

CHEMICAL AND BIOLOGICAL WEAPONS IN SYRIA

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Preface

More than any other Arab or Muslim state, Syria is notable for (at least up to now) a dearth of nuclear capabilities, which radically necessitates, in Syria's view, that it compensate with the development of chemical and biological weapons as a source of minimal, unconventional strategic-military balance of power with Israel. It is clear, however, even without connection to Israel, that the processes of unconventional armament in the Arab states and Iran spur Syria on, lest it lag behind in this domain. Turkey as well, as a neighboring regional power that is identified as an ally of Israel, makes an indirect contribution in this regard.

Syria's journey down the biochemical path began in the period preceding the Yom Kippur War, as it equipped itself with chemical weapons that it had received from Egypt, and increased in stages in the wake of regional events: the Israeli-Egyptian peace treaty, the Lebanon War, the revelation of Israel's nuclear capacity, the revelation of Iraq's biochemical capacity, and Syria's strategic alliance with Iran. With the beginning of the erosion of Iraq's chemical power at the time of the Gulf War, Syria began to acquire the status of the country with the most advanced offensive chemical capacity (quantitative and qualitative) among the Arab states, and also in comparison to Iran. In terms of quality, Syria had already been characterized as such a state in the previous decade even in comparison with Iraq, which up to the Gulf War had the most impressive arsenal of chemical weapons. There is no doubt that Iraq's power in this regard, together with the perception of strategic requirements *vis-à-vis* Israel, were among the factors that spurred Syria's buildup in the chemical-biological area. It regards this capability, combined with its ballistic capacity, as a paramount component of the

totality of its strategic-military power, and persistently continues to invest great effort in it.

The accelerated pace of Syria's buildup in the area of chemical weapons in recent years has enabled it in this respect to surpass Egypt, which up to fifteen years ago had the largest chemical offensive capacity of all the Arab states; and this despite the fact that the media publicity surrounding Syria's offensive chemical capability has been, and remains quite scant – and also misleading in this sense – compared to other Arab states (and Iran as well) which harbor chemical weapons. In addition to building a chemical arsenal, Syria has embarked on armament with biological weapons, which have much greater strategic value as weapons of mass destruction.

The survey to follow, then, will consider processes that have occurred in Syria over the past twenty-five years – specifically, the development of its strategic concept of chemical and biological weapons, and its acquisition of such weapons, first from Egypt and later, domestically. I shall examine Syria's capacity for independent production of chemical and biological weapons as well as systems for their delivery, the external aid that it has received for this purpose (mainly from Western Europe, India, Russia, China, and North Korea), and the close, outstanding strategic cooperation that it maintains with Iran.

The Conceptual Outline

The incipencies of the Syrian concept regarding unconventional weapons were already evident in the process of Syria's strategic preparations (together with Egypt) for the Yom Kippur War, in the framework of which Egypt transferred chemical weapons to Syria. This was undoubtedly a radical step, which was taken as an essential component of the two states' joint strategic preparations for this surprise war, and reflected a complete and most profound agreement that Assad and Sadat arrived at on this matter. Thus, Syria for the first time acquired for itself a chemical offensive capacity, which was based on a non-persistent, lethal chemical warfare agent (sarin) and on a persistent agent (mustard). The munitions that contained these war gases, namely, artillery shells and aerial bombs, enabled their use for both tactical and strategic purposes. This was the first case in which chemical weapons were transferred from an Arab state to its partner.

The purpose of Syria's equipping itself with chemical weapons as a preliminary measure, and perhaps, in its view, as a necessary condition for the Yom Kippur War, and the question of to what extent it was prepared to use them depending on how the war developed, are not sufficiently clear. One may reasonably assume that in the course of the war the chemical weapons were in constant operational readiness, but that use was not made of them because, apparently, Syria did not fall into severe distress to an extent that would have justified this in its view. Indeed, these weapons were not used even for the purpose of achieving the initial vital objective of the Syrian forces – the conquest of the Golan Heights. Subsequent to the Yom Kippur War, in which, in fact, the Syrian army suffered a failure despite its overwhelming initial advantage, and a real threat on Damascus even emerged, the Syrian president's concept that Syria must create and maintain its own strategic power crystallized; at the same time, it was completely clear that Syria was not, in the foreseeable future, capable of forming a technological infrastructure that would enable the development of nuclear weapons.

This, together with growing awareness of the value of chemical and biological weapons, led Assad to formulate the approach that became known as the "strategic parity concept" (*vis-à-vis* Israel). This concept, whose main aim was to ensure a balanced defensive and offensive capability *vis-à-vis* Israel, both from a deterrent-strategic and a military-operational standpoint, conferred, and continues to confer, central importance on the maintenance of chemical and biological weapons in Syrian hands. Thus, after the chemical weapons it had received from Egypt had become obsolescent, Syria devoted ongoing effort to this enterprise, in two main areas of self-armament – aerial bombs and missiles warheads that contain nerve agents, as well as, moreover, in the field of biological weapons.

This process was already reflected in the pages of **Al-Magla El-Askariya**, the Syrian military magazine, on October 1, 1975, in an article by Amin el-Nafari, the retired Syrian Deputy Chief of Staff, that attested to the existence of chemical and bacteriological weapons in Syria's possession. On August 2, 1977, the head of the unconventional warfare department of the Syrian army stressed, in a newspaper interview in **Al-Sha'ab**, that the Syrian army recognized the importance of unconventional weapons, and was preparing itself for this type of warfare.

After it had been publicly revealed in **Jane's Defence Weekly** that Syria possessed chemical weapons (September 22, 1984), the retired Syrian colonel Bassam a-Shheita published an article on January 9, 1986 in **el-Kabas**, which he confirmed that Syria indeed possessed such weapons. There appeared, later in the article, clear allusions to the existence of unconventional weapons in Syria's possession.

Public reflections of the evolving Syrian concept increased, gradually. In January 1987, President Assad indicated, in an interview with the Kuwaiti newspaper **el-Kabas**, that Syria was seeking a technical solution that would constitute a direct counterweight to Israel's nuclear weapons. A few months later, in May 1987, Radio Damascus emphasized that Syria had an answer to the Israeli nuclear threat, possibly of even greater power. A year later, on the 43rd anniversary of the establishment of the Syrian army, Syrian Chief of Staff Marshal Shihabi noted that Syria was satisfied with its achievements in the area of strategic parity, and that Syria possessed deterrent weapons against Israel's extremely lethal weapons. These statements underlined the existence of chemical weapons in Syria and included an allusion to the biological weapons that were already in Syria's possession or in the process of development, implying that the Syrians regarded biological weapons as exceeding even nuclear weapons in their significance.

