

# Expertise side-lined: science, fraud and bogus molecular detectors in the Mexican 'War on Drugs'

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## Abstract

*The paper presents a summarised chronology of the controversy surrounding the use of fraudulent handheld molecular detectors in Mexico, as well as the responses to the controversy from three critical sectors: the Mexican media, the different government branches and national scientific institutions. The paper also includes interview material with the most prominent critics and of the molecular detectors in Mexico and compares the voices of 'scientific activists' with the institutional responses. Finally, an analysis of all these different responses to the controversy is made, along with a short discussion of the relevance for expertise studies, as well as a critique of the application of existing expertise frameworks in developing country contexts such as Mexico's.*

## A brief history of molecular detectors

Since the early 1990s, several devices marketed as *handheld molecular detectors* or using similar monikers began to be marketed in the police, security, rescue and military equipment market around the world. In 1993, after warnings from several law enforcement agents who had documented the widespread use of these seemingly miraculous apparatuses which were in fact nothing more than dowsing rods marketed under a veil of pseudoscientific jargon, the US government indicted the manufacturers of the earliest MD models – known as the *Quadro Tracker* – and subsequently banned their sale in the USA. Three years later the company was served with an injunction, based on the argument that one of the critical electronic chips which was supposed to make the detectors function could not be shown to work under accepted scientific principles even though the *Quadro* was being marketed as top-of-the-line scientifically backed equipment.<sup>1</sup>

In the following decade several other devices, some of them identical to the *Quadro Tracker* (excepting minor cosmetic differences) appeared under different brand names in the USA and Europe and were marketed all around the world, but particularly to non-developed countries. These include the *MOLE Programmable Detection System* manufactured by Global Technical Ltd in the UK, the *DKL Lifeguard* manufactured in the USA by the Electroscop Company (still sold today as a golf-ball search device) and the *Sniffex* manufactured between 2005 and 2008 by various American companies but now distributed by German company Univar; Univar also markets the *HEDD1* detector, a new iteration of the *Sniffex*. Finally, two other detectors that have received much media attention are the *ADE-651* detector made by UK-based ATSC and the *GT-200* detector, also manufactured by Global Technical. Other British-manufactured detectors exist such

as the *Alpha 6*, *XK9*, *ADE-101*, *ADE-650* and *ADE-651* along with other lesser-known models. The principal ‘families’ of detectors are outlined in the table below along with the ‘underlying scientific principle’ that the manufacturers claim makes each device work:

Detector family	Alleged underlying scientific principle
Quadro tracker/MOLE	Substance-specific oscillating electric fields.
DKL Lifeguard	Detection of dielectrophoretic electric fields.
Sniffex/HEDD1	Modulation of magnetic fields.
Alpha 6/ ADE-651	Resonating magnetic fields.
GT-200	Dia- and para-magnetic field sensing.

Table 1: Molecular detector ‘families’

### Scientific testing of MD devices

The *Quadro Tracker* affair in the USA caused journalists to take some notice of molecular detectors turning the whole episode into a minor press scandal.<sup>2</sup> The device had been put to use in the field by police agencies, in airport security stations and in schools until an FBI agent was alerted of the device’s extensive use in law enforcement and security departments throughout the country. This alert to the FBI then led to an official investigation and a thorough testing at Sandia National Laboratories in 1996, which found the device was nothing but an empty plastic box with an aerial antennae attached and no working electronics inside. This gave rise to fraud charges and an injunction against the manufacturer, a trial and indictments against their sale. The FBI also issued a nationwide alert against the use of fraudulent and bogus detectors.

The *DKL Lifeguard 2* detector was subject to a double-blind test at Sandia National laboratories in early 1998 after the FBI was alerted that it was being advertised as a tool for search & rescue missions.<sup>3</sup> The double-blind Sandia test concluded, “the device performs no better than random chance” (Murray et al 1998). The manufacturers did not permit a destructive physical evaluation by Sandia, but the report clearly stated that although the existence of the dielectrophoretic fields which the manufacturers claimed to detect are a scientifically sound phenomenon, the idea that these weak fields could cause the detectors antenna to swivel without an outside power source was “clearly wrong”. Other ‘scientific principles’ claimed to make the device operate as found in the manufacturer’s literature were also considered to be mistakenly quoted to explain the device’s functioning. The FBI again closed the controversy in the US by issuing a nationwide warning to “the Emergency Medical Services, Search and Rescue, and law-enforcement communities” stemming from the Sandia results (Conover 2012).

In 2002 Sandia National Laboratories were again called up, this time to test the *MOLE* detector, which was being marketed – along with many other uses – as a bomb detection device after the *MOLE* was brought to the attention of the Rocky Mountain office of the National Law Enforcement and Corrections Technology Center. The Sandia report again concluded that “based on statistical analysis of the double-blind test results, the *MOLE* performs no better than a random selection process” (Murray 2002). Sandia also noted on the report that the *MOLE* detector was an almost exact physical copy of the banned *Quadro Tracker* that had been examined previously by the same team, albeit with different product labelling and a different non-removable setup for the ‘programming chip’.

The *Sniffex* device, manufactured in Bulgaria but marketed from the US, was first tested by the US Navy's Counter Terrorism Technology Task Force in August 2005 in a two day series of double-blind trials with four Navy-owned detectors. The results were definitive with the Navy test team reporting that "the SNIFFEX handheld explosive detector does not work. The vendor failed to make good on any guarantee of the device's performance and provided no possible reason as to why the SNIFFEX was unable to perform as marketed".<sup>4</sup>

### **The ADE-651 and the GT-200**

The *ADE-651* and its derivative iterations were subject to scrutiny and severe criticism by US government aides and journalistic media and also from other public voices. Magician and 'scientific sceptic' spokesperson James Randi issued one of his famous public challenges with a US\$1 million purse against *ADE-651* manufacturers if they could prove the device worked through his James Randi Educational Foundation, which helped to increase the visibility of the controversy; the challenge was never answered by the manufacturer.<sup>5</sup>

On 22 January, 2010, BBC's *Newsnight* featured an investigative report on the ADE-651, prompted by the extensive use of the device for bomb detection in Iraq and Afghanistan, two locations where numerous British military forces were staged at the time. *Newsnight* consulted British scientists who showed that the devices were clearly hoaxes, and concentrated on the danger that using fake 'explosive detectors' meant for the Iraq and Afghanistan troops.<sup>6</sup> After the show aired, the UK government took immediate action, banning all export of these and other bogus MD devices, albeit only to Iraq and Afghanistan as the purpose of the ban was to prevent danger to British troops. The UK government stressed that the export ban was only applicable to Iraq and Afghanistan as these were the only territories where it had legal powers to enforce it, but that the Foreign Office would send out a warning about devices like the ADE-651 and the GT-200 (Hawley and Jones 2010b) to all governments.

The warning was put forward on 5 January, 2010, yet *Newsnight* also reported that it had been since March 2009 that the Foreign Office had been aware of the devices' inefficacy and yet the Iraq government had not been warned about it until November of that year. There were further concerns by some MPs that it was not until the *Newsnight* investigation shed light on the affair that the export ban was considered (Hawley and Jones 2010c), although no serious investigations seem to have been made. *Newsnight* was also told that between 2001 and 2004 elements from the Royal Engineers had been hired to promote the device at arms fairs around the globe (Hawley and Jones 2011), and in fact the GT200 had long been advertised by the manufacturers as officially tested and sponsored by the Royal Engineers. Although the British armed forces never promoted the device institutionally, there is evidence that Royal Engineer teams did have carry out tests of the device at RE installations and gave a very favourable assessment of its 'efficacy'.<sup>7</sup>

### **Molecular detectors in the Third World**

Despite bans and fraud convictions in the US and numerous warnings by the American government regarding fraudulent molecular detectors and the UK governments later alerts, the devices were and are still sold to numerous security agencies and armed forces

around the world, particularly the Third World. Two cases must be mentioned because of the tragic consequences due to usage of fraudulent detectors, Iraq and Taiwan.

The Iraqi government is reported to have spent over USD \$85 million in *ADE-651* detectors. Yet despite the UK government's 2010 warnings and the overwhelming scientific trials that cast doubt on the legitimacy of the devices, the Iraqi government did not immediately stop using them. Interior Minister Jawad al-Bolani argued that in fact the GT-200 had detected over 700 car bombs, even while the director of ATSC, the device's manufacturer, was being detained on suspicion of fraud by misrepresentation by British authorities.<sup>8</sup>

*The New York Times* reported how in one car-bomb blast that killed 155 people, the vehicle had to pass at least one checkpoint where the ADE-651 was being used for certain.<sup>9</sup> Tragically, top-level Iraqi commands continuously refused to heed any of the warnings or expert test results, in a pattern that has repeated itself over and over in other underdeveloped countries where multi-million fraudulent detector purchases were made. In 2009 Iraqi Major General Jihad al-Jabiri, head of the Ministry of the Interior's General Directorate for Combating Explosives was reported by the *NYT* as declaring about the detectors:

“Whether it's magic or scientific, what I care about is it detects bombs”.

