



Disarming Syria Under the Al-Julani Regime - The Biological Weapons Dimension

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EXECUTIVE SUMMARY: While the Syrian chemical weapons program has been targeted and degraded since 2013, almost nothing has been done about Syria's biological weapons program. The recent regime change in Syria could provide an opportunity to finally locate and destroy Syria's biological weapons program.

In 2004, the Swedish Defense Research Agency concluded, following a seemingly comprehensive analysis, that "Syria does not have an offensive biological weapons program... and does not have any military nuclear program ambitions".

Both these conclusions were entirely wrong.

In 2012, a year and a half after ending his term as head of IDF intelligence, Amos Yadlin identified Syria as "a state possessing chemical and biological weapons (CBW) stockpiles on an enormous scale, worldwide". A joint OPCW-UN mission was established the following year, agreed upon by the US, Russia and Syria, to oversee the elimination of vast under-declared portions of the Syrian CW arsenal, including a large complex that produced the biological toxicant ricin. Other biological facilities were not probed at all.

A remarkable master's thesis completed in 2019 at Missouri State University noted that "Syria has one of the most significant BW programs known to the Middle East". The details of Syria's overall BW program, in terms of its full makeup, sites, warfare agents, and delivery systems, remain enigmatic.

Syria has now been taken over by the Al-Julani regime. That dramatic change could provide an opportunity to expose the full scope of the BW program of the ousted Assad regime in order to wipe it out.

The underlying platform for the Syrian BW program is fairly plain. Syria completed an initial stock of self-made CW in 1986. Fifteen years later, Syria started to build a North Korean-modeled plutonium reactor with the aim of achieving nuclear weapons. Throughout those 15 years and thereafter, particularly after the destruction of the nuclear facility, Syria invested deeply in its chemical arsenal. In the 1990s, it apparently added an advanced biological arsenal as well.

Thus, in parallel with its secret nuclear program (which was critically damaged in 2007), the main military thrust of the former Syrian regime's strategy was to reinforce its ballistic-chemical-biological nexus with the goal of maximizing its power and preparedness while minimizing transparency and vulnerability.

Brief chronology

By the 1970s, the Soviet bioweapons effort had become a huge program rivaling its vast investment in nuclear arms. This program attracted Syrian attention. In 1972, Syria was positioning itself towards the emerging international Biological Weapons Convention (BWC), which it signed but never ratified.

Syria received its initial BW and CW capabilities from Egypt as part of their joint preparations for a broad surprise offense against Israel. Syria established the Scientific Studies and Research Center (SSRC), an institution designed to develop and produce advanced and strategic weaponry - including BW and CW - behind civilian masking.

In 1973, President Hafez al-Assad issued a directive officially authorizing close synergistic relations between the SSRC and the Syrian MoD and army. A chemistry department was added to the SSRC, and by 1980, a biology department had been built as well. The latter was headed, from 1980-1990, by Prof. Hani Rizk, whose CV indicates that he led 12 unpublished studies during those 10 years.

The biology department was nominally composed of laboratories for bacteriology, immunology and water treatment. Overtly, it dealt with ordinary bacteria like *E. coli* and *S. feacalis* (Dr. Fauza Muneim). Viruses were soon added in the form of tobacco mosaic virus (Dr. Zoheir Al Moudallal) as a model for advanced virological investigations.

The area of proteinology was added as well, conducted by Dr. Antuanet Susanie

and involving Iranian collaborators. Coincidentally or not, in 1987, Syrian astronaut Colonel Muhammad Ahmed Faris participated as a research cosmonaut in a Soviet Soyuz space mission in which ultrapure biological preparations, particularly proteins with both military and civil potential applications, were produced under zero gravity. Fundamental know-how about the toxic protein ricin was attained by the SSRC from academic laboratories in France.