In **el-Kabas** additional reports were published that were consistent with Assad's and Shihabi's allusions, in which it was stated that Syria was entitled to use various kinds of unconventional weapons, including kinds that go beyond chemical weapons.

By now, in any case, Assad's approach of publicly ascribing legitimacy to Syria's possession of chemical weapons had already crystallized. In his conversation with Senator McCain in January 1989, Assad asserted that Syria's development of chemical weapons was a reasonable course of action. For his part, Syrian Foreign Minister Farouk a-Shara, who was Assad's representative at the Conference on Chemical Disarmament in Paris, alluded at the same time to the appropriateness of this course of action from Syria's standpoint. In an interview with **Le Monde**, a-Shara said Syria was prepared to commit itself to the elimination of all types of weapons of mass destruction so long as Israel also committed itself to this. Hence, the primary purpose of developing chemical weapons was deterrence against Israel, to which an unconventional capacity was attributed. Indeed, at the Paris conference a-Shara stressed that together with the elimination of chemical

weapons, there was a need to eliminate weapons of mass destruction of whatever kind, particularly in the Middle East. He called for comprehensive participation in negotiations on the Chemical Weapons Convention and emphasized the need for sufficient guarantees to states not possessing weapons of mass destruction, and for persuading states that did possess such weapons of the need to relinquish them. Undoubtedly, this stance of Syria's is important in terms of public relations and as a bargaining position. Syria's only public attempt to dispute claims that it produces chemical weapons can be seen, in this context, as the exception that proves the rule.

Syria acted for the adoption of its negative stance toward the Chemical Weapons Convention by other Arab states and by the Arab League, and it apparently invested no less effort on this matter than Egypt, though – typically – without the publicity that characterized Egypt's activity. This was manifested in December 1992, a few weeks before the signing of the Convention, when Syria declared that what would provide “an incentive for Arab states to sign the Chemical Weapons Convention” would be the fulfillment of “the need to act in order to ensure Israel's signing of the Nuclear Proliferation Treaty”, and that in the existing situation, “Syria will not sign the Chemical Weapons Convention because it will not agree to be exposed to the unconventional threat from Israel.”

Indeed, in January 1993 when the Chemical Weapons Convention was signed, Assad gave further voice to Syria's refusal to join the Convention. He asserted, in a joint interview with Egyptian President Mubarak that the proposal that the Arab states join the Convention worked against them, and that raising the issue of chemical weapons without raising the issue of nuclear weapons was very strange and did not make sense. Syria's attitude was also represented simply and directly as a concept asserting that:

The possession of chemical weapons by the Arabs constitutes a minimum of deterrence in the face of Israel's nuclear weapons, and affords them a partial strategic parity, which limits Israel's freedom to use nuclear weapons or to threaten to use them. Likewise, these chemical weapons help to placate the Arabs.

This stance reflected Syria's aspiration to bring about the elimination of Israel's weapons of mass destruction, with the indirect use of its chemical weapons as a lever. This is also manifested in Syria's opposition to the American demand that, in the framework of progress in peace negotiations

with Israel, Syria commit itself to destroy its own unconventional weapons. This Syrian stance gathered strength along with Egypt's stance, no doubt in coordination with it, and it may have taken on a final, irreversible character. Today as well there is coordination of stances between Syria and Egypt, with respect to leadership of an Arab camp that opposes joining the Chemical Weapons Convention and the Biological Weapons Convention.

The Gulf War of 1990-1991 brought Syria for the first time to formulate a comprehensive public stance on strategic weapons in their totality (including ballistic missiles). Syria stressed that the destruction of Iraq's strategic weapons under the umbrella of the United Nations must be linked to the destruction of the strategic weapons of all Middle Eastern states. This stance indicates, at least theoretically, Syria's readiness to relinquish its chemical and biological weapons and missiles in exchange for the elimination of all of Iraq's, and of course Israel's, strategic weapons. When asked about the Scud-C missiles and Syria's unconventional capacity, Assad himself declared, in an interview with **Newsweek**, that their purpose was defensive.

At any rate, this capacity is described as a clear materialization of President Assad's personal strategic vision, as Syria's optimal embodiment from the standpoint of military and technological power, and as a component of power that gives the Syrian army a sense of self-confidence and an appropriately modern image.¹

In 1993, Assad stressed that a Syrian solution exists for regaining the Golan Heights, at whatever cost entailed and despite Israel's nuclear supremacy. In this Assad alluded, to some extent, to scenarios of Syrian use of its chemical-biological weapons. This was also alluded to in the Syrian information minister's declaration in 1995 that Syria possessed "cards" that it had not yet played, but would play according to need in case of a military confrontation with Israel, and in the most recent warning by Syria's ambassador to Egypt that Syria would threaten the use of its chemical weapons against Israel in response to an Israeli threat to use its nuclear weapons.

"The other types of weapons" – as Assad habitually referred to Syria's chemical-biological weapons, in distinguishing between them and the nuclear weapons that are attributed to Israel – "Syria and the Arabs are ready to get rid of them, but only after Israel's nuclear disarmament," as he put it. Recently, Assad declared that Syria can cause Israel great damage with the

“special weapons” it possesses, and that the Syrian army has arrived at strategic parity with the Israel Defense Forces.

Furthermore, the exposure of the Syrian operational deployment of Scud-C missiles by satellite photographs shows that chemical armaments are integrated into it, in a way that provides an option for a surprise chemical strike, and that the missiles are aimed at the Dimona nuclear reactor, the airports, and the large cities in Israel – without Israel being capable of carrying out a preemptive strike.² Meanwhile, the exposure of the nuclear operational system that is attributed to Israel by the magazine **Jane’s**, using satellite photographs, seemingly enables Syria to carry out a chemical strike against this system. This is a strategic option of the first order that is possibly in Syria’s possession or quest for it. Also notable in this context is the transition from aboveground installations for production and storage of chemical and biological weapons to underground installations, which makes intelligence monitoring, as well as the possibility of striking them, difficult.

