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Dr. Szybalski, a member of The Polish Academy of Sciences, was awarded the Honorary Doctor Degrees (D.h.c.), from Universities in Lublin (1980), and Gdańsk, Poland (1989). Among awards, he received: Alfred Jerzykowski Foundation Award in Biology, New York (1977); Hildegard Award, University of Wisconsin-Madison (1994); and Gregor J. Mendel Gold Medal for Merit in the Biological Sciences, Academy of Sciences of the Czech Republic (1993).

Dr. Szybalski was a Chairman of Gordon Conference on Nucleic Acids (1971); Chairman of Virology Division, Am. Society for Microbiology (1972-75); and Member of RAC, NIH Advisory Committee on the Recombinant DNA Molecule Program (1975-1977). He served on Editorial Boards of many journals; he is the Founder (1976-1996), and at present the Honorary Editor-in-Chief of the Journal, GENE. His current interests include developing novel methods in the field of genomics, including cloning methods and automated sequencing of large DNA fragments.
CHAPTER 8

MAINTENANCE OF HUMAN-FED LIVE LICE IN THE LABORATORY AND PRODUCTION OF WEIGL’S EXANTHematous TYPHUS VACCINE

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ABSTRACT

Scientific details and history of the adaptation of clothes lice, *Pediculus vestimenti*, as a propagation and amplification host of the microbial typhus agent, *Rickettsia prowazekii*, for production of the first successful vaccine against exanthematous (epidemic) typhus are described. Professor Rudolf Stefan Weigl (1883-1957), while working in his Institute, before and during the World War (WW2), developed the vaccine at the University of Jan Kazimierz (UJK) in Lwów, Poland. The procedure of 1939 - 1945 consisted of:

(i) feeding of healthy lice kept in special cages on the skin of human 'feeders',
(ii) infection of lice and propagation of *R. prowazekii* in the midgut (stomach) cells,
(iii) the dissection of louse midgut, and
(iv) the final preparation of the phenolized vaccine. Furthermore, the significance of Weigl's vaccine is discussed, as well as the tragic fate of Weigl's scientific heritage and his Institute. The history of vaccine development, in relation to the humanitarian, political and historical ramifications of the very unique and trying period in the history of Central and Eastern Europe, including Lwów and Poland, during and after WW2 are narrated.

INTRODUCTION

Before the era of vaccination and effective insect control, the louse-transmitted typhus was one of the major infectious diseases and a cause of disastrous epidemics. Prof. Rudolf Stefan Weigl (1883-1957) (Figs. 1&2) developed the first successful anti-typhus vaccine at the University of Jan Kazimierz (UJK) in Lwów, Poland (Weigl, 1920, 1930a,b, 1947). This vaccine was produced on large scale in Weigl's laboratory before World War II (WW2) in Lwów, Poland, and used in China (Rutten, 1936,1943), Ethiopia (Mariani, 1939) and other countries. Production continued during the WW2, when Lwów was occupied firstly by Stalin's USSR, in 1939 - 1941, and then by Hitler's Germany in 1941-1944.

In early Spring of 1944, Prof. Weigl was forced to leave Lwów and most of his Institute was forcibly evacuated to Germany by the retreating Nazi army on
destroyed when Lwów was re-occupied by Stalin's USSR, soon afterwards annexed, and then ethnically cleansed.

After suffering waves of occupations, by Soviet Union (1939 - 1941), by Nazi Germany (1941 - 1944), and re-occupation by USSR in 1944, the Polish population of Lwów (at the beginning of WW2, the Polish citizenry of Lwów consisted of about 70% Roman-catholics, 20% Mosaic (Jewish) and 10% Armenian-catholic, Greek-catholic, Lutheran and others), if not liquidated earlier or deported to Siberia, was forcibly evacuated to the Western Poland, mainly Silesia.

This forced evacuation followed by annexation of Lwów by Soviet Union was the result of the USA-approved Yalta and Potsdam agreements, an abominable act of "ethnic cleansing" that the Polish citizenry of Lwów considered as a blatant act of treason committed by USA and Great Britain against Poland, their always faithful wartime ally. Altogether, Poland lost over six millions citizens killed by Nazis and one million by Stalin's regime as result of the WW2, and about two millions deprived of the opportunity to return home at the end of WW2. Moreover, and despite of incorporation of some East German territories, the area of the pre-WW2 Poland was reduced by nearly 20%.

As described above, Prof. Weigl had to leave his beloved city of Lwów, and he then moved to Krościenko nad Dunajcem, where he established a small laboratory, then to Kraków (Cracow) as Professor of General Microbiology at
Figure 2. Prof. Dr. Rudolf Weigl. The winner of the battle with the epidemic (exanthematous) typhus. This postcard represents a rather faithful rendition of Prof. Weigl's facial features, and stresses his major hobby, archery (to which he was very proficient) in an allegoric relationship to the battle with louse-transmitted epidemic typhus. This watercolor painting is from the Album of the 23 cartoons painted by Leszek Szczerbaski and offered to Professor on his 80th birthday on April 17, 1941 (Aquarelle 38 x 20.5 cm; owned by the Muzeum Narodowe Ziemi Przemyskiej, 37-700 Przemysl, Pl. T. Czackiego 3, Poland).

the Jagiellonian University (1945-1948), and finally to the University of Poznan (1948-1951). After retirement, he died in Zakopane, Poland, in 1957, reaching 74 years of age (Kryński, 1957a,b, 1997; Nespiak and Ojrzyński, 1994; Suchy, 1994).

Weigl's accomplishments and procedures for adapting an insect, louse, as an experimental laboratory animal, and applying it in the production of an anti-typhus vaccine are described below.

LICE AND VACCINE PRODUCTION

To produce Weigl's anti-typhus vaccine, the typhus-causing microorganisms, Rickettsia prowazekii, were propagated in the midgut (stomach) cells of live lice and were killed by 0.5% phenol. The individual stages of the vaccine production, as based on my recollections in conjunction with a detailed and scholarly account in the monograph of Kryński et al. (1974), were as follows:
Production of Healthy Lice

(a) Louse strains

The major accomplishment of Prof. R. Weigl was the introduction of an insect, louse, as the experimental animal, for the purpose of propagation of *R. prowazekii*. He has 'engineered' a special strain of lice, named *Pediculus vestimenti*, which was easy to breed, and was well adapted to the production of typhus vaccine. The strain was a Caucasus-African cross between lice isolated from the WWI Russian prisoners (captured by Austrians) and Ethiopian lice received in 1939 by Weigl from the Laboratory for Rickettsiosis in Addis Ababa. This cross was designated as "Weigl strain" (Krynski ET al. 1974: Mariani, 1939). Reasons for cultivating *R. prowazekii* in lice were manifold:

(i) At that time no suitable artificial media existed for cultivation of *R. prowazekii*,

(ii) Subsequently proposed propagation of *R. prowazekii* in hen eggs resulted in the inadvertent selection of progressively less immunogenic variants of *R. prowazekii*, and

(iii) Cultivation and passing of *R. prowazekii* in the midgut of Weigl's strain of lice (*Pediculus vestimenti* or *Pediculus humanus corporis*) was resulting in the most potent and reliable anti-typhus vaccine (Krynski et al. 1974).

(b) Hatching of louse eggs

Lice deposited eggs on small squares of woolen fabric (see below). Each square was then held by a partial constriction near the middle of a cotton-plugged glass vial (hatching tube) and incubated at 32°C. The healthy lice larvae, which hatched after 3 to 6 days, dropped to the bottom of the hatching tube and the crop of 400 - 800 larvae formed a pulsating yellowish ball of about 5 - 8 mm diameter. Larvae were transferred to the flat (of about 4 x 7 cm size) cages (Sikora, 1915, 1917, 1924) only about 5 mm deep and made of wood (for a drawing, see Krynski et al., 1974). One wall of these cages consisted of special screen adapted by Weigl, with his usual ingenuity, from screens routinely used for flour sifting in the Polish flour mill industry. Lice were able only to stick out only their heads through this screen, but were not able to escape. About 800 larvae were placed into each cage containing a loose small square of woolen fabric (for depositing eggs), which during WW2 was made of discarded, Russian or German army uniforms. The cages were seated with paraffin to prevent escape of any tiny larvae.

(c) Feeding of lice on human legs

Depending on the size of calves or thighs, about 7 - 11 cages were placed screen-down on the leg of the 'feeder'. The screen walls of the cages were pressed against the skin, while cages were held under a wide garter-like elastic band. Sticking out their heads through the screen wall, the lice were able to
pierce the skin and suck blood for about 45 minutes, once a day, for about 12 days. The resulting 1 x 2 inch reddish marks on the skin were washed with 60% alcohol, which contained HgCl₂ as the disinfectant. Feeders could tolerate well the moderate discomfort and loss of blood (Finkel, 1932). Between WW1 and WW2, Weigl tried to adapt pigs as large-scale louse feeders, but he did not succeed to make it practical (Weigl, 1920, 1930a,b, and personal communication).

