

says. “And that will only happen if the problem has a strong ethical component.”

Among the moral arguments for action on climate change is the idea that society must preserve Earth for future generations, says another meeting organizer, climate scientist Veerabhadran Ramanathan of the Scripps Institution of Oceanography in La Jolla, California. A further argument is that the world’s 3 billion poorest people produce a fraction of humanity’s annual greenhouse-gas emissions — about 5% — but are predicted to suffer disproportionately from the impacts of climate change, such as more extreme weather.

Francis is not the first major religious leader — nor even the first pope — to speak out on climate change. In a 2009 statement, Archbishop of Canterbury Rowan Williams and other UK religious representatives recognized a moral imperative to address the causes of global warming. And last month, the presiding bishop of the US Episcopal Church, Katharine Jefferts Schori, described those who attribute global warming to purely natural causes as “often driven by greed and self-centred political interests, and sometimes by wilful blindness”.

Closer to home, Francis’s predecessor Benedict XVI made numerous statements on the environment, describing climate change in 2011 as a “worrying and complex

phenomenon”. But Ramanathan thinks that the huge popularity of the current pope presents a unique opportunity to raise awareness. “Pope Francis has become a Kennedy-like figure who goes beyond Catholicism and appeals to the whole world,” he says.

Even a popular pope can stir controversy, however. Francis’s support for action on climate change has raised hackles among some conservative Catholics, such as Steve Moore, who is chief economist at the Heritage Foundation, a free-market think tank in Washington DC. Francis has “allied himself with the far left”, Moore says.

But Dan Misleh, executive director of the Catholic Climate Covenant, an environmental group in Washington DC, says that Francis is unlikely to endorse specific policies to fight climate change. “I don’t think he is going to say that a carbon tax is preferable to a cap-and-trade programme,” Misleh says. “But I think he will say that there is a connection between how we treat the planet and how we treat one another.”

Such a strategy will allow Francis to avoid seeming “ideological” while still speaking

“I think he will say that there is a connection between how we treat the planet and how we treat one another.”

clearly about the role of humans in climate change, says James Bretzke, a Catholic theologian at Boston College in Massachusetts. Already, he says, several Vatican figures who are likely to be involved in drafting the Pope’s encyclical have made unequivocal statements on global warming. Last year, for example, Bishop Marcelo Sánchez Sorondo, chancellor of the Pontifical Academy of Sciences, said that “essentially all documents published now accept as a scientific truth that climate change is due to human activity”.

The document set to be signed at this week’s meeting contains a very similar statement, according to co-organizer Partha Dasgupta, an economist at the University of Cambridge, UK. Attendees were scheduled to discuss the physical and chemical processes that underlie global warming, he says, but a debate on the idea that human activities drive that warming was not planned. “Religious leaders might ask whether other scientists have different views,” says Dasgupta, adding that the small minority of scientists who are sceptical of climate change were not represented at the meeting.

Still, the Pope will be careful to point out where scientific uncertainties remain, Bretzke predicts. Such caution is borne of the Vatican’s famous over-certainty in the past. “Centuries ago, the Church got on the wrong end of cosmological arguments,” he says. “It has been chastened by that.” ■

MEDICAL RESEARCH

Gene-testing firms set sights on drug development

Companies race to gather large DNA data sets in bid to find treatments based on genetics.

BY ERIKA CHECK HAYDEN

Companies that offer genetic testing directly to consumers are renewing their ambitions. Recent moves by US regulators have given the firms fresh hope that the large genetic data sets they amass will have commercial as well as scientific value, spawning diagnostic tests or drugs.

The moment seems ripe. In February, the US Food and Drug Administration (FDA) allowed 23andMe — a company in Mountain View, California, that has offered genome analysis to consumers for nearly a decade — to begin marketing a test for mutations that cause a rare disease called Bloom syndrome. This was the first time that the agency had approved a genetic test marketed to the public, not clinicians — and companies are betting that it will not be the last.

Many expect the FDA to further expand the types of medically relevant information that consumer genetic tests can supply. The February decision “is a huge step for the field”, says Ken Chahine, a senior vice-president at Ancestry.com DNA of Provo, Utah, which offers genetic testing to the public. “You’re starting to see others get into this space because everyone sees a lot of value in it.”

Ancestry.com DNA, a subsidiary of genealogy website Ancestry.com, is one of those newcomers. The company has so far collected DNA from 850,000 customers, which it uses to help people to find relatives among members of its genealogy-focused social network. It is now exploring the idea of collecting users’ medical histories, too, so that it could offer them medically relevant information and investigate the genetic roots of diseases.

