

*TRANSCRIPT OF "FILE ON 4" – "BIOSECURITY"*

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THE ATTACHED TRANSCRIPT WAS TYPED FROM A RECORDING AND NOT COPIED FROM AN ORIGINAL SCRIPT. BECAUSE OF THE RISK OF MISHEARING AND THE DIFFICULTY IN SOME CASES OF IDENTIFYING INDIVIDUAL SPEAKERS, THE BBC CANNOT VOUCH FOR ITS COMPLETE ACCURACY.

“FILE ON 4”

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Producer: Nicola Dowling

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CAIDAN: These are what we call submarine type doors. We can make them gas-tight so that any problems remain within the laboratory and not transferred outside.

#### ACTUALITY OF DOORS BEEPING

NORTHAM: This week, File on 4 enters one of Britain’s most dangerous laboratories, where lethal pathogens are investigated and genetically modified. If any of them got out, it could trigger an epidemic.

CAIDAN: You’re very very careful. We know what the consequences of any sort of organisms escaping from here is.

NORTHAM: Internationally, scientists are raising urgent questions over experiments producing mutant strains of deadly viruses. But it’s not only formal laboratories that carry out biological experiments. We report on the growing number of amateur enthusiasts who see microbiology as an innocent hobby, like hi-tech home-brewing. How far can you go in replicating what people do in sophisticated laboratories?

LANG: Very far, if you understand the principles. Extracting your own DNA and then spreading it out so that you can have it analysed is perfectly do-able, and you can do it in the kitchen. I mean, truth is, it's a lot like cooking.

NORTHAM: What if this branch of knowledge were to fall into the wrong hands? In the event of accidents or an attack, is Britain protected?

JOPLING: I don't think that we are at all well prepared for a major biological attack. If we had the sort of disaster which could follow and the government of the day was shown to have been ill-prepared, I think the wrath of God would fall both on individual ministers and Government as a whole, because the public would say, 'Why haven't you dealt with this?'

#### SIGNATURE TUNE

FRASER: I came home from work and she spoke to me in the kitchen. She just looked really ill and she collapsed on the floor.

NORTHAM: Just over a year ago, Andy Fraser became concerned over a sudden deterioration in his wife Rio's health.

FRASER: I said, 'I need to get you to hospital.' She said, 'No, I'm okay.' I put her on the settee and we made a cup of tea and we watched a bit of telly and she fell asleep, and then later on she just didn't wake up, so I phoned the hospital and the paramedics came out and she was taken into the hospital. They took her to the Intensive Care Unit and put her into what they called a self-induced coma.

NORTHAM: Rio had a history of using heroin and, a surprise to her husband, had returned to the drug. She went into a rapid decline.

FRASER: After about two days she'd been in the coma, and then they took me into a room and said, 'I'm afraid there's some bad news.' And I said, 'Well, what is the bad news?' And they said, 'Every organ has failed in her body, your choice really

FRASER cont: is to either be with her as we shut the machinery down or whether you want to just go and let us get on with it,' and I chose to be with her and I held her hand as she went.

NORTHAM: What Andy didn't know at the time was that Rio's death was linked to an outbreak of mysterious symptoms and deaths which for months had been taxing officials 450 miles away – in Glasgow.

ROBERTSON: It was in the December 2009 and there was a report of someone who had been admitted to the hospital on the south side of Glasgow who had an infection which had subsequently tested for anthrax spores.

NORTHAM: As soon as Detective Superintendent Derek Robertson heard the word 'anthrax' he knew he was dealing with one of the most widely-feared biological threats.

How quickly did other cases come to light?

ROBERTSON: It was actually the very same day we had our first report. The hospital said they had another patient in the hospital who also had the same presentation of soreness in an injection site, and the tests were awaited but it was very likely that was anthrax as well.

NORTHAM: When you began to realise that this was not just one case or two cases, this was an outbreak, what did you think was going on?

ROBERTSON: The commonality at the time for the first two, three victims, they were all heroin users, they were all injectors, they had all sores at the injection sites, and the sores were subsequently tested for anthrax. I immediately thought, when the facts were presented to me at the time, that heroin supplies had been tainted with anthrax in the south Glasgow area.