Men usually were attaching the cages to their calves, while women placed the cages on their thighs (as to hide the reddish marks under their skirts). After the 30 - 45 minutes feeding session, the louse gut as well as the entire body was swelling like a balloon, since each louse was ingesting the amount of blood equal to its entire body weight. Lice became rather dark colored (not red) with very shiny abdomens.

(d) Handling of caged lice

Cages were placed 'screen-down' in special holding boxes, as to keep lice dry and clean, while their feces, when drying out, did sift through the screen and collected at the bottom of the holding box. The boxes with cages were kept in 32°C incubators. Lice were periodically transferred (first time after six days, then more frequently) to the cleaned and heat-sterilized cages, each containing a square of woolen fabric for depositing eggs (see above). These transfers were necessary both for collecting eggs, and for removing any dead or unhealthy appearing lice and louse debris, including feces and products of molting. All operations were carried out under highly aseptic conditions, assuring that the lice colony remained healthy and free of any viruses, bacteria or other parasites. However, microbial epizootic infections did sometimes occur, requiring destruction of the contents of such infected cages (Krynski, 1967c, Krynski et al. 1974).

The healthy 12-day old lice were produced by "breeding units" (hodowla), each composed of the supervisor (kierownik hodowli) and 12-15 feeders (karmiciele), i.e., persons who fed the lice. The author of this chapter served as a supervisor of such a unit, and also as a feeder, between 1941 and 1944. Most of the feeders in my breeding unit were Professors of UJK (see the section on the Humanitarian, Historical and Political Ramifications, below). Dr. Zofia Pokorny supervised the entire operation.

Infection of Healthy Lice with *R. prowazekii*

The next step in the vaccine preparation was the infection of lice with *R. prowazekii* at a concentration corresponding to one Rickettsia-infected and fully homogenized louse midgut per ml (10⁵ to 10⁶ infectious units per ml). Cages, each containing 300 - 400 of 12-day old healthy lice, were transferred to the completely separate "injection units", where the specially trained "injectors"
(strzykacze) infected lice manually with *R. prowazekii*, and then fed the infected and caged lice for another 4 days. The entire injection operation was highly engineered, as to make it efficient (for details see Kryński et al., 1974).

As the first step, 20 to 50 lice were immobilized in a special device (Weigl's clamp) where each louse was held by a very gentle spring clamp, while the anal segment of their abdomen was exposed and easily accessible. These clamp devices were then placed under a 32x binocular microscope, and each louse was anally injected with a suspension of *R. prowazekii*. A 0.05 - 0.1 mm glass microcapillary (with its end cut on angle and fire polished, as to avoid injury to louse anus and intestine) served as an injection device. Propagation of *Rickettsiae* took place in cells which lined the louse's straight, strong and elastic midgut. The anal part of gut (*amnium recti*) is lined with very tough chitin and thus is resistant to injury by the glass capillary. Injection was mediated by a pulse of weak positive pressure, controlled by reducing valves, electrically actuated solenoid valves, and finally by the operator (injector) who was using a foot-operated pedal. Each injection cycle consisted of the insertion of the capillary into the louse anus, briefly depressing the pedal to effect the injection, and withdrawal of the capillary; the entire cycle required about one second. Including all the auxiliary operations, a team of two highly skilled operators (one immobilizing and the second injecting the lice) was able to inject up to 2000 lice per hour.

Each batch of about 500 injected lice was then loaded into a cage, and fed for 5 more days by sucking blood of the intensively vaccinated 'injectors'. Feeding of the infected lice attested to the efficacy of Weigl's vaccine, since no serious typhus cases occurred among the injectors.

When population of *R. prowazekii* reached 10⁷ per cell, the gut cells began to burst, resulting in leakage of the undigested and thus red human blood into the louse abdomen; thus in the final stage of the rickettsial infection, the lice bodies turned bright red.

Weigl's methods for large-scale breeding and infecting insects were quite a unique achievement, thus having an impact on other branches of experimental entomology. E.g., experiments were carried on the infection of lice by *Fervinia* and *Pasteurella*, and on testing the efficacy of antibiotics on the rickettsial infection (Becla, 1974; Becla and Kryński, 1972; Kryński and Becla, 1964; Kryński et al., 1966); analogous methods were used for infecting ticks (Becla, 1974). Moreover, the editor of this Manual, Prof. Karl Maramorosch, had adapted some of these methods for cultivation of leafhoppers and for the construction of the "leafhopper clamp and injection" device (Maramorosch and Jernberg, 1970).
Dissection of Lice and Preparation of the Vaccine

The entire production of vaccine at Weigl's Institute in Nineteen Forties was supervised by Dr. J. Starzyk (Starzyk, 1938). As the first step, cages with the infected lice (about 5 days after injecting with Rickettsia) were inspected and cleaned of feces and debris. Those lice with adequate crop of Rickettsia, i.e., those that turned red, were placed into jars filled with 0.5% phenol, earmarked for vaccine production, and consequently transferred to the “dissector’s stations”. “Dissectors” (preparatory) harvested louse guts that were heavily infected with Rickettsia. My younger brother, Stanisław Szybalski worked as a dissector, and helped to refresh my memory about some details described here. Many instruments are depicted in the review of Krynki et al. (1974).

Using a fine scalpel and under the 16x binocular microscope, an incision was made between the thorax and abdomen of louse, and the Rickettsia-infected gut was pulled out using the needle and the tip of the scalpel. Dissection of about 300 lice per hour per dissector was the norm. Both ends of the gut were cut off, and the infected midguts were then transferred to the jars containing 0.5% phenol solution and subsequently ground to a fine suspension in the Weigl’s mortar. Debris were then removed at 100 rpm, the suspension sedimented at 6000 rpm and finally resuspended in 0.5% phenol buffer. The vaccine was prepared at three different strengths and was composed of the vaccination fluid (buffer) containing fine emulsion of phenol-killed R. prowazekii, equivalents to 15, 30 and 45 louse guts. These three strengths of vaccine were packaged and distributed in sealed glass ampoules. At the time of my tenure at the Weigl’s Institute, the entire course of vaccination consisted of three injections, administered at the increasing strength at one-week intervals and amounting to a total of 90 infected louse guts.

The vaccine was safe with the exception of sometimes serious allergic reactions, especially observed among the Weigl’s Institute employees who often became sensitized to louse byproducts. Personally, I have developed asthmatic reaction to louse feces dust; moreover, I had a very strong anaphylactic shock after the third round of vaccination.

SIGNIFICANCE OF WEIGL’S VACCINE

At the time of its development, the Weigl’s vaccine was the first and only remedy against the dreaded typhus epedemics. Although at present, typhus does not appear to be of any major epidemiological importance, this disease was responsible for major epidemics and death of millions, up to the second half of the 20-th century. The extensive epidemiological, clinical and historical accounts could be found in the chapter of Snyder (1948). Only a few salient features are mentioned here. The first description of typhus is of year 1083
from a convent near Salerno, Italy, and similar accounts could also be found in the famous work of Fracastorius, "De Contagione", published in 1546. As described by Professor Stefan Kryński, a collaborator of Prof. Weigl, in several of his articles in 1993-1998 in the Gazette AMG Gdańsk (see especially, Kryński, 1997), and kindly sent to me by Prof. Janusz Limon of the Medical Academy of Gdańsk, the most severe epidemics of typhus usually accompanied the major wars and famines. One of the biggest epidemics was during Napoleon's retreat from Moscow in 1812, when more French soldiers died of typhus than from Russian bullets. One could say that lice have defeated Napoleon's armies; moreover, their retreat has spread the infected lice and typhus through the entire continent of Europe. Especially severe epidemics affected the Byelorussian and Lithuanian areas of the former Polish-Lithuanian Kingdom. Typhus has contributed also to the defeat of Napoleon III in the war with Prussia, when the fortress of Metz had to surrender because of the epidemics. During the WWI, typhus epidemics have killed 150,000 Serbs in 1915.

Therefore, the development of the first highly effective anti-typhus vaccine by Weigl was of such a major epidemiological importance, although his discoveries were barely noticed in the Western medical literature (Snyder, 1944; Anigstein, 1947). A total of 5-6 millions of individuals were vaccinated against typhus during German occupation in the eastern zone of war operations.

