

NEWS

Japanese monkey deaths puzzle

Researchers claim outbreaks of unknown haemorrhagic illness are no threat to humans.

Scientists from Japan's premier primate research centre are struggling to reassure the public that a mysterious illness killing their monkeys poses no threat to humans. Almost a decade after it first appeared, scientists from Kyoto University's Primate Research Institute (PRI) described the disease and their unsuccessful search for a cause in an online publication on 1 July and in a press release on 7 July. But their account leaves other researchers hungry for details.

In the first outbreak to hit the PRI in Inuyama, near Nagoya, between July 2001 and July 2002, seven Japanese macaques (*Macaca fuscata*) fell ill and six of them died from what the institute scientists



Japanese macaques are succumbing to a mystery disease.

provisionally call a 'haemorrhagic syndrome'. Symptoms included anorexia, lethargy, pallor and nasal haemorrhaging. Autopsies revealed bleeding in the lungs and intestines. Genetic, bacterial and toxicological tests failed to pinpoint a cause, and after the outbreak ran its course, operations at the institute returned to normal. But between March 2008 and April 2010, another 39 cases appeared in the same species. Of those, 25 died of the disease and 13 were humanely killed. Only one

monkey survived each outbreak.

On 1 July, an institute committee set up after the second outbreak published its findings in the online version of the Japanese-language journal *Primate Research* (Kyoto University Primate Research Institute Disease Control Committee *Primate Res.* 26, 69–71; 2010). The committee tested blood, faeces and tissues from the diseased monkeys for 6 bacteria and 16 viruses. The tests, which included PCR analysis, turned up nothing that could explain the deaths. François Villinger,

director of pathology at the Yerkes National Primate Research Center in Atlanta, Georgia, says that Japanese laboratories tend to have excellent diagnostic capabilities: "Therefore I have confidence in the fact that the illness is probably not due to any of the known agents inducing haemorrhagic fevers."

PRI director Tetsuro Matsuzawa spoke out against suggestions in the local media that the disease could spread to humans or other animals. At the 7 July press conference, he stressed that none of the other primate species at the institute, which houses more than 1,200 animals from 13 species, including chimpanzees, marmosets and crab-eating macaques, has contracted

the syndrome. The humans who handled the monkeys also show no symptoms. "I don't like the headlines in the news media," he says. "We think that the haemorrhagic syndrome is due to a species-specific pathogen of the Japanese monkeys."

Matsuzawa says that the institute did not publish its findings earlier because it feared causing panic in the wider population. Cases are still occurring, but following the use of disinfectants and the isolation of sick monkeys, the pace has

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Questions raised over Korean torpedo claims

It seemed like an open-and-shut case. In May, two months after the South Korean warship *Cheonan* suddenly sank in the Yellow Sea, the country released the findings of its investigation, blaming a torpedo attack by its northern neighbour.

The evidence included a smoking gun: parts of a torpedo found near the ship had the same dimensions as those in North Korean munitions pamphlets, and ink marks identified the torpedo as North Korean.

But North Korea has consistently denied the attack, demanding that the United Nations (UN) coordinate a joint North-South investigation. The UN released a long-awaited statement on 9 July, condemning

the incident, which led to 46 deaths, but it conspicuously failed to blame North Korea.

On the same day, at a press conference in Tokyo, scientists raised issues about the South Korean investigation that they believe cast doubt on North Korea's involvement. Seung-Hun Lee, a South Korean-born physicist who works at the University of Virginia in Charlottesville, says that the most problematic point is the claim that material from the *Cheonan* was adsorbed onto the torpedo's propeller. Although electron-dispersive spectroscopy found a match between the adsorbed material and the ship,

X-ray diffraction analysis found no sign of the expected aluminium or aluminium oxide from the ship.

To explain this discrepancy, the investigation team suggested that, after the explosion, the material cooled rapidly into an amorphous form that cannot be detected by X-ray diffraction. But this supercooling is a delicate process, says Lee. "It's impossible that 100% of it would be amorphous." Lee's experiments show that aluminium left over from a detonation would mainly be crystalline.

Lee's analysis, posted online on 3 June (S.-H. Lee and P. Yang, preprint at <http://arxiv.org/abs/1006.0680>; 2010), was soon

bolstered by independent work from Panseok Yang, a laboratory manager specializing in mass spectrometry at the University of Manitoba in Winnipeg, Canada. Yang's data, added on 28 June to Lee's report, show that the ratio of oxygen to metal in rapidly cooled aluminium oxides would be much lower than that found by South Korea's investigation, and that the material identified could be the torpedo's own corroded aluminium.

Lee also says that it is unclear how the ink, which apparently identified the torpedo as North Korean, could have survived the heat of the detonation. He suggests that the *Cheonan* might have been



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Birds that devote less time to their offspring engage in more same-sex behaviour.
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slowed to one case in May and one in June. Matsuzawa is holding back some data for a more detailed future publication and would not answer *Nature's* questions about whether his group is also probing possible environmental causes, which bacteria and viruses have been tested for, and what analysis of the two surviving monkeys has revealed.

