

*This is the long version of the paper for the symposium "Japanese Human Experimentation in Wartime China: inquiries into its historical, political, cultural and ethical issues" (S31) in the 22nd International Congress of History of Science, Beijing, July 29, 2005. Some Chinese characters of Japanese and Chinese names and Japanese texts for citation from Japanese references were added. Because of the shortage of time, in the symposium the abridged version was read.

I am grateful if you send me some comments, since I'm still revising this for the complete version that should be published as a chapter of *The Oxford Textbook of Clinical Research Ethics*, Oxford University Press (forthcoming).

JAPANESE MEDICAL ATROCITIES 1932-45: WHAT, WHO, HOW AND WHY?

Takashi TSUCHIYA 土屋 貴志

Associate Professor 助教授

Department of Philosophy 哲学研究室

Faculty of Literature and Human Sciences 文学研究科

Osaka City University 大阪市立大学

Osaka 558-8585, Japan

tsuchiya@lit.osaka-cu.ac.jp

Introduction

Between 1932 (Substantially 1933) and the end of World War II, Japanese researchers—mostly under the aegis of the Japanese Imperial Army—killed thousands of human beings in medical experiments. The experiments, which included vivisection, fell broadly into three categories: studies of the progression of disease; surgical research and training; and biological warfare research and development. Most of the human experimentation took place in Japanese-occupied Manchuria and China, although there also were experimental centers in Southeast Asia and on the main Japanese islands. Most of the victims were Manchurian or Chinese criminals, political prisoners, or

prisoners of war, although some prisoners of war of the Allied powers—such as the United States, Australia, and New Zealand—also were used in these experiments, and killed.

Most of the researchers involved were never brought to trial, because of an immunity arrangement with U.S. officials. In return, the United States got secret access to the result of Japanese biological warfare experiments that had been performed on prisoners. Many of the human experimenters went on to prestigious civilian careers—leaving both Japan and the United States with unresolved ethical issues dating back more than half a century.

Background

Shiro Ishii 石井四郎*, the founder and leader of Japan's network of human experimentation facilities, entered the Army upon graduation from Kyoto Imperial University Medical School 京都帝国大学医学部 in 1920. In 1925, when the Geneva Convention prohibited the use of biological and chemical weapons, Ishii reasoned that these weapons might be hugely powerful and began to lobby his superiors for research and development in biological warfare. In 1930, after a two-year trip to Europe and the United States, he became a professor in the Department of Epidemic Prevention of the Army Medical College (Rikugun Gun'i Gakko Boeki Bu--Boekigaku Kyoshitsu 陸軍軍医学校防疫部・防疫学研究室), located in Tokyo. He wanted to improve the prestige of medical officers in the Japanese Army by developing biological weaponry as a powerful attacking arm. Utilizing the Army's superior power in 1930s Japan, he also envisaged a national network for medical research that would be much more powerful and effective than the existing academic infrastructure, and furnished with luxurious laboratories that could freely use human subjects for Research and Development of military medicine.

The takeover of Manchuria by Japan's Kwantung Army 關東軍 in 1931—known as the "Manchurian Incident" or, in China, the "9.18 Incident"—gave Ishii his opportunity. The following year, he established a large new department specializing in biological warfare under the deceptive name of the Epidemic Prevention

Laboratory (Boeki Kenkyu Shitsu 防疫研究室) in the Army Medical College 陸軍軍医学校. This laboratory became the headquarters of his network. Simultaneously he built a secret facility called the Togo Unit 東郷部隊 in Beiyinhe 背陰河, a small town in Manchuria located about 70 km southeast of Harbin. This was Ishii's first prison-laboratory, where deadly human experimentation substantially began in the fall of 1933. The subjects were mainly Chinese but included some Russians, Mongolians, and Koreans who were arrested by the Kwantung Army Military Police 關東軍憲兵隊 as spies and resisters and scheduled to be executed without trial. Ishii and his colleagues thought it was better to utilize them as human guinea pigs than merely to execute them.

However the facilities of Beiyinhe were not sufficient for Ishii's project. The buildings were not strong enough to serve as a prison; in fact, 16 captives revolted and escaped in September 1934. So Ishii and the Army built a much larger, stronger prison-laboratory-factory in Pingfang 平房 (sometimes written as Ping Fan), about 20 km southeast of downtown Harbin (now one of the districts of Harbin City). Construction began at Pingfang in 1935, all residents of four villages nearby were forced to evacuate, and the huge complex was completed around 1938. In 1936, even before construction was completed, the Togo Unit became an official unit of the Japanese Army. This means the Japanese Emperor, Hirohito 裕仁, formally acknowledged Ishii's project.

The Togo Unit was now known as Epidemic Prevention Department (Boeki Bu 防疫部) of the Kwantung Army, and as Unit 731. It was soon renamed the Epidemic Prevention and Water Supply Department (EPWSD) (Boeki Kyusui Bu 防疫給水部); in addition to their medical experimentation, Ishii's units were responsible for water purification for Japanese troops in China from 1937 on. Ishii had invented a water purification machine that could be easily carried to the battlefield. During the battles for Beijing 北京 and Shanghai 上海, he sent teams to the front to operate it—garnering even more support from Army leaders. In 1938, the Japanese Army adopted Ishii's machine as standard equipment and organized 18 divisional EPWSDs (Shidan Boeki Kyusui Bu 師團防疫給水部) whose directors were officers of Unit 731. By 1939, Ishii's network included some field water purification units, 18 divisional EPWSDs, and five permanent Epidemic Prevention Departments 固定防疫機關 in Harbin 哈爾濱 (Unit

731), Beijing 北京 (Unit 1855), Nanjing 南京 (Unit 1644), Guangzhou 廣州 (Unit 8604), and Tokyo 東京 (Boeki Kenkyu Shitsu). Altogether, Ishii commanded more than 10,000 personnel. When the Japanese Army occupied Singapore in 1942, another permanent EPWSD was added to the network (Unit 9420). Unit 731 itself had a proving ground in Anda 安達 (about 150 km northwest from Harbin) and five branches in Mudanjiang 牡丹江, Linkou 林口, Sunwu 孫吳, Hailar 海拉爾, and Dalian 大連.

In addition, as a leader of army surgeons, Ishii had power over army hospitals 陸軍病院 in occupied cities in China. His network had also close connections with other biological warfare departments such as the Military Animals Epidemic Prevention Department (Gunju Boeki Shou 軍獸防疫廠) in Changchun 長春, Manchuria (Unit 100), and institutions for chemical warfare such as the Army Sixth Technology Institute 陸軍第六技術研究所 in Tokyo, the Army Narashino School 陸軍習志野学校 in Narashino, in the suburbs of Tokyo, the Army Ninth Technology Institute 陸軍第九技術研究所 (Noborito Institute 登戸研究所) in Noborito, also in a Tokyo suburb, and Kwantung Army Chemical Department 關東軍化学部 in Qiqihar 齊齊哈爾 in Manchuria (Unit 516).

Unit 731 probably moved to the new base in Pingfang in 1938. This was a 6 km² complex of secret laboratory-factories surrounded by trenches and high-voltage electric wires. The whole district became a special military area, which meant anyone approaching without permission was to be shot by the guards. The main building had two special prisons in its inner yard, so that escapees could never go outside. The captives were called "maruta マルタ," which means "logs" in Japanese, and were identified only by numbers. At a little-noted war crimes trial conducted by Russian authorities at Khabarovsk in 1949, Surgeon Major General Kiyoshi Kawashima 川島清, who was the chief of a division of Unit 731, testified that the prisons usually held 200 to 300 captives, including some women and children, but that their maximum capacity was said to be 400 (Materials p. 257). These captives were sent to Unit 731 by the Military Police under the Special Transfer Procedure (Tokui Atsukai 特移扱), a system the Japanese Army newly developed to supply human subjects. About 400-600 captives were sent to Unit 731 every year (ibid.). No one could get out alive. At Unit 731 from

1940 to 1945 at least 3,000 people were tortured to death (Materials p. 117). But this number does not include victims before 1940 or at other medical experimentation sites. Even prisoners of war of the Allied Powers may have been subjected to experiments by Unit 731 researchers at the camp in Mukden 奉天 [now Shengyang 瀋陽] (Williams & Wallace 1989, Chap. 5; Harris 1994, Chap. 9).

Moreover, the activities of Unit 731 researchers were only a part of the medical atrocities committed by Imperial Japan. According to a large body of testimony, deadly experimentation was also performed in other permanent EPWSDs such as Units 1644 and 1855. U.S., Australian, and New Zealand prisoners of war were forced to participate in experiments by Surgeon Captain Einosuke Hirano of the 24th Field EPWSD in Rabaul, Papua New Guinea (Tanaka 1996).

In August 1945, when Russia declared war on Japan and advanced into Manchuria, Ishii's medical network suddenly collapsed. The Japanese Army immediately decided to withdraw all human experimentation units from China and to destroy evidence of medical atrocities. At Unit 731, all the still surviving captive subjects were killed, cremated, and cast into the Songhuajiang River 松花江. The main building with its special prisons were totally destroyed by artillery troops. Its surgeon officers, researchers, workers, and soldiers were hurriedly evacuated in specially chartered trains and ships. Most succeeded in escaping and returned to Japan. In Tokyo, the Epidemic Prevention Laboratory (Boeki Kenkyu Shitsu 防疫研究室), the headquarters of Ishii's network, had already been destroyed by U.S. air raids in March and May 1945. But Ishii and his colleagues cunningly held onto precious medical data for biological warfare.

Although the United States occupied Japan after Japan's surrender on Aug. 15, 1945, General Headquarters/Supreme Command for the Allied Powers (GHQ/SCAP) did not investigate medical crimes. Instead, investigators from the U.S. Army Chemical Corps in Camp Detrick, Md., which oversaw U.S. chemical and biological warfare efforts, sought the biological warfare data that Ishii and his colleagues accumulated—so that the United States could catch up with the Soviet Union and other countries in biowar research and development (Ohta 1999, Tsuneishi 1994, Harris 1994, Regis

1999).

In order to get the data, the first investigator, Lieutenant Colonel Murray Sanders, asked General Douglas MacArthur and General Charles Willoughby, a close MacArthur aide and chief of counterintelligence, to promise Ishii and his researchers immunity from war crimes charges in October 1945. Ishii and his colleague gave some data, but they concealed the facts from Sanders and his successor, Veterinarian Lieutenant Colonel Arvo T. Thompson that these data were got by experimentation with human subjects. The United States had not got evidence of the performance of deadly human experiments until 1947.

Early in January 1947, the Soviet Union sought the extradition of Ishii and his researchers for investigation of their experiments, which the Soviets had learned about from captured officers and soldiers of Ishii's network. The Soviets also wanted the biowar data and threatened that if the United States monopolized the information, Russia would reveal the Japanese medical atrocities at the International Military Tribunal for the Far East—the so-called Tokyo Tribunal, which conducted the war crimes trial of top Japanese leaders in 1946-1948. The United States dismissed this threat but reinvestigated the Japanese doctors much more closely. The Russians not only failed to get the data but also had no chance to accuse Ishii and his researchers at Tokyo Tribunal because G-2 controlled it.