Weigl, although having Austrian parents and being born in Presov, in the Moravian part of the Austro-Hungarian empire, moved with his mother and stepfather, a high school principal, to Iași, Tarasovița, Stryj and later to Lwów, where he attended Polish schools, and became by his own choice a very patriotic Pole (A Monograph, 1994; Kryński, 1967a,b, 1997). His son Wiktor was my close high school friend; Wiktor's mother, Zofia née Kulikowska, the first wife of Prof. Weigl, was always very kind to me, as she was to all the Wiktor's friends.

It has been established in 1909 by Charles Nicolle of The Pasteur Institute, Paris, that louse was the vector for typhus. It has been proven in 1916 by H. da Rocha-Lima that the infectious agent carried by lice is *Rickettsia prowazekii* (named after the American and Czech investigators, H. T. Ricketts and S. von Prowazek (born as Stanisław Prozvák), both of whom died of typhus while studying *Rickettsiae* as the etiologic agent). Weigl was destined to make next critical contribution to the field; being a zoologist, parasitologist, comparative anatomist, histologist, and entomologist, and also a professor of biology at the University of Lwów, Poland, he became an expert in the biology and pathology of lice. In the early Twenties, feeding infected lice and testing typhus vaccine were all done with guinea pigs (Weigl, 1920), especially since Weigl, who was not a physician, was reluctant to perform human experiments. The latter were done without prior Weigl's knowledge, by a dedicated couple of technicians,

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Michal and Rozalia Martynowicz, who in this manner tried, however surreptitiously, to help their beloved Professor. Michal was a typhus survivor, and thus immune, whereas his wife Rozalia was never exposed to typhus. Without notifying his boss Prof. Weigl, Michal has vaccinated his wife Rozalia with Weigl's vaccine, and then she agreed to feed the *R. prowazekii*-infected lice. Only after both were sure that Rozalia did not contract typhus, they notified Prof. Weigl about their results. This experiment became crucial for Weigl's decision to perform large-scale vaccination trials in the regions of endemic typhus (Chodzko, 1933; Radio, 1937). The very successful results were widely reported and praised in the Polish and World Media. Especially successful was the vaccination campaign in China carried out by the Belgian missionaries (Rutten, 1936, 1943). As cited from the report of Father Rutten: "Typhus was one of the greatest human enemies killing at that time more victims than all other epidemics combined. Of 150 fathers active in China, 70% died of typhus in the years of 1908 to 1931." Father Rutten wrote further, that: "When news reached us, that a Polish Professor had developed a vaccine, we were first very skeptical, since many 'cures' were proposed or sold to us before, but all of these failed. Anyway, we decided to try the Polish vaccine and the results turned out to be dramatic. During the past 7 years, since we started using the Weigl's vaccine, not a single of our missionaries or of the vaccinated Chinese patients died of typhus. Your Polish vaccine saved lives not only of missionaries but also of many thousands of Chinese".

Praises were heaped upon Prof. Weigl, including a kind statement by Charles Nicolle, a Nobel laureate, who established that louse is the typhus vector; he wrote: "The 'war' with typhus did not appear promising, until it was joined by the brilliant Polish scientist, Professor Rudolf Weigl from Lwów, Poland. Weigl taught us how to cultivate the typhus agent in lice, and moreover, has developed a superior vaccine, which saved many thousands of lives. As person, Weigl deserves highest recognition, as a brilliant intellect, untiring worker and a fanatic of science" (Kryński, 1997).

Unfortunately, the well-deserved Nobel Prize has eluded Weigl because of the politics and WWII. However, he received many honors, including the Order of St. Gregory from the Pope Pius XI, the Leopold Order from the Belgian King, the Order of Polonia Restituta, and in addition he was elected to the Polish Academy (PAU or Polska Akademia Umiejętności) and many foreign Academies, and he became an honorary member of several scientific societies (A Monograph, 1994; Kryński, 1967a,b, 1997).

Weigl's typhus research was continued for a few more decades by his collaborators and students, among them Anna Herzig-Weigl (Herzig, 1939), the second wife of R. Weigl, Stefan Kryński, Stanisława Wojciechowska (see Kryński, 1987), Henryk Mosing (Mosing, 1947), Zbigniew Suchy, and Albina Kuchta (A Monograph, 1994; Kryński, 1967a), but at present it is mainly of a historical interest.
HUMANITARIAN, HISTORICAL AND POLITICAL RAMIFICATIONS

The Period Before WW2

Most of the methods for the cultivation of lice and production of the Weigl vaccine were developed before WW2 in the Department of Biology of the UIK in Lwów, in the free and independent Poland (see Introduction). Lwów was a very Polish city, with several Universities or Schools of Higher Learning, best characterized as a counterpart of Boston in USA or Cambridge in England. It had rich Western and international traditions, as reflected by its many names (Leopolis in Latin; Leopoli in Italian; Lemberg in German; Leopol in French; Lwów in Polish, Livov or Lwów in Russian; Livij or Lwiw in Ukrainian, the Russian and Ukrainian names depending on the transliteration). Lwów was a city with about 600 years of Polish history and tradition and the extremely patriotic Polish citizenry. At the eve of WW2 in 1939, its population of about 350,000 was a rather homogeneous 'melt' with various ethnic and religious backgrounds: predominantly (about 70%) Roman-catholic, about 20% Mosaic (integrated and orthodox Jewish), the remaining about 10% Armenian-catholic (of Armenian origin), Greek-catholic (predominantly of Ukrainian origin), Lutheran (mainly Austrian or German) and others.

The Period During and just After WW2

WW2 started on September 1, 1939, and as results Lwów became occupied first by the Soviet and later by the Nazi's Armies. However, Weigl's Typhus Institute became a 'safe haven' for the intellectuals in 1939 - 1944, during both occupations. Otherwise, during this period, Lwowian universities have lost over 40% of Professors, with highest loss of about 90% at the Medical School (Albert, 1989a).

(a) The period of Soviet occupation 1939 - 1941

During the USSR occupation period of 1939 - 1941, Weigl did his utmost to protect the Institute employees from the systematic and inhumanely cruel deportation to Soviet gulags in the North (for men), and to Southern Siberia (for women and children, who were arrested at night and exiled by trucks and trains to very primitive kolhozes situated mainly in the wilderness of Kazachstan), where the death rate approached 40% per year, and where I lost many of my friends and colleagues (see also, Kopanski, 1997).

About the time when the Soviet secret police (NKVD or KGB) organized their first cruel deportation of Polish population of Lwów to Siberia, the first secretary of the Ukrainian Communist Party, Nikita Khrushchev, has visited Weigl at his 'Institute and offered him the title of Academician and a
directorship of an Academy Institute in Moscow. Weigl has politely rejected it, which fortunately did not cause any negative consequences; instead Weigl has received promises of additional buildings for his Institute in Lwów (Nespialk and Ojrzynski, 1994), and of an exemption for his employees from deportations to Siberia.

I learned about the details of the Khrushchev's visit from my father, who spoke fluent Russian, because long before WWI he lived and studied in the Russian-occupied provinces of Poland, including Warsaw. My father, Stefan Szybalski, a pre-WW1 graduate of the University of Toulouse, France, was asked by his friend Prof. Weigl (who was unfamiliar with Russian language, similarly as nearly the entire population of Lwów, including myself) to help him in dealings with Russian visitors and the Soviet Russian administration, including Khrushchev and the NKVD (who supervised arrests and deportations), during the 1939-41 period of the Soviet occupation of Lwów. It is a pity that Stefan Szybalski has not written up his memoirs of this period, since many famous Russian professors and Academicians, who were 'starved' of the contacts with the western world made a pilgrimage to Weigl's Institute in Lwów, considered by Russian as a Vienna-like Western European city, though just occupied then by Soviets. Posing as biologist in laboratory attire, my father played deftly a role of Weigl's translator. Frequently, after a few glasses of vodka, the Russian visitors could not resist temptation of describing their hardships and then share their personal tales of horror related to life in USSR and to Stalin's terror; one of the Russian visitors, after getting drunk, gave the following very characteristic and helpful advice: "Do not ever join the Communist Party and do not steal excessively". He then elaborated: "If you are not a Party member, they will always court you to join, but once you join and then are kicked out of the Party this is your end. If you steal too much this will lead to your demise, but if you do not steal at all, you will starve; thus remember to steal only in moderation, just enough to survive!"