NORTHAM: Scotland's Health Protection Agency set up an outbreak control team, chaired by Dr Colin Ramsay. One of his immediate concerns was that stocks of blood could run out as patient after patient needed transfusions in the effort to resuscitate them. Doctors quickly established the pattern of symptoms and eventually, for thirteen confirmed victims and a fourteenth suspected, the result was terminal decline.

RAMSAY: The majority died because the bacteria had multiplied within their systems to the extent that their immune systems were overwhelmed by the toxins which anthrax produces. That's essentially how anthrax kills. It's not the bacteria, it's the toxins which do the real damage.

NORTHAM: And they died of multi organ failure. What does that mean?

RAMSAY: All the organ systems - the brain, the liver, the kidneys all become so severely damaged by the toxins. Anthrax is a very unusual organism in that it is one of the very few that's designed to kill its host.

NORTHAM: Dr Ramsay wanted to know how far the problem would spread. But, as he tells File on 4 in his first substantial interview on the subject, nobody could say.

RAMSAY: What we didn't know was whether that contamination was occurring within Scotland, very locally, or whether in fact it had occurred in the country of origin. Our concern was that if it had happened in the country of origin, we had no way of telling how big this outbreak could be. And when there were indications from Germany that there were cases occurring at almost an identical time period in Germany, the potential for a European-wide outbreak became apparent. So what worried us intensely at the beginning was how big an outbreak we could be having and indeed what we would be able to do to control it.

NORTHAM: The outbreak attracted considerable official attention - partly because it was unusual, but also because it raised the fear that it could be a case of bioterrorism. There was particular concern in the United States, where there had been a

NORTHAM cont: confirmed series of attacks using anthrax spores in 2001, beginning a week after 9/11. Contaminated letters were sent to news media offices and the Senate building. One of America's leading microbiologists, Dr Paul Keim, put the resources of his laboratory to help Glasgow identify the source of its outbreak.

KEIM: There were probably a couple of hundred anthrax cases at least suspected and there were fourteen deaths. If we see fourteen people die of anthrax, that's very unusual. Unfortunately, anthrax is one of those diseases that can be used as a biological weapon, and so when we see a cluster of cases like this, it catches our attention because we want to try to head off, prevent and pursue the attackers if it is a case of bioterrorism.

NORTHAM: Back in Glasgow, Detective Superintendent Robertson decided that his number one priority was to trace the origin of the outbreak in order to get it under control. He persuaded drug users to identify their dealers, on the understanding that the police weren't going to arrest them. The more important thing was to identify the source of the anthrax.

ROBERTSON: Information that came from one victim in particular named his supplier. We actually controlled that supplier. The supplier was linked to an organised crime team that were operating in Scotland at the time, and they were linked to an English team on the north east coast, who were getting supplies from the continent. And let's face it, heroin comes from Afghanistan, Turkey, the Balkans, Iran, it's all coming from that area into the UK. The lines were beginning to get drawn on the map at that stage.

NORTHAM: At his laboratory in Arizona, Dr Paul Keim concluded that the strain of anthrax involved was not the same as in the Washington attacks, nor did it match previous biological weapons programmes in Iraq, Russia or the 1940s British experiments on a Scottish island. So what was it? Dr Keim came up with an answer which fitted evidence from the police.

KEIM: We have a large collection of anthrax genetic profiles in my laboratory that have been developed over the last fifteen years. We ran that profile through our database and it came up to being related to samples that had been seen in Turkey

KEIM cont: - not exact matches, but they were the closest that we found. And so the most likely hypothesis right now is that somewhere in that transit, perhaps Turkey, the heroin was somehow contaminated with material from anthrax cases that were local there.

NORTHAM: Police concluded that the heroin had probably been wrapped in a contaminated goat skin during transit through Turkey. When it appeared that this was not a deliberate attack, there was relief among Scottish and American officials. But the outbreak did expose some gaps in British preparedness. Apart from doubts over supplies of blood, we had no stocks available of an antitoxin which could be used almost as a last resort to try to revive infected patients. Dr Ramsay made an emergency arrangement with health officials in America.

You had to bring in antitoxins from the United States?