One of the main repercussions of this state of affairs is Syria’s inclination to achieve an initial total neutralization, in terms of seeming first strike capabilities – at least theoretically – of Israel’s nuclear threat, which would likely foil Syrian military attainments on the Golan Heights, if and when Syria deems it appropriate to launch an attack there, particularly if it would include Syrian use of chemical and biological weapons. Syrian chemical weapons are apparently maintained or exercised adjacent to the Golan Heights.³ Beyond the Syrian ballistic capacity, and despite the supremacy of the Israeli Air Force, it is also clear that the Syrian Air Force is set up and designated for the use of chemical weapons by means of aerial bombs. It is worth emphasizing that the Syrian threshold for use of chemical and biological weapons will be substantially lower once Syria is protected by an Iranian nuclear umbrella, since it will not have to fear a situation of an Israeli retaliatory nuclear strike, and will probably be willing to absorb an equivalent Israeli retaliatory strike (chemical/biological).

In the conceptual context, also notable are the budgetary allocation and the comprehensive effort that Syria’s building of its chemical-biological capacity consumes, particularly when this is combined with a ballistic capacity – an enormous share – up to a sum between one to two billion dollars annually⁴ – compared with the other components of power and other budgetary allocations in the Syrian army. From this standpoint, the picture in

terms of the poorness of the Syrian army's conventional ordnance is extremely misleading.

In summary, there is no doubt that Syria will not decrease its buildup in the area of chemical and biological weapons, at least as long as no agreement is reached involving Israel's nuclear disarmament.

The Camouflaged Program

Prof. Abdallah Wattek Shahid, a senior Syrian nuclear physicist, was appointed Minister of Higher Education in Syria in 1967 (when the Syrian army was encamped on the Golan Heights), and also served as a member of the Committee for Atomic Energy in Syria. He thus conveyed his view on how to fully exploit Syria's resources in the area of technology and science for national goals having strategic priority. These resources were very scant, and with the task of advancing them and applying them in a camouflaged manner to the development of weapons, Prof. Shahid was appointed Director-General of the Scientific Research Council.

The Scientific Research Council (hereafter "the Center") was established in 1971, ostensibly as a civilian scientific body, on the basis of Presidential Directive No. 193 of August 13, 1969, when President Assad still served as Defense Minister; yet in 1973 another presidential directive was published that gave official authorization to interrelations between the Center and the Syrian Army. By then Assad was already president. The Center was established – with a link to the President's Office – as a principal engine for the development or refinement of weapons for the Syrian army within Syria itself, even if there was a need for a great deal of assistance from foreign actors. In 1974 Prof. Shahid was appointed Chairman of the Committee for Scientific Manpower in Syria, apparently so as to provide him a convenient position for the regulation of manpower resources and means in the interest of the Center. He also controlled the Supreme Syrian Committee for Science.

When it became clear to Prof. Shahid and to President Assad that Syria was unable to develop nuclear weapons, preparations began in the latter half of the 1970s for local production of chemical weapons, and a mechanism was established for the camouflaged acquisition of the components needed for the development of chemical and biological weapons under the auspices of the Center. Thus Syria became the second Arab state (after Egypt, and in

parallel with Iraq) to orient itself to the development of chemical and biological weapons.

On the one hand, it was reasonable to maintain, from an official standpoint, a department for chemistry and biology in the framework of a body that was defined as a “Scientific Studies and Research Center”. But on the other hand, the revelation of work on the development of conventional means of warfare in the framework of this body would cast great doubt about the actual purpose of having a department for chemistry and biology under the same roof. Thus the department’s activity was officially concealed under the pretense of work on chemical and bacteriological pollution of rivers, sewage treatment, and the building of water purification facilities.

In 1978, the Center began to operate an open scientific body called the Arab School for Science and Technology; in this framework it received, at least to some extent, the backing and the cover that were needed in this context.

The uniqueness of the Center and the effort to conceal its military importance were well reflected in the summer of 1979, when Prof. Shahid participated in the United Nations Conference on the Development of Science and Technology that was held in Vienna, as head of the Syrian delegation. In the working paper that he submitted to the conference, the Center was described in a general and obscure way as

...designed along the lines of other national institutions, and devoted to research that is specifically aimed at serving various aspects of development. The Center is autonomous, and most of its researchers work full-time. Some [also] serve in faculties of state universities.

Although this opaque characterization did not reveal the Center’s real nature and its link with the army, the “scientific” institution did not receive the international funding that the Syrians anticipated. The Syrians’ resentment at this was expressed when the Lebanese journalist Zaidan Sardar interviewed Prof. Shahid for the prestigious scientific journal, **Nature**. Prof. Shahid complained about what he referred to as the prevailing biases and injustice in the world scientific and technological order. He criticized the budgetary allocation on the ground that the lion’s share was received by the more advanced states among the developing countries, such as Yugoslavia and Brazil, whereas it was precisely the less advanced states, such as Syria,

that needed to receive most of the funding. In another interview, Prof. Shahid stated that

The Center concentrates its attention on a number of critical technical problems of interest to Syria in the fields of: applied and industrial chemistry, applied physics, electronics, mechanical engineering, applications of computer science and science policy.⁵

The Center's financial needs for ostensible civilian purposes increased; moreover, at the same time Syria's program to replace aging Egyptian chemical munitions in its possession with self-produced chemical munitions, as one of the essential projects of the Center, took shape. Three years later Zaidan Sardar published his book **Science and Technology in the Middle East**, and did not refrain from characterizing the Center as a body that "belongs to the Syrian Defense Ministry, and conducts military research".

At the same time, the Center received financial support from UNESCO for the purchase of equipment. It also received financial support, mainly from the Kuwaiti National Institute for Scientific Research, for organizing professional symposiums, which from an official standpoint were held in the framework of the Arab School for Science and Technology. Leading foreign scientists, mainly from the West, took part in these symposiums, and the Center was the main beneficiary. The Arab League gave these conferences, which were held in Syria, its official sponsor. The definition of their purpose as "strengthening and cultivation of cooperation between Arab and non-Arab specialists, in every technological field, by creating a framework for close interactions", did not distort the truth. This formulation was, indeed, general enough to cover any sort of cooperation.

In actuality, the framework of the conferences was Syrian-Kuwaiti rather than all-Arab, although scientists from other Arab states participated in them. The Kuwaiti National Institute for Scientific Research was blessed with suitable budgetary allocations and even maintained a reasonable professional level on its own; hence, over the years it accorded well with the needs of the Syrian Center. Thus the Center also benefited from its guise as a civilian body, which enabled it to dispatch dozens of scientists abroad to acquire vital technological information, and to obtain whatever equipment and materials were desired over the course of years.

