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David R. Jones, ed.. *The Military Encyclopedia of Russia and Eurasia.* Gulf Breeze, Fla.: Academic International Press, 1998. xi + 241 pp. $32.50, cloth, ISBN 978-0-87569-198-5.

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This book, edited by David Jones of the Russian Research Center of Nova Scotia, is the eighth volume of *The Military Encyclopedia of Russia and Eurasia*. The encyclopedia contains thirty-eight detailed entries, about more than thirty-four different types of aerial bombs, including: the earliest bombs designed in imperial Russia, propaganda or "agitation" bombs, aiming and marker bombs (to help pilots navigate), anti-airplane bombs, anti-tank bombs, concrete-piercing bombs, fragmentation bombs, anti-submarine bombs, laser-guided bombs, anti-bridge bombs, nuclear bombs, anti-personnel bombs, and chemical and bacteriological bombs. Indeed, the Russians must have believed strongly in Henry Adams' aphorism: bombs educate vigorously. Each section averages about four pages and concludes with an extensive bibliography of almost exclusively Russian-language sources dealing with that specific type of aerial bomb. Jones and his colleagues draw extensively from other primary sources, such as the notes of the U.S. military attache in Riga in the interwar period (located in the National Archives).

Jones's volume starts out with entries about some of the earliest aerial bombs developed in the early 1900s, which included free-fall bombs, "agitation" bombs, aiming bombs, marker bombs, and anti-airplane or anti-Zeppelin bombs. Soviet innovators encountered many problems with these early models, involving, for example, the accuracy of the bombs and the bombs' weight given the negligible lift capability of the early airplanes. In the Balkan Wars of 1912-1913, Bulgarian pilots or passengers in the plane would simply drop the bombs weighing only four to eight kilograms from the plane over the target. But this method entailed risks to the plane and its passengers, and also was not always accurate. Faulty fuses and hazardous storage conditions added to these problems.

The propaganda or agitation bomb (***agitatsionnaia avatsionnaia bomba***) was apparently first used by the Germans in World War One (pp. 92-97). Balloons were used to drift over enemy territory and drop propaganda by timed release. The Bolsheviks in Russia then adopted this German technique in their civil war against the Whites. To illustrate the importance of propaganda to the red command, Soviet aerial theorist A.N. Lapchinskii wrote, "According to official figures covering the full period of the Civil War (from November 1917 to 1922), during a total of 19,377 sorties, Soviet pilots dropped some 9,000 kilograms (19,845 lbs) of leaflets as compared to 94,508 kilograms (208,390 lbs) of bombs" (p. 93).

Thanks to the reports by the U.S. Military Attache in Riga in 1925, we have some idea about how these early propaganda bombs were constructed: "The devices involved simple cassettes or containers, possibly of the same kind employed in dropping aerial 'flechettes' or 'darts' (***strely***)" (p. 93). One such container, referred to as the "Krilov

Apparatus," was specifically "used for distribution of propaganda leaflets" and consisted of a "box made of veneer" that was 0.91 meters (36 in.) long, 0.57 meters (22.3 in.) wide and 0.46 meters (18 in.) deep. A small "explosive compartment" was fitted with a safety pin much like a hand grenade and attached to the bottom. By means of a time fuse, this could be set to explode at a desired height above the ground so as to break open the box and scatter its load of propaganda leaflets.

These early uses of propaganda were not at first fully understood within the Soviet military, in part because there was no larger propaganda organization to support these efforts in the early years. In addition, many Soviet officers and pilots scoffed at this method of delivering propaganda, arguing that airplanes should be used only to drop "real explosives." However, soon a lighter type of paper was invented and a greater quantity of leaflets could be dropped within a single bomb, and there were some signs that the propaganda had an effect on the German soldiers in World War One (p. 96).

In addition to "agitation" bombs dropped from planes and balloons, the Soviet Red Army also used radio loud speakers to broadcast German-language propaganda in rear areas. (Incidentally, much later, in World War Two, East German communist leaders were recruited for this activity, including the future S.E.D. party leader Walter Ulbricht, who edited the German language radio broadcasts, along with such writers as Erich Weinert and Willy Bredel. Ulbricht was attached in 1942 to the political section of the Don front.)