And when confronted by the scientific evidence against the devices, the Major General responded:

“I don't care about Sandia or the Department of Justice or any of them. I know more about this issue than the Americans do. In fact, I know more about bombs than anyone in the world.”

It was not until 2011 that a major political response came about from the Iraqi government and al-Jabiri was arrested in relation to purchases of the ADE-651, this after hundreds of bomb-blast deaths in Baghdad; bombs that had magically eluded the detectors used at numerous checkpoints around the city.<sup>10</sup> By that time, the Iraqi government had spent over USD \$122 million on the devices, purchasing them at an average of three times its already ridiculous asking price and amidst a huge corruption scandal that centred on al-Jabiri, who avoided any punishment through legal technicalities set up to protect top-level public servants from prosecution, though it was estimated that around 75% of the total reported cost for the Iraqi bogus MDs had in fact gone into corruption payments at the highest levels of government.

The case of Thailand is no less tragic although the bloodshed was apparently lesser than in the Iraqi case, and it was the GT-200 that was the Thai detector of choice. The international media reported that hundreds of people had been arrested or jailed based on military searches and raids carried out between 2007 and 2010 where use of the GT-200 had been central to 'point out' and convict 'criminals'.<sup>11</sup> Extremely worrying is that – as in the Iraqi case – despite the large evidence, activism and expert opinion against bogus MD use, the Thai military did not care about whether the device worked or not through accepted scientific principles, even though the device was also hailed as a piece of scientifically advanced technology. *The News* reports Colonel Pramote Promin, deputy spokesman for the Thailand Internal Security Operations Command, declaring

“We found real evidence – guns, weapons, grenades– that's why we arrested them. It might be a hallucination but we found (weapons) many times. It might be a fluke or coincidence that it worked. [The device could work due to] ‘something above science’.”<sup>12</sup>

Déjà vu. The Thai military staunchly held on to its version that the GT-200 was an effective piece of equipment despite all other opinions to the contrary and overwhelming scientific evidence disproving the device.<sup>13</sup> In fact, Thai online activists were active in attempting to show how actual bogus MDs were only *empty plastic boxes* with a swivelling antenna on top.<sup>14</sup> After mounting pressure, the Thailand government finally decided to run its own double-blind tests in early 2010, coming to the conclusion that the devices did not serve for detection purposes. Thai Prime Minister Abhisit Vejjajiva then declared, "we've done a double-blind test where the equipment was only successful in discovering in 20 percent of the cases, when just a random choice would give you 25 percent – so there's no statistical significance to having the equipment".<sup>15</sup> But despite these declarations and the Thai government's announcement of possible legal action against Global Technical, one could still hear voices like those of Pornthip Rojanasunand, director of the Central Institute of Forensic Science saying,<sup>16</sup>

"I know it's not scientific equipment, but forensic scientists can use it effectively. We won't buy more, but we won't stop using them either."

### The Mexican GT-200 telenovela

The rest of the paper will centre on the Mexican case, where the *GT-200*, known in military circles as ‘La Ouija del Diablo’ (‘The Devil’s Ouija’) has been the most widely used bogus detector. According to estimates made by blogger activists using requests to the *Instituto Federal de Acceso a la Información* (IFAI – Federal Institute for Information Access) along with other freedom of information channels, it is estimated that Mexican government agencies have spent at least \$26 million dollars on bogus detectors, most of them GT200s.<sup>17</sup>

The reach of the MD scam was not limited to the military but has spread to other federal and local agencies. Those duped by the molecular detector scam run the whole gamut of the Mexican political spectrum and are not only limited to the ruling PAN or the traditional PRI parties; newspapers have reported left-wing, progressive Mexico City Governor Marcelo Ebrard proudly showcasing the GT-200 as a technological tool for security sweeping of the massive *Central de Abastos* food market.<sup>18</sup> Documents from IFAI, press bulletins and other information portals confirm MDs have been purchased by various institutions at the both the federal and local levels, including the National Defence Ministry SEDENA (742 GT-200s), the PGR attorney general's office (7 detectors), various Port Authorities (3 detectors), the Mexican Navy (102 GT-200s), PEMEX (Mexican Petroleum state-owned company) through various sub agencies (54 detectors), the State Worker's Social Security Institute ISSSTE (1 detector), the Colima state local government (3 ADE -651s), Sinaloa state local government (1 GT-200), Michoacán state public security ministry (2 ADE-652s), Chihuahua state public security ministry (3 GT-200s), Guanajuato state public security ministry (5 GT-200s), Chiapas state judiciary office (5 GT-200s) and public security ministry (5 GT-200s),

Mexico City public security ministry (3 GT-200s), Mexico state public security ministry (26 GT-200s); the Federal Police uses GT200 apparently lent by SEDENA.<sup>19</sup>

When they first appeared, reports in the Mexican press about molecular detectors followed the Mexican Armed Forces press bulletins in hailing the GT-200 as a top-of-the-line technological weapon against the drug cartels and organised crime syndicates, in the bloody ‘War on Drugs’ that started soon after currently outgoing president Felipe Calderón was sworn to office in 2006.<sup>20</sup> Calderón’s hard-line, and highly controversial military-centred *National Security Strategy* has seen brutal crime-related violence, gruesome public body dumpings and high profile kidnappings increase to unprecedented levels. The cartel-related death toll has consistently grown to a mind-boggling *official* figure of nearly 60,000 dead since the beginning of Calderón’s presidency, partly as the cartel’s bloody response to the successful capture or killing of the majority of the Mexico’s leading drug lords by the Armed Forces, and partly as the result of an on-going inter-cartel territorial dispute.<sup>21</sup>

The molecular detectors were initially presented by the press as the beginning of a miracle cure to the increasingly sophisticated methods used by the cartels to move drugs in and out of the country. In a piece entitled “New Defence Ministry weapon makes drug lords shake with fear”, the widely read newspaper *Excélsior* infamously reported<sup>22</sup>

“[The GT-200] is a remote detection system [...] which from 500 metres away is capable of detecting anything: drugs, explosives, firearms and money, without human intervention. This ‘Devil’s Ouija’ is a British invention which has been used in the UK for over nine years. It works through the detection of ‘diamagnetic fields’ (which repel magnets) and ‘paramagnetic’ ones which are emitted by chemicals, plastics, uranium acetate, ammonium nitrate, and ammunition which made be built of bismuth, a lead substitute. [...] The device, also capable of detecting human beings, tobacco and several toxins, weighs 450 grams and is fed by user-generated static electricity, thus not requiring additional energy sources.”

The article ended by noting, in a very humorous tone, how even the GT-200 could fail by reporting a curious incident where a shipment of cheese was mistaken for drugs, but no critical angle of this ‘mistake’ was deemed necessary.

But the lack of a critical attitude was not limited to *Excélsior*. Newsgroup *OEM* – whose *Sol* nationwide syndicated periodicals are the highest read newspapers in the country – has continuously printed and to date still prints news of successful uses of the GT-200 by the Armed Forces, such as drug raids in Guanajuato state where the GT200 is described as “sophisticated equipment” for the detection of “firearms, drugs, money and explosives”,<sup>23</sup> use of the “technologically advanced device to find illicit objects” in poor neighbourhoods also in Guanajuato state,<sup>24</sup> use of the GT-200 “explosive trace detector” during a high school bomb alert which gave a positive reading even though no explosives were found later by a K9 unit in Chihuahua state (no reasons are given for the false positive),<sup>25</sup> a capture by the Army of nearly 500kg of marihuana “supported by the molecular detection device GT-200” in Oaxaca state,<sup>26</sup> capture of a massive illegal firearm and drug precursor shipment “detected using the GT-200 device” in Michoacán state,<sup>27</sup> amongst dozens of other articles that point out the great advantages that using the fraudulent detectors offers the federal and local authorities in raids, checkpoints,

sweeps, detentions and searches that look to detain Mexico's bloodiest criminals up and down the country.