In the area of biological warfare agents, the SSRC launched R&D of the ricin protein castor biotoxin. Syria disguised this research as a governmental pharmaceutical project into castor oil. According to a supreme decree imposed in 1989, this project was run under the full formal supervision of the MoD.

This project was scaled up and two more protein biotoxin manufacturing facilities were added. Later, the following capabilities were established, nominally for civilian purposes:

Ricin toxin at the Al-Maliha ricin production facility

This facility, which was affiliated with Tameco (the entirely Syrian “Arab Medical Company”), was supervised directly by the MoD plus the SSRC. (Al-Maliha is an eastern suburb of Damascus.) FAO reported that in 2003, the production of castor beans in Syria went from just over zero to some 1,300 tons per year. It remained at this level even after the civil war began. (In the years 2004-2006, there may have been no reporting.) This factory is likely to have dealt with the handling of powders with sweeping effects.

The Al-Maliha facility was destroyed under the chemical disarmament agreement Syria undertook (lingeringly and misleadingly). The fate of the ricin toxin produced therein for about a decade is unclear, however.

Botulinum toxin at the Ghandour pharmaceutical factory, Hama

Established in 2005, this seemingly ordinary pharmaceutical factory produces hyaluronic acid injections and the bacterial botulinum toxin type A under the designation "Maxitox Cosmetics". The firm employs 11-50 people and has, notably, an office in China. Allegedly, the toxin produced at Ghandour is a highly purified protein that follows the strictest international quality control standards.

Snake toxin anti-serums

The SSRC manufactured a biomedical product containing a polyvalent anti-serum to be used as an emergency treatment against the venoms of six snakes: the Indian cobra, Levant viper, saw-scaled viper, Israeli viper, sand viper, and horned desert

viper. This anti-serum, called Antivenom-2, is prepared using pure plasma separated from the blood of horses that have been immunized against the venoms. This implies that the venoms themselves were obtained and accumulated by the SSRC. Some of them are regarded as biowarfare agents. (Alongside the snake anti-serum effort, scorpion venom anti-serums were also manufactured by the SSRC.)

Bioactive protein modulators

In addition, an R&D offshoot of the SSRC called the Higher Institute of Applied Science and Technology, Department of Pharmaceutical and Chemical Industries, Damascus absorbed important know-how from China's State Key Laboratory of Drug Research, Shanghai Institute of Materia Medica, Chinese Academy of Sciences concerning the development of bioactive protein modulators, in that case of protein tyrosine phosphatases.

Staphylococcus enterotoxin

According to the Syrian General Commission for Scientific Agricultural Research, "SSRC activities of the Biology Department include: environmental and medical biotechnology such as biodegradation for some pollutants and waste water, and many other medical microbiological applications, genotyping of microorganisms, with special attention to epidemiological studies and designing specific DNA probes, dot blot and southern blot for [the bacterial enterotoxin] *S. aureus*."

The key phrase in that quote is "many other medical microbiology applications". The variety of pathogens under discussion include some that are known biowarfare agents. They could plausibly include waterborne bacteria like *V. cholera* and salmonella, as well as other pathogens like anthrax and the smallpox virus. The latter two might be of particular importance, as follows:

Smallpox

The isolated Syrian smallpox strain referred to is SYR72_119. An outbreak of 54 smallpox cases occurred in 1972 in Syria, an extension of an Iranian outbreak (isolated strain IRN72_tbrz) that reached Syria via Iraq. The smallpox virus has the potential to be used as a biological weapon. The Syrian isolate is held, discreetly, at the CDC in the US, but it is not known whether additional isolates were kept locally from those 54 Syrian cases.

In addition, there is a possibility that the camelpox virus (isolated for the first time in Syria in 2005, strain CP-Syria-2005) may have been used as a model virus for smallpox. Unverified information points to North Korean assistance to Syria on an

upgraded smallpox virus. It is certainly conceivable that North Korea, which cooperated fully with Syria in its construction of a nuclear weapons-oriented plutonium reactor and which possesses a substantial BW arsenal, has provided assistance to Syria in acquiring BW.