A further presidential directive that Assad published on October 4, 1983 accorded great priority to the Center, and stressed its growing importance. The director-general of the Center was given the powers of a minister, and it was stipulated that except for the director-general (who is appointed by Assad), the commander of the military and the armed forces would choose the members of the board of the Center as well as its technical personnel, and all departments of the Center would be elevated to the status of research institutes. Thus, the Center's Department of Chemistry and Biology became the Institute for Chemistry and Biology. The directive also enjoined the establishment of a new institute: the Higher Institute of Applied Sciences and Technology. The directive defined this institute as an outgrowth of the Center, which would be managed by the Center's administrative council and subject to the Center's laws in all matters that were not mentioned in the presidential directive. Like the Center, this institute maintained a tight link with the army, inasmuch as the commander of the military and the armed forces appoints its director, determines its regulations, and approves the decisions of the administrative council. In actuality, the institute belonged to the Center, trained its professional personnel in the chemical, ballistic, and other fields, and supplied it with technological infrastructure. Dr. Abdel Halim Mantzur, Shahid's deputy, was appointed head of the institute. Thus, the Center is in the Damascus area, in a place called Barzeh, and has an extension in the Aleppo area, in a place called al-Jedida. The Center thereby set up, in a camouflaged manner, the first facility for the industrial production of chemical weapons in the form of the "Boro-Silicate Glass Project" (actually – production of di-chloro, a substance that is the main source of the nerve gas sarin), carried out by the West German company Schott-Boresist. The components of the facility included chemical-reaction vessels and pipes, all of them chlorine-resistant.

The British press reported that the production of chemical weapons was being carried out in plants in Damascus and in Homs. Subsequently, it was published that a plant for the production of nerve agents had been established in the Syrian desert, far from Damascus, that development of chemical weapons is being conducted at a site near Aleppo, and finally, that development and production facilities exist near the village of Sefira (in the Aleppo region), south of Homs, and adjacent to Lattakia. Later, near the city of Hama, not far from the Chinese missile plant in Syria, the establishment of a plant for the production of VX was completed, while an additional

facility for biological weapons was set up in Cerin. Some or all of these facilities were ostensibly founded as civilian extensions of the Center.

Somewhat late it seems (October 1992), the German government warned German research institutes not to hold contacts with the Syrian Scientific Research Council on the grounds that it belonged to the Defense Ministry, simultaneously conducted military and civilian activities, including the production of chemical and biological weapons, and was directly linked to President Assad.

Up to that point the Center had operated for years without disturbance, and constituted the heart of the Syrian camouflaged program. Operating along with it, though secondarily, was the General Syrian Institute for Chemical Industries, which in September 1989 signed an agreement with the Syrian-Jordanian Company for Industry on the establishment of a plant for the production of insecticides and detergents in Syria, apparently based on the idea that by the acquisition of chemicals through such framework (possibly via Jordan) it would be possible to provide for military needs of the Center in a camouflaged legitimate way, similarly to the camouflaged maneuvers made by Iran, Egypt, and especially Iraq.

Thus, Syria exploited a plant for production of the insecticide DDVP in order to camouflage the acquisition of raw materials for the production of nerve gases. Ninety tons of the raw material tri-methyl-phosphate were supplied by the Indian United Phosphorous Company to a Syrian company from Damascus called Setma, in two shipments. According to those who ordered the materials, and according to a final user's license that was issued by the Syrian Office of Commerce, the material was intended for the production of the insecticide (DDVP) in a Syrian civilian plant. Camouflaged backing for these and similar activities was also provided by the Syrian company, Gasgroup. Subsequently, the Syrian program of camouflaged activities was further refined with the establishment of a new underground plant for chemical weapons near Aleppo, ostensibly as a warehouse, with the "National Syrian Company for Security and Safety" (which actually belongs to the Syrian intelligence establishment) leading the project.⁶ The Center remained, at any rate, the major "civilian" buyer, having its ramified connections with many central chemical producers all over the world.⁷

The Suppliers of Technology

Syria is without doubt the most impressive state in the Arab world, in terms of the wide gap between the level of its techno-scientific infrastructure, which by all accounts is very low, and its technological achievements in practice, which clearly are noteworthy, with respect to the local development and production of chemical weapons. How then did this occur?

First and foremost, there was an optimal integration between the conceptual framework and the camouflaged program, as described above. The Syrians were wise enough to create such an optimal integration thanks to the sober and pragmatic approach of the regime, an awareness of existing limitations, an ability to distinguish between limitations that could be altered and those that could not (and therefore dictated ongoing dependency on external suppliers), and adherence to the objective.

Second was the response of the suppliers of the technology – whether with or without the knowledge of the home country; whether with or without awareness of the actual purpose of the technology being supplied – all of these combinations having occurred over the years, in many and repeated instances.

Third was the Syrian resourcefulness in utilizing a wide variety of suppliers, and in shifting the bulk of the weight, with effective timing and the appropriate pace, from European suppliers to Asian suppliers. The Egyptian assistance that Syria, as noted, received in preparation for the Yom Kippur War (Egypt transferred to Syria small quantities of chemical warfare agents for research purposes, as well as technical knowledge about them, and subsequently a considerable quantity of chemical munitions) was a onetime affair, and in its aftermath Syria was left isolated in this regard (only recently has the Syrian cooperation with Egypt been renewed). Yet, wondrously enough, Syria was nourished at the beginning of its independent course – the late 1970s and early 1980s – with information and knowledge that were in fact obtained both from the Soviet Union, by means of the interface between the Syrian army and the Soviet Chemical Corps, and from France, by means of the interface between the Center and French scientific institutes. These two interfaces intensified over time, although in a very hushed-up and controlled manner, but their benefit for the Syrians was certainly substantial.

The link with the Soviet army was clear from the strength of its patronage of the Syrian army, and the link with France, for its part, stemmed from traditional relations, which found a special manifestation in regard to the Center, whose name in French – *Centre Etude Recherche Scientifique* – sounds very similar to the name of a French network, *Centre National Recherche Scientifique*. It is still not completely clear how the Soviet Union contributed to the Syrian chemical enterprise, but it appears that its contribution involved the institutional transfer of information and sample components of munitions⁸ together with self-restraint in regard to “initiated collection” of such information by the Syrians. Arsine-methyl-cyanide was the first substance about which the Syrians acquired Soviet scientific knowledge, when in the 1970s and early 1980s a Syrian chemist named Ramadan, of Aleppo University, received training in the Soviet Union.