OEM's on-going 'journalistic' travesty extends not only to mere reportages of the GT-200's use, but even includes opinion pieces that openly *praise* the GT-200's powers, going as far as hiding Global Technical's 12-year history of frauds by portraying it as a respectable, well-established British company (such a piece was published one month after the *BBC Newsnight* scandal had erupted and the devices were being banned for export by the UK government, making it inconceivable that any serious journalist could be so ill-informed as to not realise this 'mistake').<sup>28</sup>

The severity of *OEM's* continuous and continued misrepresentation of the GT-200 – even to this day when the controversy of their use has blown up full steam in Mexico in other printed media – cannot be understated.<sup>29</sup> Circulation numbers aside, *OEM's* history of subservience to the oligarchic *PRI* political party makes it difficult to expect its newspapers to act as any sort of serious journalistic work, yet the sad fact remains that Mexico's largest circulation newspaper has by openly negating any attempt at a balanced view regarding the detectors, aligned itself with the views of convicted international fraudsters.

But other GT-200 praises are also found outside OEM's servile newspapers. While coverage of molecular detectors is slim in other journalistic outlets compared to *OEM* even the media outlets that have recently taken up more critical voices have had serious slips. *El Universal* newspaper, Mexico's most widely-read online newspaper which has been one of few critical media outlets through a handful of investigative works by L. Castellanos, also has featured reports that affirmed the GT-200's astounding effectiveness unquestioningly. *El Universal* for example reported the GT-200's utility in security monitoring task and detection of "firearms, explosives, drugs" and "even cocaine", with "a radar that covers distances of up to 700 metres through earth and airspace" in Mexico's City's biggest markets<sup>30</sup> and reported effective uses of the GT200 in mass grave searches, even though "scene contamination" had led to a fivefold overestimate of the number of bodies the previous day.<sup>31</sup> *Milenio* newspaper – which ironically hosts an op-ed by science populariser M. Bonfil who is one of the most vocal activists against the use of the GT-200 – in a very recent article has reported on the use of the detectors by the Mexican army thanks to the GT-200's "capability to locate drugs and people through earth, water, gasoline, concrete, metal, lead and any other type of material",<sup>32</sup> and in an article criticised by Bonfil himself reported on the use of "top of the line technology to find bodies in unmarked graves" by the Durango state attorney general's office.<sup>33</sup> Even the hardline government-critical *Proceso* magazine did not fail to report on a case where "the use of a GT-200 molecular detector allowed [soldiers from the Mexican Army] to locate 26 barrels" of various illegal substances.<sup>34</sup>

### **Activism against molecular detectors in Mexico, part I: a 'sceptical' blogger against the mainstream media**

Although newspapers like *Reforma*, *El Universal*, *Milenio* and political magazines like *Crítica* and *Proceso* have published isolated critical articles on MDs during the past two years, these have been few and far in between. Moreover, they have featured little or no investigative journalism, except for *El Universal*. As opposed to the BBC investigations for example, press reports in Mexico are generally either rewrites of government-made

press releases in the worst cases, or second-hand information found in the anti-molecular detector blogosphere for the more critical ones.

Of primary importance to disseminating the MD scandal has been the *El Viaje de Lonjho* blog by writer and science fiction author Andrés Tonini, whose publications on the topic began on 24 February 2009,<sup>35</sup> his own work being prompted by warnings about the devices found in the English-language blogosphere and in 'sceptical scientist' websites describing or denouncing the MD frauds (Tonini recalls an article by magician James Randi as the first time he heard about bogus detectors). His on-going entries now number in the hundreds, and Tonini's blog is in fact one of the most complete repositories of information on molecular detectors on the Internet. Though written in Spanish it is constantly referenced by many other anti-MD activist blogs.

Tonini and other blog collaborators have used social networking service Twitter to inform some of Mexico's most prominent journalists about the molecular detector case, with only very minimal success. Tonini describes how out of nearly 60 journalists contacted, in addition to around 50 national media outlets, only 2 replies acknowledged attention to the messages.<sup>36</sup> Though this by itself cannot be taken as anything else than anecdotal evidence of the press's disinterest in the efforts of a lone sceptic, Tonini has also consistently monitored the national press's coverage of the topic quite thoroughly, and the lack of information in published media is easy to verify. Tonini has continuously blogged about the frustration of having the topic ignored by the national media, though notable exceptions such as the previously mentioned newspapers and some commentators like TV and radio journalist Denise Maerker's sporadic coverage do exist.<sup>37</sup> But it was in fact thanks to Tonini that science populariser Martín Bonfil, who contributes to well-read *Milenio* newspaper, wrote the very first critical opinion column in the Mexican media. Yet despite bringing this topic to a somewhat wider public, Tonini sees these sporadic news bits as a greater sign of the anti-MD campaigners' failure:

The role of the Mexican press has been pathetic. It was only after Bonfil started writing in *Milenio* that the topic started being discussed outside the Internet, but if newspaper readers are a small minority in this country, readers of newspaper science columns are a minority within this minority, so in practical terms this amounted to nothing. [...] In fact, not even the front page articles by Laura Castellanos in *El Universal* in October 2011 and in 2012 and by Patricia Dávila in *Proceso* in January 2012 have turned this topic into what it should really be: a national scandal. Printed-media readers are a small minority in Mexico and the main source of information in Mexico –television– has with very few exceptions not only ignored the topic, but in fact highly praised the alleged capabilities of these devices.<sup>38</sup>

Many of Tonini's blog entries are dedicated to document the apathy shown by the Mexican media concerning the MD issue, or its misrepresentation of the controversy. When comparing the British and Mexican cases, the difference the media's effect on the molecular detector debate could not be more extreme. While the BBC's investigative journalism directly led to a swift and decisive UK government response in a matter of days in what seemed like an obvious response to the report, the overwhelming majority of the Mexican media's compliancy to the official view sits at the opposite extreme. However, Tonini also pointed out that in general journalist's interest in the molecular detector frauds even in the UK took years to break into the mainstream and in the US



case Randi's frustration at getting the public interested in the fraud; the BBC story ran in 2010, but the fraud had been documented in the British blogosphere since 2006. Tonini has published his investigations in a Spanish 'sceptical' magazine, but has not been invited to do so in local media.<sup>39</sup>

### Activism against molecular detectors in Mexico, part II: the scientists

The second frontline of criticism against the use of molecular detectors in Mexico came from scientists – physicist mostly – but again the differences between the MD controversy in Mexico compared to the USA is remarkable when one focuses on the participation of scientists at the institutional level. While in the US law enforcement agencies actively sought out the skills of Sandia National Laboratory (once the scandal was discovered) and the armed forces took the investigation of bogus detector efficacy into the hands of their own scientists, in Mexico the recurring position from the local governments and military has been to present its own anecdotal evidence of detector successes as a proof of the devices' efficacy.

The most prominent scientific spokesperson against MDs is physicist W. Luis Mochán Backal from the National University of Mexico (UNAM – responsible for around half of the scientific research output in the country). Mochán previously achieved a brief spell of fame in the Mexican media when he publicly presented his analysis of the real-time voting reports of the highly contested 2006 presidential elections, coming to the conclusion that the electronically registered voting reports presented via the Preliminary Results Programme (PREP) did not correspond to what would be statistically expected, which many took as a confirmation of ballot fraud.

Interviewed for this work, Mochán recounted his first exposure to the MD fraud from physicist and 'sceptical' science talks:

I was in Atlanta in '99, in the March meeting of the American Physical Society [...] during which there was a big sort of party to celebrate its 100<sup>th</sup> anniversary and as part of the events they invited James Randi to give a talk on scepticism, with Michael Schermer and Robert Park; I knew about Randi from ten years back when he got involved with the 'water memory' issue. [...] He talked about a lot of frauds he had uncovered, and amongst them he talked about the Quadro tracker.

For Mochán the molecular detectors were simply another case of fraudulent science as many others Randi referred to in his talk, but almost a decade later this changed when the molecular detectors started cropping up closer to home –literally.

In 2010 Bob Park –who was then in charge of communications at the American Physical Society– sent me the *What's New* newsletter, which deals with scientific, policies and frauds like perpetual-motion machines, creationism, etc. In one of the weekly notices there was a bit of news about Mexico, saying that Mexico had been victim of fraud because they'd purchased these [molecular detector] devices which were described exactly as the ones I'd seen before. That left me very worried, and I decided I wanted to write something about it, but a long time passed and I had a lot of work even though it was still in the back of my mind. I talked it over with friends and family, until one day I learnt that in the school

which is next-door to my own house they actually went in with their GT200, I learnt from a neighbour. That made me feel really indignant... and nervous... to feel it so close.

Mochán's involvement in the GT-200 controversy began with an article written for a local newspaper in his hometown of Cuernavaca, which features a weekly page devoted to a scientific topic in collaboration with the local Morelos Science Academy. Ever the activist, Mochán personally began distributing the article to political figures, but receiving only one answer from Senator Yeidckol Polevsky from the left-wing Democratic Revolutionary Party (PRD), who was shocked to read about the case, thinking at first that it was actually a hoax by Mochán.