Through his influence, and often helped by my father, Weigl was able to help in securing the release and return to Lwów of several of the Siberian deportees. Among those was Stefania Skwarczynska (at that time at UJK, and after WW2 the Professor of Theory of Literature at University of Łódź, Poland, and a member of PAN), who was deported to Kazakhstan, because of her "guilt" of having a husband, who was a pre-WW2 colonel of Polish Army and at that time a war prisoner in the German 'Oflag'. Stefania was helped by her UJK major professor, Juliusz Kleiner, and by Weigl to return from Kazakhstan in Siberia with her mother and two very young children (one of her daughters, Maria Olszewska, is at present a Professor of Cytology and Cytogenetics of Plants at the University of Łódź, Poland, and a member of PAN). Weigl has provided Stefania with a safe employment in his Institute, and while working with her at adjoining desks in 1941-43, I learned plenty about her own and her mother's and children's hunger and misery of the inhuman deportation. She
was an enthusiastic and gifted raconteur, and as an accomplished storyteller, she described to me some amazing and cruel experiences in the steppes of the Soviet Kazakhstan, hundreds of miles away from the 'civilization' (as represented by the nearest railway station).

My family had also been directly threatened by deportation to Siberia at least twice. Our 'passports' were first confiscated by NKVD and then the dreaded 'paragraph 11' was added to them; this meant that we had to be moved to some place located hundreds of miles away from any even smallest town, which 'location' meant the wilderness of Siberia. Again, thanks to Weigl's help, my father was able to nullify this cruel ruling; however, the same happened to us again, but this time our second 'paragraph 11' ruling reached us only one day before the Nazi invasion of Soviet Union.

Hitler's armies attacked the Soviet army on June 22, 1941, and entered Lwów on June 29, 1941. During this ghastly last week of the Soviet occupation there were massive arrests and all jails became overcrowded with Lwowian civilians. Then in the middle of that week the Soviets initiated the systematic mass murder of the prisoners.

Just after June 30 when we entered the first prison, trying to help my friend in finding his father (who was a lawyer and a lice 'feeder' at the Weigl's Institute, and who was arrested a few days earlier), we saw the partially decomposing bodies stacked four to ten deep on the cell floors. In this prisons, the Soviet policemen murdered about 3,000 prisoners before the Soviet retreat (Kopanski, 1997). During the next few days of the unusually hot weather, we searched other prisons, finally located the body of my friend's father among the progressively more viscous mass of the victims of this Soviet atrocity of ethnic cleansing.

(b) The period of German occupation (1941 - 1944)

During the Nazi occupation of Lwów (1941 - 1944), employment in Weigl's Institute provided some degree of protection from the random arrests and deportation to the Nazi concentration camps. Gestapo seemed to prefer to avoid 'dealings' with persons from whom they might accidentally acquire typhus-infected lice (it was well known that carrying lice was our occupational hazard). Moreover, all employees carried an impressive looking identification card ('Ausweis') from the 'Oberkommando des Heeres' (Office of the Commander-in-Chief of the German Army); this 'Ausweis' was another of Weigl's life saving 'inventions' (as partly 'engineered' by my father).

Weigl helped to protect many of the unemployed university professors and their associates by employing them as lice feeders; such employment entitled to special food rations and made them at least partially immune from arrests, deportations and/or death during the Nazi occupation. Some aspects of employment in Weigl's Institute had some elements in common with Spielberg's Hollywood movie "Schindler's List".
Since feeding lice occupied the feeders for only one hour per day, and since the University (with exception of the Institute of Technology, renamed by Germans as "Technische Fachkurse") was closed by Nazis, the feeders had the remaining time left for organizing the underground University courses and for other patriotic activities. For instance, I was supervising a 'breeding unit' consisting of feeders who were mostly mathematicians of the famous Lvów school of mathematics, including the world famous professor, Stefan Banach, and others including Jerzy Albrecht, Felix Baranski, Kazimierz Berg, Bronislaw Knaster, Wladyslaw Orlicz, and also other scientists like Tadeusz Baranowski (biochemist), Ludwik Fleck (bacteriologist; Fleck, 1947), Seweryn Krzemieniewski and his wife Helena (both famous bacteriologists), and Krukowski (archeologist). Famous artist Stanislaw Skrowaczewski (with whom I attended piano classes of Florentyna Listowska) was also a lice feeder, he became a composer and a famous conductor of the Minneapolis Symphony Orchestra, whom I met many times at his concerts in Madison, WI, in the Sixties or Seventies.

Lvów school of mathematics was also known as "Scottish", not because of any direct relation to Scotland, but because of the name of the Kawiarnia Szkołka (Scottish Coffee House) where Lvowian mathematician were routinely meeting and solving their theorems on the paper napkins or on disposable table cloth. The first computer language ("Polish" or "reverse Polish", as used by the Hewlett-Packard Company) was also created by this group. It was intellectually so stimulating but also somehow surrealistic, to listen to their long discussions about theories in mathematics, including elements of topology and theory of numbers, while they were feeding lice. But I had to watch that in the fervor of their discussion they did not overfeed lice, beyond 45 minutes, because our laboratory lice lost their natural instinct to stop feeding, with a disastrous consequence to them, because their guts started to burst due to 'drinking' too much blood.

During Nazi occupation of Lvów, 1941-44, Weigl used his fame and the pre-WW2 scientific connections with German biologists to protect all of us from Nazis. To achieve that, however, he also had to play dangerous and potentially questionable humanitarian role by being forced to produce his vaccine for Germans. At the same time, he had to resist a Nazi's offer to become a director of a special Institute to be established for him in Berlin and to become a German citizen called "Reichsdeutsche". Despite great personal risks, he made a brave response in 1941/42 to this offer by a high-ranking German Army military (as combined with subtle threats); he said that: "As biologist, I know the phenomenon of death; it is to you to accept me as Polish professor of Polish nationality". He also added "it might appear questionable for the Germans, to offer honors to a Polish Professor, who by accepting the German offer would have dishonored himself". The high-ranking German officer understood that Professor Weigl was neither to be threatened nor to be
bought. About this dramatic exchange Professor Weigl has informed, thereafter, my father, who in turn related it to me.

Weigl had permission to have a radio, and allowed my father to listen to it and spread the political news among his trusted friends during this very bleak and sad time of the Lwowian history; this access to the radio was a blessing, since otherwise there was a death penalty for having a radio. Weigl was very courageous and not afraid to secretly cooperate with Polish Underground (AK or Polish Home Army, about one million strong) during Nazi occupation. Several shipments of Weigl’s vaccine were surreptitiously and illegally delivered to the Warsaw ghetto and to other Nazi-imposed Jewish ghettos in other major cities, where typhus epidemics were rampant. My father, who was assisting Prof. Weigl in administration of the Exanthematous Typhus and Virus Research Institute, had more than once transported the vaccine to the Warsaw ghetto; I was helping him with that task. Tomasz Cieszyński (whose father, Dr. Antoni Cieszyński, Professor of Nematology of UJK, was murdered by Nazi Gestapo in Lwów in July 1941 (Albert, 1989b) as among the 25 massacred Professors of the UJK, Institute of Technology and other Academic Schools of Lwów) has described one of the sessions in Weigl’s office that preceded the second of the transports of Weigl’s vaccine to the Warsaw ghetto (Cieszyński, 1994). The “death penalty” threatened all of us engaged in this activity, but this did not deter us, since the everyday life was more than dangerous anyway. As an example, of 120 Polish students (about 10 Roman-Catholics, 10 Greek-Catholics and 100 Mosaic Jewish) who together with me succeeded to pass the Communist-administered entrance examination as to enroll in October/November 1939 at the School of Chemistry of the Lwów Institute of Technology (Politechnika Lwowska, with its name being modified depending on the changing occupations), only 14 could be accounted for by 1944.

Re-occupation by Soviet Union in 1944

Although successfully resisting the “enticing” and personal German offers in 1942/43, Prof. Weigl was not able to resist the unavoidable forced move from Lwów to central Poland. Soviet army re-entered Lwów in July 1944, and Weigl’s beloved city was ethnically cleansed by the Soviet administration, as a consequence of the abominable USA-approved Yalta/Potsdam acts (see Introduction), which authorized the forced and cruel deportations. The annexation of Lwów and its ethnic cleansing was secretly planned in advance and signed by Roosevelt, (later Truman), Churchill and Stalin during the Yalta and Potsdam Conferences. This was done treacherously, behind the back of the Polish Government in Exile in London, the staunch WW2 ally of USA and UK. Thus, USA was in fact promoting the second, practically total ethnic cleansing of Eastern Poland by Soviet Union. Such first ethnic cleansing, even a more
cruel one, was perpetrated by USSR in the years 1939-41, as a result of the Hitler-Stalin pact of 1939, but involved 'only' about 20% of the Polish population of the Eastern half of Poland, because USSR did not have enough trains and time to deport to Siberia the entire population (Kopanski, 1997).

Moreover, by this act USA was also approving all the atrocities inflicted upon Polish population during and after WW2 by the Soviet Union, although USA could have easily prevented this unnecessary tragedy, simply by refusing to 'ratify' the Hitler-Stalin (Ribbentrop-Molotov) pact of 1939, which divided Poland between Nazi Germany and the Soviet Union; the Hitler-Stalin pact still appears to be in force, as far as the Soviet-imposed ethnic cleansing and annexation of Eastern Poland, including Lwów, and the loss of the pre-WW2 private property are concerned.

