23°36' N 58°32' E

Waterloo, Canada

17:15 UT "How do you make a clock out of light?" asks Olaf Dreyer, a visitor having lunch at the Perimeter Institute for Theoretical Physics. He wants to figure out whether it is possible to use light beams to define time in a theory of quantum gravity. Fotini Markopoulou and Daniel Gottesman from the institute kick the idea around with him for a bit before more people arrive and the conversation inevitably turns to the World Cup. No practical plans for a light-clock emerge.
13:15 local time 43°28' N 80°32' W

Worcester, Massachusetts

17:54 UT Daniel Rowe and his mentor Douglas Golenbock raise a glass to celebrate Rowe's successful defence of his PhD thesis. Rowe

identified a protein that interacts with an immune-system molecule called toll-like receptor 4, or TLR4. The work took him five years; he has yet to decide his postdoc position.
13:54 local time 42°16' N 71°48' W

Moorea Island, French Polynesia

18:29 UT Gustav Paulay and Sally Holbrook of the Gump Research Station collect coral symbionts from a reef just after dawn. Paulay is part of the Moorea Biocode Project, which aims to catalogue the entire flora and fauna of this volcanic island. Holbrook studies the complex system of coral reefs and lagoons that surround the island. The animals in the early-morning catch will be identified, photographed and genetically barcoded for use in studies of the reef's food webs and populations.
08:29 local time 17°30' S 149°50' W

Buenos Aires, Argentina

19:00 UT Everyone in the organic-chemistry department of Buenos Aires University is gathered in front of the department lounge's television to watch the Argentina-Netherlands football match. All research activity has stopped except for the NMR spectrometer next door, which is measuring a carbon-13 spectrum — something it will manage to do uninterrupted for the next 90 minutes.
16:00 local time 34°12' S 58°18' W

Gröningen, the Netherlands

19:00 UT The staff, students and researchers from Ben Feringa's synthetic organic chemistry lab at Gröningen University, having enjoyed their annual barbecue at the boss's house, are gathered indoors in

front of a big screen for the Netherlands-Argentina match. Even those who come from neither country are pretty excited.
21:00 local time 53°13' N 6°34' E

Pasadena, California

19:04 UT At the Jet Propulsion Laboratory, Jon Giorgini updates the orbit of asteroid 2004 XP14 and sends the tracking data to the Goldstone planetary radar facility in the Mojave Desert. 2004 XP14 will come almost as close to Earth as the Moon is on 3 July; it will be the closest asteroid approach ever observed by radar.
12:04 local time 34°12' N 118°11' W

Denver, Colorado

19:12 UT Bruce Williams, who teaches 13-year olds at Joyce Kilmer School in Trenton, New Jersey, is registering a team to compete in the National Middle School Science Bowl in Denver. His students, Roger Barrett, Niyi Odumosu, Dyanmond Ruffin and Dahlia Wesley, will compete in a hydrogen fuel-cell model-car race: the fastest over 10 metres wins.
13:12 local time 39°41' N 104°58' W

Norman, Oklahoma

20:00 UT Samuel Mbainayel, a meteorologist in Chad's civil service, takes his wife and daughter to the local health centre for immunizations. When he gets back, he returns to the literature review he is doing for a paper on how variability in rainfall in the Soudano-Sahelian zone of west Africa might be affected by interactions between land surface and the atmosphere, which will form part of the master's thesis he's over in the United States to work on.
15:00 local time 35°13' N 97°26' W

Ondřejov, Czech Republic

20:45 UT It's not a good night for the automated observatories in the Czech Republic as they scan the skies for fireballs — haze and clouds are affecting the view. The only trails observed are caused by planes and the International Space Station. Instead, Pavel Sporný spends the evening analysing the trajectory of a meteor spotted over the remote Nullarbor Plain in southwest Australia on 8 March, captured on disk by collaborators at the Western Australian Museum in Perth.
22:45 local time 49°54' N 14°46' E

Bar Harbor, Maine

21:35 UT The Jackson Laboratory freezes its 3,052,986th mouse embryo. There are now 2,612 strains of mice cryopreserved in the labs' vaults. Also passing through the cryopreservation service today: 1 fresh sperm order, 1,597 two-cell embryos frozen in 38 straws, 40 embryo transfers and 3,084 oocytes. One order was shipped.
17:35 local time 44°22' N 68°12' W

Malargüe, Argentina

23:04 UT At the Pierre Auger Observatory, after hours of careful calibration, researchers begin to take their data. Eighteen telescopes spread across the *Pampa amarilla* of western Argentina begin the hunt for the glow of cosmic rays from far beyond the Galaxy. The wind is a little high, but the skies are clear — and the night will be the longest that the team will have all year.
20:04 local time 35°28' S 69°35' W

There is a greatly expanded version of this feature online
www.nature.com/news/specials/solstice