Research in Colombia on Explosives Detection by Rats

The interdisciplinary research group INVESTUD is investigating the effectiveness of mine-detecting lab rats. In Africa, the APOPO program is well-known for using African giant pouched rats for mine detection, but INVESTUD hopes to build on and even surpass APOPO's progress to advance Colombia's mine-clearance efforts.

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Colombia has been the focus of attention in several articles in *The Journal of ERW and Mine Action* over the years mainly because Colombia continues to have landmine victims numbering among the highest in the world.[1,2] According to the most recent *Landmine Monitor Report,*[2] however, the number of fatalities began to decrease in 2007 for the first time since 2002.

Since 1999, the Landmine Monitor has provided background on the Colombian armed conflict, the state of the current landmine problem, casualty figures and explanations of victim-assistance programs. Few reports have mentioned the local scientific research and technological development of devices for detection and deactivation of explosives.

The 2000 *Landmine Monitor Report* briefly mentioned a potential research project aimed at developing a mine-detection robot. The project was to be carried out by the Department of Mechanical Engineering at the University of Los Andes in Bogotá.[3] The 2001 *Landmine Monitor Report*, however, stated that this plan failed to take off when no groups showed interest in the initiative.[4] Landmine Monitor entries from 2002–2008 make no mention of mine-detection research.

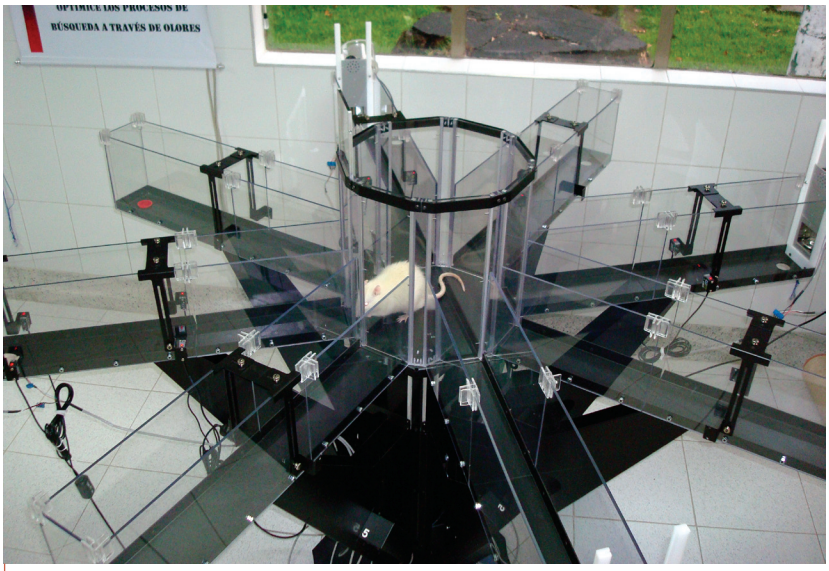
INVESTUD Introduces the Wistar Rat

Since 2004, the interdisciplinary research group INVESTUD of the Colombian National Police has been exploring if white Wistar rats of the *Rattus norvegicus* species (commonly used as lab rats) are capable of detecting explosives in an open field. An antecedent of this project is the APOPO program, which originated in Belgium and set up its first operations in Mozambique. APOPO relies on the olfactory abilities of the African giant pouched rat, *Cricetomys gambianus,* for landmine and unexploded-ordnance detection.[5]

Although the Colombian research project led by INVESTUD has not yet tested its rats' detecting abilities in a real minefield, the team of researchers continues to believe there are several advantages of Wistar rats detecting explosives over the current APOPO program. The two most relevant advantages are:

1. The white rat weighs less than the African giant pouched rat (450 grams versus 1,500 grams [1 pound vs. 3 pounds]); although the weight of the African giant pouched rat is generally not enough to trigger a typical anti-personnel mine,[6] the white rat, being lighter, would be even less likely to set off a mine. This is particularly important because the mines terrorists use in Colombia are often more sensitive than a typical landmine.
2. The white rat is found and can reproduce anywhere in the world (because it is a classical strain of laboratory rat).[7]

With financial support from the Colombian Ministry of National Defense and the Colombian National Police, INVESTUD has successfully



A rat learns to detect explosives in a laboratory experiment at the Graduate School of Police, Bogotá, Colombia.

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completed the first phase of olfactory detection and discrimination of seven explosive bases in controlled conditions (see photo above). The average discrimination index achieved by the six subjects (four females and two males) was 90 percent.[8] The results were replicated with a group of subjects that were the first group's offspring that grew in the laboratory. These rats were exposed directly to other species such as cats, dogs and humans,[9] which helps sensitize them to the smells they are likely to encounter in an actual minefield.



Explosives-detection field training of a rat in an open field at the Graduate School of Police, Bogotá, Colombia.

Hope for Progress in Mine Detection

Currently, the open-field phase of detection (see photo at left) is being developed near the Animal Behavior Laboratory of the *Escuela de Estudios Superiores de Policía* (Graduate School of Police) in Bogotá under the direction of Dr. Luisa Fernanda Méndez Pardo. While research is ongoing, initial results have already been reported in several national and international media.[10,11]

Colombia's progress in the detection and deactivation of explosive remnants of war could make the country a vital part of the solution to the anti-personnel landmine problem. If this research project proves successful in real minefields, as with the African giant pouched rat, relief from mine contamination is well on its way for the war-torn country.

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