RAMSAY: Yes, these were offered to us by the United States Government essentially.

NORTHAM: And staff to use them?

RAMSAY: Yes, and they offered staff to help supervise, because in fact they had never been used extensively, even in the United States. I think there had only been two or three cases where they had actually used it in the US.

NORTHAM: Without that help from America in both staff and antitoxins, would you have been struggling?

RAMSAY: Even if there had been no antitoxin, we would still have managed these patients in the standard way. The antitoxin was merely an additional treatment which was created as an option, but the full benefit of that has still to be evaluated.

NORTHAM: Should we have had those stocks ourselves?

RAMSAY: I think because of the experimental nature in some respects of these antitoxins, there have been subsequent discussions about whether or not there should be stockpiles in the UK, and that's still an on-going discussion as far as I am aware.

NORTHAM: Do we have stockpiles now?

RAMSAY: I am not in a position to comment on that.

NORTHAM: Does that mean yes or no?

RAMSAY: I'm not in a position to comment on that.

NORTHAM: Doubts about our general readiness to deal with a mass outbreak of disease, particularly one caused deliberately in a bio-attack, have long exercised the former Agriculture Minister, Michael Jopling. Now a peer, he's proved almost a lone voice in the House of Lords, raising question after question about precautions to ensure that essential emergency services could continue to function if a bio-terrorist were to strike. Eight years ago Lord Jopling discovered that the United States had forty thousand doctors, nurses and paramedics inoculated against a possible smallpox attack. In Britain, he was officially told there were just two hundred and seventy. Last month, that number was reported to have risen to five hundred. Lord Jopling still regards this level of protection against smallpox and anthrax as 'pathetically low', given what he calls the 'dangerous situation' of the coming Olympics. The Government's responses, he fears, have shown little sense of urgency.

JOPLING: One tends to get rather flat Civil Service answers which ministers put their names to, which don't seem to take it as seriously as I think they ought to. A number of answers that I've had refuse to give details because they say this is not in the national security interest.

NORTHAM: Well, it's a fair point, isn't it?



JOPLING: It is a fair point.

NORTHAM: I mean, they don't want to tell you, for example, in public what stocks we have of different kinds of vaccines and where they are.

JOPLING: I don't see what is wrong in saying how many doses of vaccines there are unless they are lamentably few. If there are ample, let's say so, everybody ought to know. But if they are in very short supply, and I've been asking questions about anthrax, because there's been a collapse in the production of anthrax vaccines at Porton Down between 2010 and 2011, which is concerning. They say they will make it up this year, but I'm not quite sure how much the shortfall was.

NORTHAM: As a country, are we prepared for the possibility of a biological attack during the Olympics?

JOPLING: If we had the sort of disaster which could follow a biological attack and the government of the day was shown to have been ill-prepared, I think the wrath of God would fall both on individual ministers and Government as a whole, because the public would say, 'Why haven't you dealt with this?' And I don't think that we are at all well prepared for a major biological attack.

NORTHAM: File on 4 asked the Home Office to comment on this potential risk to biosecurity at the Olympics. It told us:

READER IN STUDIO: The Government is committed to delivering a safe and secure Olympic Games. The current risk assessment does not indicate any need to change the existing national vaccination strategy.

NORTHAM: Biosecurity extends beyond preparations - or lack of them - to deal with terrorism. Extremely hazardous biological agents are already among us - being worked on for benign research purposes in laboratories in almost every major centre of population. There are more than eight hundred of them across Britain, with three hundred and forty-seven laboratories working at the second highest danger level on organisms like

NORTHAM cont: tuberculosis. And ten labs work at the highest risk level on viruses like Ebola and the most deadly strains of flu.

#### ACTUALITY OF GATE BEEPING

CAIDAN: We've just come into the lobby and we've got two doors facing you. They're the entrance to the laboratory.

NORTHAM: At the Medical Research Council's top security laboratories in Mill Hill, north London, the head of security, Simon Caidan, agreed to give File on 4 access to the most closely-guarded building on the huge site. He could do this only because the lab was out of operation for a few days of routine servicing. In normal times, would I get this far?

CAIDAN: No, you certainly wouldn't. We don't allow anybody that's not approved to come into the facility, to come through the front door, let alone coming into this area here.

