

Tanzanian rats with nose for trouble train to save lives

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They have proven their worth in detecting landmines but Africa's giant pouched rats have a lesser-known but equally critical vocation - saving lives by speeding up tuberculosis detection.

It's all in the nose, says the Belgian non-governmental organisation APOPO.

Its founders, in 1997, saw potential for these abundant rodents with a sense of smell as keen as a dog's but dismissed as pesty vermin—or a potential meal.

"The biggest obstacle has been the negative perception that people have of the rat," said APOPO director Christophe Cox, whose NGO has been based in Morogoro in Tanzania's eastern highlands since 2000.

Yet 83,000 landmines have been neutralised in Africa and Asia thanks to the rodents, APOPO says, saving countless lives where explosives still maim and kill up to 20,000 people—many of them children—each year.

Eyebrows were also raised when the group—whose acronym stands for Anti-Personnel Landmines Detection Product Development—branched out in 2007 to use [rats](#) for TB detection, under contracts with local authorities.

'Quite efficient'

"When I first heard about this technique I was a bit shocked, but it proved to be quite efficient, in fact more efficient than the microscopy we use," said Daniel Magesa, a doctor at Pasada Upendano Clinic in the capital Dar es Salaam which now sends APOPO's Morogoro base some 200 human sputum samples every month.

Africa accounts for most of the million-plus people who die of TB each year and untreated carriers can infect dozens of others, making speedy detection essential.

"The problem is the concentration of the TB in the samples we have. It is sometimes not concentrated enough for us to see it through the type of microscopy we use, even though it is very modern," Dr. Magesa said.

"With the lack of resources, qualifications and time, hospitals in the region only detect about 50 percent of TB cases," said APOPO director Cox, a figure confirmed by Dr. Magesa.

Today, more than 29 hospitals in Dar es Salaam and Morogoro send the Morogoro lab sputum samples. Another dozen clinics in the Mozambique capital Maputo send samples to an APOPO center opened in that country in 2013.

The NGO says it has detected 10,000 missed TB cases, identified by workers like Oprah and Violet, whiskers bristling as they move along a row of test tubes.

"The big advantage is how quick the rats are. They can go through 100 samples in about 20 minutes, and this is what a lab technician will take four days to do," said Cox.

During TB detection, rats are presented with a mix of negative and positive samples, the latter decontaminated for safety "but the smell

remains", said training director Haruni Ramadhan.

When a rat identifies a "true" positive, it is rewarded with a banana-peanut butter mixture. "We can only reward the rat if we are certain it is right," Ramadhan said.

The negatives are not necessarily suspicious but become "suspect", and subjected to further testing, if the rat reacts.

"Thanks to the rats, we have increased (TB case) detection rates by 40 percent" in the participating clinics, said Cox—citing the same figure given by Dr. Magesa.

APOPO now employs 222 rats—108 for demining and 42 TB detectors.

'A lot faster'

The others are breeders or still in training, like Jon Stewart and Stephen Hawking—year-old twins named for the US television star and the British scientist—who are hard at work, poking their noses in soil studded with deactivated mines.

"In these boxes we have buried land mines, so the rats have to pass and sniff and whenever they find the smell of TNT ... he has to scratch strongly," said chief trainer Jared Mkumba.

If they get it right, the instructor snaps a clicker, a signal that the rat can claim its reward, a bit of the banana-peanut butter concoction.

After six to nine months' training, the "HeroRATs", as APOPO calls them, are sent to Mozambique, Angola and more recently Cambodia to comb former battle zones—but this is no suicide mission.

At one to 1.5 kilogrammes (2.2 to 3.3 pounds), the rats are big enough to attach to a long, thin leash as they scan areas but light enough not to set off mines, which are cleared by human cohorts.

Another plus is the African pouched rat's "long" lifespan, six to eight years, its affinity for repetitive tasks and its small size, which makes it easy to house, transport and feed.

"This is a lot faster than traditional methods, because rats only detect mines while metal detectors will beep for every single piece of scrap," said Mkumba.

But they will never entirely replace other methods, he said. "Rats are more efficient when on large minefields where mines are spread, but they are useless when there are lots of mines, for minebelts for example, because we know where they are."

The World Health Organization has not, so far, endorsed this TB testing but APOPO, funded mainly by donations, won't stop there. Buoyed by its success, future ideas include trying out rats in detecting cancer and neurodegenerative diseases.

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