Then U.S. officials learned about the deadly human experimentation, and the immunity that they had granted to Ishii and others became a worrisome problem. In Nuremberg, Germany, the United States and its allies were harshly prosecuting Nazi doctors for their human experimentation. On the other hand, the United States secretly made deals with Imperial Japanese doctors and gave immunity to their performance of deadly human experimentation in order to monopolize the data for biological warfare. This behavior must be extremely inconsistent, and severely blamed by the international community when it is revealed. The GHQ/SCAP discussed the dilemma repeatedly with officials in Washington, and the United States finally concluded:

Information of Japanese BW [biological warfare] experiments will be of great value to the U.S.

research program. . . . The value to the U.S. of Japanese BW data is of such importance to national security as to far outweigh the value accruing from "war crimes" prosecution. . . . The BW information obtained from Japanese sources should be retained in Intelligence channels and should not be employed as "war crimes" evidence. (State-War-Navy Coordinating Subcommittee for the Far East 1947)

This conclusion was based on close examination of the data that was finally provided by Ishii and his colleagues. The last investigator, Edwin V. Hill, reported to the Chief of the U.S. Army Chemical Corps as follows:

Evidence gathered in this investigation has greatly supplemented and amplified previous aspects of this field. It represents data which have been obtained by Japanese scientists at the expenditure of many millions of dollars and years of work. Information has accrued with respect to human susceptibility to these diseases as indicated by specific infections doses of bacteria. Such information could not be obtained in our own laboratories because of scruples attached to human experimentation. These data were secured with a total outlay of ¥250,000 to date, a mere pittance by comparison with the actual cost of the studies. (Hill 1947)

Thus, most officers and researchers involved in Japan's human experimentation program, including Ishii himself were never accused. Ishii died in peace of laryngeal cancer in 1959, at the age of 67. Many army surgeon officers and researchers gained positions in medical schools, national institutes, or hospitals. Some practiced in their own clinics, some others established pharmaceutical companies (See Willams & Wallace 1989, Chap. 17).

Although failing to get custody of Ishii or access to his data, the Soviet Union brought 12 captured officers and soldiers to trial before an open military tribunal at Khavarovsk in December 1949, commonly called the Khavarovsk Trial (Materials 1950). The accused included the Captain General of the Kwantung Army, Otozo Yamada 山田乙三, six army surgeon officers, and two veterinarian officers. Six of the accused were from Unit 731 and two from Unit 100. They all were sentenced to

confinements in a labor correction camp for 2 to 25 years according to each crime, but returned to Japan by 1956 when the Soviet Union and Japan resumed diplomatic relations. The Russians intended to spread the news of the medical atrocities worldwide, but because the prosecutors, lawyers, and judges were all Russians, and there were no reporters from abroad, the trial drew only a little attention. The United States succeeded in branding it as communist propaganda. The People's Republic of China 中華人民共和國 also tried Japanese war criminals before military tribunals in 1956, but among the researchers of Ishii's network only one surgeon officer was included. None of these defendants received a death sentence, and all returned to Japan by 1964, probably because China placed a higher priority on returning to the international community than to punishing war criminals.

The Facts of Medical Atrocities

I define medical massacre or atrocity as mass murder performed by medical doctors in the name of medicine. Those performed by Imperial Japanese doctors can be classified into three categories:

1. Research (experimentations with human subjects)
2. Training (of army surgeons)
3. Biological warfare maneuvers

1. The Research

The deadly research by Japanese doctors can be classified into three categories:

- 1) Explicating Diseases (Acquisition of Scientific Knowledge)
- 2) Development of Therapies
- 3) Development of Weapons

Here I describe several examples with documentation in each categories.

1) Explicating Diseases (Acquisition of Scientific Knowledge)

Doctors in Ishii's network performed experiments on captives and killed them in order to gain new scientific knowledge. There were two major kinds of research. One was bacteriological studies, including intentional infection in order to observe how the disease occurs and proceeds and to search for its pathogen. Another was physiological studies, including observation of the body's reaction to artificially caused conditions such as an extremely low temperature environment, low pressure such as that experienced at high altitudes, salt overdose, drinking only distilled water, and intravenous air injection. Anthropological-anatomical studies with "fresh human brain" were also performed at Manchuria Medical University.

Bacteriological Studies

Shiro Kasahara 笠原四郎, a researcher at Kitasato Institute 北里研究所 in Tokyo, worked for Unit 731 for several years. In 1944 he, Surgeon General Masaji Kitano 北野政次, who was Commander of Unit 731 from August 1942 to March 1945, and others published a paper on identification of the pathogen of epidemic hemorrhagic fever, the etiology of which was then still unknown. It reads:

We made an emulsion with 203 ground-up North Manchuria mites and salt water, and injected it into the thigh of an ape hypodermically. This first ape became feverish with a temperature of 39.4 degrees Celsius on the 19th day after injection and moderately infected. Then we took blood of this feverish ape and injected it into the second ape, which became feverish and produced protein in its urine. Typical epidemic hemorrhagic kidney was found at its autopsy. . . .Epidemic hemorrhagic kidney was never found at autopsy in the most feverish period, . . . But kidney, liver, and spleen of this period are most infective.

北満トゲダニ 203 疋を磨碎し食塩水乳剤となし之を猿の大腿皮下に注射した。此の初代猿は接種後 19 日に至り 39.4°Cの発熱があり中程度に感染したのであるが、此の発熱時の血液を以て接種した第 2 世代猿は潜伏期 12 日で発熱し尿蛋白陽性を示し剖検により定型的流行性出血熱腎を証明したのである。……発熱極期（病勢極期の意ではない）に剖検すれば本疾患に特異的な解剖所見として我々が強調している流行性出血熱腎を検出した験しがない、……然しかかる時期の腎・肝・脾こそ感染力は

絶大なのである。之に反し下熱期或は体温がまったく平熱に復してから剖検すると茲に甫めて流行性出血熱腎は認められるのであるが、かかる病変顕著の諸臓器は既に感染力を消失していることを学んだ。(Kasahara et al. 1944, p. 3)

This means they vivisected the “ape 猿,” because in order for surgeons to “autopsy in the most feverish period” the subject needs to be alive. Moreover, “the ape” must have been a human being, because the normal temperature of an ape is higher than that of a human being; 39.4 degrees Celsius is normal for an ape. In another paper, Kasahara and his colleagues noted that apes do not become feverish from this disease. So it is clear that they infected human subjects and vivisected them (Tsuneishi 1981). Kasahara himself confessed later:

My work involved supervising the extraction of blood samples from cases previously injected; they would normally show a slight temperature rise to about 37 deg C. These samples were reinjected into a second spy by members of another section, which had nothing to do with mine, and, after the injection, the second generation of patient became infected with haemorrhagic fever . . . From the symptoms we were able to discern the transmission of the strain . . .

Only on rare occasions did patients die of EHF; normally, they would recover. I have heard rumour that in extremely rare cases, military surgeons, anxious to perform an autopsy, had injected critical and terminal cases with morphine . . .

. . . When I went to the Unit for the second time in 1942 I had to participate in the experiments of Kitano and the military doctors that were already in progress, namely, injecting people, spies; this was the result of orders and simply had to be obeyed.

I feel very guilty about what I have done and I think I did wrong. There were very few instances but, when a spy did die as a result of human experiment . . . I felt terribly sad and I always arranged for a memorial service to be held in the main hall of the Ishii Unit, which was give by a Buddhist priest from among the soldiers . . . but that's how deeply I was disturbed, and I think I was the only person in the Ishii Unit to arrange such a memorial service. (Williams & Wallace 1989, pp. 39-40)

In the late 1960s former Surgeon Lieutenant Colonel Naeo Ikeda 池田苗夫, who practiced medicine in Osaka 大阪 after the war, published papers reporting his Unit 731 experiments on epidemic hemorrhagic fever, in which the "fatality rate was 15% in 1941." (Ikeda 1967). Ikeda wrote that in 1942, at Heihe Army Hospital 黒河陸軍病院, he injected blood taken from a feverish patient into two "volunteers 有志," who became infected, in order to confirm that this disease was surely infectious (ibid). At the same time, he infected another two "healthy volunteers" with contaminated lice and four "volunteers" with contaminated fleas (Ikeda 1968). Later Ikeda said in an interview that these volunteers were "coolies" at Heihe Army Hospital, and insisted that he sent them back there after treatment at Unit 731 (Asano & Tsuneishi 1985, p. 96).

However, Ikeda evidently killed subjects in a study of tetanus. To measure muscle chronaxie of tetanic patients, he injected 14 with toxin or spore of tetanus. All died, but before their deaths, Ikeda and Army Engineer Saburo Araki measured chronaxie of their masseter, nasal muscle, orbicular muscle of eye, papillary muscle, intercostal muscles, anterior tibial muscle, and musculus gastrocnemius (Ikeda & Araki p. 52).

Extensive data regarding the minimum infectious dose for 50% of subjects (MID50) of various human diseases—information that was important for development of biological weapons—were described in a U.S. investigator's report (Fell 1947). Japanese researchers artificially infected human subjects to learn the MID50 of anthrax, plague, typhoid, paratyphoid A and B, dysentery, cholera, and glanders. Of anthrax Dr. N. H. Fell wrote, "The MID sub 50 . . . was determined to be 10 milligrams subcutaneously for both man and horse, and orally it was 50 milligrams for man." On direct infections "Data are given for the preparation of suspensions used, the incubation period and the clinical course of the disease. The postmortem findings are also covered in considerable detail." Spraying experiments were also performed: "In a typical experiment four human subjects were placed in a glass room 10 m [3] in size, and 300 cc. of a 1 mgm/cc suspension were introduced using an ordinary disinfectant sprayer. No particle size determinations were made, but two of the four subjects developed skin

lesions which eventually resulted in generalized anthrax.” Of plague, "The MID50 was found to be 10 [-6] mgm subcutaneously and 0.1 mgm orally. Respiration for 10 seconds of air containing 5 mgm/m [3] was infectious to 80 per cent.” Plague was also directly infected: "The incubation period was normally 3 - 5 days and death occurred within 3 - 7 days after onset of fever. In most cases of artificially induced plague which terminated fatally the usual bubonic form became pneumonic three days before death and was then highly infectious.” Of cholera, "The MID50 orally was 10 [-4] mgm of most organisms and 10 [-6] cc. of a mixture of freshly isolated organisms and feces. About half of the cases so induced terminated fatally within 5 days.” Of glanders, "The MID50 subcutaneously for man was 0.2 mgm and this produced a mortality of 20%.” Of spraying experiments of glanders, "Those experiments carried out in chambers were highly effective. In one trial one gram of dried bacilli were placed in a small glass box and stirred with a fan, a rubber tube attached to the box was inserted into the noses of 3 human subjects and all 3 became infected after inspiration of an estimated 0.1 mgm.” These passages clearly reflect performance of dire experiments. Some of them were not necessarily fatal, but many of these subjects were probably died of these experiments.

Experiments with human captives also were performed at medical schools in Manchuria. Kameo Tasaki 田崎亀夫, a research associate of the Department of Dermatology of Manchuria Medical University 滿洲医科大学, described his "human experiment 人體實驗" of lymphogranuloma in a 1936 paper. Manchuria Medical University, which was run by the South Manchuria Railway Company 南滿州鐵道株式会社, the Japanese counterpart of the East Indian Company, was then the top medical school in Manchuria. Tasaki wrote that he injected emulsion of grated brain tissue of an infected mouse to the condemned “guerrilla's 匪賊” prepuce. A papula grew at the focus, but the subject was executed two weeks after the injection (Tasaki 1936, p. 790). Judging by other anatomical-anthropological studies, utilizing "the condemned 死刑囚" for medical studies seemed to be not so uncommon practice in Manchuria.

Physiological Studies

Hisato Yoshimura 吉村寿人 was a lecturer at Kyoto Imperial University Medical School 京都帝国大学医学部 when his head professor ordered him to go to Unit 731 in 1938. He stayed there until its collapse in 1945 and used captives in his studies of frostbite. At the Khabarovsk Trial, many officers and soldiers testified about the cruelty of Yoshimura's experiments. Satoru Kurakazu 倉員サトル, a Sergeant Major of Military Police at Unit 731, testified:

I saw experiments performed on living people for the first time in December 1940. I was shown these experiments by researcher Yoshimura, a member of the 1st Division. These experiments were performed in the prison laboratory.