Beginning in 1945, and as result of the Stalin-imposed 'ethnic cleansing', the settlers from Soviet Union became almost the entire new population of Lwów, which presently is reported have over 800,000 inhabitants. However, a few thousand of survivors and descendants of the pre-WW2 Polish Lwowians still remain in Lwów (presently Lviv) and try to preserve their heritage, including the Roman-catholic Cathedral, a few churches, and some very monumental and old cemeteries.

CONCLUSIONS AND COMMENTS

Weigl's scientific research flourished in Lwów, and led to the development of an effective anti-typhus vaccine in the period between WW1 and WW2, during the total independence of Poland. Weigl's Institute remained very active during most of the WW2, but it became liquidated concurrent with the 1944/45 annexation and ethnic cleansing of Lwów and Eastern Poland by the Soviet Union. This annexation was treacherously approved by Western Allies at the Yalta and Potsdam Conferences. Instead of sponsoring this rape of Lwów and Poland, USA should have never accepted all those totally unreasonable Stalin's demands of the westward USSR expansion at the expense of Poland and other smaller and previously independent countries. Poland, after all, was the first country, which on September 1, 1939 has resisted Hitler's aggression, whereas Stalin's USSR was Hitler's ally between 1939 and 1941. USSR was actively supporting Hitler's war effort by supplying Germany with trainloads of war materials and food. On the other hand, a very secret small unit of the Lwowian underground, with which I and at least one other 'house reeder' in Weigl's Institute were associated (my close friend and high school colleague, Broniek Wojciechowski), was charged with disrupting the Soviet supplies for Hitler's armies which were attacking Western Europe; our unit has detailed or destroyed several Russian-German transport trains in 1940 and up to June 1941 (using explosives, which were secretly produced by myself as the student at Politechnika Lwowska in the laboratory of the Organic
Chemistry Department, directed by Professor Edward Sucharda and with his 'blessing'). Derailing Soviet trains had a doubly beneficial role for the Eastern Poland and Allies, since the same trains that carried Soviet supplies for Hitler's armies, were used also for cruel deportation to Siberia of the pre-WW2 citizenry of Lwów and of Eastern Poland (Kopanski, 1997).

During this period of close USSR-Nazi Germany cooperation, the USSR authorities have also confiscated practically all-private property in Eastern Poland, including Lwów. These properties were never returned to the rightful owners (like, e.g., Professor Weigl, his family, many University Professors, including those who fed lice, or my family and myself), neither at the end of the WW2, nor even now. Moreover, the over 600 years of Polish history of Lwów and Eastern Poland, including many art galleries, museums, historical and scientific edifices, all that what was the essence of Polish culture, had perished as a result of the forced resettlement and ethnic cleansing. This is the sad end to the personal fate of Prof. Weigl and many others like him, who gave so much to the science, medicine, and humanity in general, and as the 'reward' were deprived of their roots and have lost everything, many of them their lives*.

One could add here, at the end, that the generally despised insect, louse, has played a double role during the WW2: it was not only a carrier of a dreaded disease, typhus, but ironically it was also protecting lives of those who worked with this insect and of those who were vaccinated with the product of Weigl's brilliant research effort. --- Moreover, one could also conclude that while Weigl was trying to help humanity by developing his insect cultivation methods and typhus vaccine, the Stalin's USSR (1939 - 1941 and after 1944) and Nazi Germany (1941 -1944) were engaged in murders and cruel deportations, whereas the naive and destructive USA policies of 1943-1950 were responsible for the further human misery in the USSR-dominated, annexed or occupied, but pre WW2 independent Eastern and Central European countries, and moreover, for a definite possibility of a nuclear holocaust, which almost by miracle was avoided because of Stalin's death. Most of that seems to be now forgotten, and the insect louse plays practically no role in our lives. But the noble deeds, courage and scientific discoveries of Professor Rudolf Weigl and those associated with him should not be forgotten!

FOOTNOTE

* This tragedy could have been easily avoided, if not because of the treacherous and shortsighted US policies at the end of WW2. USA could have easily protected people of Eastern and Central European countries, including citizens of Lwów and of Poland, from the rape by the Soviet imperialism. This could have been done simply and as a matter of fact, without endangering any American lives, since in 1945 Stalin well understood the overwhelming power of USA and its atomic weapons. Any well motivated and skilled USA statesman or diplomat could have easily 'persuaded' Stalin and his henchmen not to tamper with the pre-WW2 status quo in Eastern Europe, and to desist from any
unilateral Soviet annexations or other changes, unless based on USA-supervised elections or plebiscites. After all, the despotic nature of the Soviet regime, including its atrocities, ethnic cleansing of the Eastern Poland and mass murder in Katyn during the first two years of WW2 (when USSR was in an alliance with Hitler), were well-known to the British and American Governments, according to information supplied by their Intelligence services and by Polish Government in Exile. Moreover, Edward Pfeiffer, a homosexual double agent and his British lover Maclean, have passed in 1940 onto the Soviet Union the information about a French plan of sending 15,000 Polish officers from the Soviet detention camps to Syria, where General S. Kopanski was forming a new Polish Carpathian Brigade. Report by these spies certainly had influenced Stalin’s decision on “the Katyn liquidation” of the intellectual elite of the Polish army, deceptively captured in 1939 by the Soviet armies (Kopanski, 1997). However, when the Soviet killing fields of Katyn were discovered in 1943 and the finding was disclosed to the shocked world, President Franklin Roosevelt falsely declared it all to be “a Nazi lie and Hitler’s plot”. Maybe this Roosevelt’s lie was justified during the war, but the American tacit approval and lack of any corrective actions during years just after WW2 concerning Stalin-instigated ethnic cleansing, murders and other atrocities, together with the lack of any decisive remedies against development of the atomic weapons by Stalin, was unbelievably shortsighted, if not treasonous!

Neither Stalin nor his henchmen nor the oppressed Poles and other citizens of Soviet-dominated parts of Europe were able to understand the American ineptitude at the end of WW2. The general feeling among the Eastern and Central European intellectuals (shared also by the most of the general population) was that USA policies were either guided by politicians totally inept in the art of foreign policy, and ignoring the true American interest, or critically influenced by American traitors, as exemplified by Alger Hiss, President Roosevelt’s advisor and a convicted traitor. As the result of these USA policies, the World has just exchanged one dictator, Hitler, for an equally cruel but probably more cunning Stalin.

This monstrous American mistake, so easily avoidable in 1944/5 and even for several more years until USSR has developed its own atomic weapons, set the precedent for the future massive ethnic cleansing and was also destined to end in Stalin-initiated nuclear holocaust, providing that Stalin would have lived for another 5 or 10 years, he would have been successors by a similarly insane dictator; such grim possibility could not have been excluded at that time. It was a sheer luck for the humanity that Stalin, who progressively become more and more obsessed, died in 1953, before he had a chance to deploy the nuclear weapons. Providing they had an access to such weaponry, dictators like Stalin or Hitler would have not hesitated to use atomic bombs indiscriminately to advance their political plans or fantasies.

ACKNOWLEDGMENTS

Dr. Karl Maramorosch, the Editor of this Manual, and originally from the Kolomyja region of pre-WW2 Poland, has encouraged and helped me to prepare this Chapter. The technical part of the louse breeding and vaccine production was based first on my imperfect memory, and then substantially
rewritten based mainly on the publications of Stefan Kryński, Professor Emeritus of the Medical University of Gdańsk (Kryński, 1967a-c, 1997; Kryński et al., 1994; and others below), who also read a late version of this manuscript, all that thanks to the generous help of Prof. Janusz Limon, Chairman of the Department of Biology and Genetics, Medical University of Gdańsk. My memory was also refreshed and the manuscript was corrected by my brother, Stanisław Szybański, as acknowledged in text. Dr. Malina Kuczynska, Professor Emeritus of the Slask Institute of Technology in Gliwice, Poland, was extremely helpful in locating persons connected with the Weigl’s Institute, including Dr. Jakub Cieśnieski and his father Dr. Tomasz Cieśnieski; the latter, a Professor Emeritus of the Medical Academy in Wrocław, Poland, has spent very many hours correcting the latest versions of this manuscript and adding some crucial details (see also Cieśnieski, 1994). Furthermore, I was helped by Prof. Jerzy Chmielewski, Chairman of the Department of Biochemistry of the Slask Institute of Technology in Gliwice, Poland, who is trying to erect a memorial plaque on the edifice of the former Weigl’s Institute at the corner of Mikolaja and Długosza Streets in Łódź, Poland (presently Lviv, Ukraine), by Dr. Liliana Nitecka of Midwestern University, Chicago, and by my cousin, Dr. Romana Tuma (née Bogdaska), one of the "feeders" and presently a retired ophthalmologist in Florida.