Polevsky contacted Mochán and offered to personally take the case to the Mexican Senate after hearing the details of the controversy. After several months of delay, the Senate then asked the opinion of the Scientific Consulting Council of the Presidency of the Republic (Consejo Consultivo de Ciencias, or CCC), a body of highly-renowned scientists directly advising the President of Mexico on scientific issues of all kinds. The CCC then gave its opinion that the MD case was a serious matter that the Senate should investigate. The Senate's Science and Technology Workgroup organized a formal meeting with 'eminent scientific figures' to meet with the Workgroup on 13 September 2011. Invited speakers included Mochán, Tonini, Bonfil, Mexican Science Academy president Arturo Menchaca, the Director of the UNAM Nuclear Science Research Institute Alejandro Franck who acted as a proxy for the head of the CCC, and several other physics and engineering researchers from Mexican public universities.

Mochán acted as unofficial spokesperson for the scientific community during the event. The opinion of all the scientific spokespersons, encapsulated in Mochán's presentation, was unanimous: there was no scientific evidence whatsoever to claim these detectors could work based on the physical principles that the manufacturers cited. Mochán spoke about the work of James Randi and the international MD scandals, the bogus scientific claims made by MD manufacturers along with an analysis of the pseudoscientific statements made about the product, and the outline for what constitutes a double-blind test. The final talk, given by Tonini, was based on his extensive documentary effort, concentrating on the international bans, injunctions, arrests and international scandals surrounding the molecular detectors' parent companies.

As a result of the meeting, the Senators in attendance proposed to draw up a 'sense of the Senate' resolution to formally establish the Senate Science and Technology Workgroup's agreement with the scientific consensus view that the molecular detectors efficacy needed to be scrutinized through double-blind testing immediately, which was to be presented before the Senate's plenary session on the following day. Though this might be seen as a successful result of scientific lobbying, a sense of the Senate resolution is non-binding and carries no legal force.<sup>40</sup>

According to the Senate's webpage, the resolution was presented on 22 September 2011 to the Senate plenary in a document that outlines the information presented at the meeting by the scientific exponents. This draft resolution – drawn up naming only three PRD senators present at the meeting – exhorts the head of the federal executive power (i.e. President Calderon) "to summon the Mexican scientific community in order submit to tests and experiments the GT-200 molecular detectors purchased by the Mexican government, and to provide a detailed report about the detector purchases". However, despite the gravity of the detector controversy a formal *draft* of the resolution

was not presented to the Senate plenary for full consideration until 30 May, 2012, more than 8 *months* after the meeting.

The wording of this new resolution was tamer, now only exhorting the President and other federal agencies “to evaluate the effectiveness and the functioning of the GT-200 molecular detectors purchased by the Mexican government”. In fact, there is no call for a definite test and much less for an immediate ban of the detectors, but only for further “round tables” to be organized in order to discuss the detector efficacy with the scientific community. There is also a call for the scientists involved to help draw up a double-blind protocol in order to then test the devices, despite the fact that such a protocol had in fact been available through Mochán’s personal blog months before and had already been used in a double-blind test ordered by a local judge (see below). It was not until 6 June that the draft was turned into a formally signed sense of the Senate resolution, with the wording limited to the same call for “the organization of workgroups with the Mexican scientific community and departments from the federal public administration”.

The resolution ends by noting that it is the CCC’s duty to formally advise the Presidency –who is also the head of the Mexican armed forces– concerning technical matters, and that the evaluation of the GT-200 should be delegated to it (no mention is made of the ADE-651 which during the Senate meeting Tonini had clearly stressed was also being used in Mexico).<sup>41</sup> To date, the CCC has issued no official documents nor can any reference to the molecular detectors be found on its website. Despite the author’s attempts to contact the CCC to find out if it was aware of the Senate resolution or if the tests had been carried out, no reply to these queries was received either through the CCC’s sole electronic-mail contact nor from messages sent to the CCC’s Head Coordinator.

### **Bogus molecular detectors as court evidence**

The Mexican press’ position was one of generalized negligence of the molecular detector controversy. The executive power and the military under its command has been a persistent force of outright denial of scientific opinion. The legislative sector has only exhibited an extremely sluggish and ineffective response and the scientific community has demonstrated complete apathy at institutional level save for the isolated case of the Mexican Academy of Sciences. These three instances of institutional disassociation with pressing public issues is sadly all too familiar for anyone aware of the typical working of Mexican society and its Kafkaian institutions.

A few local judiciaries have on the other hand been more positive in attempting to probe the controversy and fully take up scientific opinion. In March 2011 *Reforma* newspaper published an article<sup>42</sup> in which Menchaca gave his opinion that the molecular detectors were fraudulent devices, and upon reading it Mochán decided to contact the reporter who then showed some interested in further interviewing Mochán. Mochán was contacted by the reporter later that year to give his opinion on the acquisition of several detectors by the Mexican Army through the US-Mexico *Mérida Initiative* anti-narcotic cooperation program. The *Mobile Trace* detector was found by Mochán to indeed be a *bona fide* and scientifically sound explosive trace detector, which he then contrasted to the fraudulent GT-200.<sup>43</sup>

Mochán was contacted by the defence attorney of a man who had been detained on drug smuggling charges after having been ‘pointed out’ by a bogus detector during an

Army raid after he read the 16 May *Reforma* article. Ernesto Cayetano Aguilar, a member of the *mixe* ethnic group, was arrested while riding a bus near the Gulf of Mexico coast on 29 January 2011.<sup>44</sup> After a canine unit searched the bus, a kilogram of marijuana was found inside one of the seats, albeit a few rows ahead of the one that Cayetano was actually seating on. Nevertheless, after being ‘pointed out’ by the GT-200 he was arrested, strip searched, and was imprisoned for over 8 months awaiting trial. Cayetano was fortunate that his case was taken up by a young district judge, who upon scrutinizing the accusing arguments based on detector ‘evidence’ decided to rely on scientific opinion to judge their efficacy. The attorney first asked Mochán to look at the case documentation:

The attorney first sent me the [molecular detector] operator’s statements. Each time they capture someone with the detectors, the operator goes before the judge and describes how they were walking down such and such street, and then the [molecular detector] antenna turned pointing towards such and such place. Then after this narration they explain how the detector works. I had eight of these explanations at hand, all identical, so obviously it’s just a cut-and-paste text. I read it, and it was obviously a fraud.

Mochán then suggested in his ‘expert opinion’ that the proper way to proceed was to carry out a test of the experiment and thus empirically prove that the device simply did not work. Much to his surprise, he found that was not a strategy likely to be successful:

I told the attorney, “look, this is obviously bogus. What we need is for the judge to order a [double-blind] test”. The attorney however explained to me that in Mexico a judge will *never* order such a test unless from the start the judge has an argument which contradicts the previous one. So what I did was to analyse the molecular detector technical specifications line by line, which I though was absurd given what the technical specifications say but I still did it anyway.

Before Mochán’s opinion could be used in full, Cayetano’s attorney had to come up with a legal strategy to “draw the judge’s attention” to Mochán as a neutral witness. Mochán had to publish an ‘independent report’ of his findings on his own personal blog. Amongst the arguments that Mochán gave for finding the detector’s technical specification impossible to sustain scientifically were the lack of an external power source (the detector is claimed to operate using static electricity produced by the user) and the recurrent use of mistaken or plainly wrong scientific terms. In particular, Mochán highlighted how the dia- and para-magnetic fields which the detector is supposed to locate (these fields are accepted scientific phenomena) are too small to be detected. For this Mochán calculated the field strength of a *10kg* sample of a *ferromagnetic* substance at *10m* (ferromagnetic substances produce much stronger fields than dia- or para-magnetic ones) which turns out to be around two orders of magnitude below the Earth’s magnetic field strength. For situations set out well within the technical limits in the GT-200 technical specification (e.g. using *paramagnetic* substances at *kilometres* distance when only a few *nanograms* are present) he came to the conclusion that these are around  $10^{-28}$  times smaller than the Earth’s magnetic field, and “nobody anywhere could detect this even with the most sophisticated equipment available”. Mochán’s report was then ‘anonymised’ by making no reference to the specific documents used for the evaluation,

and then then judge ‘discovered’ the report and asked Mochán to use this as actual court evidence.<sup>45</sup> Mochán was finally called in to court to testify as a certified and credentialed scientist and expert and then the judge could use this as evidence to disprove the accusation, leading to Cayetano’s release on 3 October 2011 when all charges were dismissed.