NORTHAM: So we're now through another door.

CAIDAN: What we would do normally now is take off all your clothes.

NORTHAM: All of them?

CAIDAN: All of them, everything, then we'd go through the next door naked.

NORTHAM: So I would be completely naked?

CAIDAN: Absolutely.

NORTHAM: And you would now let me go through this door?

CAIDAN: I would, yes. This is the next door. This is we call the infectious area.

NORTHAM: Off we go, but with my clothes on.

CAIDAN: Absolutely.

#### ACTUALITY OF DOOR BEEPING

NORTHAM: And this looks like a shower.

CAIDAN: Yes, we shower on the way out, but we don't shower on the way in. We're completely naked when we're standing in this area and we put these clothes on before going through the next door into the laboratory area.

NORTHAM: At the heart of the complex security is the lab itself, with rows of conventional-looking workbenches, filtered extractor fans and sealed glass cabinets.

CAIDAN: So now we're into the facility proper ....

NORTHAM: In the search for new treatments and vaccines, it's here that scientists manipulate lethal organisms, including malaria, the cervical cancer virus, tuberculosis, HIV and strains of flu.

CAIDAN: These are what we call submarine-type doors. We can make them gas-tight. We have cabinets that you can see over there.

NORTHAM: Show me how you would work in one of these cabinets.

CAIDAN: Okay, let me go and put the gloves on.

NORTHAM: The gloves being these huge cones that you're putting your hands through.

CAIDAN: We call them gauntlets.

NORTHAM: I'm surprised that you would not, at this stage, be wearing something like a spacesuit with a full mask and goggles and ...

CAIDAN: We do things differently in this country compared to how they work on the continent and the US. If they have a spillage, they are protected from the spillage by the suit, whereas we're protected by the cabinet.

NORTHAM: Has any deadly organism ever escaped from this laboratory?

CAIDAN: No, absolutely not.

NORTHAM: Never?

CAIDAN: No.

NORTHAM: Has anybody ever got through to this laboratory who should not have?

CAIDAN: No. Again I can categorically say that. We are very certain that nobody has got in here that shouldn't have done.

#### ACTUALITY WITH COMPUTER

NORTHAM: Sadly, not every laboratory can claim a 100% record of safety and security. If you go on the Health and Safety Executive's website, you can find examples of labs where standards have slipped. Here, for example, is a hospital in East Sussex, in May last year, which failed to keep its ventilation system properly checked, exposing staff to the risk of TB. Here there's a similar problem in London.

NORTHAM cont: Three years ago, the BBC learned that workers at a government veterinary laboratory in Surrey had been exposed to bird flu in two needle-stick incidents. They were each sent home for seven days quarantine and put on flu medication. But such details are rare.

#### ACTUALITY WITH COMPUTER

NORTHAM: Back on the website, there is a published list of reported 'injuries, diseases and dangerous occurrences', known as RIDDO, which includes 'the release or escape of a biological agent likely to cause human infection or illness'. Last year there were 382 biological incidents reported, a rise of 13% on the previous year. The HSE doesn't give any information at all about these dangerous occurrences. The Head of the Biological Agents Unit, Dr Joanne Nettleton, has revealed to File on 4 that twenty-five of these incidents happened in labs supposed to have the highest two levels of security for the most deadly organisms. But she won't give details either.

NETTLETON: The majority of those occurrences are things like people spilling material out of a test tube within a safety cabinet or sometimes handling material on a bench when it should have been handled in a safety cabinet. So nobody has been harmed typically from these types of occurrences, and in fact, because we place such an importance on these we call them precursor events, we expect them to be reported so that we can investigate and see if there are any lessons to be learned.

NORTHAM: Would it not increase public confidence in what you do and what these laboratories do if you were to publish the details of every one of these twenty-five incidents?

NETTLETON: The RIDDO material is available. I think you've got a list ....

NORTHAM: Well, the numbers are available.

NETTLETON: The numbers are available.

NORTHAM: But the details aren't.

NETTLETON: We don't routinely provide details of the incidents, because there are names of people involved and privacy, data protection requirements in relation to those.