By screening the 790 remaining Japanese macaques for other viruses and bacteria and running genetic tests, Matsuzawa hopes to pin down the cause of the syndrome and to create a test for early diagnosis. He says that he is looking for collaborators, and animal-pathogen researchers contacted by *Nature* are certainly eager to learn more about the illness. Primate disease specialist Sonia Altizer of the University of Georgia in Athens wonders whether any of the animals were recently captured in the wild, where they could have picked up the infection, and whether animals were housed singly or in groups. "Knowing the possible contacts between animals and the chronological pattern of illness or deaths might also help determine whether this was indeed an infectious agent, and the possible routes of transmission," she says.

She also asks what measures the human workers were taking before the outbreaks to minimize transmission of infectious agents between monkeys and humans. "Presumably there would be some pretty careful measures in place that would limit human exposure to any contaminant or pathogen," she says, "so saying that humans are not susceptible to me seems premature." ■

David Cyranoski

hit by a mine or rammed by another ship — a suggestion also raised by Shin Sang-chul, a former officer in the South Korean navy who was part of the investigation team.

This week, a US-led UN team plans to meet North Korean military representatives to discuss the sinking. The South Korean government has adamantly denied fabrication or major problems with its interpretation of the data. Others also doubt that there is an alternative interpretation. "Aside from the science, it is consistent with North Korea's behaviour in the past," says James Schoff, an Asian regional security expert at the Institute for Foreign Policy Analysis in Cambridge, Massachusetts. Referring to South Korea's investigation, he says: "I have no doubts personally that the conclusion is correct." ■

David Cyranoski

See go.nature.com/5q5igr for a longer version of this story.

Start-up model patently flawed

It is widely believed to be the standard route for academics starting their own business: disclose an invention to the university, get it patented and venture forth into the spin-out world. But an extensive survey has found that this is not how the majority of companies are started by US academics, suggesting that government and universities are missing an opportunity in their quest to boost entrepreneurial activity.

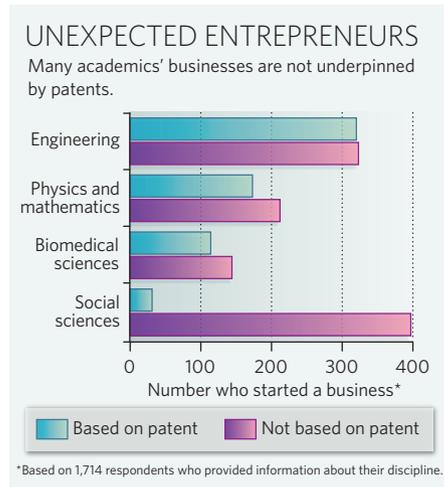
In what the authors say is the largest study of its kind, experts on entrepreneurship surveyed 11,572 professors at institutions across the United States (R. Fini, N. Lacetera and S. Shane *Res. Pol.* doi:10.1016/j.respol.2010.05.014; 2010). Of the 1,948 respondents who had started a business, only 682, or about one-third, had set them up to exploit patents obtained through formal university intellectual-property systems. The remaining 1,266 respondents had started businesses — including consultancies and manufacturing and service-based firms — based on non-patentable knowledge.

Social scientists and engineers started the most businesses that were not based on patented inventions, but such ventures were also prevalent among biomedical and physical scientists (see 'Unexpected entrepreneurs').

"There is a lot of stuff that academics are realizing isn't patentable but they can commercialize for themselves by starting a company," says Scott Shane, an economist at Case Western Reserve University in Cleveland, Ohio, and a co-author of the study. Because surveys of entrepreneurial activity — including government assessments — typically focus on patent activity, they may be significantly underestimating academics' efforts, he notes.

The study also says that universities' technology-transfer offices (TTOs) are "failing to help" a sizeable proportion of academic entrepreneurs. "If you aren't measuring [the full range of activities] you can't promote them," says Shane. "All the policies and approaches focus on the formal intellectual-property system, which means we are missing a big part of the iceberg that is under the water."

Ashley Stevens, president of the Association of University Technology Managers, calls the study "a significant new piece of data". But he says that TTOs do help academic entrepreneurs outside



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the formal intellectual-property system. A major barrier to more support is that, unlike businesses started inside the system, those started without patents are less likely to provide the university with a financial return, he adds.

Yet the survey found no discernible difference in respondents' financial return between businesses started with and without patents, although those businesses not based on patents were more likely to fail.

The study comes as the US government is shaping its policy on the commercialization of federally funded research. The Office of Science and Technology Policy put out a call for information earlier this year, and is promising to use the results to help identify a set of "promising practices" that will encourage technology commercialization, says Tom Kalil, the office's deputy director for policy. "These include entrepreneurship education for faculty and students, proof-of-concept funding, standardized intellectual-property agreements, and policies that allow faculty to take 'industrial leave' to start up a company."

Some experts say that governments and universities are still right to focus on patent-based academic entrepreneurship. Businesses built on inventions tend to need more support to establish themselves, and can potentially generate the greatest returns, says Mark Schankerman, who studies entrepreneurship at the London School of Economics. "It is getting out a new drug, not a new consultancy company, which is going to make the larger contribution to the economy and society," he says. ■

Zoë Corbyn