Although this story has a positive outcome, other similar cases, some run by the same judge, still await ruling. The Mexican Humans Right Commission (CNDH) has emitted a formal Recommendation that the molecular detectors should not be used as evidence or probable causes for arrest or detentions in either searches or trial. Although this recommendation could be seen as a step forward in the anti-MD cause, in fact upon closer examination it is no advance for the scientists’ arguments. In its *Recomendación General No. 19* the CNDH states that the GT-200 is a “device for the detection of drugs, weapons and explosives, amongst other substances, which functions using the static electricity produced by the human body”.<sup>46</sup> Although the ‘recommendation’ acknowledges that foreign governments have branded the detectors as fraudulent, it also states that “the fact of it’s being used, independently of its effectiveness or lack thereof, is a violation to individuals’ right of privacy in their homes”. This Commission report therefore abstains from using the scientific opinion that the detector does *not* work allowing that in fact it *may* work and still be illegal. CNDH president Raúl Plascencia Villanueva later spoke out against the use of the detectors as devices “more fraudulent than trustable”, again demonstrating a tepid take-up of the scientific consensus.<sup>47</sup>

In another case where the GT-200 was used as evidence by the Army to detain a woman on drug-trafficking charges, the judge accepted the defending attorney’s demand that the devices be put to stringent scientific tests.<sup>48</sup> The judge then had to formally demand the Army’s cooperation on five different occasions until her requests were finally acknowledged. To test the devices, the judge sought out molecular physicists as expert witnesses and contacted Alejandro Ramírez Solís from the local Universidad Autónoma del Estado de Morelos (UAEM) to act as an expert witness (*perito*), a colleague of Mochán. Although Ramírez Solís asked the judge to order that one of the devices be handed over to be studied directly, the Army denied cooperation in this respect. At Mochán’s insistence, the strategy was changed and instead a double-blind test was planned where only the Army’s ‘expert users’ would handle the device themselves.

The judge ordered the test, with the Army also providing samples of substances that the GT-200 was claimed to detect. Mochán was called in and was put in charge of developing the test protocol in November 2011 at a warehouse at the Mexican Academy of Sciences (ironically, the Academy is now housed in the infamous ‘El Partenón’, the former palace-mansion of ex- Mexico City police chief Arturo ‘El Negro’ Durazo, who was imprisoned on charges of corruption, extortion and cocaine trafficking amidst one of the country’s largest political scandals). Mochán explained,

The test itself was very simple, but you have to be careful that you’re not being tricked in some way. It has to be double-blind, and that also requires some care. Essentially, what you do is you hide the substance and the operator has to find it, and then you do a statistical analysis of how many times you hid it and how many times it was found, and then you compare it with what would happen in a random chance trial. If the difference is significant, then the device works, and if it isn’t then the device is useless. The crucial requirement is that the person who is looking for the substance cannot communicate with the person who places the

substance, plus you've got to be careful that things are done so no one can accuse you that the substance has been contaminated to falsify the test. Therefore searcher and the placer have to be from the same 'team'.

Mochán had access to the GT-200 user manual, and realized that the test was not going to be as simple as previously thought. The test manual mentions many reasons why the test can fail according to the manufacturers:

The manual gives all sorts of bad excuses for failure. The device always works perfectly, but if the user is tired, than it doesn't work. If the operator is under pharmaceutical treatment, it doesn't work. If the operator is not at ease or is nervous, in an agitated state, it doesn't work, because the operator is the one that gives the detector the electrostatic energy for it to work, supposedly. If *someone else* is under pharmaceutical treatment it doesn't work. The antenna will only point in the direction of whatever is being searched for and it can create an 'energetic bond' with whatever substance is closer but it can also be with a sample that is far away, so if a neighbor has some medicine in his house then it can falsify the reading. There are a thousand and one reasons given why it may not work!

To overcome these limitations, the scientific team proposed that before the actual tests, 'calibration runs' would be set up where the substance to be searched for would be put in plain sight of both observers and operators, and the operators would show how indeed the device would 'find' the substance rendering further falsifying claims mute.

Because the case has not yet concluded the tests results are still considered as evidence in an on-going investigation and Mochán was not comfortable with talking about them in detail, but he did say that he was "wholly unsurprised" by the outcome of the test. Reports have nevertheless appeared in the press that claim the *peritaje* (a legally sanctioned expert opinion) has shown the detector to be useless.<sup>49</sup> Mochán is also currently acting as an expert witness in another similar case where the defendant also challenged GT-200 evidence on scientific grounds (though he is still waiting for the official court summons to arrive after a half a year's wait).

However, in a case reminiscent of the Iraqi and Thai military's responses, the Mexican government's *executive branch* (and not only the military as was to be expected) has nevertheless refused to back down from its position that the GT-200 is a reliable device. The Mexican Attorney General's office has recently filed an appeal at the Supreme Court that challenges the decision to discard the GT-200 as court evidence in the first trial Mochán was involved in.<sup>50</sup> The Supreme Court has decided to revise the challenge hoping to establish binding precedent for similar future cases in order to determine "if the data produced by this detector can be considered as evidence in penal processes",<sup>51</sup> in what could be the closing chapter in the controversy, at least in the judicial arena.

### **A view from the other side of the controversy: users' belief in molecular detector efficacy**

It is not easy to gain direct insight into the Mexican Armed Forces' perspective on the debate, given the present political climate in the country and the connection of the

molecular detectors with the raging drug wars and national security issues. However, several accounts by scientists themselves provide an indirect insight into the matter.

In his short but incisive presentation during the scientists-Senate meeting, Franck briefly discussed his experience of discussing the detectors with Mexican Navy personnel who had actually used the detectors in the field. Franck made an interesting observation, that in his opinion MD users definitely did believe that the MDs are a fully trustable piece of technology:

I've had the opportunity to occasionally talk to personnel from the Mexican Navy and I've come to realize that they sincerely believe that these devices work. The scientific community is not affirming that anyone is acting in bad faith with the purchase of this equipment.

When Mochán had the chance to test the detectors alongside Army personnel in the field during the AMC tests, he similarly observed that users were genuinely shocked to find out the device did not work quite as expected:

Everyone who went to carry out the test was participating with very good will. Nobody was really trying to fool us. The [Army] people who were working the devices did believe the devices worked at the beginning of the test, and they did everything very, very honestly.

At the ground level, it seems a reasonable working hypothesis to assume that the detector's users firmly believe that the devices work. There are also no imminent reasons to suspect that the top military ranks do not share this belief to some degree. In the rest of this paper I will therefore work under the assumption that users of this technology – including decision makers in the Mexican armed forces– do believe that the molecular detectors do work in earnest.

## **Discussion**

The Mexican molecular detector controversy lends itself to different levels of analysis. It is tempting to take it as a particularly simple, open-and-shut case of bad political decision-making where the relevant expertise is simply ignored and where user's headstrong beliefs are created through a simple psychological explanation. Thus to explain MD users' strong beliefs on the detector's efficacy, sceptics and activists constantly cite work on the 'ideomotor effect', a 19<sup>th</sup> century term coined by W. B. Carter to explain cases of 'unexplained' occult phenomena (e.g. Ouija boards) through purely psychological means and which was also investigated by Faraday. In fact, the 'ideomotor effect' explanation is more a part of the 'sceptical' culture literature than of mainstream science, and there are relatively few references to it in mainstream psychology journals. Unsurprisingly, in contrast to their well-constructed scientific arguments on the detectors, physicist's ideomotor 'explanation' lacks the solidity of their typical argumentative lines. For example, one of the physics sceptics involved in the controversy wrote to the author,

What I know about the ideomotor effect I read in 'Paranormality: Why we see what isn't there' by Richard Wiseman, where he cites very careful experiments by

Michael Faraday from the middle of the 19<sup>th</sup> century. I don't know any recent experiments on the ideomotor effect. Carpenter's work is considered a contemporary classic, but I have not personally read it. I was more interested in Faraday's work because he is the father of electromagnetic induction and of electrochemistry.<sup>52</sup>

Although the explanation of bogus MD belief can certainly be interpreted this way without needing much more to back up the explanation, taking up this view only repeats some obvious points already raised by the scientists and sceptical activist, mainly that policy making should centre on the opinion of those 'most knowledgeable' about these matters (scientists) and not on users' pseudo-knowledge or 'wrong' inferential claims.

This position nevertheless leave the explanation of the phenomenon at an *individual-level psychology* that in reality says nothing to us about what is clearly an *institutionalised belief-system* that traces out collective action concerning a particular phenomenon. Deeper and sociologically richer question can be asked about the controversy. *Why* is it that in this controversy, scientific expertise has been openly ignored? Again, there are easy answers that stem from the 'obvious' sceptical discourse: a lack of 'scientific culture' and 'scientific illiteracy' in Mexico, etc. But what do these terms actually mean? What is a 'scientific culture'? How does a lack of it help to explain users' beliefs, institutional positions on the detector controversy, and political authorities' apathy and inaction? Sceptics often point out that 'scientific culture' should mean an appeal to experiments such as double-blind tests, but how is this position inherently *scientific* and not just plain common sense?