When I walked into the prison laboratory, five Chinese experimentees were sitting on the long form; two of these Chinese had no fingers at all, their hands were black; in those of three others the bones were visible. They had fingers, but they were only bones. Yoshimura told me that this was the result of freezing experiments. (Materials 1950, p. 367)

Naoji Uezono 上園直二, who had worked for the Printer Division of Unit 731, described another grisly scene in an interview in the 1980s:

Two naked men were put in an area 40-50 degrees below zero and researchers filmed the whole process until they died. They suffered such agony they were digging their nails into each other's flesh. (Williams & Wallace 1989, p. 44)

Yoshimura himself gave a lecture on his frostbite studies in Harbin in 1941, although he said nothing about cruel experiments (Yoshimura 1941). After the war, he and his colleagues published three papers in Japanese medical journals—in English—reporting part of the studies (Yoshimura & Iida 1950-51, Yoshimura & Iida 1951-52, Yoshimura, Iida & Koishi 1951-52). We know that these concern their studies at Unit 731, because they themselves wrote at the end of these papers that those outlines were read at the 21st and 22nd annual meetings of Japanese Physiological Society in

1942-43. They wrote, "The experiments were made on about 100 male subjects (laboratory workers, students, soldiers and laborers) . . ." (Yoshimura & Iida 1950-51, p. 149). They explained their methods as follows:

To Examine [sic] the temperature reaction of blood vessels to cold, the authors chose the tip of the left middle finger of humans as the site of examination, and the finger was dipped in ice water of 0 C up to its base for 30 minutes. The skin temperature of the back of its tip was then measured every one minute after immersion. To determinate [sic] the skin temperature, a thermopile of Lewis' type made with copper and constantan wire of 0.02 mm diameter was applied on the tip of the finger with adhesive plaster, and protected against water with vaseline. E. M. F. of the junction on the finger was measured potentiometrically against its cold junction in ice water. The water in which the finger is [sic] immersed was stirred frequently and the room temperature was usually maintained at about 20 C. (Yoshimura & Iida 1950-51, p. 148)

Women, children, and even a baby were included as subjects:

The temperature reaction in ice water was examined on about 100 Chinese coolies from 15 to 74 years old and on about 20 Chinese pupils of 7 to 14 years. (Yoshimura & Iida 1951-52, pp. 177-178)

Though detailed studies could not be attained on children below 6 years of age, some observations were carried out on a baby. As is seen in fig. 2, the reaction was detected even on the 3rd day after birth, and it increased rapidly with the lapse of days until at last it was nearly fixed after a month or so.

As to sexual difference of the reactivity, only an outlining aspect was obtained from the observation on Orochon subjects. . . . The reactivity of the female subject was a little lower than the male's in adult age, while they were nearly the same with each other in childhood. (Yoshimura & Iida 1951-52, pp. 178-179)

After the war, Yoshimura became a professor at Hyogo Prefectural Medical University 兵庫県立医科大学 and finally became president of Kyoto Prefectural Medical University 京都府立医科大学. In 1978, Emperor Hirohito gave him the Order of the Rising Sun-Third Class 勳三等旭日章 for pioneering work in "environmental adaptation science" (Williams & Wallace 1989, p. 238).

Frostbite experiments with Chinese captives were performed elsewhere than Unit 731. Surgeon Major Kazuharu Tanimura 谷村一治 of Datong Army Hospital 大同陸軍病院 organized a detachment and went on an expedition into Inner Mongolia from Jan. 31 to Feb. 11 of 1941 to study frostbite, field surgeries, hemostatis, blood transfusion, and other procedures (Toki Eisei Kenkyuhan 1941). He took eight "living bodies 生體"—male Chinese captives—as "material" for experiments. At dawn on Feb. 6, researchers performed frostbite experiments on six subjects in various conditions such as wearing wet socks or gloves, drunk, hungry, and having atropine. Their report, found in a bibliopole in Tokyo and published as a reprint in 1995, describes the result precisely with sketches and photographs (ibid.). These eight subjects were also used in other experiments and operations, and finally were shot or vivisected to death. The report includes even the names of the subjects, direction for their confinement, a log of killing, the program of their memorial service 生體慰靈祭, and Tanimura's condolence (ibid.).

Sadao Koshi 越定男, a driver of Unit 731, describes a shooting experiment performed in airtight chamber designed to study the condition of gunshot wounds in low pressure conditions. When a fighter pilot was shot in a dogfight and parachuted at very high altitude, his wounds would gape in low pressure (Takasugi 1984, p.46).

According to the testimony at the Chinese investigation of Japanese war criminal Masauji Hata 秦正氏, Dr. Muto 武藤 of Yoshimura's division performed a salt overdose experiment on a Chinese captive in January 1945 in order to confirm that salt increases basal metabolism (Chinese Central Archive et al. *Jintai Jikken*, p.92).

Yoshio Kurihara 栗原義雄, an assistant in the Togo Unit at Beiyinhe from 1935 to 1936, describes a torture test with distilled water:

I was ordered to help civilian Dr. Satoshi Sugawara's experiment to learn how long man can live only on distilled water. The subject lived for 45 days with ordinary water and 33 days with distilled water. A subject forced to drink distilled water asked me, "Mister, please give me tasty water." The subject who lived for 45 days was a physician called Zuo Guangya 左光珪, a very intelligent man, not a bandit.

自分は、軍属の菅原敏さんの下で水だけで何日生きられるかという実験をやらされた。その実験では、普通の水だと45日、蒸留水だと33日生きました。蒸留水を飲まされ続けた人は死が近くなると「大人、味のある水を飲ませてくれ」と訴えました。45日間生きた人は「左光珪（サコウア）」という名前の医者でした。彼は本当にインテリで、匪賊ではなかったですね。

(Tsuneishi 1994, p. 162)

Yoshitoshi Omino 小美野義利, a corporal of the Shinkyō 新京 [Xinjing, now Changchun] Military Police, testified that Surgeon Captain Takeshi Ogasawara 小笠原武 intravenously injected air into a Chinese worker arrested for alleged stealing. The subject did not seem to be harmed, but was decapitated with other two captives by Omino (Chinese Central Archive et al. *Seitai Kaibo*, p. 15). According to the testimony by an assistant, Yataro Ueda 上田彌太郎, doctors of Unit 731 seemed to know the lethal dose of air injection (Takidani 1989, p. 242).

Anthropological-Anatomical Studies

Doctors of the Department of Anatomy of Manchuria Medical University 満洲医科大学 performed anthropological-anatomical studies with specimens of seemingly vivisected Chinese brain. According to an accusation by a Chinese assistant at the department, Zhang Buqing 張不卿, there were about five vivisections from the Autumn of 1942 to the Spring of 1943. About 25 male captives were killed. (Chinese Central Archive et al. *Seitai Kaibo*, pp. 19-22). The doctors prepared many brain tissue specimens from these subjects, which have been found in China Medical University 中

国医科大学 in Shengyang 瀋陽, the Chinese successor of equipments of Manchuria Medical University. The performance of vivisections was indicated because Zhang saw fresh blood on the floor of dissection room and the color of the corpses was fresh. The doctors published anatomical studies of the brain experiments with figures and photographs of these specimens in academic journals. For example, Naokiti Suzuki 鈴木直吉 et al. wrote:

The present work on the cytoarchitectural structure of the regio frontalis was based upon the study of serial sections of the fresh human brains. Each of them was the brain of an adult chinese man with no history of mental or physiological disease. . . . (Suzuki et al. 1942, p. 140)

Then they expressed their gratitude to army surgeons at the footnote:

We are greatly indebted to Surgeon-Colonel Dr. Kizima, the director of Mukden Garrison Hospital and Surgeon-Captain Dr. Watanabe who acted so kindly and satisfactorily [sic] in performing the delicate operations desired. (ibid.)

These passages seem to confirm Zhang's accusation.

2) Development of Therapy

The second category of human experiments in Ishii's network was for development of therapies, including development of vaccines, surgical techniques both in hospital and on the battlefield, hemostasis, transfusion of blood or its substitute.

Vaccine Experiments

U.S. investigator Fell noted immunization experiments against anthrax, plague, and cholera (Fell 1947). Of anthrax he wrote, "It was found that a heat-killed

vaccine gave no protection, while an attenuated spore vaccine gave complete protection against 4 mid orally; however, the living spore vaccine in humans was followed by such violent reactions that it was concluded it could not be employed except in emergencies.” Of plague, "Three avirulent strains were used for vaccines, and gave about 50 per cent protection against a challenge subcutaneously with 1000 MID. An acetone extract of a virulent strain gave considerably less protection.” Of cholera, "The results with heat-killed and formaldehyde-killed vaccines were negative, but a vaccine produced by the ultra-sonic method using 6300 kc for 50 minutes gave complete protection in a small group of 3 subjects, the challenge dose was approximately 10,000 MID.” These passages indicate that experiments with human subjects were surely performed. Vaccines are necessary to save not only patients but also friendly soldiers in biological warfare.

Yoshio Shinozuka 篠塚良雄, a former junior assistant of Unit 731 with his birth name Yoshio Tamura 田村良雄, wrote in 2004:

Unit 731 was developing an envelope vaccine of plague. . . .

Karasawa Division, to which I belonged, also performed human experimentation and vivisection on five Chinese under the pretext of a virulence test of the germ.

First we collected blood from them and measured their immunity.

On the next day, we injected four kinds of plague vaccines to each of four subjects. No vaccine was given to one subject as control.

A week later, vaccines were given again.

A month later, we injected 1.0 cc liquid with the same number of plague germs in every subject. All five were infected with plague. . . .

The man that had no vaccine was infected first. Two or three days later he became feverish and pale. On the next day he was dying and his face grew darker.

He was still alive but the members of the Special Division, which administered the special prison of "Maruta" ["logs"] brought him naked on the stretcher to the dissection room where we awaited him. . . .

Lieutenant Hosoda auscultated his heart beat on his chest. At the moment the

auscultation finished, Surgeon Colonel Ohyama ordered “Let's begin!” . . .

七三一部隊では、当時、ペストのエンベロープ（被膜）ワクチンを開発していたのですが、【中略】

私が所属している柄沢班でも、細菌の毒力をテストするという名のもとに、五人の中国人を使って、人体実験と生体解剖を行いました。

まず、五人の採血をおこない、免疫価を測定しました。

翌日、そのうちの四名に、四種類のペストの予防注射液（ワクチン）を注射しました。比較用の対象者一名には、ワクチンを注射しないのです。

一週間後、再度、ワクチンを注射しました。

一カ月後、五名全員に、菌数計算をしたペスト菌液一 cc を注射しました。この注射によって、五名は重症のペストにかかりました。【中略】

ワクチンなしでペスト菌を注射されたその男性は、そのために一番最初に感染しました。そして二、三日後には、高い熱が出て顔色が青くなり、その翌日くらいには瀕死の状態顔が黒っぽく変わっていきました。

「マルタ」の管理をしている特別班の隊員によって、この男性はまだ息のある状態で裸のまま担架に乗せられ、私たちが待機している解剖室に運ばれてきました。

全身をゴムの防菌衣に包んだ細田軍医中尉が、解剖台の男の体を洗うように私に命じました。【中略】

細田中尉が、胸に聴診器を当てて心音を聞きました。

その聴診器が男性の体を離れると同時に、大山軍医少佐から「はじめよう」の命令が出ました。

(Shinozuka & Takayanagi 2004, pp. 78-82)

Shinozuka's superiors vivisected the subject and took organs as specimens. Shinozuka testifies that even his friend, junior assistant Mitsuo Hirakawa 平川三雄, was vivisected when infected with plague (ibid, pp. 88-96).

Masauji Hata 秦正氏, who testified about the salt overdose experiment, also testified that in January 1945 Surgeon Major Masahiko Takahashi 高橋正彦 of the First Division of Unit 731 injected plague bacteria into three Chinese and infected them with severe pneumonic and bubonic plague. Takahashi then tried to treat them with Japanese

sulfa drug but failed. All of these subjects died (Chinese Central Archive et al. *Jintai Jikken*, p.92).