NORTHAM: You could publish details of the incident without naming anybody, couldn't you?

NETTLETON: What we do have is strategies throughout the HSE, where we've identified what the particular issues are. We've taken into account the evidence that we've identified from this type of incident.

NORTHAM: But you're not making it public?

NETTLETON: Not routinely.

NORTHAM: So the public is bound to be suspicious where there is any secrecy, isn't it?

NETTLETON: I think in this particular case the public can be assured that this, this work is generally done very safely and that we have a robust regulatory framework.

NORTHAM: And you want us to trust you in that regard?

NETTLETON: I would hope that the public would trust us in that regard.

NORTHAM: There are many laboratories, in Britain and around the world, where scientists don't just research existing dangerous organisms - they modify them genetically to make them even more harmful. There can be an innocent purpose in this - to pre-empt, for example, the natural mutation of a virus in order to come up with effective vaccines before any novel outbreak occurs. The scientific world is currently in a state of



KEIM cont: would be impossible to stop, so all of these considerations had such dire consequences. The Board just felt it was very important that a broader discussion take place to develop policy.

NORTHAM: But Dr Keim's request for scientists to, in effect, censor their research findings has met a vigorous response. The research teams and the journals concerned have delayed publication but not yet agreed to any cuts. They, and a host of other experts, have declared a moratorium on further bird flu research lasting until the twentieth of March. They want a robust public debate about the wisdom of continuing their experiments and publishing their results in full. This first argument over publication is unlikely to be the last. Microbiology is a rapidly advancing field and it doesn't just involve organisms already known in nature. A newly-emerging science called synthetic biology can create new forms of life, some of which will cure us, others which could kill.

MOONEY: As a rule of thumb, everyone says in the business that the cost and the speed of synthetic biology has changed by one hundredfold since the beginning of this century.

NORTHAM: The Etcetera group, based in Ottawa, runs an international monitoring network on new technologies and their likely impact. Its Executive Director, Pat Mooney, argues that long-established microbiological manipulations, coupled with the rise of synthetic biology, present real dangers if they fall into the wrong hands.

MOONEY: It took thirteen years and \$2.3 billion to map the first human genome. It now takes about seven or eight days and about \$5,000 to map a human genome, so that's the kind of change of pace that we're dealing with. What makes it particularly attractive for everybody is that it's kind of a do it yourself system. Anyone can go onto eBay and buy themselves for about \$400 a gene synthesiser, a second hand one, it's kind of slow, but it certainly works. And then, together with other friends on the internet, they can collectively build genomes or design their own life really.

NORTHAM: So this is a technology which at the moment is expanding rapidly, not only in terms of its ability to do things, but in terms of who can do it?



MOONEY: It doesn't seem to require any particular previous skills in biology, you don't have to know what things look like or know how biology functions, you have to know a little bit more about circuitry and about electronics. The need for new things to kill us, new microbes to do damage is questionable, They've managed to rebuild polio, smallpox, they can construct viruses that we thought we were getting rid of or at least thought were safely stored away, that can now be done by scientists in a lab or can be done by kids in the garage.

## ACTUALITY AT CLASS

CALOW: Welcome to MadLab. I think there's quite a few people here that I've not seen at MadLab before, so I'll just give you a couple of minutes, just kind of describe what MadLab is and why we're here.

NORTHAM: It's Wednesday evening in a quiet street in Manchester's fashionable Northern Quarter. A group of twenty amateur enthusiasts is gathered for the weekly class in DIY biology. They're not experimenting on dangerous viruses, they're just well-intentioned hobbyists. And between them, they've managed in less than a year to learn a lot about biological practice and to put together the necessary equipment. Alex Lang, an electronics engineer by trade, has proved a particularly keen contributor.

LANG: I think it's a new buzz thing, being able to do things like check your DNA at home, take snails and grow them and see how they interact genetically and things like that. There's a lot you can do.

NORTHAM: How far can you go in replicating what people do in sophisticated laboratories?

LANG: Very far if you understand the principles. I believe you can do a considerable amount. I know that extracting your own DNA and then spreading it out so that you can have it analysed is perfectly do-able, and you can do it in the kitchen. I mean, truth is, it's a lot like cooking.

