

has built the Active Denial System, a non-lethal high-power microwave weapon supposedly able to deter an angry mob by creating the sensation of being burned.

For decades, the US military has conducted much of its research on such weapons in secret. It has often hinted that it is on the verge of a breakthrough, yet high-power microwave weapons are noticeably absent from modern battlefields and scenes of civil unrest. The military, for the most part, won't discuss its progress — or lack thereof — citing secrecy in the name of national security.

There is nothing unique about the classification of this research: nuclear weapons, stealth aircraft and satellite reconnaissance systems were all developed in secret. Although such furtiveness can legitimately protect US weapons and capabilities, it can also prevent much-needed dissemination of scientific research. And it has all too often concealed a lack of progress.

As we discuss on page 198, this has been the problem with the programme to develop high-power microwave weapons: the little information that has been released points to obvious scientific and technological problems. Crucially, power sources for such devices are often too unwieldy to use. More than ten years after the Active Denial System was first revealed to the public, its size and complexity mean that it is still nearly impossible to deploy. The military rejected the system for use at checkpoints in Iraq because it would have taken 16 hours to cool down the weapon's pulse generator to superconducting temperatures to fire it.

Many records related to the Active Denial System remain classified and inaccessible to the public and the scientific community. The US Air Force's unwillingness to reveal the full scope of its research into the biological effects of high-power microwaves in the 1990s, which included work on their auditory and lethal effects, flies in the face of the defence department's claims that it is interested in classifying only weapons technology, and not science. If, as the Air Force says, the biological research never led to weapons, then there is no reason not to release it.

Work on high-power microwaves designed to take out electronics has not fared much better. Advocates can always claim that classified

programmes are yielding great progress, but information in the public sphere does not paint a rosy picture. Military officials and academics acknowledge that developing compact power sources remains the biggest hurdle. The Air Force and a contractor have touted efforts to develop a high-power microwave cruise missile, but neither will release details that might allow independent experts to judge the programme's potential. The Pentagon is staying quiet on a system developed to take out improvised explosive devices, but what little information is available indicates that — like the Active Denial System — it has proved too cumbersome to use effectively.

**“The government must be willing to share data and findings between military labs and academia.”**

This is not to say that all government spending on high-power microwaves is a waste. Academic funding under Multi-disciplinary University Research Initiatives is contributing to a host of peer-reviewed publications and collaborative research. But for the government to take full advantage of that research, it must be willing to share data and findings between military labs and academia. The defence department's own science board has found that reluctance to share is a barrier to progress.

Getting to the truth about high-power microwaves requires transparency. Independent experts must be able to scrutinize technology to enable scientific–military cooperation and to provide a reality check for those who make fantastic claims about a weapon's potential.

By the time it cancelled the Airborne Laser programme earlier this year, the US defence department had poured billions of dollars into the weapon: a chemical laser in the nose of an aircraft, designed to shoot down ballistic missiles. In the end, the question was not whether the laser would work, but whether it would be usable, given the scientific and technological practicalities of integrating such a complex system. “There's nobody in uniform that I know who believes that this is a workable concept,” concluded former US defence secretary Robert Gates, when he finally moved to kill the project. The same concerns would probably be expressed about high-power microwaves — if more information about them were available. ■

## The name game

*After several years of wrangling, zoologists can now name new species online only.*

With access to the Internet, the (official) world of animals and plants will soon be at your fingertips. In a landmark ruling, zoologists last week agreed that newly identified species can be named in online-only publications. Previously, the first official description of anything that crawled, flew, wriggled, walked or swam across Earth needed to be formally written up and recorded in print, where it would remain in perpetuity for future scientists to reference.

That made sense when Henry Fairfield Osborn described *Tyrannosaurus rex* in 1905; less so when Rob Gay named a new theropod, *Kayentavenator elysiae*, in 2010, which helps to explain why Gay broke with convention and claimed the first description of the species in a self-published print-on-demand book.

As technology blurred the distinction between what is published and what is not, some predicted online anarchy, with ‘taxonomic vandals’ taking to the Internet to self-publish reports of new species. An obvious solution to the problem would have been to extend the rules from print to cover online scientific journals, and to draw the line there. But there were concerns about whether online journals would endure. In a messy compromise, online journals that published descriptions of new species printed and bound several dozen copies of the paper — in case a

twenty-second-century palaeontologist should call. In an even messier compromise, some scientists printed papers from journal websites and posted them to libraries themselves.

No more. The International Commission on Zoological Nomenclature (ICZN), which sets the rules for the naming of new species, announced on 4 September that it was relaxing its code to encompass publication in online-only publications. The change, which followed a vote of 23 in favour to 3 against, with one abstention, comes into force at the start of next year. The amendment allows for descriptions of new species in “widely accessible electronic copies with fixed content and layout”. New animal species will also need to be registered with ZooBank.org, the official registry of the ICZN.

It is a sensible move, and one that most in the field should welcome. It comes a year after the International Botanical Congress endorsed online-only publication for new types of plant. In an Editorial at the time (*Nature* 475, 424; 2011), which called on zoologists to follow suit, *Nature* said: “At this point, it seems that there is little reason to continue to demand paper on a shelf to make a species name official.”

On hearing the news from the ICZN, one member of *Nature's* staff quipped: “Now to name a dinosaur you don't have to behave like one.” But that is a little unfair. Proper taxonomy and a robust archive are crucial to science, and the zoologists were right to consider with care the possible negative aspects of such a change, as well as listening to the clamour to embrace the new. True, the change has been a long time coming. It is overdue, even. Still, when you have been dead and waiting for a name since the Mesozoic era, what are a few extra years? ■

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