The first thing to be done in attempting to draw up a sociological answer to these questions is to take a very careful look at what has been documented in this paper. On first approach, it is tempting to say that policy-makers and army users have ignored 'the science' behind bogus detectors according to the material presented above. But in fact what the Mexican authorities have continuously rejected is individual scientific *opinion* on the matter. Thus Mochán complained:

The Mexican Academy of Sciences has manifested its opinion only through [ex-president] Arturo Menachaca, *never institutionally*. The Academy has never taken a stance, except when Menchaca sent a letter to the Secretary General of the Defence Ministry as President of the AMC, offering the help of the scientific community to design a test protocol. (emphasis added)

In another critique of the lack of 'scientific community' involvement in the controversy he explained:

It is even more troubling that universities have not involved themselves in the discussion. I sent a letter to the [UNAM] *Consejo Universitario*<sup>1</sup> [explaining the

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<sup>1</sup> The *Consejo Universitario* [General Assembly] at UNAM is the highest decision-making body of Mexico's most prestigious university and has representatives from all levels of the UNAM community. As such is not only a collegiate organization but also a group with political power. In general, UNAM's official opinion is extremely important in the Mexican political scene, the dean of the University is a major political figurehead, and



controversy] for consideration and they said, ‘no, no, this sort of opinion is too unusual. You’d better make this letter disappear’. I withdrew the letter, but they promised that the *Consejo Técnico de la Investigación Científica* [CTIC]<sup>2</sup> was going to take up the subject, but they said to me ‘nah, look, it’s better to not make a fuss about it. It’s better to negotiate and speak person-to-person with these people’. [...] The director of the institute I work in talked to the UNAM Attorney General about the matter, but the Attorney said the only thing the CTIC could do was to suggest a public test, and only that. And nobody would accept that, so the best option was to let it die in silence.

As if this position of institutional neglect weren’t enough, Mochán has been explicitly warned that at no time should he present his position as that of UNAM – the *institution* – leaving any critique of the detectors merely as the *opinion* of a lone individual:

It would be trivial to have an institutional position on the subject [through the CTIC] instead of the opinion of a lone madman. I’ve been warned, ‘be careful. You and only you are responsible for anything you say. That is not what UNAM says. Don’t dare to say that is UNAM’s opinion.’ And why the hell should UNAM not have an opinion?! Of course I can’t talk for UNAM, but there are people who could. Why don’t they do it? That not only makes me feel hopeless, it quite angers me.

As has been previously mentioned, the CCC has also abstained from handing out an institutional response:

The President of the Consejo Conculativo de Ciencias is a friend of mine. He is supposedly a personal advisor to the President and he knows about this matter. He could have said, ‘Felipe, c’mon, you’re really screwing up here’, but the Presidency has never called up the CCC, and they have never taken the initiative to say ‘the CCC has analysed this matter and it is clearly a fraud’. People prefer to not make a fuss about it.

Commenting on Mochán’s failures to attract an institutional response from the scientific community, Tonini also remarked on the generalised apathy of the from scientists to his calls for further involvement:

Sadly, I am not surprised [by the collective response from scientists]. It is a symptom of this apathy that the only scientist (or any person with a knowledge of

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University politics can often be read as thermometers for political topics on the entire country.

<sup>2</sup> The *Consejo Técnico de la Investigación Científica* [CECIT] is a localised version of the *Consejo Universitario* that is restricted to the UNAM scientific research institutes and schools. Amongst its institutional objectives is “to establish and publish policies outlined in the UNAM scientific subsystem to study the country’s state of being and to propose solutions to problems of national interest”, according to its webpage:

[http://www.cic-ctic.unam.mx/cic/consejo\\_tecnico/acercade\\_ctic.cfm](http://www.cic-ctic.unam.mx/cic/consejo_tecnico/acercade_ctic.cfm)

physics) that ever replied to me at some point was a Spaniard. Of all the Mexicans whom I wrote to, or who through common friends I was able to put the data in their hands asking for help to show all the lies behind this pseudoscientific nonsense, nobody ever answered. And there were plenty of them.<sup>53</sup>

It is thus not ‘scientific opinion’ that has been ignored at the political level, but rather the individual opinion of a few, select scientific experts, albeit highly qualified ones. Though this is only one factor amongst many in explaining the development of the controversy, it is a very remarkable one. If one sits at the policy-making level, the only thing that one has access to is scientific *opinion* as an individual phenomenon, not *scientific knowledge or certainty* as a social effect. What is really at stake in this case is not the strength of scientific certainty at the epistemological level (which the run-of-the-mill Mexican politician has no access to) but rather the social strength of *collective scientific opinion*, which in the Mexican context we have seen is null, by the scientific institutions very own choosing.

But Mexican scientific institutions have *chosen* to be side-lined in this controversy is only one of the dimensions of the controversy. I’ve argued that the role of the media as a source of social pressure has been one of either ignorance or outright complacency towards the official view. Thus a second front of political leverage disappears from the controversy at the political level.

Another point which must necessarily be taken into the account is that in dealing with the Armed Forces the individual scientists’ views have clashed with one of the most rigid forms of what Goffman (1961) called ‘total institutions’, self-contained social systems where the individual inmates’ worldview is moulded on the outset to the closed nature of the system. Thus, it is not surprising to read extracts such as the following lines from an online BBS populated by Mexican army personnel on a debate concerning the GT-200’s use by the military:

Military discipline [...] is something that you clearly do not understand. I’ve read your posts and even though you think we have ‘blind faith’ [on the detectors] this has nothing to do with faith. Military orders always have a reason for being, but it is clearly something that only we in the military understand.

In another military-oriented BBS, soldiers constantly reiterate the point that “if the Army does it, then it must be right and well-founded”:

With all due respect to fellow users, these [molecular detectors] really do work. If the SEDENA, SEMAR, PGR and all other nationwide police forces are using it, do you think they really can’t work?

I’m no physicist or a chemist, but the government would not spend so much money on devices that don’t work!

In fact, the Infomex and IFAI freedom of information queries gathered by Tonini show that although the first two government agencies to purchase the detectors (PEMEX and the Mexican Navy) claim to have ‘tested’ the detectors, they refused to give any information regarding the way these tests were carried out (Tonini 2010). Tonini also

found that the rest of the government agencies that have admitted to purchasing the devices also admit to not have carried any sort of testing whatsoever. Insofar as can be gathered from the available documents and through personal channels the purchases were made solely after non-rigorous 'demonstration' sessions by the bogus detector marketing companies.

It seems inconceivable that within the Armed Forces and institutions like PEMEX there were no voices that protested against the purchases of the devices, or that indeed there was no internal review of the technical characteristics of the devices by scientific personnel. The mistakes in the 'science' used to support bogus MD claims are outrageous enough that any physicist should instantly spot them, and PEMEX, for example, is a prime employer of Mexican physicists. In fact, Mochán has personally spoken to physicist and engineers working within the Army whose opinions and complaints were consulted... and subsequently ignored. He has also spoken to others who report similar cases in other sectors of the Armed Forces. When Menchaca offered the cooperation of the AMC to SEDENA, the answer followed the same pattern in a refusal based on a supposed confidentiality clause in the purchase contract. Likewise, Franck is reported to have had his help refused by three different Navy senior officers even when extreme discretion was offered (Dávila 2012). Thus while at the lower ranks user testimony is clouded by the 'total institution' ideology, at the upper ranks we again see the weakness of institutional take-up of scientific opinion that cannot be mitigated by the lone scientist's efforts.

One must also consider the role that outright deception from the fraudulent manufacturers must have had on the rigid armed forces which on top of everything we find severed from a 'scientific culture' – to be understood as a collective phenomenon – on top the convicted fraudster's precise tailoring of the bogus detector marketing schemes aimed precisely against these scientifically naïf countries. Moreover, one must also question whether there are not some shared ethical responsibilities in role that the UK government played in applying only a partial ban and a lukewarm warning against devices which it was not willing to allow its own armed forces to use, not to mention the fact that the warning only came out when an imminent political scandal was near at hand whilst the devices had been denounced through other channels for many years.