NORTHAM: What equipment have you got?

LANG: One of the first things we were asked for was something called a PCR machine. It's a method of amplifying DNA.

NORTHAM: And you've got one. Where did you get it?

LANG: I built it from plans I found on the internet.

NORTHAM: And where did you get the parts to build it?

LANG: Mostly from the rubbish bin. The casing is an old power supply from a computer. Inside the casing there's an old filament light bulb that I'm using to heat and cool things.

NORTHAM: And you've packed it round with polystyrene.

LANG: Yes, to provide a bit of heat insulation.

NORTHAM: And the rest of the kit came from where?

LANG: We've got a fan from a computer and the rest of the electronics I bought on the high street.

NORTHAM: Is there anything here, in this piece of kit you've put together, which I could not buy tomorrow?

LANG: Everything you could buy tomorrow. Putting it altogether with about ten minutes help, it could be done.

NORTHAM: Manchester's DIY biologists stress that they have only benign uses of their science in mind. But the fear that others could have less innocent intentions troubles a leading ethicist at the University of Oxford. Professor Julian Savulescu





NORTHAM: US governments have spent \$60 billion over the past decade improving various aspects of bio defence such as air sensors, specialist training for doctors and medical supplies. In contrast here, the Home Office spent £3 million last year on bio defence, including detection, decontamination and medical countermeasures. That's less than half what was spent three years ago. The MoD put a further £51 million into protecting troops. Four years ago, the House of Commons Select Committee covering science became anxious that biological techniques were advancing so quickly that they outstripped the mechanisms to control them. The MPs examined ways in which government departments and official regulators kept tabs on more than eight hundred active laboratories. And they uncovered a shambles. Or, as their report put it, 'a striking lack of co-ordination'. The Select Committee was chaired by the Liberal Democrat, Phil Willis, now Lord Willis.

WILLIS: The policy was incredibly muddled, that here you have somewhere in the region of about forty new completely dangerous pathogens that actually entered into human contact over the last twenty-five years. Exactly the same was happening in terms of animals. And yet the coordination, for instance, between human pathogens and animal pathogens was virtually non-existent. The ministerial oversight was virtually non-existent. And here we had that the Government didn't know where the, we'll call them level 4, the highest containment laboratories around the country. Surely you would have a handle on where they were, mainly because you would want to use them if, in fact, there were serious outbreaks.

NORTHAM: The Select Committee made scores of recommendations, principal among them that a single Government Minister - such as the Minister of Science - should bring all relevant departments together in a unified approach. To find out what has happened we asked for an interview with the Minister of Science, David Willetts. He couldn't find time to see us. But his department told File on 4 that he is not, in fact, in charge of biosecurity. That was a matter, they said, for DEFRA, the Environment Department and the Health and Safety Executive. DEFRA told us that they have no Minister in charge of biosecurity and again referred us to the HSE. So is there one Minister in charge? Downing Street tells File on 4:

READER IN STUDIO:                   The responsibility for biosecurity is shared by a number of Government departments. The National Security Council was set up on the very first day of the new Government, which brings together key ministers, military and intelligence chiefs, and a National Security Advisor was appointed.

NORTHAM:                               It was Lord Willis whose Select Committee originally called for the appointment of a single Minister to take responsibility for biosecurity. So is he now satisfied that there is one?

WILLIS:                                 I've done exactly the same piece of research and no, there isn't. I find that hugely, hugely disappointing, because the UK punches massively above its weight in terms of its science base, particularly in terms of human medical health, perhaps second only to the United States. And in fact, to have any threat, any threat in terms of biosecurity which might damage that image and damage the investment coming I think is something which Government should again look very very seriously about going back to that report and implementing the recommendations.

NORTHAM:                               So if there still is not a minister overall responsible for biosecurity, what do you say?

WILLIS:                                 It is a serious error. It is one which should be revisited, because they will not be forgiven, ministers of this coalition government or a future government if, in fact, we have another outbreak where a dangerous pathogen gets loose and causes the sorts of mayhem that happened with foot and mouth. And if it happened as a human pathogen out into the open then my goodness, it would be a very very sorry tale indeed.

SIGNATURE TUNE