When the Syrians first developed an aerial bomb containing binary sarin, they made use of the Soviet aerial incendiary bomb ZAB for the weaponization of DF and isopropyl alcohol. From these, sarin is obtained in a binary system. At a later stage, also tested was the possibility of developing chemical warheads for the Soviet aerial cluster bomb PTAB-500 (which contains bomblets), and for short-range Soviet missiles that were in Syrian possession – FROG-7 and SS-21 – and in the wake of this, experimental development began. Against the background of the visit to Syria of General Pikalov, commander of the Soviet Chemical Corps, in 1988, it was assessed that Syria had acquired from the Soviet Union, the capacity to arm Scud missile warheads with the persistent nerve agent VX.⁹

Furthermore, in Russia in 1993, Syria acquired at least 800 kg of raw material for production of an updated version of VX, by means of a straw company that was established by General Konzevitz, Yeltsin’s adviser on chemical disarmament and commander of the Russian Military Academy for Chemical Warfare. The material was smuggled from the academy, apparently together with technological knowledge about how to use it. Over a few years, the Russian assistance grew in scope – not necessarily on an institutional basis—to encompass the clandestine supply of additional raw materials via Cyprus (supplied by Russia as well as by Cuba), Syrian production of advanced VX, the application of sophisticated chemical weapons technologies, the development of improved cluster chemical warheads, as well as cruise and homing systems.¹⁰

From the Soviet Union, the transfer to East Germany (still in the 1980s) – and from it to West Germany – was quite plain and natural.

Thus, in Syria in 1986-1987 there were experiments on the spraying of organo-phosphorous compounds (in that case – an insecticide), involving cooperation between Dr. Ismael al-Hussein, who officially belonged to the Faculty of Agriculture at Dir-a-Zor, and the East German professor Theo Wetzel of Martin Luther University in Halle-Vitenberg, a specialist in this field. It appears likely that this was only the tip of the iceberg of East German interface with Syria, with much greater assistance being provided clandestinely (as it was provided to Iraq).

In regard to West Germany, the situation was clearer. The production line that Syria planned for a serial production facility for di-fluoro (DF, from which sarin for binary munitions is obtained) included two stages: the first required resistance to a compound that included chlorine, which had to be produced before the DF, and the second required resistance to fluoride, an even more destructive component than chlorine. For the carrying out of the two stages, two West German companies were chosen: Schott and Zigri.

The Schott Company is one of the largest industrial-glass manufacturers in Germany. The company's commercial name, Boregist, stresses its specialization in installations for the production of chemicals, made from glass of high durability, which is provided by boric oxide as a supplement to silicon oxide. In fact, the Syrian Center came up with the camouflaged name Boro-Silicate Glass Project, whose components the Schott company supplied to the Center. These components included chemical-reaction vessels and pipes, all of them chlorine-resistant.

A few years later, after many tons of the chlorine compound di-chloro (and from it, DF) had already been produced on the glass-made production line, Dieter Kepler, spokesman of the Schott company, explained that the company did not know for what purpose the manufacturing equipment it had sold to the Syrians was intended, and that in most cases the customer does not tell the company the purpose of the purchase. This, however, was inadequate, since the substitution of chlorine with fluoride in order to obtain DF, from which is obtained the sarin in binary munitions, requires additional components that are fluoride-resistant, this being among the most destructive elements from the chemical standpoint.

In this regard the Germany company, Zigri was well suited, since it specializes in internal teflon coatings for reaction vessels and for other instruments in the chemical industry that are made of stainless steel. The teflon, in its optimal configuration, is fluoride-resistant, and the accumulated experience of the Zigri company taught its engineers that it is possible to derive, from blocks of teflon that have undergone an upgrading process, welded teflon surfaces at a thickness of 4 mm. This surface has a high level of crystallization, and thus also satisfactory low permeability and mechanical strength. Ultimately, the production facilities acquired in West Germany were erected in Syria with foreign assistance, apparently West and/or East European.

The German companies Weber, Leifeld, Carl Schench, Ferrostaal, and others supplied the Center with mixing vessels, high-temperature furnaces, hot isostatic presses, and sophisticated mechanical instruments.¹¹ The raw materials for DF production were obtained from various West European companies, which did not even bother to evade the question about the real purpose of the materials; conspicuous among them was, again, a German company, Geritt-van-Delden. The technologies, equipment, and raw materials for production of chemical and biological weapons were supplied to Syria mainly by large chemical middlemen and brokerage offices in Germany, the Netherlands, Switzerland, France, Britain, and Austria. Syria – together with Egypt, Iraq, Libya, Sudan and some further 50 countries – still appears as importer of chemicals included in the Australia Group List from Britain.¹²

In regard to munitions that contain sarin, it appears that the Syrians were also aided by classified information that was obtained by a German physician born in Syria (Dr. Rifat Ramahi), who was suspected of spying for Syria in the context of his work for a company that specialized in the cleaning of chemical munitions sites. Also, during 1992-1994, Syrian military intelligence in Syria operated a key German (Hans-Joachim Rose) who supplied, by means of industrial spying, information on the production of chemical weapons.¹³ In addition, and despite the German government's relatively sincere attempt to halt the assistance extended to Syria by West German companies in recent years, it appears that the involvement of German suppliers in projects for the production of chemical and biological weapons in Syria – continues.

In France, the Syrians acquired valuable scientific knowledge whose main application is in the biological field (see below), while in the chemical field, various chemicals have been supplied from France to Syria.¹⁴ Also, the Syrian-French tracks led to Iran: the Syrian chemist Fayez Falouh was sent to Iran to conduct a joint research in the area of synthesis of organo-phosphorous compounds, “relatives” of nerve agents, while his partners in this research were Iranians and Frenchmen. One of the conspicuous manifestations of the tightening of the Syrian-Iranian chemical connection was that Syria and Iran were aided in their purposes by the same European firms. Thus, the West German Karl Kolb company helped with a system for production of chemical weapons in Iran, after it had previously aided Syria (and Iraq); the West German Uhde company assisted in the establishment of a suspicious plant for medicines in Syria, after it had previously established a suspicious plant for insecticides in Iran; the British M.W. Kellogg company simultaneously set up identical plants (for ammonia and for urea) in Syria and in Iran. These plants have, at least apparently, both a civilian and a military chemical-technological potential. At any rate, the Syrian-Iranian connection, on the whole, has developed into a wide and profound strategic-military cooperation, including in the chemical-biological field. This pertains especially to the development of chemical-biological warheads for surface-to-surface missiles that are acquired and produced by Syria and Iran in the framework of cooperative projects between them, which are aided by North Korean, Chinese, and Russian technologies. In this respect, Iran constitutes, in regard to Syria, a technology supplier on the first order, if not a full strategic-military partner in every respect.

