NEWS

New year, new science

Nature looks at what key events may come from the research world in 2010.

Planck peeks at the Universe's origin

The first detailed images of the cosmic microwave background sent back by the European Space Agency's Planck mission could alter theories about the origins and structure of the early Universe. Full results won't be officially released until 2012.

Life, but not as we know it

Surely this will be the year when genome pioneer Craig Venter and his team reveal they have booted up a laboratory-made genome inside a living bacterial cell, to create what will be billed as synthetic life.

An Antarctic time machine

An ice core from Antarctica could provide the sort of year-by-year climate records already gathered in the Northern Hemisphere from Greenland. The West Antarctic Ice Sheet Divide Ice Core project is in the final stages of pulling up a 3.4-kilometre-long climate record that covers the past 40,000 years in enough detail to compare how the north and south polar regions warm up, or chill, in relation to one another.

How many species will join the Rajah Brooke's birdwing butterfly on the protected list?

Stopping species loss

The United Nations has proclaimed 2010 the International Year of Biodiversity, to culminate in an October summit in Nagoya, Japan, that hopes to establish strategies to prevent

biodiversity loss — probably by setting out ways to try to halt the current decline by 2050. New ideas are sorely needed: this year, 120 countries will miss a goal set by a 2002 accord to achieve a 'significant reduction' in biodiversity loss.

J. CARMICHAEL JR/NHPA

A flood of genomes

The completed Neanderthal genome and the genomes of remaining primates will count among the highlights of another year of ever-cheaper DNA-crunching. Following last year's comprehensive portraits of cancer genomes, medically minded sequencing will continue to focus on the causes of specific diseases, and on spotting more human genetic variants.

Mexico City: the new Copenhagen

Starting in late November, Mexico will be the venue for the next major round of United Nations climate-policy wrangling, where an overdue formal agreement to succeed the Kyoto Protocol on climate change may finally be hammered out. Before then, attention will focus on the action that individual countries

Shorter NIH grant form launches

For many, a new year means a fresh round of paperwork, but in the United States this year many biomedical researchers have something of a reprieve. The length of applications for most grants at the National Institutes of Health (NIH) — including mainstay 'R01' grants — has been slashed by more than half, from 25 pages to 12.

The streamlined form comes into effect this month and is part of a major overhaul of peer review at the agency, based in Bethesda, Maryland, which will this year fund some US\$16 billion in research project grants. The aim, says Sally Rockey, acting deputy director of the NIH's office of extramural research, is to reduce the administrative burden on applicants and reviewers, and to focus on "the

essentials of the science".

The shorter form "really forces applicants to concentrate on getting their point across more rapidly and to organize their application" accordingly, Rockey says. With the longer applications, she adds, "reviewers often focused on the minutiae within the methodologies instead of focusing on the overarching concept and impact".

To try to move away from this, other changes to the process include a new scoring scale for peer reviewers, plus 'enhanced' review criteria to emphasize the big picture over the details.

Reviews of the shorter application form are mixed as the 5 February R01 submission deadline approaches. Some researchers agree that its brevity

encourages clarity. "It's asking us to be more focused and concise in our explanations," says Joan Teno, a professor of community health and medicine at Brown University in Providence, Rhode Island, who is seeking an R01 to refine a data-gathering tool she developed to

"In the past, I would have easily put in at least ten figures. That's impossible now."

measure the quality of US hospice care. "That's a really good thing."

David Wicczorek, a molecular geneticist at the University of Cincinnati in Ohio, concurs that the abbreviated format tends to focus both the mind and the writing.

But, he adds, "once you get past a certain [word] limit, it becomes very difficult: what do you include and what do you exclude?" Late last month, his draft application for a five-year grant to study mouse models of heart disease ran to 13 pages, and he was bracing himself to find a final page of trims.

The former 25-page length for R01 applications stood out among funding agencies and foundations worldwide. Project grant application forms at Britain's Wellcome Trust, for instance, are limited to 3,500 words plus up to five pages of figures; a recent informal sample of such applications found their average length to be 6–8 pages, including figures. The Investigator Awards that will replace project grants later this year at Wellcome

CLUES TO TASMANIAN DEVIL CANCER

Tumours are found to arise from cells that insulate nerves, raising test hopes. go.nature.com/wzHTGp

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need to take on their commitments, on climate legislation in the United States and on international standards to monitor emissions and verify promised reductions.

Earth-like worlds elsewhere

As planet-hunters eagerly await the discovery of an Earth-like planet in the habitable zone around a Sun-like star, they may have to make do this year with an easier target: a potentially hospitable planet around a red dwarf star. NASA's Kepler telescope has already discovered previously unknown planets (see page 15).

