

# Aum Shinrikyo's Chemical and Biological Weapons: More Than Sarin

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**ABSTRACT:** The radical religious group Aum Shinrikyo was founded in Japan in the 1980s and grew rapidly in the 1990s. Aum members perpetrated a mass murder in Matsumoto City in 1994, where they used sarin as a chemical weapon to poison approximately 500 civilians. On March 20, 1995, Aum deployed sarin in an even larger terrorist attack on the Tokyo Subway System, which poisoned some 6,000 people. After the Tokyo Subway attack, the Japanese Police arrested the sect's senior members. From 2005 through 2011, 13 of these senior members were sentenced to death. In this article, aspects of Aum's chemical and biological terrorism are reviewed. Sarin production efforts by the sect are described, including how the degradation product of sarin in soil, methylphosphonic acid, enabled the detection of sarin production sites. Also, Aum's chemical-warfare agents other than sarin are described, as are its biological weapons. The author was permitted by the Japanese government to interview Dr. Tomomasa Nakagawa, one of the senior members of Aum Shinrikyo. From Dr. Nakagawa the author obtained valuable inside information about Aum's chemical and biological weapons programs.

**KEY WORDS:** Aum Shinrikyo, biological terrorism, chemical terrorism, sarin terrorism, Shoko Asahara, Tokyo Subway attack, Tomomasa Nakagawa.

## INTRODUCTION

The use of sarin in the attack on the Tokyo Subway System (on March 20, 1995), and a similar sarin terrorist attack in Matsumoto City (on the night of June 27, 1994), are well known. The motivation for the attackers, a religious sect known as Aum Shinrikyo, to commit such terrorist acts is puzzling to many people [3,5]. Their ultimate objective, according to Aum members, was to establish a new government by overthrowing the current Japanese government. They believed that chemical and biological weapons were the best means to attain these goals. But they did not rely on these weapons alone, as the sect was not only producing sarin; it also was procuring conventional weapons such as assault rifles, helicopters, and tanks. Many of these conventional weapons were purchased or planned to be purchased from Russia. However, there was no evidence that Russia was actively collaborating with Aum members in their coup d'état plans. It appears that it was a purely commercial activity for the Russians. This article identifies the biological and chemical weapons other than sarin that were used by Aum Shinrikyo.

### I. SARIN

#### A. Early Production Efforts

Aum Shinrikyo leaders reportedly obtained the idea to use sarin from a Bulgarian book, "The Story of Poisons" (Figure 1), which had been translated into Japanese [6].

Aum member Masami Tsuchiya, a brilliant chemist, first made 20 g of sarin for the sect in July 1993. He soon made increasing quantities: November 1993, 600 g sarin; December 1993, 3 kg sarin; February 1994, 30 kg sarin.



**Figure 1.** The cover of the book from which Aum Shinrikyo obtained the idea to use sarin (photographed by the author).

The large-scale sarin release in Matsumoto City on June 27, 1994, caused 7 deaths and injured about 500 more people. Initially the poison was not identified, but scientists at the Public Health Lab of the Nagano Prefectural Government used mass spectrometry on July 2, 1994, to discover that the toxic agent used was sarin. This was a remarkable achievement since they did not have a standard for sarin.

#### B. Detection of Sarin Manufacturing

I published an article in the September 1994 issue of *Chemistry Today* [4] that mentioned that sarin could be detected in the soil after it is converted into methylphosphonic acid (MPA) (Figure 2). The Japanese Police read the article and contacted me for help. They wanted to know how to analyze and detect sarin's degradation product in the soil. I obtained the detailed analysis of the compound from the US Army. I forwarded 31 pages of analytical methods on sarin degradation products to the Japanese Police on September 20, 1994.

places in Tokyo, but nothing happened. The main reason for the failure was due to the lack of proper knowledge of how to grow botulinum bacteria.

### C. Anthrax

The next BW agent Aum produced was a large amount of *Bacillus anthrax*. These bacteria were originally found in soil. Only three strains are relatively well studied; they are the Ames, Vollum, and Sterne strains. The Sterne strain is nontoxic; therefore, it is frequently used for vaccine production. The Sterne strain lacks a protective capsule so it is destroyed by macrophages when it enters the human body.

For BW purposes the spore of anthrax is used, not the anthrax bacteria. When the anthrax spore gets into the human body, it generates anthrax cells that multiply and eventually produce toxins that kill the victim. In the United States there is a general belief that Endo used a nonvirulent strain by mistake. Dr. Nakagawa said that this is not entirely true. He said Endo knew his anthrax was nontoxic, but he had confidence that he could “convert it to a virulent strain through genetic engineering”; however, it was a complete failure. Dr. Nakagawa said Endo simply did not know anything about bacteriology, since he was a virologist. Both anthrax and botulinum are bacteria, not viruses.

Because of the BW projects failure, Asahara lost confidence in Endo. Seiichi Murai introduced Masami Tsuchiya to Asahara, and Tsuchiya recommended the use of sarin as a chemical weapon to Murai and Asahara in January 1993. Tsuchiya synthesized not only VX, but also many other poisonous gases for the group. Contrary to the great success of Tsuchiya’s CW, the BW program supervised by Endo was a complete failure. Endo refused

to talk to anyone about his BW program. According to Dr. Nakagawa, Endo kept everything to himself because his final death sentence was already pronounced and further discussion would not help him.

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Anthony T. Tu obtained his Ph.D. from Stanford University in 1961. After postdoctoral work for one year at Yale University, he was an assistant professor at Utah State University from 1962 to 1967. He became an associate professor at Colorado State University in 1967, then full professor there in 1970, and is currently emeritus professor there.

Dr. Tu consulted for various government agencies, such as the Food and Drug Administration, the National Institutes of Health, the Office of Naval Research, the US Army, and the US Air Force. He was a consultant to Ainsham University in Cairo, Egypt; Suez Canal University in Ismalia, Egypt, and King Abdelaziz University in Jeddah, Saudi Arabia. He has been a visiting professor at the University of Arkansas; Tokushima University, Tokushima; Rikkyo University, Tokyo, and the Chiba Institute of Science, Choshi, Japan. He was awarded the Order of the Rising Sun with Neck Ribbon medal by the Japanese emperor in 2009. He was also awarded the Lifetime Achievement Award by the Toxinological Society of India in 2013. He has given lectures in 25 countries and has published nearly 300 research papers.

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