Thus, the Iranian-Syrian strategic interface led to very substantial technological assistance from North Korea, China as well as Russia – each of which possesses an arsenal of missiles with advanced chemical and biological warheads and stocks of chemical and biological warfare agents. Further, China supplied raw materials for the production of chemical warfare agents to Syria.¹⁵ Syria’s assistance from Russia and North Korea is massive and of great significance, since it appears that it encompasses or will encompass in the near future all of the factors that are still delaying the completion of the processes of development of chemical and biological weapons in the desired advanced fashion; China also makes a considerable contribution here. As a closely related matter, also to be noted is India’s substantial assistance to Syria. As mentioned, in 1992 the Indian United Phosphorous Company supplied to Syria the raw material tri-methyl-

phosphate (used in the production of nerve gases). Although the company was accused of including a forbidden substance in its exports, it asserted that it would continue to supply it to Syria, in the absence of evidence that it was not being used for the production of insecticides. Undoubtedly this was, in any case, only one example of India's technological assistance to Syria.

And from India, to the Islamic bloc itself: within the Islamic bloc, Syria thus certainly cooperates with Iran in processes of chemical-biological development, almost certainly also with Libya, probably also with Egypt, and possibly even with Iraq. In the Syrian-Libyan context, Syria apparently established (with the help of a West German firm), thanks to its cooperation with Libya, a large, up-to-date plant for chemical weapons identical to the one that Libya had previously established in Tarhunah.¹⁶

Chemical Weapons

The chemical weapons that Syria possessed at first were obtained from Egypt and included, as noted, nerve agent (sarin) and blistering agent (mustard), artillery munitions, and aerial munitions. By the late 1970s, the Egyptian chemical munitions in Syria's possession had begun to age; yet, the mustard, which is a stable substance, had been produced by Egypt between 1963 and 1972, while the sarin, which is much less stable, had been produced between 1968 and 1972 and the munitions that contained it had to be replaced.

Hence, by today the sarin (of the unitary, as opposed to binary, type) that Syria received from Egypt is undoubtedly worthless because of decay, whereas it is certainly possible that the mustard that Egypt supplied to Syria is still usable. Beyond that, for the first time Syria amassed on its own, a simple asphyxiant gas – cyanide – on a limited scale. In the summer of 1980, Iraqi intelligence raided the Syrian embassy in Baghdad, against the background of the deterioration in relations between the two states. In the embassy, liquid cyanide was held in sealed bottles, and solid cyanide in sealed boxes. Iraqi intelligence claimed that the substances were intended for the carrying out of a small military action and for extensive poisoning of water sources.

A year and a half later, however, as of February 1982, the Syrian secret police itself invaded the Syrian Sunni neighborhoods in the city of Hama, in

order to suppress “rebellious actors that endanger the well-being of the Syrian nation”. The head of the Syrian secret police was then Rifat Assad, brother of the president. After a heavy bombardment of the city, it emerged that the number of fatalities was lower than expected, only coming to “thousands”. Thus, the rebels were given “special treatment” in the form of cyanide gas containers that were conveyed in rubber pipes to the entrances of the homes, after these were sealed. The lethal gas was funneled into the buildings and killed 18,000 people who were inside them.

These were, in any case, only preliminary stages of the preparations for a powerful Syria. In order to avoid the need to repeatedly refresh the sarin depots, Syria formulated a program for domestic production of chemical weapons, according to which, at first, aerial bombs would be developed in Syria, containing sarin nerve agent in a binary format; the bombs would be manufactured on an industrial scale, and would gradually replace the aging nerve agent munitions of Egyptian origin. Indeed, after a few years (on August 7, 1986), the Israeli foreign minister noted, in an address to the National Security College, that Syria had begun the industrial production of aerial bombs containing binary sarin. There are, in addition, unverified indications of the existence of sarin-filled operational artillery munitions as well in the hands of the Syrian army.¹⁷

The process moved forward at the laboratory level up to the year 1980, with the Soviet incendiary aerial bomb ZAB serving for the placing of the DF and the isopropyl alcohol. The Syrians chose this bomb because its internal structure, as an incendiary bomb, was divided into sections that were designed for mixing phosphorous with combustible material. The mixing was done after an impact fuse fixed in the nose of the bomb activated an explosive charge, thus removing the separating partition. As of 1983, the Center began the serial production and accumulation of DF. The chemical warfare agent containers were stored in the Damor area. Thus, Syria began to accumulate quantities of DF intended to be placed in the binary ZAB aerial bombs, together with isopropyl alcohol and the catalyst, and for the first time possessed chemical weapons, in this format, that it had produced itself.

By the mid-1980s the Syrians already possessed a stock of aerial bombs loaded with chemical warfare agents that it had succeeded in producing, and began to amass chemical warheads for missiles. New facilities were planned for the production of chemical warfare agents, in addition to the already-

active production facilities; the accumulation of chemical warheads for Scud missiles continued, and a major stage was completed in Syria's preparation for the use of chemical weapons.

Syria now turned to the addition of the nerve gas VX to its arsenal of chemical weapons. In contrast to sarin, VX's persistence, and also its lethality both through the breath and the skin, are particularly high. Hence, it is considered a more valuable nerve gas than sarin (which was then already in Syria's possession), or at least as a chemical warfare agent complementary to sarin, in operational terms. In 1988, and also subsequently, it was reported that Syria was equipping itself with VX. It appears that in that period Syria already approached the adaptation of VX for installation in aerial bombs and Scud warheads. The head of the Scud-B, and the head of the SS-21 missile, underwent experimental adaptations for the carrying of the large nozzles and dispersal equipment that are needed for chemical warfare agents, especially for the spraying of a persistent agent such as VX. Indeed, Syria was already assiduously planning new systems for the delivery and dispersal of chemical warfare agents. The possibility was checked of developing chemical warheads for the Soviet aerial cluster bomb PTAB-500 (which contains bomblets), and for short-range Soviet missiles that were in Syria's possession – FROG-7 and SS-21; subsequently, experimental development began.

