

# Doubts About “Novichoks”

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## Novichoks and the Salisbury poisonings

In the House of Commons on 12 March the Prime Minister stated that:

It is now clear that Mr Skripal and his daughter were poisoned with a military-grade nerve agent of a type developed by Russia. It is part of a group of nerve agents known as Novichok. Based on the positive identification of this chemical agent by world-leading experts at the Defence Science and Technology Laboratory at Porton Down, our knowledge that Russia has previously produced this agent and would still be capable of doing so, Russia's record of conducting state-sponsored assassinations and our assessment that Russia views some defectors as legitimate targets for assassinations, the Government have concluded that it is highly likely that Russia was responsible for the act against Sergei and Yulia Skripal.

The Prime Minister said if there is no “credible response” by the end of Tuesday 12 March, the UK would conclude there has been an “unlawful use of force” by Moscow.

## Summary of key issues that need to be addressed

- 1) There are reasons to doubt that these compounds are military grade nerve agents or that a Russian “Novichok” programme ever existed. If they were potentially usable as chemical weapons, people on the OPCW Scientific Advisory Board who were in a position to know the properties of these compounds would have recommended that they be added to the list of Scheduled Chemicals. They have never been added.
- 2) Synthesis at bench scale of organic chemicals such as the purported “Novichoks” is within the capability of a modern chemistry laboratory. Porton Down itself must have been able to synthesize these compounds in order to develop tests for them. The detection of such a compound does not establish Russian origin.

## Details

### *(1) Doubts about the history of the “Novichok” Programme*

The history of the alleged “Novichok” programme remains unclear. The original source for the story that a new class of organophosphate compounds was developed as chemical weapons under the name Novichok in the Soviet Union during the 1970s and 1980s is from Vil Mirzayanov, a defector in the 1990s. Mirzayanov described the chemical structures of these compounds and stated that the toxicity of an agent named Novichuk-5 “under optimal

conditions exceeds the effectiveness of VX by five to eight times". Mirzayanov alleged that Russian testing and production had continued after signing the Chemical Weapons Convention in 1993.

However, a review by Dr Robin Black, who was until recently head of the detection laboratory at the Defence Science and Technology Laboratory (Porton Down), emphasizes that there is no independent confirmation of Mirzayanov's claims about the chemical properties of these compounds:

In recent years, there has been much speculation that a fourth generation of nerve agents, 'Novichoks' (newcomer), was developed in Russia, beginning in the 1970s as part of the 'Foliant' programme, with the aim of finding agents that would compromise defensive countermeasures. Information on these compounds has been sparse in the public domain, mostly originating from a dissident Russian military chemist, Vil Mirzayanov. No independent confirmation of the structures or the properties of such compounds has been published. (Black, 2016)

The OPCW's Scientific Advisory Board (SAB) appeared to doubt the existence of "Novichoks", and did not advise that the compounds described by Mirzayanov, or their precursors, should be designated as Scheduled Chemicals that should be controlled under the Chemical Weapons Convention:-

[The SAB] emphasised that the definition of toxic chemicals in the Convention would cover all potential candidate chemicals that might be utilised as chemical weapons. Regarding new toxic chemicals not listed in the Annex on Chemicals but which may nevertheless pose a risk to the Convention, the SAB makes reference to "Novichoks". The name "Novichok" is used in a publication of a former Soviet scientist who reported investigating a new class of nerve agents suitable for use as binary chemical weapons. The SAB states that it has insufficient information to comment on the existence or properties of "Novichoks". (OPCW, 2013)

The Scientific Advisory Board included Dr Black, and several other heads of national chemical defence laboratories in western countries. These labs would have presumably made their own evaluation of Mirzayanov's claims and specifically would have done their own experiments to determine if compounds with the structures that he described were of military grade toxicity. Such studies can be done quickly and efficiently *in vitro* using methods developed for drug discovery (combinatorial chemistry and high-throughput screening). It is reasonable to assume that if these labs had found that these compounds were potentially usable as chemical weapons, the Scientific Advisory Board would have recommended adding them to the list of Scheduled Chemicals as the Chemical Weapons Convention requires.

Until independent confirmation of Mirzayanov's claims about the toxicity of these compounds is available, and there is an adequate explanation of why the OPCW Scientific Advisory Board did not recommend that the compounds purported to be "Novichoks" and their precursors be designated as scheduled chemicals, it is reasonable to question whether these compounds are military grade nerve agents, or that a Russian "Novichok" programme ever actually existed.

## *(2) Who Could Have Synthesized the 'Novichok' Compounds?*

The Prime Minister stated that:

There are, therefore, only two plausible explanations for what happened in Salisbury on 4 March: either this was a direct act by the Russian state against our country; or the Russian Government lost control of their potentially catastrophically damaging nerve agent and allowed it to get into the hands of others.

However, Mirzayanov originally claimed that the Novichok agents were easy to synthesize:-

One should be mindful that the chemical components or precursors of A-232 or its binary version novichok-5 are ordinary organophosphates that can be made at commercial chemical companies that manufacture such products as fertilizers and pesticides. (Mirzayanov, 1995).

Soviet scientists had published many papers in the open literature on the chemistry of such compounds for possible use as insecticides. Mirzayanov claimed that "this research program was premised on the ability to hide the production of precursor chemicals under the guise of legitimate commercial chemical production of agricultural chemicals".

As the structures of these compounds have been described, any organic chemist with a modern lab would be able to synthesize bench scale quantities of such a compound. Indeed, Porton Down must have been able to synthesize these compounds in order to develop tests for them. It is therefore misleading to assert that only Russia could have produced such compounds.

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### Sources

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