As for the effect during World War One of these leaflets and radio broadcasts on the enemy, one would think that this propaganda would not be effective, since the soldiers on the other side would probably recognize this as propaganda and ignore it. Indeed, according to some accounts, the propaganda had little effect. However, one German writer, Klaus Uebe, opined that more Germans than Russians were affected by these propaganda bombs.

Moreover, the Soviet writer Lapchinski cited with pride an event that allegedly took place on the Eastern Front in February 1919. Then, an order of the Twentieth Rifle Division recounts, the proclamations distributed by Red flyers provoked marked demoralization within the ranks of the opposing White army, and so brought the desertion of two regiments to the Reds. "The leaflets of Soviet power, which were spread by aircraft," Lapchinski concluded, "were powerful 'explosives' that ripped whole regiments away from the enemy." Later during the 1930s the agitation or propaganda bomb became (and remains) a standard item in the Russians' arsenal of free-fall munitions (p. 103).

The purpose of another early type of aerial bomb, the so-called aiming bomb (***pristrelochnaia avatsionnaia bomba***) was to test a certain locale to ascertain the location of the enemy and thereby conserve the more powerful and expensive munitions for the real targets. As the accuracy of Soviet bombs improved, these aiming bombs became less necessary. A third type of aerial bomb that appeared before World War One was the marker bomb (***aeronavigatsionnaia aviatsionnaia bomba***), which was intended to serve as an aid to aerial navigation. This bomb could be dropped over water or land. The earliest versions of this type of bomb were made of glass and filled with a bright dye substance that would spread once the bomb had burst. The resulting patch of color on either land or water helped pilots orient themselves. These free-fall air navigation bombs were first used in the First World War, and were included in the specialized munitions developed for the Red Air Forces during the 1920s (pp. 98-99).

Although the anti-airplane bomb (***protivosamoletnaia aviabomba***) also appeared during the First World War, the Russians used it most often against slow-moving German dirigibles rather than against airplanes. As Jones points out,

these zeppelins were considered ideal targets because "they were the only aerial platform that could carry enough bombs to inflict real damage." They were hundreds of feet long, filled with highly flammable hydrogen, and moved very slowly, thus were easy to hit (p. 100). Some aircraft pilots used darts with hooks at the end that would in theory be dropped en masse over the balloon. When these hooks caught onto the fabric, the "incendiary device ignited both the balloon and the hydrogen inside." The "Fusee Nicolardot" was one favorite dart used by the Russian Imperial Aerial Fleet.

From the welter of facts in this military encyclopedia, one can discern an interesting and paradoxical pattern of relations between the German and Russian military complexes. Beginning with the Treaty of Rapallo (April 1922) the two "outcast nations" of Europe assisted each other militarily and economically. Restricted after World War One by the Versailles Treaty, the German army was able, through its work with Russia, to maintain a high standard of training, technical knowledge, and familiarity with new weapons and equipment. The Weimar government was willing to work with the Bolshevik regime, which had been no party to the Versailles treaty and claimed no monetary reparations. The Soviet Union, in turn, had concluded from the failure of proletarian revolution in Germany and Hungary that the time was not ripe for the sovietization of Europe.

By entering into normal diplomatic relations with Germany, the USSR obtained needed manufactures and military training from Germany. Thus the German military played a key role in the development of the Soviet military, both with respect to its weapons systems and strategy. Throughout the individual entries in this encyclopedia one encounters examples of how German practices influenced Soviet military technicians and strategists in the field of propaganda (explained above), mine-laying, nuclear weapons development, and chemical and biological weapons. The paradox is that this German assistance also made Russia more vulnerable to the German military. As a result, one can see examples of how Russian fears of the German military have shaped Russian habits and military culture.

The 1939-1940 "Winter War" with Finland and ensuing Second World War provides another example of how close German-Russian military collaboration backfired. In addition to learning from the Germans about propaganda techniques, the Russians had apparently requested assistance in 1939 from their new German allies for help in laying naval mines in Finland by air. Many of the Soviet bombs in this period were "duds": they had poor fusing devices and failed to go off as planned. The Russian subsequently withdrew their request, because they had learned how to do lay mines on their own. Later, during World War Two, after Germany had invaded the USSR, Soviet military personnel began to steal superior German bombs that they had acquired and simply loaded them into Soviet planes (p. 69). By 1944 the German Luftwaffe discovered this practice. The Germans then began to make "booby-trapped bombs," and the Soviet pilots ended up mining their own territory (p. 70).