Toyonori Yamauchi 山内豊紀, a researcher at Kanagawa Prefectural Hygiene Laboratory 神奈川県立衛生試験所, and his superiors studied manufacturing vaccine with ultrasonic devices (vaccine made with virus attenuated by exposing to ultrasound). Their study drew Ishii's attention, and Ishii hired them in 1938. One of their papers has been found in the journal of Ishii's headquarters (Watanabe et al. 1939). Yamauchi and his superiors was sent to Unit 731 in June 1939, and performed cholera vaccine experiments on 20 Chinese captives in the special prison in May 1940. He was told that the subjects were "guerrillas convicted to death 死刑判決を受けた匪賊." Eight subjects were given vaccine made with ultrasonic devices, eight were given vaccine made at the Army Medical College, and four received nothing as controls. Then they were forced to drink milk contaminated with cholera bacteria that had been developed as a weapon. The eight subjects who received ultrasonic vaccine did become seriously ill, but those who received with the other vaccine had severe diarrhea, and one of them died. All four controls died too. Ishii ordered Yamauchi and his superiors to produce ultrasonic vaccine on a large scale (Chinese Central Archive et al. *Jintai Jikken*, pp. 93-97).

Medical orderly of Unit 731 Furuichi 古都 also testified at Khabarovsk about a typhus vaccine experiment:

. . . [T]his was at the end of 1943. To test the effectiveness of vaccines, 50 Chinese and Manchurians were used as experimental material. First these 50 men were given preventive inoculations, but these were differentiated inoculations--some prisoners were given one, others were given two. Furthermore, different men were inoculated with different quantities of vaccine, and some of these 50 men were not inoculated at all.

Thus, these 50 men were divided into five different groups. All these men were forced to drink water contaminated with typhoid germs and then observation was kept to see what effect these pathogenic germs had in the different cases, depending on whether preventive inoculations had been performed on the man or not, how many times, and in what quantities.

. . . Most of these men contracted typhoid. Exactly what percentage I do not remember, at all events 12 or 13 of the men died.

. . . I myself know of one other case of such infection, this was at the end of 1944 or beginning of 1945, when infection was caused by similar methods. (Materials 1950, pp. 355-356)

Human vaccine experiments also were performed at Manchuria Medical University. Masaji Kitano 北野政次, then a Professor of microbiology at that University and later the Commander of Unit 731, and his colleagues wrote in an unpublished paper found in China after the war, "In Linjiang 臨江 area we performed human experiments with 10 volunteers and 3 condemned. . . . They were healthy men of 32-74 years old with no anamnesis of typhus and other acute fever." (Kitano et al.) Kitano and his colleagues injected Typhus bacteria into 11 subjects who had been vaccinated and into two condemned without vaccination as controls. The condemned subjects both developed fever and were vivisected on 11th and 19th day. Of the 11 who were vaccinated, five became feverish, and one was vivisected.

Development of Surgery

Deadly experimental surgeries were performed on captives to develop new surgical methods. At least two studies are documented. One set of experiments aimed at development hospital techniques was performed on U.S. Air Force crews in mainland Japan. The other experiments, to develop field surgical procedures, were performed on Chinese captives in Inner Mongolia.

From May to June of 1945, Professor Fukujiro Ishiyama 石山福二郎 of the First Department of Surgery, Apprentice Army Surgeon Taku Komori 小森拓, and other Ishiyama's disciples performed experimental surgeries on, and killed, eight USAF crewmen at Kyushu Imperial University Medical School 九州帝国大学医学部. The American airmen were captured when their B-29s were downed, one of them by the suicide attack of a Japanese fighter. The Japanese Western District Army 西部軍 decided to execute them and handed them over to Komori and Ishiyama. On May 17,

1945, Ishiyama removed a lung from two POWs. On May 22, Ishiyama and his team performed total gastric resection and heart surgery on a POW, and removed the gall bladder and half the of liver of another POW. On May 25, they performed trigeminal rhizotomy (severing the facial nerve roots) on a POW. Finally, on June 2 Ishiyama performed surgery on the mediastinum and removed the gall bladder of two of three POWs. The last POW had blood substitute transfusion mentioned later. All of eight POWs were killed during these operations (SCAP: Legal Section 1940-48).

GHQ/SCAP brought this case to the military tribunal in Yokohama after the war. Komori had already died; he had been badly injured in a U.S. air raid on Fukuoka 福岡 in July 1945. Ishiyama hanged himself in prison in July 1946. On Aug. 28, 1948, the Yokohama 横浜 tribunal condemned two army officers and three university doctors to death by hanging, and sentenced another officer and two doctors to life imprisonment. Five other officers, eight doctors, and a head nurse were ordered to hard labor. However, their sentences were reduced in 1950 when Korean War broke out, and no one was executed.

Surgeon Major Kazuharu Tanimura 谷村一治 and his colleagues experimented with field surgery during their expedition to Inner Mongolia. They wrote in their log that on Feb. 4, 1941, they performed enteroanastomosis (intestinal bypass) on "living material No. 1 生體第一号." On the next day, "In order to follow up wounds, using living material No. 3, we amputated the left thigh, cut and sewed right thigh skin, and cut open the skin of the left hypogastrium. Treatments of dummy perforate gunshot wounds were performed on the left arm and right thigh of living material No. 7, and on the left waist and left chest of No. 6." On Feb. 6, they shot No. 8 to make perforate wounds, then performed transfusion and tracheostomy on him (Toki Eisei Kenkyuhan 1941).

Hemostasis Experiment

Tanimura and his colleagues also performed hemostasis experiments. On Feb. 5, subjects No. 6 had hemostasis on the arm wound, and No. 7 had it on the thigh wound. On Feb. 6, they cut No. 5's arteries in the leg and performed hemostasis with

clamps. On Feb. 8, they performed various experiments with tourniquets on the same subject (Toki Eisei Kenkyuhan 1941).

Transfusion Experiments

Tanimura's detachment performed various transfusion experiments. On Feb. 5, 1941, they wrote that subjects No. 1 and No. 3 had transfusion of blood and Ringer solution at room temperature. On Feb. 7 they transfused blood kept in thermos bottle, blood that had been frozen outside the tent and then been thawed, and sheep blood. On Feb. 8, they transfused blood taken from the heart of corpse (Toki Eisei Kenkyuhan 1941, pp. 25-29).

At Unit 731, transfusion experiments with different blood groups were performed. Naeo Ikeda 池田苗夫 wrote:

In my experience, when A type blood 100 cc was transfused to an O type subject, whose pulse was 87 per minute and temperature was 35.4 degree C, 30 minutes later the temperature rose to 38.6 degrees with slight trepidation. Sixty minutes later the pulse was 106 per minute and the temperature was 39.4 degrees. Two hours later the temperature was 37.7 degrees, and three hours later the subject recovered. When AB type blood 120 cc was transfused to an O type subject, an hour later the subject described malaise and psychroesthesia in both legs. When AB type blood 100 cc was transfused to a B type subject, there seemed to be no side effect.

私の経験では、A型給血者をO型受血者に100cc輸血例に於て、輸血前脈拍87、体温35.4度、30分後体温38.6度、軽い戦慄。60分後、脈拍106、体温39.4度、2時間後37.7度、3時間後恢復した。またAB型給血者をO型受血者に120cc輸血した場合には1時間後両下肢冷感ならびに倦怠感を訴えた。AB型給血者をB型受血者に100cc輸血した場合には何等副作用らしきものを認めなかった。(Ikeda 1966)

At Kyushu Imperial University Medical School, sterilized and diluted brine as blood substitute was transfused to U.S. airmen in the experimental operations described above. On May 17, 1945, Professor Ishiyama and his aides transfused 2,000 cc of blood

substitute into the first subject whose lung was removed. On June 2, they drew about 500 cc of blood from the right thigh artery of another POW and transfused blood substitute 300 cc. These subjects were vivisected and killed (SCAP: Legal Section 1940-48).

3) Development of Weapons

The third category was weapons development research. The aim of researchers in this category was to find the ways not to save but to kill people more effectively and certainly. Doctors in Ishii's medical network performed both biological and chemical weapon trials on human subjects and killed them.

Biological Weapon Trial

US investigator Dr. N. H. Fell wrote on many biological weapon trials in his report. Of anthrax bomb trials he notes:

Full details and diagrams of the field trials are given. In most cases the human subjects were tied to stakes and protected with helmets and body armor. The bombs of various types were exploded either statically, or with time fuses after being dropped from aircraft. . . . The Japanese were not satisfied with the field trials with anthrax. However, in one trial with 15 subjects, 8 were killed as a result of wounds from the bombs, and 4 were infected by bomb fragments (3 of these 4 subjects died). In another trial with a more efficient bomb ("Uji"), 6 of 10 subjects developed a definite bacteremia, and 4 of these were considered to have been infected by the respiratory route; all four of these latter subjects died. However, these four subjects were only 25 meters from the nearest of the 9 bombs that were exploded in a volley. (Fell 1947)

This description coincides with testimony by Japanese officers and soldiers at the Khabarovsk Trial and the Chinese investigation. For example, Surgeon Major Tomio Karasawa 柄澤十三夫, who was the Chief of the Production Division of Unit 731,

testified at Khabarovsk as follows:

I was present on two occasions at experiments in infecting people under field conditions at the Anta [sic] Station proving ground. The first experiment was made towards the end of 1943 with anthrax bacteria. Ten persons were used for these experiments. They were brought to the proving ground and tied to stakes five metres apart from one another. A fragmentation bomb was used for the purpose, placed 50 metres from the people to be infected. The bomb was exploded by electric current. Some of the experimentees were infected as a result of these experiments. They were given certain treatments and then sent back to the detachment. I later learned from the report that the persons who had got infected with anthrax subsequently died. (Materials 1950, p. 268)

Surgeon Major Hideo Sakakibara 榊原秀夫, who was the Chief of Linkou 林口 Branch of Unit 731, testified at the Chinese investigation that he took part in a similar anthrax experiment at the Anda Proving Ground (Takidani 1989, pp. 109-110). Masauji Hata 秦正氏 of Unit 731 testified that he saw a film that recorded this kind of experiments (Chinese Central Archive et al. *Jintai Jikken*, pp. 91-92).

Of plague, Fell reported precisely:

d. Bomb trials

A summary of 3 or 4 of the best trials is given below (in these trials the concentration of bacilli on the ground around the subjects was measured with plates). . . .

The conclusions from all the bomb trials was that plague were not a satisfactory B.W. weapon due to their instability but that it was much more practical to spread plague by means of fleas.

e. Spraying experiments

The results indicated that this method was highly effective, both with subjects held within a room and also exposed to bacilli spread from aircraft at low altitudes. 50 - 100 per cent of the subjects used in various trials became infected and the mortality was at least 60 per cent.

f. stability

No success was attained in stabilizing plague bacilli either in suspensions or by drying.

g. Infected fleas

A great deal of work was done on methods of breeding fleas and infecting them through rats. Methods were developed for producing many kilograms of normal fleas (one gram = 3,000 fleas), and for infecting them on a production basis. This flea work is described in great detail and represents an excellent study.

It was found that infected fleas survived for about 30 days under the best conditions and were infective for that length of time. It was also found that one flea bite per person usually caused infection. It was also found that if subjects moved freely around a room containing a concentration of 20 fleas per square meter 6 of 10 subjects became infected and of these 4 died.

Bomb trials were carried out using the "UJI" porcelain bomb with primacord explosive. The fleas were mixed with sand before being filled into the bomb. About 50 per cent of the fleas survived the explosion which was carried out in a 10 meter square chamber with 10 subjects. 8 of the 10 subjects received flea bites and became infected and 6 of the 8 died. (Fell 1947)

Surgeon Major General Kiyoshi Kawashima 川島清 of Unit 731 testified at Khabarovsk about an experiment in the summer of 1941:

The persons used for these experiments, fifteen in number, were brought from the detachment's inner prison to the experimental ground and tied to stakes which had been driven into the ground for the purpose. Flags and smoke signals were used to guide the planes and enable them to find the proving ground easily. A special plane took off from Pingfan [sic] Station, and when it was over the site it dropped about two dozen bombs, which burst at about 100 or 200 metres from the ground, releasing the plague fleas with which they were charged. The plague fleas dispersed all over the territory.