Although it is tempting to aim all blame for the extensive use of these proved fraudulent devices at the political decision-makers and the armed forces' upper echelons, it is an inescapable conclusion that a major degree of *co-responsibility* is shared with the Mexican scientific establishment and its weak or null responses to the detector controversy. This is, in the end, what constitutes a lack of 'scientific culture' in a Third World science setting such as Mexico's: the lack of science as an essential subsystem of political decision-making as a whole, (whether willingly, forcedly, or both). But while Mexican scientists constantly denounce lack of political willpower and interest as the source of Mexico's continuous under-funding of science and technology sectors (with less than 0.5% of its GDP devoted to science and technology spending, Mexico has one of the poorest records in this sector for OCDE countries<sup>54</sup>), the molecular detector case showcases how Mexican scientific institutions also take a self-imposed back seat when their involvement in crucial social issues is called for.

### **The bogus MD case as an anomaly for STS analysis**

Although the paper presented here is focused as a presentation of the Mexican bogus MD case, a few final considerations as to what expertise studies can learn from it are in order. As a case study for STS analysis, the Mexican bogus MD case is interesting in that it turns on its head the typical case study conditions encountered in the sociology of expertise. In canonical expertise studies cases such as those by Epstein (1996), Horst & Irwin (2009), Jasanoff (2003) and Wynne (1992) the 'socially weaker' expert is always the non-scientific layman or the plain citizen. Thus, AIDS patients and sheep-farmers naturally need to turn into 'activists' in the face of powerful scientific groups to keep the science in check, and it is for these activist groups for whom the STS scholar becomes a natural voice. While Collins & Evan's (2007) SEE programme may display a stronger stress on science over lay expertise, this starting position is nevertheless still adopted by default in their work (see Collins & Evans 2007, Chapter 2).

It is not difficult to understand this starting position if one takes a historical glance at expertise studies as the successor of what Collins and Evans (2002) refer to as the 'Second Wave' of STS. The three 'Waves' were immersed and reflected wider scholarly reactions to science as an institution that gained enormous power and cultural importance at the beginning of the 20<sup>th</sup> century. As science became an autonomous and powerful cultural institution, it also became subject to greater public and scholarly criticism, culminating in contemporary expertise studies which try to reconcile science with wider political preoccupations. Yet in underdeveloped countries like Mexico, this historiography of STS is not tied to the development of the country's scientific institutions. As the MD case highlight, science in Mexico does not exist as an institution with strong socio-cultural power or resources and it is located well outside the mainstream political culture's considerations. Thus, unlike the 'typical' contemporary expertise case studies encountered in developed nations where the cases are immersed within a social context where science is already solidly anchored to the social system in question, one finds that in the MD case the 'minority' position is actually that of the scientist. In the MD case described above it is in fact the individual scientists, the pro-science bloggers and the sceptics that need to turn into the relentless activists. Also strange in the MD case is that the 'right' answer as to what a policy-maker should do in deciding whether to use a piece of 'controversial' technology is already known beforehand. Thus in the Mexican context it is not true that as Collins & Evans (2007, p. 8) assert, "in general, the speed of politics exceeds the speed of scientific consensus formation", a crucial part of their model of expertise take-up.

None of the expertise scholars cited above would be able – I believe – to give a viable course of action as to how to proceed to resolve the bogus MD case in the political context within which it actually develops in Mexico. Although Collins & Evan's SEE program could claim to give the most straightforward answer (i.e. let the expert scientists give their verdict on the detectors, then follow their advise) in fact SEE tells us nothing about how exactly this should be done given the Mexican 'abnormal' socio-political context. The case becomes even more complicated if we imagine the situation without reference to the MD controversy outside of Mexico itself, that is, in the situation where we could not know the 'right' answer beforehand. Using Collins & Evan's (2007, p. 9) terminology, it is only because the 'problem of extension' and the 'problem of legitimacy' have been solved for us beforehand that the case seems particularly easy. But apparently, for the average Mexican politician the problem has not in fact been solved, and it is in this that SEE's strong roots in developed Western political systems makes it seem directly inapplicable to the Mexican case.

Moreover, although the greatest problem in the MD controversy seems to be the sheer ‘irrationality’ of Mexican politicians and public authorities ignoring the relevant experts, it is not easy to imagine how one could rule out the experience-based expertise of bogus MD detector users *without knowing the right answer in advance*, which is exactly the case the politicians find themselves in. This is of course a problem not only for SEE, but also for the other programmes. It is clear – but only because we know the answer – that the detector is a fraud, but one should not take this to mean that the bogus MD users should necessarily be treated as hoaxers, frauds, or confidence tricksters (see Collins & Evans p. 54).

If SEE is to be promoted as a *normative decision-making* political programme and not just an intellectual exercise in these sort of political contexts too, then it is unavoidable that considerations of empowerment and power relations must enter the analysis in order to understand where the Mexican politician actually stands at when making these decisions. What I take to be SEE’s limited capacities to deal with the Mexican MD case *in situ* arises because SEE considers as fundamental to its political decision-making normative model a supposition that is simply not applicable to the Mexican case: that policy-making is guided first and foremost by an exercise of rational choices in which power –relations seemingly have small impact. Ironically, before a ‘Wave Three’ plateau could be reached in a ‘Mexican expertise model’, a pseudo-Wave One position might be first necessary to actually *bolster* scientific institutional status. For it is generally untrue that in Mexico “science and technology have become ever more familiar, their ways of assessing evidence bearing a disturbing resemblance to everyone else’s ways of assessing evidence” (Collins & Evan 2007, p. 138-139). In an analysis of Mexican society and its scientific institutions, one would first have to deal with the fact that science as a cultural product and ‘scientific reasoning’ are very far from the center of social practices at large.

Adopting a political position closer to Wave One than Wave Two or Three in the Mexican context would need not turn into copying the old positivist agenda of putting science in a pedestal above all other cultural products. It could include many contemporary STS developments. Perhaps it might be that it is only in combination with some of the ideas found in the works by the other expertise scholars referred to above – usually taken to be SEE’s political antagonists – that SEE could most easily give a viable political solution for the case at hand and other similar controversies. In promoting the view of ‘the minority’ through the framing of localised power struggles, the ‘anti-SEE’ approaches would in the MD case necessarily advise that the science activists voices be given higher prominence than that given by the Mexican authorities. It is thus ironic that, though only by coincidence, clearly the empowerment of science that would stem from this would seem to be the ‘right’ course of action at the policymaking level. But this doesn’t show that the ‘anti-SEE’ response is any better suited to answer Mexican policymaking questions than SEE itself. Rather, the anti-SEE answer only highlights the highly anomalous nature of the MD case for contemporary STS frameworks once more; a case that develops wholly outside of the world of Western institutionalised science and cannot be treated using formulas tailored made for a social system where science starts from a position of power *ab initio*.

Mexico’s upside-down and rather unfortunate version of political rationality is a reflection of its wider socio-cultural conditions, perhaps what led a frustrated André Breton exasperated by the city’s chaotic conditions to say of the Mexican capital city in 1938, “our art is not needed in this country”.

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<sup>1</sup> For a brief summary of detector history centred on the GT200 see EPIC(2000). The history of molecular detectors offered here is based on the work of Tonini(2010) and documents cited therein, as well as other historical summaries spread throughout the blogosphere, which has been the pivotal point of news diffusion in Mexico.

<sup>2</sup> See the "Quadro Tracker" Wikipedia article for a list of journalistic references:  
[http://en.wikipedia.org/wiki/Quadro\\_Tracker](http://en.wikipedia.org/wiki/Quadro_Tracker) .

<sup>3</sup> See Conover (2012) for an account of the correspondence exchanged between Keith Conover, a search & rescue director, and the FBI.

<sup>4</sup> Banks (2005).

<sup>5</sup> See Randi (2008).

<sup>6</sup> Hawley and Jones (2010a).

<sup>7</sup> The blogosphere is a rich resource of material that never made it to the press or material that for various reasons cannot be found elsewhere. The allegedly Royal Engineer-sponsored report "Trial of GT200 Programmable System Detector" published online by Global Technical Ltd, was taken offline from the manufacturer's webpage but is still available at:

<http://explosivedetectorfrauds.blogspot.mx/2010/02/secret-royal-engineer-test-report-on.html>

In a letter signed by Quentin Davies MP, Parliamentary Under-Secretary of State at the Ministry of Defence responsible for Defence Equipment and Support, prompted by a query of the anti-detector fraud by blogger "Techowiz" there is acknowledgement of a Defence Export Services Organisation test of a Global Technical device at the Royal School of Military Engineering in Chatham, by an Export Support team "comprising of serving military personnel provided by the MOD". The letter admits that "Global Technical Ltd [...] produced a report that was described as a 'trial'. It should not have been described in that way as it did not meet the MOD criteria for a formal trial. Separate Army Trials and Development Units exist for that purpose." Furthermore, the letter ends by stating that:

"Evaluations of equipment are carried out by EST personnel for internal company use only and current instruction to the EST emphasises that they are

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not to be used by companies in any form of marketing. UKTI DSO is taking legal advice to be able to include a form of wording on all reports produced to retain ownership of their contents and to ensure a company cannot use an EST evaluation to promote their product. In this particular case, UKTI DSO will be asking the company not to use the 1999 report to promote their product. They will also request that any reference to MOD or UKTI endorsement in their literature and on their website be removed.”

