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Science

Rats being used to sniff out land mines

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Ian Wood visits a training centre in Inhambane, Mozambique where rats are used to detect land mines

They are almost universally despised as disease-carrying vermin and are attacked wherever they are found.

But in an experimental scheme in Africa the special talents of the rat are being harnessed to help save lives.

It is estimated that there are between 15,000 and 20,000 deaths and injuries caused by land mines every year.

The majority of these happen to civilians, many of them children, living in countries where conflict has ended but where their lethal legacy remains.

The process of clearing land mines is slow, pain staking, and of course dangerous. In fact, using a metal detector, it takes one person roughly a week to clear a 100 square metre area of mines.

But in a pioneering project it has been found that a rat, because of its acute sense of smell and after intensive training, can find all the mines in the same patch in less than half an hour.

The APOPO project (a joint venture between Belgium and Tanzanian researchers) has successfully trained sniffer rats to detect explosives and has now developed this unusual idea into a competitive technology.

The theory behind the process is termed vapour detection and is based on the fact that every item releases a specific odour signature. For land mine detection, APOPO traces the vapour of the explosive emitted from mines by using the extreme sensitivity of a rat's nose.



A rat sniffing for mines (top) and in-harness

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APOPO has training centres in Tanzania and Mozambique where each afternoon the rats go to work.

An area of land has been divided into 10 by 10 square metre sections. Each segment has several land mines buried in it and is separated from its neighbouring box by a safe lane.

Two rat trainers stand on either side and are joined by a piece of string attached to a lower leg. The rat is then led across this guide and if it successfully finds a land mine is given a food-based reward.

When it reaches the edge of the box, the trainers take a side step and repeat this process until the whole sector has been searched.

The rat indicates the position of a mine by scratching the surface, but is too light to set off

the explosive.

After a training period of up to a year the rat faces a series of tests and if successful will graduate to real de-mining duties in Mozambique.

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Between 1977 and 1992 up to 1m people died in a civil war in Mozambique and large parts of the country were mined.

The work of the trained rats includes a confirmation search to back up mechanical operations, but they have also proved reliable enough for primary land mine location.

In fact, they have been so useful for clearing mines in Mozambique that the technology is about to be exported to Angola.

Dogs have been used for land mine detection for some time, but the rats have a number of advantages. Like dogs, they respond well to humans, but they do not bond to an individual handler. This means that in de-mining operations one person can deal with a number of rats consecutively.

They are also small enough to be easily accommodated and transported and can concentrate for much longer periods of time. More specifically, African Giant Pouched rats are endemic in Africa and resistant to most tropical diseases. Their one drawback is their life expectancy, which is only up to 8 years.

Often viewed as vermin, these rodents are now moving on to detecting tuberculosis in humans. In many parts of the world TB is a growing epidemic and early detection is vital for efficient treatment.

The APOPO project in Tanzania has been training rats to smell TB in human saliva samples with impressive results. A single rat can test as many as 150 samples in just 30 minutes. By contrast, a human using a microscope can test only 20 samples in a whole day.



The field divided in sections (top) and a rat getting a food reward

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