A long interval was allowed to pass after the bombs had been dropped in order that the fleas might spread and infect the experimentees. These people were then disinfected and taken back by plane to the inner prison at Pingfan Station, where observation was established over them to ascertain whether they had been infected with plague. (Materials 1950, p. 259)

Following the testimony of about the anthrax experiment cited above, Tomio Karasawa 柄澤十三夫 described another plague experiment:

The second occasion was in the spring of 1944. These were experiments in the use of plague germs. The infection was to be through the respiratory organs. The experimentees were handled in the same way as in the anthrax tests. (Materials 1950, p. 269)

Of glanders, Fell reports also about bomb trials:

Only one trial was conducted using 10 human subjects and 10 horses. Three of the horses and one of the men became infected, but there are no data on cloud concentration or density of the organisms on the ground. (Fell 1947)

Of gas gangrene, Surgeon Lieutenant Colonel Toshihide Nishi 西俊英, who was the Chief of the Training and Education Division of Unit 731, testified at the Khabarovsk Trial about bomb experiments in Anda 安達:

In January 1945, by order of the Chief of Detachment 731, I went to Anta [sic] Station. There I saw experiments in inducing gas gangrene, conducted under the direction of the Chief of the 2nd Division, Ikari 碓, and the researcher Futaki 二木. Ten prisoners were used for the purpose. They were tied [to] facing stakes, five to ten meters apart from one another. The prisoners' heads were covered with metal helmets, and their bodies with screens.

Each man's body was fully protected, only the naked buttocks being exposed. At about 100 meters away a fragmentation bomb was exploded by electricity, this being the means of causing the infection. All ten men were wounded in the exposed part. The experiment over, the ten men were put in a special automobile and sent back to the prison at Pingfan Station. I later asked Ikari and researcher Futaki what the results had been. They told me that all ten men had been injured and died of gas gangrene. (Materials 1950, pp. 289-290)

Chemical Weapon or Poison Trial

A report authored by unknown researcher in Kamo Unit 加茂部隊 [Unit 731] describes a large field human experiment of yperite gas—that is, mustard gas—from September 7th to 10th of 1940. Twenty subjects were divided into three groups and placed in combat emplacements, trenches, gazebos, and observatories. One group of subjects was clothed with Chinese underwear, no hat, and no mask, and were subjected to yperite gas as much as 1,800 field gun shots over 25 minutes. Another group was clothed in summer military uniform and shoes; three had masks and another three had no mask. They also were exposed to yperite gas as much as of 1,800 field gun shots. A third group was clothed in summer military uniform, three with masks and two without masks, and were exposed to as much as of 4,800 shots. Then their general symptoms and damage to skin, eye, respiratory organs, and digestive organs were observed at 4 hours, 24 hours, 2 days, 3 days, and 5 days after the shots. Injecting the blister fluid from one subject into another subject and analyses of blood and soil were also performed. Five subjects were forced to drink a solution of yperite and lewisite gas in water, with or without decontamination. The report describes conditions of every subject precisely without mentioning their aftermath (Kamo Butai).

There are other documents of this kind of experiment of chemical weapons. In his log of April 21, 1939, Surgeon Colonel Setsuzo Kinbara 金原節三 wrote about "A Report of Special Tests in Manchuria 満州における特殊試験報告" presented at the Department of Army by Surgeon Lieutenant Colonel Kondo 近藤 of the Army Science Institute. These "tests" seem to have been performed together by the Army Science Institute 陸軍科学研究所, Kwantung Army Chemical Department, and Unit 731. Kondo reported results as follows. About cyanide fume, "subjects became unconscious in 4-6 minutes. Since the results of human being and guinea pig are the same, we can bring latter 4 – 6 分間にて人事不省となる。人とモルモットは同一なる故、モルモットを携行すれば可なり" (Kinbara, Part 1, 1-a). About yperite and lewisite, "treatments are effective if done in 30 seconds. Direct disinfection causes heat and burn 30 秒以内に処理せざれば効なし。直接皮膚を消毒すれば熱をおこし火傷を起す" (ibid.). On Oct. 16, 1939, Kondo presented another report titled "Results of Basic

Studies for Chemical Warfare 化学戦に対する基礎的研究成績の発表" at the Department of Army 陸軍省. It said:

(a) Sprinkle of Yperite 黄 1 号丙撒毒

Sprinkled at dawn. Entering with no protection, three to five hours later action became impossible and finally died. 仏曉撒毒 2 時間後無防護侵入。3 ~ 5 時間後戦闘行動不能となり最後致死。

Entering with light protection, fifteen hours later action became impossible. Treatment for more than one month was necessary (mild injury prevents fighting). 軽防護侵入。15 時間で戦闘不能。一ヶ月以上の治療を要す (軽症は戦闘妨害)。

(b) Sprinkled at dawn. In case without protection for six hours, action became impossible at five hours. 仏曉撒毒 6 時間無防護の時。5 時間で戦闘不能となる。

In case with light protection for 10 to 15 hours, action impossible. Treatment for more than one month was necessary (mild injury prevents fighting). 軽防護 10 ~ 15 時間。戦闘不能。一ヶ月以上治療を要す (軽症は戦闘妨害)。

(c) Sprinkled at dawn. No protection. Prevents fighting for 26 hours. 仏曉撒毒 無防護 26 時間 戦闘妨害 (ibid.)

Similarly, on Nov. 19, 1942, Lieutenant Colonel Kumao Imoto 井本熊男 wrote in his log about "A Study of 'Cha' 茶の研究." 'Cha' means cyanide fume. He wrote:

50kg blow guns were placed at each 25m of 1000m. When 17.5 tons of cyanide fume was blown, in the area of 2km distant all the subjects died, and 4km distant half of the subjects died. 1000m 正面ニ 50kg ノ噴射キヲ 25m 間隔ニ置キ 17.5 屯ヲ使用シ縦深 2 軒ニ亙リ致死効力ヲ出セリ、更ニ 2 軒ニ亙リ半死効果アリ

With 1500mg/m³ dense, lethal effect continued for two minutes. 濃度 1500 ミリ g 1 立方 米ニテ、2 分ヲ以テ致死効果発揚ス (Imoto, Vol. 22)

Williams and Wallace report a testimony of an anonymous researcher of Unit

731 Dalian 大連 Branch. He described an experiment with a cyanide bomb:

They used a newly developed gas bomb by Unit 516 for human experiments conducted at Hailar. Nearly 100 marutas [subjects] were used and except one, all of them were killed. Their bodies were carried by truck, ten or twenty at a time, and transported to Haruarushan where tents had been erected for a pathologist to carry out a pathological autopsy. I wasn't involved in the dissection. The person who actually did the dissection was Dr Okamoto. I had to wait outside the tent to obtain the blood that had been recovered from various organs of the autopsies and placed in tubes, and took these to the military hospital in Hailar. There I checked the contents of cyanide in the blood. That was my job. (Williams & Wallace 1989, pp. 46-47)

At the Khabarovsk Trial Senior Sergeant Kazuo Mitomo 三友一男 of Unit 100 described poison experiments in which he helped researcher Tsunetaka Matsui 松井 経孝:

Experiments on human beings were performed in August-September 1944. These experiments took the form of giving experimentees, without their knowledge, soporific drugs and poisons. The experimentees included 7-8 Russians and Chinese. Korean bindweed, heroin and castor-oil seed were among the poisons used in the experiments. These poisons were put in the food.

The poisoned food was given to the experimentees five or six times over a period of two weeks. Korean bindweed was used mostly in soups, I think heroin in porridge, while tobacco was mixed with heroin and bactal. After eating the soup mixed with Korean bindweed the experimentees dropped off into a deep five-hour sleep 30 minutes or an hour later. After two weeks the experimentees were so weak that they could no longer be used. . . .

For purposes of secrecy all the experimentees were put to death. . . .

There was the case of a Russian experimentee who, on the orders of Matsui, a researcher, was put to death with an injection of one-tenth of a gram of potassium cyanide. . . .

I made the injection of potassium cyanide. . . .

I dissected the body at the detachment's cattle cemetery. . . . (Materials 1950, pp. 323-324)

Poison experiments were also performed at other EPWSDs. Engineer Major Shigeo Ban 伴繁雄 of The Army 9th Technology Institute 陸軍第九技術研究所 (Noborito Institute 登戸研究所) confessed to performing poison experiments at Unit 1644 in Nanjing. Early in May 1941, the Army General Staff Corps 陸軍参謀本部 ordered Ban and his eight colleagues to visit Unit 1644 to test the toxicity of a newly developed poison acetone cyanhydrin in human beings. In 1993, Ban wrote:

Director Shinoda of Noborito Institute met Commander Shiro Ishii of Unit 731 at the General Staff Corps and asked for cooperation with this experiment. Ishii freely agreed. Unit 731 was established as Japanese Army's secret biological warfare unit, but in its pharmacological division cyanide compounds were also studied. . . . According to the program, the experiment would continue for about a week, the experimenter would be an army surgeon of Unit 1644, and researchers of Noborito Institute would support him. The subjects were captive soldiers of Chinese Army or the condemned for general crimes. The number of the subjects were about fifteen. . . .

The aims of the experiment were to determine lethal dose of acetone cyanhydrin, to observe symptoms, and to compare it with potassium cyanide. The results of deglutition and injection experiments demonstrated that, as had been predicted, both forms of cyanide made almost the same progress from administration to death and showed almost the same effects at dissection. Injection was most effective, hypodermic injection was enough.

The lethal dose of acetone cyanhydrin was about 1cc (1g), whose effect appeared in a few minutes and led to death in 30 minutes. But it depends on constitution, sex, and age, in some cases it took from several to more than ten hours to die. We could not determine it precisely. Anyway, acetone cyanhydrin begins to take effect in seconds, though it takes a little more time than potassium cyanide.

この実験にあたって篠田【鏑、登戸研究所】所長は、関東軍防疫給水部（昭和十六年八月から秘匿名・満州第七三一部隊に改称）の石井四郎部隊長（当時軍医少将）と参謀本部で接触し、実験への協力を快諾を得ていた。関東軍防疫給水部は日本軍の極秘細菌戦部隊として設けられたが、薬理部門では青酸化合物などの研究も行われていたからである。【中略】実験期間は約一週間を見込み、実験者は同防疫給水部の軍医で、実験には登戸研究所

からの出張員が立ち会うというものだった。実験対象者は中国軍捕虜または、一般死刑囚約十五、六名、とされた。【中略】

実験のねらいは、青酸ニトリールを中心に、致死量の決定、症状の観察、青酸カリとの比較などだった。経口（嚥下）と注射の二方法で行われた実験の結果は、予想していた通りで、青酸ニトリールと青酸カリは、服用後死亡に至るまで大体同様の経過と解剖所見が得られた。また、注射が最もよく効果を現し、これは皮下注射でよかったことも分かった。

青酸ニトリールの致死量は大体 1cc（1 グラム）で、二、三分で微効が現れ、三十分で完全に死に至った。しかし、体質、性別、年齢などによって死亡までに二、三時間から十数時間を要した例もあり、正確に特定はできなかった。しかし、青酸カリに比べわずか効果が現れる時間が長い、青酸カリと同じく超即効性であることには変わりがなかった。

(Ban 2001, pp. 81-82)

These passages show that the Ishii medical network had close connections with other science and technology institutes, and that the Army used Ishii's EPWSDs as laboratories for human experimentation.

Ban, who died soon after writing these passages in November 1993 at the age of 87, expressed deep remorse about this experiment:

Even though it was on captive soldiers and the condemned, inhumane and horrible human experimentation was performed. Belonging to the dark side of wartime, this fact has been passed over in silence. But now I want to disclose it. By revealing this historic fact now I want to offer my sincerest prayer for the repose of their soul and for world peace.

捕虜・死刑囚に対して行われたとはいえ、非人道的な悲惨な人体実験が行われたのである。戦争の暗黒面としてこれまで闇の中に葬り去られてきたが、いまこのいまわしい事実を明らかにしたいと書き綴った。いまは、歴史の空白を埋め、実験の対象となった人々の冥福を祈り、平和を心から願う気持ちである。(ibid.)