The full text of the letter is available at:

<http://explosivedetectorfrauds.blogspot/2009/10/global-technical-more-lies.html>

<sup>8</sup> BBC Online News, “Iraqi Interior ministry backing ‘bomb detector’ ”, 24 January 2010. [http://news.bbc.co.uk/2/hi/middle\\_east/8477601.stm](http://news.bbc.co.uk/2/hi/middle_east/8477601.stm)

<sup>9</sup>R. Norland, “Iraq Swears by Bomb Detector U.S. Sees as Useless“. *The New York Times* online. Published: November 3, 2009, checked 12 October, 2012. <http://www.nytimes.com/2009/11/04/world/middleeast/04sensors.html>

<sup>10</sup> Reuters, “Iraq: Official Arrested in Connection With Bogus British Bomb Detectors *The New York Times* online. Published: February 17, 2011 checked 12 October, 2012. <http://www.nytimes.com/2011/02/18/world/middleeast/18briefs-Iraq.html>

<sup>11</sup> “Thailand: Stop Using Discredited Explosives Detector: GT200 Device Facilitates Abuses in Southern Conflict”, *Human Rights Watch* online, <http://www.hrw.org/en/news/2010/02/17/thailand-stop-using-discredited-explosives-detector>

<sup>12</sup> “Fake bomb detectors put Thais in jail”. *The International News* online. Published: 13 September, 2012, checked: 12 October 2102.

<sup>13</sup> The Wikipedia article on the GT200 contains a detailed chronology and description of the Thailand case, of which only a summary is presented here: <http://en.wikipedia.org/wiki/GT200#Thailand>

<sup>14</sup> <http://asiancorrespondent.com/28288/forensic-official-yeah-there-is-nothing-inside-the-gt200-devices/>

<sup>15</sup>D. Rivers, “Tests show bomb scanner ineffective, Thailand says”. CNN online. Published: 16 February, 2010 , checked: 12 October, 2012. See also: <http://www.youtube.com/watch?v=cp8cISFr5wo>

<sup>16</sup> “GT200 bomb detectors: Bt800-million embarrassment”, *The Nation*, Published: 17February, 2010, checked: 12 October, 2012.



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<sup>17</sup> Electronic copies of the documents were kindly provided by a member of the anti-GT200 Mexican scientific community but are publicly available at the IFAI webpage, <http://www.ifai.org.mx/> .

<sup>18</sup> “Refuerzan seguridad en Central de Abasto”. *El Universal* online. Published: 6 July, 2011, checked: 13 October, 2012.  
<http://www.eluniversal.com.mx/notas/693450.html>

<sup>19</sup> Information taken from the presentation slides “Detectores moleculares fraudulentos: un riesgo a la vida y garantías individuales de los Mexicanos” (“Fraudulent molecular detectors: risks to the life and individual rights of Mexicans” by A. Tonini and “Ciencia, pseudociencia y seguridad: el detector molecular GT200” (“Science, pseudoscience and security: el GT200 molecular detector), both presented at a discussion forum with the Mexican Senate’s Science and Technology Commission, 13 September 2011.

<sup>20</sup> See Payan (2006) for a very brief history of drug-trafficking and government involvement in Mexico up to Calderón’s presidency and Payley (2011) for a more up-to-date summary. See NACLA (2011) for various in depth articles on the social impacts of the war. Hernández (2010) offers an authoritative journalistic investigation on the history of trafficking in Mexico.

<sup>21</sup> Carlsen (2012) provides references to the debate on Calderón’s strategy and the impact of militarisation based on national security arguments on human rights issues.

<sup>22</sup> This early article was published on 3 October, 2008 but is no longer available at the *Excelsior* webpage. It can be found republished by *Vanguardia* at:  
[http://www.vanguardia.com.mx/nueva\\_arma\\_de\\_sedena\\_pone\\_a\\_temblar\\_al\\_narco-234123.html](http://www.vanguardia.com.mx/nueva_arma_de_sedena_pone_a_temblar_al_narco-234123.html) .

Bloggger Andrés Tonini maintains a detailed chronology of molecular detectors in the Mexican press, with the earliest mention being in December 2007 by in online report in a now defunct website. Tonini’s chronology read can be read at:  
<http://lonjho.blogspot.mx/2009/07/el-gt200-en-la-prensa-mexicana.html>

<sup>23</sup> “ ‘Peina’ Ejército Bellavista con sofisticado equipo”. *El Sol de León*. Published: 13 March, 2010, checked: 13 October, 2012.  
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<sup>25</sup> “Buscan bomba en *El Bachi*”, *El Sol del Bajío*. Published: 2 March, 2012, checked: 13 October, 2012.  
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- <sup>28</sup> J. A. Leyva, “El diablo también se equivoca”, *El Heraldo de Tabasco*, Published 3 March, 2010, checked: 13 October, 2012.  
<http://www.oem.com.mx/elsoldetlaxcala/notas/n1540750.htm>
- <sup>29</sup> For an analysis of the printed media’s role in masking the Drug War violence using a mixture of sex and gore see García (2011). The article is illustrated by a telling picture of man reading, of all things, a *Sol* newspaper/tabloid with its characteristic ‘Page 3’ back cover.
- <sup>30</sup> “Central de Abastos, ¿cómo vigilan al mercado más grande?”, *El Universal* online.  
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<http://www.eluniversaldf.mx/home/nota25159.html>
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Published: 3 March, 2011, checked: 13 October, 2012.  
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<http://www.milenio.com/cdb/doc/noticias2011/ac7c316211feb4d36a82a1fee0ecb838>
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- <sup>36</sup> “Comprobando el interés de la prensa mexicana sobre el GT200” (“Testing the Mexican press’s interest in the GT200”). Published 9 February 2009, checked 15 October 2012.  
<http://lonjho.blogspot.mx/2010/02/comprobando-el-interes-de-la-prensa.html>
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<sup>40</sup> A ‘punto de acuerdo’ as the one drafted by the commission is defined in the Mexican Senate’s glossary as “a proposal by legislators to proclaim, exhort or recommend institutions or public offices concerning a matter of social importance, and that does not constitute a law.”

<sup>41</sup> “Dictamen de la proposición con punto de acuerdo...”, Primera Comisión, Gobernación, Puntos Cosntitucionales y Justicia, Poder Legislativo Federal, Comisión Permanente. 5 June, 2012.

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<sup>42</sup> B. Jiménez, R. Herrera. “Compra Sedena equipo ‘milagro’ ”. *Reforma*, National News section, 26 March 2011.

<sup>43</sup> B. Jiménez, “Estrena Sedena detector de drogas”. *Reforma*, National news section, 16 May 2011.

<sup>44</sup> L. Castellanos, “La pesadilla de los señalados por ‘la ouija del diablo’ “. *El Universal* online, published 10 October 2011, checked 20 October 2012.

<http://www.eluniversal.com.mx/notas/799848.html>

<sup>45</sup>Mochán (2011).

<sup>46</sup>“Recomendación General No. 19: Sobre la practiva de cateos ilegales”, Comisión Nacional de Derechos Humanos, Diario Oficial de la Federación, 12 August, 2011.

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<sup>47</sup> L. Castellanos. “CNDH exige dejar de “creer” en el detector molecular”. *El Universal* online. Published 11 October 2011, checked 20 October 2012.

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<sup>48</sup> L. Castellanos. “Peritaje da revés a detector de droga”. *El Universal* online. Published: 8 October 2012, checked: 20 October 2012.

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<sup>49</sup> L. Castellanos. “Peritaje da revés a detector de droga”, *El Universal* edición digital. Published 8 October, 2012, checked: 12 October, 2012.

<http://www.eluniversal.com.mx/primera/40491.html>

<sup>50</sup> J. Carrasco Araizaga. “Revisará la Corte el caso del detector molecular usado en la guerra antinarco”. *Proceso* online. Published: 29 August 2012, checked 20 October 2012.

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<sup>51</sup> “Hoy en salas de la Corte”, *Canal Judicial* (Supreme Court News blog), 29 August, 2012.

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<http://canaljudicial.wordpress.com/?s=gt-200>

<sup>52</sup> Personal communication with the author.

<sup>53</sup> Personal communication with the author.

<sup>54</sup> OCDE(2012).