REFERENCES


50). dnb. berlin- (wissenschaftlicher wochenbericht des dnb.) einen sieg hat die deutsche medizinische wissenschaft in der bekämpfung des fleckfiebers errungen. dem deutschen forscher prof. weigl. weigl ist es gelungen, einen impfstoff gegen das fleckfieber zu finden in dem vom oberkommando des heeres in krakau errichteten institut fuer fleckfieberforschung wird dieses fleckfieberserum bereits seit zwei Jahren in grossen mengen hergestellt, wodurch es gelungen ist, die verbreitung der euche im osten zu hinnen und die soldaten gegen die krankheit immun zu machen. die mit fleckfieber infizierte kleiderlaus liefert den impfstoff zunächst werden gesunde lause in millionenzahl gezuechtet dann mit fleckfiebererreger infiziert und nach der entwicklung der krankheit getoetet aus der toten laus wird der blutschlauch gelost und gesammelt zehntausend blutschlaueuche braucht man, um eine flasche zu fuellen, die blutschlaueuche werden zerrieben und zum impfstoff verarbeitet eine impfung mit dem praeparat ist zwei Jahre wirksam, so dass es ohne schwierigkeiten gelingt alle soldaten, die in die verlausten ostgebiete kommen, gegen fleckfieber immun zu machen.

bei den arbeiten zur erforschung und losung des krebsproblems wurden massnahmen ergriffen, um die voraussetzungen fuer eine grundliche bekämpfung der krebskrankheit zu schaffen der geschaefts fuhrende president des reichsausschusses fuer krebsbekämpfung dr. ramm ramm, machte jetzt eingehende mitteilungen uber die bisher erzielten erfolge die massnahmen zielen vor allem darauf hin, alle erkennbaren krebskrankungen so frueh zu erfassen, dass sie die nachbargewebe und die nachbarorgane noch nicht gefaehrdet und auch noch keine krebszellen durch das blut verschleppt haben jeder krebs im grossdeutschen reich wird kuenftig eine beratungsstelle erhalten,

Bei den Arbeiten zur Erforschung und Lösung des Krebsproblems wurden Massnahmen ergriffen, um die Voraussetzungen für eine geordnete Bekämpfung der Krebskrankheit zu schaffen. Der geschäftsführende Präsident des Reichsausschusses für Krebsbekämpfung, Dr. Ramm, machte jetzt eingehende Mitteilungen über die bisher erzielten Erfolge. Die Massnahmen zielen vor allem darauf hin, alle erkennbaren Krebskrankungen so frühzeitig zu erfassen, dass sie die Nachbarorgane und die Nachbargewebe noch nicht gefährdet und auch noch keine Krebszellen durch das Blut verschleppt haben. Jeder Krebs im Grossdeutschen Reich wird künftig eine Beratungsstelle erhalten, und jedem gau sollen alle diagnostischen und therapeutischen Möglichkeiten zur Verfugung gestellt werden, wie Dr. Ramm Ramm mitteilte.

Es ist jetzt bereits gelungen, 10 bis 15 Prozent aller Krebskranken in
...
Dezernent
Dr. Joachim Mrugowsky
Leiter des Hygiene-Instituts der Waffen-SS
Bln-Zehlendorf, Himmelsteig 7
Wegener / Oberstabsarzt

Politisch unwünscht
außerdem hat US Army B
Cossati darüber berichtet
ramine, were carried out by Professor Otto Bickenbach, a member of the Strasbourg University faculty, on Karl Brandt's initiative. The NEUENGAMME camp was the place where 150 prisoners were made to drink water containing chemical-warfare substances, as part of a research project for the purification of drinking water. There were other experiments in this field, but no details concerning them have come to light.

Another area of experiment related to the immunization and treatment of infectious and epidemic diseases such as malaria, infective hepatitis, and typhus. The malaria experiment was a civilian venture, carried out at Dachau by Dr. Claus Schilling, with the approval of Dr. Leonardo Conti, Reich chief of civilian medical services. The experiment involved 1,200 prisoners, most of them Catholic priests, and cost the lives of 300 to 400 persons. Of them, no more than 30 died of the disease itself; the others died from overdoses of the medicines that were being tried out on them. Infective hepatitis, which was prevalent in the Waffen-SS and the army, was the subject of experiments at Sachsenhausen, carried out by Dr. Arnold Dohmen, as well as at the Natzweiler and Buchenwald camps. In some of these experiments the death of the human subjects was a foregone conclusion, and for these Dr. Grawitz asked Himmler to put at his disposal Jewish prisoners, who were already condemned to death in any case. Following the invasion of the Soviet Union by the Germans in June 1941, typhus fever became widespread among the German army. From 1941 to the end of the war, a broad program of experiments on human beings was conducted at Buchenwald and Ganzweiler to test the effectiveness of various immunization inoculations. Hundreds of prisoners were used in these experiments, and hundreds died as a result.

The typhus experiments at Buchenwald were launched at the initiative of Dr. Karl Gezenken, chief of the medical section of the Waffen-SS, and by Dr. Joachim Mrugowsky, chief of that formation's Institute of Hygiene. One such group of "test persons" (TPs, in SS usage) was inoculated with various sera then in general use, while a second control group was not inoculated. A third group was infected with the disease at the start of the experiment, to serve as a bank for live viruses to be used in the infecting of other victims with the disease. As a rule, typhus is transmitted by fleas, which carry the virus. When the experiments were launched, the "natural" means of transmission was tried out, but later the "test persons" those who had been inoculated, as well as the control group, which had not been inoculated —were infected by having blood from a typhus patient injected into their bodies. Of the 729 persons used in the experiment, 154 died as a result; of the 120 persons who had served as a live-virus bank, 90 died.

Another set of typhus-immunization experiments was launched at Ganzweiler in late 1943, by Professor Eugen Haagen of Strasbourg University. Haagen asked for 300 physically fit prisoners of military age, of whom he selected 90. Using a live virus serum that he had himself developed, Haagen infected both the non-immunized control group and the immunized group. His experiments cost the lives of 30 prisoners.

Among other experiments involving contagious and epidemic diseases was one related to yellow fever, a disease prevalent in North Africa, where German forces were fighting. In it, 485 persons were inoculated with a yellow-fever serum to test its effectiveness. Other experiments dealt with smallpox, paratyphoid A and B, cholera, diphtheria, and influenza. Tuberculosis experiments were conducted on 114 "test persons" at Dachau and on 100 men and 20 children at Neuengamme. Ganzweiler was the scene of immunization experiments on 1,700 persons relating to diseases of an unknown nature.

The above experiments were for the most part carried out on behalf of the army or civilian health authorities and at their request. In addition, however, a great many experiments were conducted that merely served the interests or the medical specialization of the doctor who devised and conducted them.

"Racial" Experiments. The second category, experiments that violated medical ethics, comprised (1) experiments designed to provide biological and physiological findings to substantiate the differentiations made by Nazi ideology between the "Aryan" race and other races; and (2) experiments to further
LES PREMIERS MOIS D'OCCUPATION A L'OMV - HÉCIT D'UN TEMOIN M.L. DE L'OMV

I - L'ENTREE DES NAZIS

Septembre 1941, les Allemands occupent la grande ville de L'OMV. Certaines Ukrainiennes et Polonaises jetent des fleurs et des cigarettes sur le passage des "Vainqueurs".

Les deux premiers jours se passent dans un calme relatif. Le troisième vers 8 heures du matin, la milice ukrainienne (comprenant surtout de la peur assoiffée de pillage et de meurtres) fait sur l'ordre des SS, la chasse aux passants juifs, et par groupe des conduits vers quelques prisons de la ville. Les miliciens ne se contentent pas de la chasse à l'homme déchu. Ils s'emparent dans les logements et sous menace d'armes en font sortir des hommes et des jeunes femmes. Dans la rue ils les dépeuillent de leurs meilleurs vêtements et de leurs chaussures. Connaissant la sympathie des Juifs pour le régime soviétique, pour se moquer d'eux, ils leur ordonnent de crier : "Vive Staline!"

Dans les prisons les arrêtés sont astreints à des durs travaux divers. Affamés, y restant tard dans la nuit, tellement battus par ces brutes que par la suite certains succombent.

Cette rafle est suivie d'un véritable pogrom. Des bandes d'ukrainiens armés de gros fusils s'abattent sur le quartier juif, les rues : Zolkiewski, Golychowska, rue de Cracovie, et dans toutes les petites rues avoisinantes, ils pillent, saccagent, assassinent.