In 1948, Ban and his colleagues at Noborito Institute confessed this and other poison experiments to the detectives of the Tokyo Metropolitan Police Department 警視庁 when they were investigated in relation to a burglary and murder case called "Teigin

Affair 帝銀事件.” On Jan. 26, 1948, a man wearing an armband of the "Tokyo Metropolitan Government 東京都" entered a branch of the Teikoku Bank 帝国銀行 in Tokyo and told the staff he was there to give them a "prophylactic to dysentery 赤痢予防薬.” But in fact, he gave them cyanide, and 12 staff were murdered. The police suspected that the criminal was a former officer of Ishii's medical network or Army technological institutes, because he dealt with poison so skillfully. During the police investigation, Ishii, Ban, and other concerned parties testified that deadly cyanide experiments were performed twice at Unit 1644 in 1941 and 1943-1944 and three times at Togo Unit in Beiyinhe in 1934, 1935 or 1936, 1936 or 1937 (Tsuneishi 2002). However, they were never accused. The Police arrested Sadamichi Hirasawa 平沢貞通, a painter, who seemed to have no skill in dealing with poison. In spite of his consistent denial Hirasawa was sentenced to death, but the execution was differed and he died in prison in 1987.

2. Training

At army hospitals, army surgeons performed many vivisections on Chinese captives with anesthesia. For example, these doctors performed appendectomies and tracheostomies on the prisoners, shot them and took bullets from their bodies, cut open their arms and legs and sewed up the skin around the wounds, and finally killed them. This was purportedly part of training newly assigned army surgeons how to treat wounded soldiers at the front lines. However, since the skill to prevent needless harm and death was not required, the main purpose seems to have been to desensitize surgeons, rather than to make them skillful.

Confessions by many of the surgeons involved are on record (Yoshikai 1981, Chinese Central Archive et al. 1989). At Datong Army Hospital 大同陸軍病院 in Datong 大同, Shanxi 山西 in June probably of 1941 Surgeon Major Kazuharu Tanimura 谷村一治 and Surgeon Lieutenant Rihei Miura 三浦理平 conducted a three-day

training program. Lectures in military surgery were given in the morning, and in the afternoon exercise surgeries such as angiorrhaphy, neurorrhaphy, thoracotomy, celiotomy, craniotomy, blood transfusion, various anesthetizations, appendectomy, and nephrectomy were performed serially on "six bodies of prepared materials〇〇資材六体準備使用ス" (Daido Rikugun Byoin). The trainees were army surgeon officers of the Army Medical College. Judging from confessions about similar cases, the "materials" probably were arrested Chinese resisters who probably were killed in these exercises.

In the summer of 1989, human bones from more than 100 bodies were found in the ground where the Army Medical College had been located in Tokyo from 1929 to 1945. Eleven skulls and most long bones are heavily sawed or drilled. One skull was shot and another one was stabbed. Judging from the condition and technique, they must have been the subjects of test surgeries, preserved as specimens in the Army Medical College, and finally buried when Japan surrendered (Tsuneishi 1992). They may be the remains of vivisected Chinese prisoners.

3. Biological Warfare

Hundreds of confessions also testify to Imperial Japanese research into and use of biological warfare. Moreover, Japanese Army officers themselves wrote about biological warfare in their official records. According to these notes, at least three major attacks were carried out.

First, in 1940 Lieutenant Colonel Kumao Imoto 井本熊男, then on the general staff of Japanese Expeditionary Force in China 支那派遣軍参謀, wrote in his log several times about consultations with army surgeon officers of Unit 731. On Oct. 7, 1940, he wrote that Unit 731 officers reported "So far six attacks have completed 今迄ノ攻撃回数六回" on Ningpo 寧波 City (Imoto, Vol. 9). On Oct. 30, an epidemic of plague suddenly occurred in Ningpo, which is now suspected to be the result of these attacks. In the diary of Nov. 30, 1940, general officer Kaizo Yoshihashi 吉橋戒三

reported to Imoto "On November 21. . . an agreement was reached that next time Jinhua would be attacked 金華ヲ攻撃スル如ク協定成立セリ" with Ishii's Unit (Imoto, Vol. 10). This coincides with the fact that on Nov. 28 a Japanese bomber sprinkled granules on the city of Jinhua 金華 in which plague bacillus was found.

Second, on Sept. 16, 1941, Imoto wrote that "the Imperial Headquarters issued a direction for biological warfare ○ホ【原文は○囲みホ】ノ大陸指発令" (Imoto, Vol. 13). On Nov. 25 it was reported that Changde 常德 was attacked in the morning of Nov. 4 and an epidemic occurred there on Nov. 6 (Imoto, Vol. 14).

Third, on Aug. 28, 1942, Imoto noted how army surgeons of Unit 731 had performed biological warfare in Xigong Operations. In Guangxin 広信, Guangfeng 広豊, and Yushan 玉山, plague bacillus was scattered with contaminated fleas, rats, and rice. In Jiangshan 江山 and Changshan 常山, vibrio cholerae was directly thrown into wells or smeared on foods and injected into fruits that were left to the streets. In Quxian 衢県 and Lishui 麗水, typhus and paratyphoid were distributed with corrupted fleas. On Oct. 5, Army Surgeon Colonel Tomosada Masuda 増田知貞 of Unit 731 told Imoto that the attacks with contaminated fleas and throwing vibrio cholerae into the wells were probably successful (Imoto, Vol. 19).

Fifty-five years later, in August 1997, 180 family members of Chinese victims of the biological attacks filed a complaint in Tokyo District Court 東京地方裁判所 demanding an apology and compensation from the Japanese government. On Aug. 27, 2002, the court dismissed the complaint, ruling that individuals cannot sue a country for compensation for wartime sufferings. On July 19, 2005, Tokyo Higher Court 東京高等裁判所 dismissed it again on the same reason. But the courts acknowledged that biological warfare had been waged, because the Japanese government never argued but rather kept silent about it even in the court.

Ethical Issues

It is totally impossible to justify these deadly experiments. But some difficult ethical problems are involved. Let us consider them referring to Beauchamp and Childress' four principles of biomedical ethics (Beauchamp & Childress 2001).

First, in terms of the Principle of Nonmaleficence, the Japanese doctors did maximum harm to the subjects because they killed all the subjects. At Unit 731, when they abandoned their facilities they murdered all surviving captives to destroy evidence. . That the subjects were scheduled to be executed anyway is no excuse, because the doctors' conduct violated the principle of doing no harm. Second, in terms of the Principle of Beneficence, there was no benefit to the subjects. The only possible benefit was that the subjects were anesthetized when they vivisected. But this slight benefit must be offset by the fear and suffering they experienced before being vivisected.

On the other hand, was there any benefit to other parties? We cannot say that experimentation for weapons development is general benefit for the humankind, because weapons are developed for harming enemies. Weapons can benefit only allies. But can the benefit for allies outweigh the harm of enemy people? In other words, is it possible to justify deadly weapons-development experiments in terms of national security? From the universal ethical point of view, the answer must be, "No." However, in reality, it is not so unusual to answer, "Yes," as U.S. investigators surely did.

Moreover, how about experimentation for acquisition of scientific knowledge and therapy development? In these cases, the results can save not only allies but also enemies. Can we justify deadly experiments in terms of benefit to humankind? This is one of the hardest questions.

Former Surgeon Lieutenant Colonel Ryoichi Naito 内藤良一, who was Ishii's right-hand man, offered a list of 'merits 成果' of Unit 731 during an interview in 1981. The list was:

dried blood plasma (substitute for transfusion)

water-purification machine

penicillin
BCG (dried)
plague vaccine
typhus vaccine
cholera vaccine
antitetanus serum
乾燥人血漿 (輸血代用)
濾水機
ペニシリン (碧素)
BCG (乾燥)
ペストワクチン
発疹チフスワクチン
コレラワクチン
破傷風血清 (Tsuneishi 1995, p. 190)

This episode shows that Naito and his colleagues were proud of their medical achievements in Ishii's network. In fact, some of these 'merits' do not seem to be true. But even if there is some truth to the claimed achievements, can we accept such a justification?

From a utilitarian point of view, the answer might be, "Yes." But this seems to be outrageous. Probably we should take a deontological viewpoint and say absolutely, "No." This attitude must be required for the sake of victims.

However, when we reject a utilitarian justification, a harder question arises: Must we reject all the achievements of inhumane experiments even if those results can really save lives and reduce suffering? For example, must we ignore the results of deadly anthrax experiments even though we might use them to treat victims of anthrax terror? From a utilitarian point of view, ignoring the results of such experiments would mean disrespecting the lives of terror victims and making the subjects' deaths meaningless.

Third, in terms of the Principle of Justice, the burden of being subjects of deadly experiments was unjustly allocated. Captives were selected as subjects. The experimenters did not perform the same deadly procedures on themselves or their loved ones. So, subject selection was unjust.

Moreover, Imperial Japan established a system of "Special Transfer Procedure 特移扱" in the Army Military Police for the purpose of procuring subjects. This marks a difference from that of Nazi Germany. The Nazi transfer system was not for procuring subjects but for genocide. But in the case of the Japanese medical atrocities victims, were purposely selected and sent to Ishii's network to be subjects of torturous experiments.

But, when we explore the causes of the doctor's subject utilization, the circumstances were confusing. In Imperial Japanese case, most subjects were Chinese, Russian, Mongolian, and Korean, all foreigners to the Japanese. At that time Japanese regarded Chinese, Mongolian, and Korean people as inferior, so that their humanity need not be respected. Russians and other Caucasians were disparaged because of their imperial ambitions in Asia. Surely ethnic prejudice and racism were involved. In addition, the subjects were arrested as suspected spies and resisters who were often tough communists. The Imperial Japanese government feared and hated them. So anti-communism also explains the doctors' harsh attitude in part. However, according to Yoshio Shinozuka's testimony, doctors even vivisected their fellow Japanese junior assistant who was infected with plague. This fact implies that the doctors' first maxim was not simply "Utilize captive foreigner and communist for research material." Rather, it should be "It is better to utilize human beings who must die for research material than merely to let them die," which Nazi doctors might have adopted too. This includes again a utilitarian argument, and of itself is perhaps universalizable. What if doctors had vivisected their colleagues or family members who were infected with lethal disease? This is a counter-factual argument, but needs to be considered seriously. What makes this 'economical' maxim? Doesn't it contribute to development of medical sciences? Is it unjust?

Fourth, in terms of the Principle of Respect for Autonomy, the Imperial Japanese doctors' experiments can never be justified. The victims were clearly forced to be subjects of deadly experiments. They neither gave informed consent nor were they given any information about what would be done to them. Moreover, their dignity was totally disregarded. They were deprived of their personal identity—called "Maruta" (logs)—and identified only by number. They were treated exactly as human guinea pigs. Doctors kept them in good health only for the purpose of experiments, just as experimental animals are treated. They were utilized thoroughly: often used first for infectious experiments, then for physiological experiments until they died. When they were murdered in the experiments, their corpses were cremated in incinerators. Their remains were sometimes cast in the river. The places of their burial have never been identified. Japanese doctors' treatment of subjects was totally disrespectful toward the autonomy of human beings.

Thus, the Imperial Japanese doctors' experimentation cannot be justified from the deontological viewpoints of nonmaleficence, justice, and respect for autonomy. There might be some utilitarian argument in favor of their behavior—although most of us are probably unwilling to admit it. These deadly experiments are so grotesque that ordinary people hardly believe that they ever took place in the history of the humankind. The remaining ethical question is: How can we stop such things from occurring again? In order to answer this, we must know how it could happen and why doctors participated in the medical atrocities.

How could such medical atrocities be possible? Racism, ethnic prejudice, anti-communism, and utilitarian attitudes are often blamed. But there were other causes, too.

First, Imperial Japan had become more and more dominated by the military in 1930's. As the invasion of China grew wider and deeper, militarism became more powerful in Japanese Diet. For example, the National Mobilization Law in 1938 enabled the government to call out any resources necessary for operations without the

Diet's permission. Because the Emperor officially commanded the Imperial Japanese Armed Forces, Army leaders claimed to be acting with the authority of the Emperor even when they really were operating on the basis of their own judgment. In these circumstances, army surgeons might gradually have convinced themselves that everything was justifiable when it was done for the sake of the country and the Emperor.