Hope for HIV prevention

Early this year, the first clinical trial to use a gel incorporating an antiretroviral drug is expected to release its initial results; several large trials of other microbicides have failed to show benefit in blocking HIV. Early results are also due from long-anticipated trials that look at 'pre-exposure prophylaxis', or administering anti-HIV drugs before risky sex.

A perfect symmetry

Evidence for supersymmetry — the theory that every known fundamental particle has an undiscovered, superheavy partner — may be the most intriguing discovery to come from Europe's Large Hadron Collider near Geneva, Switzerland. The find would be even more bizarre than the anticipated Higgs boson, the particle thought to imbue matter with mass.

Quantum effects go large

Solid objects in physics laboratories could be seen to enter a superposition of states — the real-world version of Schrödinger's mythical cat that is dead and alive at the same time. The effect, predicted by quantum mechanics, has previously been seen in objects no bigger than ions, but could push into the macroscopic realm this year.

Cell reprogramming gets safer

Induced pluripotent stem cells will probably be created from adult cells using small molecules — lessening the risk of tumours, which comes with adding genetic material to a cell. Safer, more efficient reprogramming routes could lead to the field's first therapeutic applications.

Embryonic stem cells go clinical

The first clinical trials of therapies involving human embryonic stem cells (hESCs) could finally come this year. Biotech company Geron, of Menlo Park, California, plans to restart regulator-halted trials of an hESC-derived therapy for patients with spinal-cord injuries.

Space travel crosses frontiers

Among the year's planned space launches are Japan's Akatsuki, to orbit Venus, and China's second lunar probe, Chang'e 2. And as NASA looks set to choose a new direction for its human space-flight programme, a decision that could come early in 2010, the US space-shuttle

fleet will make its final outings. These include the July launch of the Alpha Magnetic Spectrometer, an instrument to study cosmic rays for evidence of antimatter and dark matter.

X-rays with laser-sharp focus

X-ray free-electron lasers, which produce short pulses of coherent X-ray light, may start to assert their superiority over synchrotrons for imaging. They should enable researchers to make images of single biomolecules without having to crystallize them, and to create detailed movies of molecular events such as protein folding. Data will flow from the first of these facilities, at the SLAC National Accelerator Laboratory in Menlo Park, California.

Climate computing heats up

Expect increasingly realistic climate models from several recently launched supercomputers, including the Earth Simulator II in Yokohama, Japan, and Blizzard in Hamburg, Germany. As some of the world's 40 most powerful computers, they will improve on two of the largest uncertainties of current simulations: resolving local eddies in ocean circulation, and providing long-term forecasts of cloud behaviour. Blizzard will also incorporate Earth's carbon cycle into its climate models.

Richard Van Noorden

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will have 8-page applications.

The NIH has been well aware of the problem. In 2008, a working group of internal and external experts strongly recommended shrinking the length of the R01 application. So did the broader research community: among more than 5,000 responses submitted to the NIH on the issue, 70% supported jettisoning the 25-page form in favour of something substantially shorter.

Last year's economic stimulus gave the agency a chance to pilot the abbreviated application by using it for Challenge Grant applications. Teno, who was a Challenge Grant reviewer, gives the updated process the thumbs up, singling out the clarity of the NIH's new instructions to reviewers. It "significantly reduces the workload and it improves the quality of doing the reviews", she says. "It used to be about five to six

Sally Rockey is helping to reform the NIH grant process.

hours and I'm now down to three to four hours per application."

But Rita Nahta, a pharmacologist at Emory University School of Medicine in Atlanta, Georgia, is struggling with an issue presented by the shortened form that is likely to dog younger investigators: preliminary data take up precious

space. And many of these can't be relegated to a list of references because, unlike data coming from more senior investigators, they are unpublished. "In the past, I would have easily put in at least ten figures," most unpublished, Nahta says. "That's impossible now."

Rockey says that the NIH has mechanisms in place to give young investigators special consideration — for instance, by dipping below the minimum percentile for grant approval to fund highly rated young scientists, and by clustering applications from young investigators for review against one other rather than against senior investigators.

Time will tell which of the changes work. "It's going to take several rounds of reviews before you are really going to know how successful this has been," says Wieczorek. The NIH launched a formal evaluation

process in December, circulating an electronic survey of 35 questions to 4,500 investigators and reviewers, asking for feedback on already implemented changes to the peer-review process. It will ask for feedback as early as this summer on the changes in the length and structure of the application.

In the meantime, an overriding concern at the NIH is the prospect of a tidal wave of applications as researchers whose 12-page Challenge Grant proposals were rejected last year resubmit them next month as 12-page R01s, forcing the agency to turn down thousands of worthy projects. Last month, NIH director Francis Collins told his advisory committee that the drop in grant success rates that is likely to result is "the thing that keeps me awake at night more than any other".

Meredith Wadman

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