23andMe is farther down this road and has already attracted interest from health-care firms. In January, it signed a US\$60-million deal with California biotechnology company Genentech, which will use genetic data from 23andMe customers to develop therapeutics. The personal-genomics firm has also hired former Genentech executive Richard Scheller to lead an in-house effort to develop drugs. And, similar to Ancestry.com, 23andMe has access to a home-grown social network that encourages its customers to interact with the company and each other.

Commercial firms are not the only group seeking to build large pools of participants for genetic studies — or the only ones harnessing social networks for this cause. The medical-research study Genes for Good, which launched on 31 March, is seeking ►

► participants through Facebook. Users of the social-networking service can download a Genes for Good app that guides them through a series of health surveys to collect basic information, such as height, weight and whether a person uses tobacco. Users who complete 15 of these surveys can receive a 'spit kit' to collect saliva for DNA sequencing, and are encouraged to continue providing health information afterwards.

"We wanted to do something that would give us the possibility of capturing very large numbers of people in a way that is more engaging than the traditional types of study," says Gonçalo Abecasis, a statistical geneticist at the University of Michigan in Ann Arbor who is leading the study.

WIDENING THE NET

Drawing on 23andMe's example, the project will return genetic information to users — such as hints about ancestry drawn from a user's genetic markers. The project also hopes to share the information it collects with other academic scientists,

"They're smart to tether their research to a platform that has a much broader market base of people."

or even companies developing new therapies, after removing identifying information such as names and addresses.

So far, Genes for Good has recruited 4,200 potential participants of the 20,000 it seeks, and hundreds of those have already sent back their spit kits. That is a relatively small number of genomes compared to the amount of genetic information contained in private databases. And it is dwarfed by the amount of data being amassed by public projects, such as one run by the UK Department of Health that aims to sequence the genomes of 100,000 patients.

Such efforts, in theory, could compete for participants with commercial ventures such as Ancestry.com DNA and 23andMe, which ask customers to pay for testing similar to the type that Genes for Good will offer for free. It is not clear whether that will affect the companies' ability to attract customers and expand their data sets, given their significant head start.

Genes for Good is tapping the power of Facebook, with its 1.44 billion active monthly users. Given this potential, the project could become more massive than any previous genetic study, says Michelle Meyer, a bioethicist and legal scholar at the Icahn School of Medicine at Mount Sinai in New York. "They're smart to tether their research to a platform that has a much broader market base of people than we're used to seeing in research studies," she adds. ■



DNA from humans who lived in the Andes 9,000 years ago gives clues to how South America was peopled.

ARCHAEOLOGY

South America settled in one go

Tests of human remains from a cave high in the Peruvian Andes point to a single early migration.

BY EWEN CALLAWAY

Humans settled in South America in a single wave of migration not long after their ancestors first crossed from Siberia into the Western Hemisphere during the last ice age, genetic evidence suggests. The finding, based on DNA from the remains of five ancient humans who lived high in the Peruvian Andes, also hints at how ancient Andeans evolved to thrive at altitudes of more than 4,000 metres.

Presented on 16 April at the annual meeting of the Society for American Archaeology (SAA) in San Francisco, California, the research sheds light on the last major continental migration in human prehistory — and one of the least understood.

South America's oldest-known human occupation site — the 14,600-year-old Monte Verde settlement in Chile — suggests that people quickly reached the continent after crossing the Bering land bridge one or two thousand years earlier, perhaps skirting the Pacific coast. But some argue for a second migration. They use skeletal evidence to propose that the long, narrow skulls of South Americans living more than about 5,000 years ago differ too much from the rounder heads of more-recent

inhabitants, and of living indigenous people, to represent one continuous population¹.

In the 1950s and 1960s, Peruvian archaeologist Augusto Cardich discovered human remains bearing the characteristic ancient skull shape in a rock shelter perched high in the Andes in a region called Lauricocha. Carbon dating put the site at around 9,000 years old, making it a classic archaeological example of early high-altitude living. Later researchers dated remains from Lauricocha closer to 5,000 years old, greatly diminishing its appeal for researchers interested in the early prehistory of South America. "People simply forgot about this site. Nobody was interested any more," says Lars Fehren-Schmitz, a biological anthropologist at the University of California, Santa Cruz.

More than half a century after the site's discovery, Fehren-Schmitz's team got permission to look at five human skeletons excavated from Lauricocha and held at the National Museum of the Archaeology, Anthropology and History of Peru in Lima. The team redated the remains, remeasured the skulls and extracted DNA.

Their work, presented by Fehren-Schmitz at the SAA meeting, paints a complicated picture of Lauricocha. Two of its residents, a woman and a 2-year-old child, died nearly 9,000 years ago. The third, a man, perished around 2,500 years later and another man died

CHRISTIAN KAPTEIN/ROBERT HARDING