Second, Japanese military rule in China was known to be very cruel. Chinese people who were forced to work in Japanese factories were treated violently and often killed. The murders by human experiments were only one part of a huge massacre by the Japanese Army. Doctors of Ishii's network might have gotten used to treating foreigners harshly, too.

Third, since the human experimentation was performed strictly behind closed doors, researchers might have lost a common sense of humanity. The Imperial Japanese Government was in part afraid of severe international condemnation if such atrocities became widely known overseas. Therefore, the fact of deadly human experimentation was treated as a "secret of secrets." The existence of the laboratories was completely hidden from the public, making it possible for researchers to ignore the constraints of medical ethics.

Most of the doctors who performed the deadly experiments were academic researchers who had already been professors at leading medical schools. They were temporarily employed by the Army. Why did they join Ishii's network? Was it impossible to avoid participation?

In Imperial Japan, pressure for their participation was high. As militarism grew powerful, cooperation with the military was common. Researchers would be blamed as traitors ("Hikokumin") if they refused to participate. They accepted their fate without trying to resist, even when they knew what they would be assigned to do. Former Army Surgeon Ken Yuasa 湯浅謙, who performed deadly surgical training at Luan Army Hospital, recalls the moment when he was ordered to perform a vivisection:

When I was told that, I felt tense and thought, "Ah, this is it." It was whispered among students in my schooldays at Jikei Medical University that an army surgeon sent to China risked having to perform vivisection. Students knew that most of those who became army surgeon did it. Since I became an army surgeon, I recognized that I couldn't escape from it. わたしは、いよいよ来るものが来たな、というような引き締まった気持でそれを聞いた。というのは慈恵医大の医学生時代の、軍医になって大陸へ渡れば、生体解剖をやる機会があるらしいということをすでに聞かされていたからである。軍医として中国へいった者は、ほとんどの者がそれをやるということは、医学生たちに知れ渡っていた。そして私も軍医になったからには、いつかはそれをやらないでは済まないだろうということ、うすうす覚悟していた。(Yoshikai 1981, p. 65).

In addition, many were ordered by their academic superiors to go to China. In Japanese medical schools, even now, head professors exercise supreme power over their staff. Usually, there is only one professor in each "Ikyoku 医局"—roughly speaking, a department, but with much more authority than university departments in most countries. The Ikyoku system is unique to the Japanese medical profession. The Ikyoku functions as an office of clinical practice, a faculty for graduate education, and a research laboratory. Even after earning a doctoral degree, researchers devote themselves to the Ikyoku, hoping to be nominated by the head professor as his successor. They cannot oppose their professor because rejection of the professor's order (for example, to go to a certain facility) would result in excommunication from the Ikyoku and wreckage of their academic careers.

With research facilities and funding in short supply, head professors were willing to cooperate with the Army and Ishii. They promised Ishii to send their best disciples to his factories; in return, the Army supplied research equipment to the professors. The medical atrocities would have been impossible without the support of the leading medical professors. Therefore, not only the Army but also the Japanese medical profession is guilty of the crime.

But some researchers who came back from Unit 731 seemed to hate the place and strenuously asked their head professors for another position in Japan. The

professors accepted such appeals in some cases, probably because they valued their disciples' talents. Thus, a head professors' order seems to have been sufficient reason to go to the Ishii network of research facilities, but not necessarily a strong enough reason to stay over the long term.

However, Ishii's facilities were luxurious places for the researchers. For example, the annual budget of Unit 731 was 10 million yen—equal to about 9 billion yen in modern currency, or about \$83 million. Half of this budget was for research, and the other half was for labor costs for about 3,000 employees (Materials 1950, p. 250). The salaries were high, and the food served there was wonderful. In fact the laboratories of Unit 731 were the most luxurious in the Japanese Empire.

Moreover, researchers in Ishii's network could study diseases that were hardly ever observed in the Japanese homeland—such as epidemic hemorrhagic fever, plague, typhus, and severe frostbite. The researchers thus could produce brilliant scientific achievements. That's why they could gain good positions in the Japanese medical establishment after the war.

In these retrospective analyses, it is clear at least that we must keep in mind such imperatives as "Do not kill." Utilitarian calculation might produce some justification for these incredible atrocities. But the victims, of whom we must always remind, would never allow this kind of justification even though it might be appealing to others.

Enduring Legacy

In cooperation with the United States, Japan hid the fact of the medical atrocities from both the international and domestic publics for decades. Testimony from the Khabarovsk Trial had been regarded as false communist propaganda. Researchers who confessed to conducting such experiments in China were considered to have been brainwashed. But in 1981, popular writer Seiichi Morimura 森村誠一 published a million-seller book on Unit 731 that included testimony by many of its anonymous

soldiers (Morimura 1981). In the same year, historian Keiichi Tsuneishi 常石敬一 published his first extensive study on Unit 731 (Tsuneishi 1981). Then these atrocities became widely known in Japan, and historical studies have advanced greatly since then as significant documents have been found in Japan, the United States, China, and Russia. However, public attention has often converged on its direness and missed the whole picture.

Outside Japan, the Imperial Japanese medical atrocities did not become widely known until even later. In Britain and the United States, the first comprehensive book in English was published in the end of the 1980s (Williams & Wallace 1989) and another essential study was published in the mid-1990s (Harris 1994). Even in China, there was little research into this issue before the testimony of Japanese war criminals was published in 1989 (Chinese Central Archive et al. 1989).

How are the two countries that conspired to cover up the historical facts behaving now? The U.S. Government is refusing to allow former employees of Unit 731 into the country on the ground that they are war criminals. In 1998, Yoshio Shinozuka 篠塚良雄 was denied entry and directly deported to Japan from Chicago's O'Hare International Airport, even though he had been invited to the country and intended to confess his Unit 731 crimes in public symposia. This attitude is hypocritical, since the U.S. Government must share in the responsibility for keeping these experiments secret because of its immunity deals with the researchers.

On the other hand, the Japanese government is still keeping silent on this issue. It has acknowledged in the Diet 国会 that Unit 731 surely existed, but never explained what was done there. The government and the Establishment in Japan are still looking away from the historical truth. Moreover, it seems as if they wish it to be forgotten and vanished.

One of the human experiments' enduring legacies in Japan flows not from the atrocities themselves, but rather from their concealment.

Within the Japanese medical profession, the issue of "Jintai Jikken 人体実験" (human experimentation) became taboo after the end of the World War II. Many of the

researchers who performed these experiments became prominent figures in academe. If junior researchers speak of human experimentation, they might touch on their head professors' "secret of secrets 秘中の秘" and wreck their own academic careers. Therefore, not only Ishii's researchers themselves but also their disciples have hardly mentioned this issue publicly.

On the other hand, most of the public has thought it unnecessary to discuss human experimentation seriously. Because the Japanese and U.S. governments have been fairly successful in covering up the experiments, most people could not believe that medical doctors, who devote themselves to saving lives, really treated human beings like guinea pigs. When a few people found the Khabarovsk trial to be credible and appealed for public inquiry, they were usually sneered at. The fact of wartime medical atrocities has been treated at best as a dire inside story. This failure to examine history publicly permits most Japanese to regard human experimentation as a barbarism performed by mad doctors in a doubtful story—totally different from medical procedures by normal doctors in real society. As a matter of fact, many cases of abuse of human subjects of research have been reported in newspapers, journals, and TV in postwar Japan (Tsuchiya 2003). However, these were presumed to be exceptional deviations. The Japanese public has avoided reflection on human experimentation in both military and civil medicine.

These circumstances are reflected in the field of medical ethics. The failure to confront reality means that Japanese medical ethics lack a framework for critically discussing and evaluating human experimentation. Medical ethicists have seldom tried to draw from historical cases of subject abuse the guiding principles that should regulate medical research. There has been little discussion, publication, and teaching about protection of human subjects. Even in postwar cases of abuse, journalists and ethicists have focused discussion a case-by-case basis and failed to derive general principles. Consequently, politicians have never proposed a blanket act for medical research, and the government has never articulated general policy for subject protection. So far, Japanese guidelines for medical research are only patchworks of articles transferred from international guidelines such as the Declaration of Helsinki. They have not been

derived from the lessons of history, especially of the past medical massacre performed by our own doctors.

This is a poor ethical state for a country boasting of its economic development and trying to lead world medical science. Looking into one's own deeds is one of the prime imperatives of ethics. In order to be acknowledged as an ethical country, Japan must admit its past deeds, inquire into the truth, apologize to and compensate the victims for their sufferings. This will surely lead to the establishment of true clinical research ethics in Japan.

*Here I write alphabet of every Japanese name in Western way, given name first and family name last. But in our own language we always put them in reverse order. Please notice that some Western references write Eastern names as Easterner usual do in domestic life, family name first and given name last.

All the texts cited from Japanese documents are translated by Tsuchiya.

REFERENCES

Asano T, Tsuneishi K 朝野富三・常石敬一. *Kibyō--Ryūkōsei Syukketunetsu* 奇病・流行性出血熱 (Weird Disease--Epidemic Hemorrhagic Fever). Tokyo: Shincho Sha 新潮社 1985.

Ban S 伴繁雄. *Rikugun Noborito Kenkyūjo no Shinjitsu* 陸軍登戸研究所の真実 (The Truth about Noborito Institute). Tokyo: Fuyo Shobo Shuppan 芙蓉書房出版 2001.

Beauchamp TL, Childress JF. *Principles of Biomedical Ethics*. 5th edition. New York: Oxford University Press 2001.

Chinese Central Archive et al. eds. 中央档案馆・中国第二歷史档案馆・吉林省社会科学院(合編). *Seitai Kaibo* 生体解剖 (Vivisection), *Jintai Jikken* 人体實驗 (Human Experimentation), and *Saikin Sakusen* 細菌作戰 (Germ Warfare). Tokyo: Dobunkan 同文館 1991-1992. These three volumes are Japanese translation of *Xijunzhan yu Duqizhan* 細菌戰与毒氣戰 (Biological and Chemical Warfare). Beijing: Zhonghua Shuju 中華書局 (Chinese Printing Office) 1989.

Daido Rikugun Byoin 大同陸軍病院 (Datong Army Hopital). *Chumogun Gun'i Shoko Gunjin Gekagaku Syugo Kyoiku Katei Hyo* 駐蒙軍軍医将校軍陣外科学集合教育課程表 (A Program of A Group Education of Military Surgery for Army Surgeon Officers of the Occupation Forces in Mongolia). June 5-7 probably of 1941. Reprinted in Toki Eisei Kenkyuhan: Appendix.

Fell NH. *Brief Summary of New Information About Japanese B. W. Activities*. HHH/ars/3, 20 June 1947. Utah: Dugway Proving Ground, File No. 005. Reprinted in Kondo 2003: Disc 3.

Harris SH. *Factories of Death: Japanese Biological Warfare, 1932-45, and the American Cover-Up*. New York: Routledge 1994 (Revised edition 2002).

Hill EV. *Summary Report on B. W. Investigations*. 12 December 1947. Utah: Dugway Proving Ground, APO 500. Reprinted in Kondo 2003: Disc 6.

Ikeda N 池田苗夫. *Ketsuekigata no Futekigo Yuketsu no Kiken* 血液型の不適合輸血の危険 (Risk of Different Blood Type Transfusion). *Osaka Hoken'i Shimbun* 大阪保険医新聞 (Newspaper for Practitioner in Osaka) January 21, 1966.

Ikeda N 池田苗夫. *Ryukosei Syukketsunetsu no Ryukogakuteki Chosa Kenkyu* 流行性出血熱の流行学的調査研究 (Epidemiological Studies of Epidemic Hemorrhagic Fever). *Nihon Densenbyo Gakkai Zasshi* 日本伝染病学会雑誌 (The Journal of the

Japanese Association for Infectious Diseases) 1967; 41(9): 337-347.

Ikeda N 池田苗夫. Ryukosei Syukketsunetsu no Shirami, Nomi ni yoru Kansen Jikken 流行性出血熱のシラミ、ノミによる感染実験 (Experimental Studies of Epidemic Hemorrhagic Fever: Pediculus Vestimenti and Xenopsylla Chepis as Suspected Vectors of the Disease). *Nihon Densenbyo Gakkai Zasshi* 日本伝染病学会雑誌 (The Journal of the Japanese Association for Infectious Diseases) 1968; 42(5): 125-130. .