Although, according to the U.S. military attache in Riga, it became harder during the Stalin years to obtain detailed bomb information, we do know that under Stalin's leadership Soviet bomb technology improved rapidly. By 1943 when the Soviet Union gained the offensive against Germany, the Stalinist regime had mobilized its best scientists and engineers to improve the construction of bombs, especially their fuses. The production rate also increased; in 1943 the output of munitions in this year was 28.9 percent greater than in 1942, and almost twice that of 1941 (p. 68). The Russians became more discriminating, using different types of bombs for different types of missions. Navy bombers became adept at disrupting German shipping. One impediment to bomb pro-

duction during World War Two was the constant need to relocate munitions factories to the Urals.

Even after World War Two, the victory over Nazi Germany in 1945 brought no relaxation of tensions under which Soviet scientists worked. If anything, the pressures increased as the Soviet Union suddenly found itself thrust into the atomic age and forced to face a range of challenges unimagined only a few years earlier. Despite his public pronouncements deliberately downplaying the significance of the atomic bomb, Stalin initiated a "crash program" in the wake of the war (p. 80). Although much nuclear technology was stolen by the Soviet Union from the United States, one document (not mentioned in Jones's encyclopedia) which was declassified in recent years reveals considerable German influence on the fledgling Soviet nuclear program. On May 13, 1946, Stalin apparently issued a resolution to create a "Special Committee on Reactive (Jet-Propelled) Technology" to oversee the fledgling Soviet missile program, an early version of the nuclear development program.

In 1945, the First Main Administration of the USSR Council of Peoples' Commissars was formed, which was devoted to the task of developing atomic weapons. Stalin planned to send groups of highly paid Soviet scientists--chosen apparently by Nikita Khrushchev--to Germany to "attach" themselves to German scientists. This May 1946 resolution paved the way for the creation of nuclear weapons, carriers for these nuclear warheads, and missiles. It also created a new branch of the defense industry, both for missile building and for the formation of the first rocket units of the Soviet Armed Forces. In this document, specific tasks were given to various ministries (each to have its own research institute). The plan also stipulated that college students of "the higher classes"--juniors and seniors-- be trained in reactive technology, so that by the end of the year 1946 there would be two hundred students from each academic institute and one hundred students from each university, ready to work.

In 1946, Stalin made the development of jet-propelled weapons his "highest-priority task."[1] The success of this crash program was, of course, demonstrated in the test blast of August 1949 (p. 81). This accomplished, the Soviet Union then began deploying its own nuclear bombs and the TU-16A (NATO "Badger") bomber, which entered production in late 1954, and was configured to carry either a FAB-9000 or any one of the five models of nuclear bombs then available. By 1955 the Soviet Union reportedly had produced an estimated 324 nuclear warheads, as well as 1,276 bombers, including some TU-4s and 600 Tu-16s for use in Europe.

Some of the most interesting portions of this encyclopedia concern biological and chemical weapons. Here again we find that the Russian and Soviet militaries first experienced these weapons at the hands of the Germans. Throughout the Cold War period the official Soviet position was that the USSR had ratified the Geneva Protocol of June 17, 1925 banning biological weapons, but that the United States and a number of other nations--Japan, Brazil, Nicaragua, El Salvador, among others--never did sign it.

While the Soviet officials steadfastly denied that they ever experimented with either bacteriological weapons in general, or aerobombs in particular, they pointed out that forms of biological warfare extend as far as back as the Tatars. Jones writes: "In the eyes of the Soviet/Russian commentators, the first bacteriological projectiles were the bodies of plague victims hurled by the Tatars over the walls of the Crimean fortress of Kaffa (today's Feodosia) to spread infection among members of the Genovese garrison" (p. 136). Soviet commentators also repeatedly charged that the Germans tried to use biological warfare in both the World Wars. Despite these official denials, the notes of the U.S. military attache in Riga suggests that the same "Kriltsov box" used for propaganda bombs

was also used in the 1920s to release microbes as well.