Anthrax

Multiple anthrax strains have been obtained in Syria from both humans and farm animals, particularly during the many outbreaks that occurred from 1983 until 1994. Two types of vaccines were produced on an industrial scale. Unconfirmed reports said a highly virulent BW strain (apparently anthrax 836), which is stable upon delivery and subsequently disseminated, was furnished to Syria by Russian experts. In terms of mass cultivation and masking, a related amylase-producing bacterium (*B. subtilis*) and a bioinsecticidal bacterium (*B. thuringiensis*), both of which were studied closely by the Syrian Atomic Energy Commission (see below), could serve as model and surrogate bacteria for anthrax (as occurred with the Egyptian and Iraqi BW programs, respectively).

Towards 1989, the serial production of anthrax and additional BWAs started at the SSRC. Apparently within that context, 10 tons of the disinfectant calcium hypochlorite $\geq 65\%$ were supplied to the SSRC in 1989.

In addition to the SSRC, we must take note of the Syrian Veterinary Vaccine Department, which is affiliated with the Central Veterinary Laboratory, Dower Al-Matar, Damascus. This facility possesses a vital biotechnological infrastructure that conducts full-scale industrial production of pathogenic bacteria and viruses. Given the variety of its products, it could significantly assist research, development and production of BWAs like anthrax, botulinum, pestis, brucella, salmonella, and smallpox. Significantly, Syria imported microbiological growth media in 1999, 2001, 2006 and 2012. This seems to indicate increased production of veterinary vaccines and/or BWAs by the former regime until 2012 and thereafter.

The connection between the Syrian Atomic Energy Commission and Syria's BW program

There is a concrete connection between the Syrian Atomic Energy Commission (AECS) and the Syrian BW program, particularly – though not exclusively – through the AECS's Molecular Biology and Biotechnology Department (MBBD). The following affair is likely to have contributed to this connection.

Dr. Ayman Habal, a brilliant scientist at the SSRC who invented the Syrian binary sarin nerve agent system, was reputedly recruited by the CIA as an informant.

Habal became excessively wealthy as a result of this arrangement. He was interrogated by Syrian military intelligence about payoffs from foreign companies ostensibly in return for contracts to sell supplies to his institute. One way or another, this tangled affair (along with other factors) prompted a remarkable shift in which the highly classified Syrian BW program migrated in part from the SSRC to AECS in the form of the MBBD. (It was also claimed that Habal had been recruited by the Mossad under the name Saleh Al-Najm. Habal was jailed in Syria and eventually executed.)

Thus, the AECS, which had been founded around 1979, thereupon having its Molecular Biology and Immunology Division (the latter headed during 1995-1996 by the aforementioned Dr. Hani Rizk, from the SSRC), that division changed in 1999 into the Microbiology and Immunology division, which was affiliated with the large (3,000 m²), newly constructed Department of Molecular Biology and Biotechnology. Notably, while the AECS was presented as "promoting [the] safe, secure, and peaceful use of atomic and nuclear related technologies...[and their] applications in peaceful fields", 90-95% of MBBD's activities were not related in any way to atomic and nuclear technologies. They related to pathogens, pathogenic and non-pathogenic surrogates, and their interplay. MBBD gained a wealth of scientific know-how from Belgian academic labs (often together with Iranian scientists).

Top US strategist Ellen Laipson, during her presidency of the Stimson Center, stressed in 2004 that there was an "organic link" (in the context of atomic isotope separation) between the AECS and the SSRC. Many AECS personnel had the highest Syrian security clearance, particularly those involved in the Assad regime's renewed classified nuclear effort. The same principle applied to the biological dimension.

Again, the Department of Molecular Biology and Biotechnology was founded at AECS in 1999 and tight bonds with the SSRC persisted. In the same year, the AECS also founded the Syrian National Biosafety Committee. The MBBD "comprise[d] 15 well-equipped labs, all of them classified according to biosafety guidelines established by the Syrian National Biosafety Committee", and was fully integral to AECS.