In the Center's laboratories, there was already progress in the development of an up-to-date aerial bomb containing VX, and in April 1992 a Syrian bomber plane made a test flight for dropping the bomb in an experimental field north of Damascus. At least one test-firing of a Scud-C missile tipped with VX occurred near Damascus in May 1998.¹⁸ Near the city of Hama, not far from the Chinese missile plant in Syria, the building of a plant for the production of VX was completed. More specifically, in technical terms, the CIA director noted that Syria completed the development of more potent, more toxic and more persistent nerve agents,¹⁹ referring, actually, to VX.

Worth noting is the first public reference by the Russian foreign intelligence service to Syria's offensive chemical capability, which was published in 1993. This intelligence service, which over the years certainly closely accompanied the processes of Syria's development in this context, holds the view that the chemical warfare agents produced by Syria include, in addition to nerve gases, mustard gas, and are based on partially finished

products (in binary formats) and on raw materials of Syria's own production capacity. Another report indicates that the mustard is loaded onto rockets and artillery shells, in other words, for tactical purposes. All in all, it is estimated that chemical warfare agents in quantities of thousands of tons are produced annually.²⁰

Not long ago, Syria also armed its Scud-C missiles (a total of about 60 missiles) with chemical warheads. This is in addition to the stock of thousands of chemical aerial bombs that are carried by Sokhoy-22, Sokhoy-24, and MiG-23 planes, as well as 100-200 chemical Scud-B warheads. The assistance from Russian specialists has also brought about the successful development of chemical cluster warheads for missiles. Moreover, the Syrian army performed a series of experimental deliveries of various model Scud missiles, intended for use with improved chemical warheads, as part of the tightening cooperation with Russia in the chemical area. Meanwhile, this cooperation has facilitated the effective development of chemical warheads. British intelligence officials have confirmed the extension of Russian assistance.²¹ Moreover, successful field tests of Scud-D missiles armed with advanced conventional/unconventional warheads have lately taken place in Syria. A cluster warhead, capable of containing chemical or biological bomblets, is being developed for the Scud-D, and a hot-agent field test of an improved chemical bomb dropped by a MiG-23 aircraft has recently been conducted.²²

Syria's main aspiration is, according to all assessments, the completion of an arsenal of enhanced-range surface-to-surface missiles that carry operational, chemical and biological munitions, including the Scud-C, Scud-D, M-9, and No-Dong. Beyond that, the anticipated next stage might include cruise missiles that carry warheads with chemical-biological cluster munitions. Presently, Syria apparently possesses SS-N-3b cruise missiles. In parallel, an immense effort is being conducted by Syria, in order to conceal and shield her ballistic arsenal, together with its related CB munitions, in underground tunnels.

Biological Weapons

Syria is well aware that in the foreseeable future its optimal strategic armament, which in its view is achievable, includes biological warheads for long-range surface-to-surface missiles, and it is acting accordingly.

Syrian spokesmen have indicated that Syria is building a technical answer to Israel's nuclear weapons, which is of even greater power, and that it is legitimate for Syria to develop a variety of types of weapons of mass destruction. In response to the growing pressure that the United Nations has exerted on Iraq as the latter attempts to conceal its biological weapons, the Syrian defense minister stressed (December 1997) that this pressure could not be justified while, at the same time, Israel was given a free hand to develop all kinds of weapons of mass destruction, and that therefore Syria and other Arab states had a right to develop means to counter hostile Israel.²³ It appears that the Syrian statements regarding biological weapons, despite – and because of – their paucity, reflect an intention to disclose indirectly the trend of Syria's buildup of biological weapons, while maintaining maximal vagueness. This is in the context both of the general awareness that Syria already possesses chemical weapons, and, at the same time, of the doubt concerning whether the maintenance of chemical weapons is sufficient in itself to erode the nuclear deterrent capacity that is ascribed to Israel. Furthermore, within the Syrian army itself, a background (general) document about biological weapons was distributed, which highlights its great strategic value in this army's view.

Public references to Syria as a state that is developing biological weapons in addition to chemical weapons began in 1988 and have continued up to the present. Yet, this development started much earlier. Today, nearly two decades after the exploration and development of these weapons commenced in Syria, Syria is sometimes described as a producer of biological weapons, and this in regard to two toxins, botulinum and ricin, and a bacterium, anthrax. Significantly, Russian experts hired by Syria are engaged in cultivating a highly virulent anthrax germ and effectively installing it into missiles warheads. At the Center in Damascus, which has already been vigorously active as we have seen, in the development of chemical weapons, a biological department is also in fact operating. Studies that it has published indeed point to work with germs and proteins.

Two bacteria – anthrax and cholera – as well as two toxins – botulinum and ricin – have been reckoned to mainly constitute the Syrian biological weapons inventory. Botulinum is an extremely toxic protein (derived from a germ) whose toxic power exceeds that of any other substance, natural or synthetic. Ricin is a lethal protein (derived from beans of the castor-oil plant, easily grown in Syria) that offers an optimal relation between cost

(production) and toxicity (respiratory). Anthrax is an easily grown, deadly germ with maximal stability under extreme conditions (storage, delivery, environmental durability in the field). Cholera is a contagious bacterium, suitable for contaminating food and water supplies through guerrilla-warfare, thus bringing about violent alimentary epidemics. Reportedly, ricin, at the least, is already being weaponized for delivery by Scud missiles.²⁴

Presumably, the new plants for the production of chemical weapons, in the Aleppo area and at other sites, also include branches for biological weapons. Moreover, an additional facility for biological weapons has been mentioned, in Cerin, as well as facilities for the development and production of medicinal preparations, in whose creation France, apparently, is playing a key role.²⁵ In fact, scientists from the Center have been trained in knowledge-rich institutes in France in the fields of toxinology and virology.

The Syrian biotechnological infrastructure is basically inferior, but in this context as well, as in the chemical context, the Syrians have created a narrow bridgehead that enables them to ascend to the next level. Syria has ongoing experience in the industrial cultivation of germs and viruses for the production of some vaccines, especially anthrax and smallpox.²⁶ The smallpox virus, which is considered a reliable and effective biological weapon, last visited Syria in 1972,²⁷ but it is feared that with its development and production as a biological weapon by Russia, it was secretly delivered to Syria, among others.²⁸ In the bacteriological field Syria's activity is considerable, focusing on, in addition to anthrax and cholera germs, the brucella germ, and involving the establishment of a biohazard facility for this pathogen as well as its isolation from sheep.²⁹ *Pasteurella*, another bacterial pathogen, has been investigated as well.