Les instincts les plus bestiaux de la populace se donnent libre cours.
y faire des parties de chasse.


Les détenus qui n'étaient pas abattus à "la chasse" mouraient d'épuisement et de maladies. Près du camp se trouvaient deux étangs abandonnés qu'ils devaient nettoyer à fond. Ces malheureux travaillaient de l'aube à la tombée de la nuit, dans une boue jusqu'au genoux, sous-alimentés mouraient lentement. Un "Kapo" ruchâchant deux brutes a ses côtés allait en ville pour faire à son tour la chasse et amener de nouvelles victimes. Avant de conduire les juifs au camp, les bandits les dépoillaient de leurs alliances, de leurs montres de tout objets de valeur, même d'un bon vêtement. Les SS avaient donné carte blanche à ces crapules, en ce qui concerne les juifs. Ils en profitaient bien.

V - LE GHETTO

En plein hiver, en décembre 1941, vint l'ordonnance de former le Ghetto. Comme dans toutes les autres grandes villes de Pologne, les juifs devaient abandonner leurs logements et aller s'installer dans quelques rues d'un quartier réservé. Les rues Zolkiewski, Zamarstynowska, Słoneczna et quelques autres furent assignées aux juifs, espace tragiquement restreint pour le nombre de la population juive de Lwow.

Les Aryens habitants le quartier réservé aux juifs devaient à leur tour le quitter. Il fut permis aux juifs d'échanger leurs logements contre ceux des Aryens. Avant donc d'être enfermés les juifs
se rendaient dans le quartier réservé à la recherche d'un logement à échanger. Les gardes SS qui se tenaient à la limite de la rue Sloneczna sous le pont du chemin de fer, à l'entrée du futur Ghetto, arrêtaient alors les hommes âgés, et ceux qui avaient l'air malade, (c'était un nouveau triage). Ces hommes fortement escortés étaient emmenés hors de la ville, où, on ne sait que plus tard, ils étaient mis à mort.

Entassés d'une façon incroyable dans le petit Ghetto, se débattant avec mille difficultés matérielles, les gens cherchaient à fuir Lwow, à gagner une autre ville un autre Ghetto, surtout Varsovie, "car là, ou il y a toute une grande ville juive de 300,000 habitants les SS ne pourraient pas se livrer à de tels excès" raisonnaient-ils. Illusion combien vaine.

Voyager pour un juif, c'était jouer avec la mort à chaque pas. Les personnes ayant de la famille ou des amis à Varsovie les suppliaient, par un mot passé clandestinement de leur envoyer un guide aryen et de faux papiers. Certains, polonais contre une forte recompense et tout frais payés, se rendaient à Lwow et revenaient avec des fugitifs. Si en cours de route les agents de la police ne s'apercevaient pas que les papiers étaient faux, laissaient tranquilles les voyageurs juifs, le guide les ramenaient jusqu'au ghetto de Varsovie, mais au cas où les faux aryens étaient démasqués, le guide changeait tranquillement de compartiment. Les juifs alors étaient descendus du train et fusillés s'année tenant pour sabotage d'ordonnance allemande.
The Jewish Center of the Adas Israel Synagogue in New York City was the location of the event. The Center was the host of the event, which was attended by a large number of Jewish community leaders and members. The event was a joint effort between the Jewish Center and the Adas Israel Synagogue, and it was held in honor of the 75th anniversary of the establishment of the Jewish Center.

The event began with a special prayer service, followed by a keynote address delivered by Rabbi David Greenberg, the spiritual leader of the Adas Israel Synagogue. The keynote address was followed by a panel discussion on the history and future of the Jewish Center, moderated by Rabbi Greenberg and featuring a number of guest speakers.

The event concluded with a reception, where attendees had the opportunity to mingle and network with other Jewish community leaders. The reception was held in the beautiful synagogue, which was decorated with flowers and candles, creating a warm and inviting atmosphere.

Overall, the event was a successful celebration of the Jewish Center's 75th anniversary, and it highlighted the important role that the Center plays in the Jewish community. The event was a testament to the strength and resilience of the Jewish people, and it inspired all who attended to continue to support and strengthen our community.
The medical profession of the former doctor.

The situation described in the entire context of the previous paragraph.

The description and discussion of the professional ethics and responsibilities of doctors and nurses.

The importance of maintaining the highest standards of medical practice and conduct.

The role of the hospital in providing comprehensive care and treatment.

The significance of continued education and professional development for doctors.

The challenges faced by medical practitioners in maintaining patient confidentiality.

The importance of collaboration between different healthcare professionals.

The impact of technology on the delivery of medical care.

The ethical considerations in end-of-life care.

The need for effective communication and shared decision-making in patient care.

The importance of patient rights and autonomy in the medical setting.

The role of regulatory bodies in ensuring the quality and safety of healthcare services.

The impact of the healthcare system on the economic and social wellbeing of communities.

The significance of public health initiatives in disease prevention and control.

The need for ongoing research and innovation in medical science.

The ethical implications of emerging technologies in healthcare.

The importance of promoting access to healthcare for all members of society.

The challenges faced by doctors in providing care in remote or underserved areas.

The role of doctors in advocating for changes in healthcare policies.

The impact of the current state of the healthcare system on the well-being of patients.

The importance of maintaining a professional and conscientious approach to medical practice.

The role of doctors in contributing to the advancement of medical knowledge.

The ethical considerations in the practice of telemedicine.

The importance of ensuring patient privacy and data security in the digital age.

The challenges faced by doctors in addressing the increasing burden of chronic diseases.

The role of doctors in promoting healthy lifestyle choices.

The importance of continued education and professional development for doctors.

The impact of the healthcare system on the economic and social wellbeing of communities.

The significance of public health initiatives in disease prevention and control.

The need for ongoing research and innovation in medical science.

The ethical implications of emerging technologies in healthcare.

The importance of promoting access to healthcare for all members of society.

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The role of doctors in contributing to the advancement of medical knowledge.

The ethical considerations in the practice of telemedicine.

The importance of ensuring patient privacy and data security in the digital age.

The challenges faced by doctors in addressing the increasing burden of chronic diseases.

The role of doctors in promoting healthy lifestyle choices.
T.O. and the China Hospital
with rotting straw mattresses. Freaky times were never issued. We were given 5 minutes in which to get up, for we went to bed completely dressed. We were hardly able to get any sleep, for there was a continuous coming and going, and all sorts of thefts took place among the prisoners. Furthermore, it was impossible to sleep because we were covered with lice; the whole Dora Camp swarmed with vermin. It was virtually impossible to get rid of the lice. In 5 minutes we had to be in line in the tunnel and march to a given place.

THE PRESIDENT: [To the witness] Just a minute, please. M. Dubost, you said you were going to call this witness upon experiments. He is now giving us all the details of camp life which we have already heard on several occasions.

M. DUBOST: So far nobody has spoken about the Dora Camp, Mr. President.

THE PRESIDENT: Yes, but every camp we have heard of has got the same sort of brutalities, hasn’t it, according to the witnesses who have been called?

You were going to call this witness because he was going to deal with experiments.

M. DUBOST: If the Tribunal is convinced that all the camps had the same regime, then my point has been proved and the witness will now testify to the experiments at the Buchenwald Camp. However, I wanted to show that all German camps were the same. I think this has now been proved.

THE PRESIDENT: If you were going to prove that, you would have to call a witness from every camp, and there are hundreds of them.

M. DUBOST: This question has to be proved because it is the uniformity of the system which establishes the culpability of these defendants. In every camp there was one responsible person who was the camp commander. But we are not trying the camp commander, but the defendants here in the dock and we are trying them for having conceived...

THE PRESIDENT: I have already pointed out to you that there has been practically no cross-examination, and I have asked you to confine this witness, as far as possible, to the question of experiments.

M. DUBOST: The witness will then confine himself to experiments at Buchenwald as this is the Tribunal’s wish. The Tribunal will consider the uniformity of treatment in all German internment camps as proved.
[Turning to the witness] Will you now testify to the criminal practices of the SS Medical Corps in the camps, criminal practices in the form of scientific experiments?

BALACHOWSKY: I was recalled to Buchenwald the 1st of May 1944, and assigned to Block 50, which was actually a factory for the manufacture of vaccines against exanthematos typhus. I was recalled from Dora to Buchenwald, because, in the meantime, the management of the camp had learned that I was a specialist in this sort of research, and consequently they wished to utilize my services in Block 50 for the manufacture of vaccines. However, I was unaware of it until the very last moment.

I came to Block 50 on the 1st of May 1944, and I stayed there until the liberation of the camp on the 11th of April 1945.