Ikeda N, Araki S 池田苗夫・荒木三郎. *Hashofu Dokuso narabini Gaho Sesshuji ni okeru Kin Chronaxie ni tsuite* 破傷風毒素竝ニ芽胞接種時ニ於ケル筋「クロナキシー」ニ就テ (Muscle Chronaxie of Patients Injected with Toxin and Spore of Tetanus). Date unknown. Reprinted in Tanaka & Matsumura 1991: 45-57.

Imoto K 井本熊男(中佐). *Gyomu Nisshi* 業務日誌 (Operation Log). Collection of the Military Archives, Japan Defense Agency 防衛庁防衛研究所図書館史料室. Cited by Yoshimi & Iko 1993, 1995.

Kamo Butai 加茂部隊 (Kamo Unit). *Kiidan Shageki ni yoru Hifu Shogai narabini Ippan Rinshoteki Shojo Kansatsu* きい弾射撃ニ因ル皮膚傷害竝一般臨床的症狀観察 (An Observation of Skin Injuries and General Clinical Symptoms occurred by Shots of Yperite Shell). Date unknown. Reprinted in Tanaka & Matsumura 1991: 1-42.

Kasahara S, Kitano M et al. 笠原四郎・北野政次ほか. Ryukosei Syukketsunetsu no Byogentai no Kettei 流行性出血熱の病原体の決定 (Identification of the Pathogen of Epidemic Hemorrhagic Fever). *Nihon Byori Gakkai Kaishi* 日本病理学会会誌 (Japanese Journal of Pathology) 1944; 34(1-2): 3-5.

Kinbara S 金原節三(軍医大佐). *Rikugun Gyomu Nisshi Tekiroku* 陸軍業務日誌摘録 (Summary of the Army Operation Log). Collection of the Military Archives, Japan Defense Agency 防衛庁防衛研究所図書館史料室. Cited by Yoshimi & Iko 1993.

Kitano M, Iwata S, Watanabe S 北野政次・岩田茂・渡辺栄. *Hasshin Typhus no Yobosesshu ni kansuru Kenkyu: Yo ra no Chosei seru Hasshin Typhus Vaccine no Jintai Kansen Bogyoryoku Shiken* 発疹チフスの予防接種に関する研究 余等の調製せる発疹チフス・ワクチンの人体感染防御力試験 (A Study of Vaccination of Typhus: On A Immunity Test of Our Typhus Vaccine). Unpublished. Its abridged Chinese translation is in Yang & Xin 2002: 333-346.

Kondo S. eds. 近藤昭二(編). *731 Butai Saikinsen Shiryo Shusei* 731 部隊・細菌戦資料集成 (*Japanese Biological Warfare; Unit 731: Official Declassified Records*). CD-ROM 8 Vols. Tokyo: Kashiwa Shobo 柏書房 2003.

Materials on the Trial of Former Servicemen of the Japanese Army Charged with Manufacturing and Employing Bacteriological Weapons. Moscow: Foreign Languages Publishing House 1950.

Morimura S 森村誠一. *Akuma no Hoshoku* 悪魔の飽食 (Devils' Gluttony). Tokyo: Kobunsha 光文社 1981 (new edition Tokyo: Kadokawa Shoten 角川書店 1983).

Ohta M 太田昌克. *731 Menseki no Keifu* 731 免責の系譜 (The Pedigree of 731 Immunity). Tokyo: Nihon Hyoronsha 日本評論社 1999.

Regis E. *The Biology of Doom: The History of America's Secret Germ Warfare Project*. New York: Henry Holt and Company 1999.

Rikugun Gun'i Gakko Boeki Kenkyu Hokoku 陸軍軍医学校防疫研究報告 (Bulletin of the Epidemic Prevention Laboratory in the Army Medical College). Tokyo: Rikugun Gun'i Gakko Boeki Kenkyu Shitsu 陸軍軍医学校防疫研究室. Its *Dai 2 Bu* 第2部 (Part 2) is reprinted by Tokyo: Fuji Shuppan 不二出版 2004-2005, 8 vols.

State-War-Navy Coordinating Subcommittee for the Far East. *Interrogation of Certain Japanese by Russian Prosecutor*. Enclosure. SFE 188/2, 1 August 1947. Reference: SWNCC 351/2/D. NARA, Record Group 165, Entry 468, Box 428. Reprinted in Kondo 2003: Disc 3.

SCAP: Legal Section: ADM. DIV. MISC. File. *Trial Case #394: Record of Trial in the Case of United States vs. Kajuro Aihara*. 1940-1948. NARA, Record Group 331, Stack Area 290, Row 11, Compartment 34, Shelf 4, Boxes 1331-1332.

Shinozuka Y, Michiko T 篠塚良雄・高柳美知子. *Nihon nimo Senso ga Atta: 731 Butai Moto Shonen Taiin no Kokuhaku* 日本にも戦争があつた：七三一部隊元少年隊員の告白 (There Was A War in Japan: A Confession of A Former Junior Assistant of Unit 731). Tokyo: Shin Nihon Shuppansha 新日本出版社 2004.

Suzuki N, Terui S, Takenaka Y, Ohno K, Juh S 鈴木直吉・照井精任・竹中義一・大野憲司・徐鑄森. Histological study of the Chinese brain. Part 1. On the cytoarchitectural structure of the regio frontalis. *Arbeiten aus dem Anatomischen Institut der Kaiserlich-Japanischen Universtitat zu Sendai* 1942; 25: 139-186.

Takasugi S 高杉晋吾. *Nippon no Auschwitz wo Otte* につぼんのアウシュウイツを追って (Searching for Japanese Auschwitz). Tokyo: Kyoiku Shiryo Shuppankai 教育史料出版会 1984.

Takidani J 滝谷二郎. *Satsuriku Kosho--731 Butai* 殺戮工廠・731 部隊 (Murderous Factory Unit 731). Tokyo: Niimori Shobo 新森書房 1989.

Tanaka A, Matsumura T. eds. 田中明・松村高夫(編). *731 Butai Sakusei Shiryo* 七三一部隊作成資料 (Documents Made by Unit 731). Tokyo: Fuji Shuppan 不二出版 1991.

Tanaka Y 田中利幸. Japanese Biological Warfare Plans and Experiments on POWs. In: Tanaka Y. *Hidden Horrors: Japanese War Crimes in World War II*. Boulder, Colorado: Westview Press 1996: 135-165.

Tasaki K 田崎亀夫. Sokei Rimpa Nikugasyu Sho ("N. F." Byo) no Kenkyu (Dai 1 Hou) 鼠蹊淋巴肉芽種症 ("N. F"病) ノ研究 (第 1 報) (A Study of Lympho Granuloma ("N. F. Disease"), Part 1). *Manshu Igaku Zasshi* 満洲医学雑誌 (Manchuria Medical Journal) 1936; 24: 785-804.

Toki Eisei Kenkyuhan 冬季衛生研究班 (The Detachment for Hygiene Studies in Winter). *Chumougun Toki Eisei Kenkyu Seiseki* 駐蒙軍冬季衛生研究成績 (The Report of Hygiene Studies in Winter by the Occupation Forces in Mongolia). March 1941. Reprinted by Tokyo: Gendai Syokan 現代書館 1995.

Tsuchiya T 土屋貴志. In the Shadow of the Past Atrocities: Research Ethics with Human Subjects in Contemporary Japan. *Eubios Journal of Asian and International Bioethics* 2003; 13 (3): 100-101.

<http://www.biol.tsukuba.ac.jp/%7Emacer/EJ133/ej133f.htm>

Tsuneishi K 常石敬一. *Kieta Saikinsen Butai* 消えた細菌戦部隊 (The Germ Warfare Unit Disappeared). Tokyo: Kaimeisha 海鳴社 1981 (expanded version 1989. pocket edition Tokyo: Chikuma Shobo 筑摩書房 1993).

Tsuneishi K 常石敬一. *Hone Wa Kokuhatsu Suru* 骨は告発する (The Bones Are Accusing). Tokyo: Kaimeisha 海鳴社 1992.

Tsuneishi K 常石敬一. *Igakusha Tachi no Soshiki Hanzai* 医学者たちの組織犯罪 (The Conspiracy of Medical Researchers). Tokyo: Asahi Shimbun Sha 朝日新聞社 1994 (reprinted in Asahi Bunko 朝日文庫 1999).

Tsuneishi K 常石敬一. *731 Butai* 七三一部隊 (Unit 731). Tokyo: Kodansha 講談社 1995.

Tsuneishi K 常石敬一. *Boryaku no Crossroad* 謀略のクロスロード (Crossroads of Stratagems). Tokyo: Nihon Hyoron Sha 日本評論社 2002.

Watanabe H et al. 渡邊邊・貴寶院秋雄・更井恒雄・山内豊紀. Chou-onpa Cholera Yobosesshueki no Jintai Sesshugo ni okeru Kakushu Shojo oyobi Kesseigakuteki Hanno ni tsuite 超音波コレラ豫防接種液ノ人体接種後ニ於ケル各種症状及血清学的反応ニ就イテ (On Various Symptoms and Serologic Reactions of Injection of Ultrasonic Cholera Vaccine to Human Body). *Rikugun Gun'i Gakko Boeki Kenkyu Hokoku* 陸軍軍医学校防疫研究報告 1939; Part 2, No. 36: 1-16.

Williams P, Wallace D. *Unit 731: Japan's Secret Biological Warfare in World War II*. New York: The Free Press 1989

Yang Y, Xin P eds. 楊玉林・辛培林(主編). *Xijunzhan* 細菌戦 (Biological Warfare). Harbin: Heilongjiangxing Renmin Chubanshe 黒龍江人民出版社 (Heilongjiang Province People's Press) 2002.

Yoshikai N 吉開那津子. *Kesenai Kioku: Yuasa Gun'i Seitakaibo no Kiroku* 消せない記憶：湯浅軍医生体解剖の記録 (Unforgettable Memory: A Document of Army Surgion Yuasa's Vivisection). Tokyo: Nitchu Shuppan 日中出版 1981 (new expanded edition 1996).

Yoshimi Y, Iko T 吉見義明・伊香俊哉. *Nihon No Saikinsen* 日本軍の細菌戦 (Japanese Biological Warfare). *Senso Sekinin Kenkyu* 戦争責任研究 (Studies in Responsibility for War) December 1993; 2: 8-29.

Yoshimi Y, Iko T 吉見義明・伊香俊哉. *731 Butai To Tenno--Rikugun Chuo* 七三一部

隊と天皇・陸軍中央 (Unit 731 and the Emperor--Army Leaders). Tokyo: Iwanami Syoten 岩波書店 1995.

Yoshimura H 吉村寿人. *Tosho ni Tsuite* 凍傷ニ就テ (On Frostbite). 第十五回滿洲医学会哈爾濱支部特別講演 The manuscript of the special lecture at the 15th Meeting of the Harbin Branch of Manchu Medical Society, October 26, 1941. Reprinted in Tanaka & Matsumura 1991: 225-288.

Yoshimura H, Iida T 吉村寿人・飯田敏行. Studies on the Reactivity of Skin Vessels to Extreme Cold. Part 1. A Point Test on the Resistance against Frost Bite. *The Japanese Journal of Physiology* 1950-1951; 1: 147-159.

Yoshimura H, Iida T 吉村寿人・飯田敏行. Studies on the Reactivity of Skin Vessels to Extreme Cold. Part 2. Factors Governing the Individual Difference of the Reactivity, or the Resistance against Frost Bite. *The Japanese Journal of Physiology* 1951-1952; 2: 177-185.

Yoshimura H, Iida T, Koishi H 吉村寿人・飯田敏行・小石秀夫. Studies on the Reactivity of Skin Vessels to Extreme Cold. Part 3. Effects of Diets on the Reactivity of Skin Vessels to Cold. *The Japanese Journal of Physiology* 1951-1952; 2: 310-315.