In the field of toxins, there is intense Syrian activity; in addition to the botulinum and ricin toxins, cooperation has emerged between the Center and the Center for Marine Research in Lattakia, most probably in the context of lethal toxins that are derived from marine animals and plants.³⁰

A considerable portion of the Syrian knowledge in the biological field was obtained by means of the Arab Science Week conferences that the Center regularly organizes. Over time, conferences were held in this format on practical subjects, such as a conference on the issue of atmospheric pollution (bearing implications for modes of dispersal of biological warfare agents from the air) that was hosted in Syria in October 1985. At the Center

itself a high-capacity sampler for aerosol particles was developed which was used in fieldwork that dealt with the analysis of micronic particles.

Knowledge with operational value concerning the possibility of additional dispersal techniques of biological warfare agents was acquired in the framework of research work on the packing, release, and effects of weed-controlling material in a polymer format, and was performed by scientists from Aleppo University and from West Germany. This technique, which is called micro-encapsulated packing (in tiny capsules), enables the controlled and ongoing dispersal of biological warfare agents (and chemical warfare agents) in inconvenient environmental conditions.

The knowledge that Syria is accumulating in these contexts is intended to serve its goal, which is to arrive at biological armament with warheads that are carried by all of the types of long-range surface-to-surface missiles in its possession. Presumably this goal is applicable within the range of a few years, if not already realized, in part.

According to Syria's official stance on biological weapons, Syria "supports very close international cooperation in the field of biological activities for peaceful purposes, which is certain to strengthen the influence and the realism of the Biological Weapons Convention." Despite its positive tone, there is of course nothing whatsoever in this vague formulation of the Syrian stance to indicate a lack of Syrian activity in the field of biological weapons. Actually, since 1983, if not earlier, Syria has conducted a considerable effort in the area of biological weapons, and it is likely that since the beginning of the 1990s, biological weapons have already been in its possession.

Concluding Remarks

Undoubtedly, Syria represents the widest gap in the Arab world, if not beyond that, in terms of extreme techno-scientific inferiority, basically speaking, as against supreme know-how attained by weapons-oriented Syrian bio-chemical experts, possibly autonomously. Syria has thus been ranked (by the US Defense Department), unsurprisingly, yet outstandingly, as the sole Moslem state (together with merely China, the former Soviet Union, France, Germany, Israel, Taiwan and United States) possessing "chemical systems capability in all critical elements".³¹ It indeed masters

cardinal technologies in that concern. At the same time, Syria recognizes the superb strategic value of biological weapons and – particularly in light of her present incompetence to acquire nuclear weapons – arms itself accordingly. The conjunction of those Syrian capacities with her remarkably increasing ballistic ordnance – especially compared with the relative decline of her non-ballistic conventional power – forms a formidable strategic menace, that certainly may not be ignored, to say the least. Moreover, as of 1996, Israeli defense officials acknowledged a “newly acquired capability by Syria to produce chemical and biological warheads and place them on Scud missiles”.³²

Further, the strongest bonds Syria maintains strategically are with the most powerful Moslem state in the Middle East, namely Iran, which is also the closest one to nuclear weapons, and this may expectedly generate, in due time, an Iranian nuclear umbrella furnished to Syria. In such case the threshold of first employment of CB weapons would certainly regress. The yet unresolved profound Syrian-Israeli dispute, as well as the futility of all past Syrian attempts to gain military superiority over Israel by means of merely conventional forces – might be further encouraging the employment of CB weapons. Such employment may possibly occur in three major modes: against targets that are intended to be occupied, against military targets that are not intended to be occupied, and against civilian targets that are not intended to be occupied.

The acknowledged Syrian-regime-oriented observer Zoheir Diab stated recently that Syria would be defeated by Israel in case of a conventional conflict between the two armies in the Golan Heights,³³ implying perhaps that an unconventional confrontation would expectedly be in favor of Syria, thus constituting, apparently, a preferable option. At any rate, the Syrian-Iranian axis is of paramount strategic importance in general, and concerning imminent unconventional threats in particular. As long as Israel is reckoned by Syria to possess unconventional weapons, Syria would unquestionably persist in perpetuating a bio-chemical arsenal. Adhering to this paradigm, Syria lately stipulated total Israeli non-conventional disarmament in return to not only a reciprocal step of her own, but rather as one major move that ought to be included in a peace process.³⁴

Indeed, the senior status of Syria, in global terms, is eventually well recognized. Thus, the Canadian Security Intelligence Service regards Syria – plus Egypt, Iran, Iraq, Libya, Pakistan, India, Israel, North Korea and

Taiwan – to pose the greatest concern from a proliferation perspective, with respect to biological weapons. The concern presently pertains to the

...“classical” forms of biological warfare agents, whereas in the long term, however, there is fear of the spread of genetically-engineered biological warfare agents that may be more effective militarily, more difficult to detect, and not susceptible to standard vaccines and antibiotics.³⁵

Similarly, Syria – together with Iran, Iraq, Libya, Israel, North Korea, South Korea, Taiwan, China and Russia – is reckoned as a biological weapons possessor or developer by the US DOD.³⁶

Broadly presented, though merely in general terms, CIA director Tenet’s recent testimony in the US Senate (March 2000) suggested significantly that

Syria, Iran, Iraq, Libya and North Korea – amongst about a dozen states – either possess or are actively pursuing offensive biological and chemical capabilities for using against their perceived enemies, whether internal or external. Some of these countries are pursuing an asymmetric warfare capability and see biological and chemical weapons as a viable means to counter overwhelming US conventional military superiority. Other states strive for biological weapons for counterinsurgency use and tactical applications in regional conflicts, increasing the probability that such conflicts will be deadly and destabilizing.³⁷

All in all, the trend underlying the Syrian profile of activities related to chemical and biological weapons, is obviously augmentation. This trend perfectly serves Syria’s supreme national strategic goal militarily, and is being productively and consistently materialized. Though primarily intended to balance the non-conventional capabilities attributed to Israel, there is, presumably, a future temporal point at which the very augmenting power endowed by those weapons may provide the Syrian leadership a drive or ambition to employ them in actuality. Such a step could become appreciable and may be taken by Syria alone, or by Syria in coordination with Iran or some other Arab state.

CHEMICAL AND BIOLOGICAL WEAPONS IN SYRIA

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