The purported objectives of the MBBD were the "promotion of biotechnology and related sciences and technologies in Syria through coordinated research programs; detection and classification of pathogenic agents widespread in Syria; and involvement in all biosafety issues in Syria and in risk analysis and training on various aspects of biosafety" regarding virulent bacteria, viruses and biotoxins,

most likely also those included in the Syrian BW program.

There are three levels of biosafety at MBBD. The Biosafety level III (P3) facility is intended for work on brucella bacteria. Importantly, there is apparently another P3 biosafety facility at the Brucellosis Compound (Veterinary Center, Directorate of Animal Health, Ministry of Agriculture), Bab Sharki - Airport Square, Damascus, and/or at Shebaa, adjacent to the Shebaa Agriculture Service Center.

AECS's MBBD has its own animal shed, and a wide variety of laboratory and pilot plant instrumentation is operated at MBBD. Among other things, it has Chinese-made fermenters/bioreactors of at least 20 liters (for bacteria cultivation), chicken embryo incubators (potentially for virus propagation), and -80°C freezers. Preservation media and recycled culture media are supplied by the Environmental and Health Applications Division of AECS. Experimental infections are conducted within MBBD.

In addition to several species of brucella, pathogenic bacteria are held and explored at MBBD. Bacteria that may have been developed, at least in part, as BWAs by Syria are *Vibrio cholerae*, several species of salmonella, *Shigella flexneri*, *Clostridium perfringens* and *Klebsiella pneumoniae*. The fungal toxicant aflatoxin is also worthy of mention.

Bacteria held and explored at MBBD as surrogates of potential BWAs include *Yersinia enterocolitica* (conceivably for *Yersinia pestis*), *Staphylococcus aureus* (for enterotoxin B), and *Bacillus* (for anthrax - see above). The hepatitis B virus (as a surrogate for hepatitis A and C) and broad bean mottle virus (as a surrogate for animal RNA viruses in general) are also notable.

In terms of lab-scale weaponization, MBBD mastered (at times in collaboration with Iranian scientists) high-grade nano-biotechnologies, including the microencapsulation of bioactive materials that can be weaponized under cover of pharmacologically designed warfare agent simulants. Syrian biologically weaponized warheads might include PTAB-500 cluster bombs, ZAB (incendiary-converted) bombs and Scud warheads, as well as portions of Scud-D warheads possibly containing Russian-designed cluster loads with biological and/or chemical bomblets. Reputedly, the regime may have also created delivery systems adjusted to accommodate cruise missiles, UAVs, helicopters, and aircraft-borne devices that can release BWAs slowly over a long, broad area.

Off-Damascus facilities reportedly involved in production and storage of BW include (beyond those mentioned in Hama and Al-Maliha) sites in Tal Snan, Sjinsjar, Palmyra, Aleppo (in conjunction with the Al-Safira CW site), Homs

(storage installation, adjacent to a major sarin site), Lake Barada (near a development and production facility), Latakia (close to the port city), and an underground biological production plant in Cerin. Parts of those facilities appear to still be active. Some exist under the cover of military compounds affiliated with the General Establishment for Blood and Medical Industries (DIMAS), which is directly supervised by the Syrian Ministry of Defense.

Notably, two or more facilities might contain Iraqi BW and BWAs that were clandestinely moved into Syria via the Russian GRU's Operation Sarandar in 2003, which was an effort to smuggle CBW from Iraq to Syria on a grand scale.

The Assad regime's BW program, now "inherited" by the Al-Julani regime, should receive at least as much attention as the Assad regime's CW program received. Syria's BW sites must be identified and exposed and then completely wiped out. Understandings must be reached between the West and the new Syrian regime, along with the relevant international bodies, to allow this vital task to be carried out.

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