Meanwhile, Soviet commentators have stated "after 1941 the United States developed, produced, and stored biological weapons at a laboratory at Fort Dietrick in Maryland and a facility at Pine Bluff in Arkansas." Despite these claims, scientific research and development in the United States in bacteriological and biological warfare only emerged after the Second World War (p. 138). Interest both in the United States, and presumably in the USSR, focused on the effects of various toxins and the transmission of selected diseases (most notably anthrax). Such efforts received still additional impetus from advances made in microbiology after 1969. The United States developed a range of biological devices (which subsequently were renounced unilaterally and destroyed). The problem military innovators encountered was that of delivering the microbes to enemy territory without killing them in the process. To be deadly, the bacteria had to be kept alive, but in manufacturing bacteriological bombs, often the explosion ended up killing the microbes.

According to Jones, most Western specialists expressed doubts over the sincerity of Soviet declarations of innocence concerning the development of their own biological weapons arsenal. During the post-war period these critics pointed to such incidents as the seeming anthrax outbreak in Sverdlovsk during April 1979 as evidence of the work of a biological warfare laboratory in that city. With regard to toxin-based substances, their attention focused on the reported use of the so-called "Yellow Rain" against civilian targets in Southeast Asia, the Yemen, and later, Afghanistan. Delivered by aircraft, this reportedly covered large areas with a yellow vapor or powder that caused headaches, vomiting, spasms, contractions, and internal bleeding, followed by the destruction of the bone marrow and necrosis as the skin blackens and immediately turns gangrenous (p. 140).

As far as chemical weapons are concerned, the Tsarist army suffered at least twice as many casualties from the poison gases used by Kaiser Wilhelm's armies than did the armies of the other European countries. This traumatic experience apparently strengthened the Russian determination to develop a sizeable arsenal of chemical weapons and led to a habitual reluctance to discard obsolete chemical weapons. During the 1920s, the Red Army had developed its chemical capabilities and appropriate delivery devices within the cooperative relationship established with Weimar Germany and its Reichswehr after the Treaty of Rapallo. By 1926, the year in which Lapchinskii published the analysis outlined above in the first edition of his Tactics of Aviation, a joint Russo-German test facility for aerial chemical tests, in which each party assumed an equal share of the operating costs, was at work near Saratov (p. 152).

The USSR continued to develop chemical weapons, bombs included, throughout the 1930s. Soviet writers justified this program by referring to the use of chemical means by Mussolini's Italy in Ethiopia (the first real airborne chemical attack), by Japan in China, and by the ongoing work in Hitler's Germany that eventually produced the phosphorous-based nerve gases Tabun and Sarin (p. 160). Throughout the Second World War, Jones asserts, Soviet planners had feared attacks by choking agents like phosgene, vesicants such as mustard or Lewisite, and blood agents like hydrogen cyanide (p. 175).

The Soviet armies again came into contact with the Germans' supply of chemical weapons in 1945 when they liberated Berlin. They transported the bulk of these weapons back to the USSR. It is clear that the Soviet leadership long remained convinced that in any future conflict, chemical warfare was real possibility and that the Soviet Armed Forces needed to be able to wage it. This conviction led to the Soviet penchant for stockpil-

ing equipment and retaining older systems, however hazardous.

In short, Jones's military encyclopedia, especially this eighth volume, is a useful reference work. The only shortcoming is that it lacks an index, making it difficult to look up a specific term. Nevertheless, this volume complements well Jones's previous (seventh) volume in the series, which contains five articles on aerial blockades of cities and regions in the Soviet Union during World War II and a final article about the aerial bomb itself, with precise definitions. This military encyclopedia also makes a significant contribution to the existing reference literature on Soviet airpower, consisting, for example, of Bill Gunston's *Encyclopedia of Soviet Aircraft since 1917* and the articles in *Jane's Soviet Intelligence Review* and *Jane's Defense Weekly*.

Note

[1]. See "How the Rocket Forces Were Created in the USSR," [Kak Sozdalis' Raketnye Sily v SSSR] *Military-Historical Journal*, vol. 1 (January-February, 1995): 53-57. The title is misleading; three documents are published in this issue, one written in 1946 (below) and two written in 1959.