Block 50, which was the block where vaccines were manufactured, was under Sturmbannführer Schuler, who was a doctor with the rank of a Sturmbannführer, equal to SS major. He was in charge of the block and was responsible for the manufacture of the vaccines. This same Sturmbannführer Schuler was also in charge of another block in the Buchenwald Camp. This other block was Block 46, the infamous block for experiments, where the internees were utilized as guinea pigs.

Blocks 46 and 50 were both run by one office; it was the "Geschäftszimmer." All archives, index cards pertaining to the experiments—as well as Block 50, were sent to the Geschäftszimmer, that is, to the office of Block 50.

The secretary of Block 50 was an Austrian political prisoner, my friend, Eugene Kogon. He and a few other comrades had, consequently, opportunities of looking through all the archives of which they had charge. Therefore they were able to know, day by day, exactly what went on either in Block 50, our block, or in Block 46. I myself was able to get hold of most of the archives of Block 46, and even the book in which the experiments were recorded has been saved. It is in our possession, and has been forwarded to the Psychological Service of the American Forces.

In this book all experiments are entered which were made in Block 46. Block 46 was established in October 1941 by a high commission subordinate to the medical service of the Waffen SS; and we see as members of its administrative council, a certain number of names; for this Block 46 came under the Research Section Number 5 (Versuchsanstalt Number 5 of Leipzig) of the Supreme Command of the Waffen SS. Inspector Mrugowski, Obergruppenführer of the Waffen SS, was in charge of this section. The administrative council which set up Block 46 was composed of the following members:
Dr. Genzken, Obergruppenführer (the highest rank in the Waffen SS); Dr. Poppendiek, Gruppenführer of the Waffen SS; and mainly we see among these names also that of Dr. Handloser of the Wehrmacht and of the Military Academy of Berlin, who was also associated with the initiation of experiments on human beings.

Thus, in this administrative council there were members of the SS, and also Dr. Handloser. The experiments proper were carried out by Sturmbannführer Schuler, but all the orders and directives concerning the different types of experiments, which I shall speak about to you, were issued by Leipzig, that is, by the Research Section (Versuchsabteilung) of the Waffen SS. So there was no personal initiative on the part of Schuler or the management of the camp.

As to the experiments, all orders came directly from the Supreme Command in Berlin. Among these experiments, which we could follow step by step (at least some of them) through the cards, the results, the registration number of people admitted to and discharged from Block 46, were; first of all, numerous exanthematous typhus experiments; second, experiments on phosphorus burns; third, experiments on sexual hormones; fourth, experiments on starvation edema or avitaminosis; finally, fifth, I can tell you of experiments in the field of forensic medicine. So we have five different types of experiments.

M. DUBOST: Were the men who were subjected to these experiments volunteers or not?

BALACHOWSKY: The human beings subjected to experiments were recruited, not only in the Buchenwald Camp, but also outside the camp. They were not volunteers; in most cases they did not know that they would be used for experiments until they entered Block 46. The recruitment took place among criminals, perhaps in order to reduce their large numbers in that way. But the recruitment was also carried out among political prisoners and I have to point out that recruits for Block 46 came also from Russian prisoners of war. Among the political prisoners and prisoners of war who were used for experimental purposes at Block 46, the Russians were always in the majority, for the following reasons:

Of all the prisoners who could exist in concentration camps it was the Russians who had the greatest physical resistance, which was obviously superior to that of the French or other people of western Europe. They could withstand hunger and ill-treatment, and, generally speaking, showed physical resistance in every respect. For this particular reason, Russian political prisoners were recruited for experiments in greater numbers than others. However, there were people of other nationalities among them, particularly
French. I should now like to deal with details of the experiments themselves.

M. Dubost: Do not go too much into details, because we are not specialists. It will suffice us to know that these experiments were carried out without any regard to humanity and on nonvoluntary subjects. Will you please describe to us the atrocious character of these experiments and their results.

Balachowsky: The experiments carried out in Block 46 did without doubt serve a medical purpose, but for the greater part they were of no service to science. Therefore, they can hardly be called experiments. The men were used for observing the effects of drugs, poisons, bacterial cultures, et cetera. I take, as an example, the use of vaccine against erythematous typhus. To manufacture this vaccine it is necessary to have bacterial cultures of typhus. For experiments such as are carried out at the Pasteur Institute and the other similar institutes of the world, cultures are not necessary as typhus patients can always be found for samples of infected blood. Here it was quite different. From the records and the chart you have in hand, we could ascertain in Block 46 12 different cultures of typhus germs, designated by the letter BU, (meaning Buchenwald) and numbered Buchenwald 1 to Buchenwald 12. A constant supply of these cultures was kept in Block 46 by means of the contamination of healthy individuals through sickness; this was achieved by artificial inoculation of typhus germs by means of intravenous injections of 0.5 to 1 cubic centimeter of infected blood drawn from a patient at the height of the crisis. Now, it is well-known that artificial inoculation of typhus by intravenous injection is invariably fatal. Therefore all these men who were used for bacterial culture during the whole time such cultures were required (from October 1942 to the liberation of the camp) died, and we counted 600 victims sacrificed for the sole purpose of supplying typhus germs.

M. Dubost: They were literally murdered to keep typhus germs alive?

Balachowsky: They were literally murdered to keep typhus germs alive. Apart from these, other experiments were made as to the efficacy of vaccines.

M. Dubost: What is this document?

Balachowsky: This document contains a record of the typhus cultures.

M. Dubost: This document was taken by you from the camp?

Balachowsky: Yes, I took this document from the camp, and its contents were summarized by me in the experiment book of Block 46.
M. DUBOST: Is this the document you handed to us?

BALACHOWSKY: We have actually made a more complete document—which is in the possession of the American Psychological Service—as we have the entire record, and this represents only one page of it.

M. DUBOST: I ask the Tribunal to take note that the French Prosecution submits this document, Document Number RF-334, as appendix to the testimony of Dr. Balachowsky.

BALACHOWSKY: [Continuing] In 1944, experiments were also made on the effects of vaccines. One hundred and fifty men lost their lives in these experiments. The vaccines used by the German Army were not only those manufactured in our Block 46, but also ones which came from Italy, Denmark, Poland, and the Germans wanted to ascertain the value of these different vaccines. Consequently, in August 1944 they began experiments on 150 men who were locked up in Block 46.

Here, I should like to tell you how this Block 46 was run. It was entirely isolated and surrounded by barbed wire. The internes had no roll call and no permission to go out. All the windows were kept closed, the panes were of frosted glass. No unauthorized person could enter the block. A German political prisoner was in charge of the Block. This German political prisoner was Kapo Dietzsch, an asocial individual who had been in prisons and in camps for 20 years and who worked for the SS. It was he who gave the injections and the inoculations and who executed people upon order. Strangely enough, there were weapons in the block, automatic pistols, and hand grenades, to quell any possible revolt, either outside or inside the block.

I can also tell you that an order slip for Block 46, sent to the office (Geschäftszimmer) at Block 50 in January 1945, mentioned three strait jackets to be used for those who refused to be inoculated.

Now I come back to the typhus and vaccine experiments. You will see how they were carried out.

The 150 prisoners were divided into 2 groups: those who were to be used as tests and those who were to be the subjects. The latter only received (ordinary) injections of the different types of vaccines to be tested. Those used for testing were not given any injections. Then, after the vaccination of the subjects, inoculations were given (always by means of intravenous injections) to everybody selected for this experiment, those for testing as well as the subjects. Those used for tests died about two weeks after the inoculation—as such is approximately the period required before the disease develops to its fatal issue. As for the others, who
received different kinds of vaccines, their deaths were in proportion
to the efficacy of the vaccines administered to them. Some vaccines
had excellent results, with a very low death rate—such was the
case with the rosin vaccines. Others, on the contrary, had a much
higher death rate. After the conclusion of the experiments, no
survivors were allowed to live, according to the custom prevailing
in Block 46. All the survivors of the experiments were “liquidated”
and murdered in Block 46, by the customary methods which some
of my comrades have already described to you, that is by means
of intracardiac injections of phenol. Intracardiac injections of
10 cubic centimeters of pure phenol was the usual method of
extermination in Buchenwald.

THE PRESIDENT: We are not really concerned here with the
proportion of the particular injections.

BALACHOWSKY: Will you repeat that please?

THE PRESIDENT: As I have said, we are not really concerned
here with the proportions in which these injections were given,
and will you kindly not deal with these details?

M. DUBOST: You might try and confine the witness.

BALACHOWSKY: Continuing Then I will speak of other
details which may interest you. They are experiments of a
psychotherapeutic nature, utilization of chemical products to cure
typhus, in Block 46, under the same conditions as before. German
industries co-operated in these experiments, notably the I.G. Farben
Industrie which supplied a certain number of drugs to be used for
experiments in Block 46. Among the professors who supplied the
drugs, knowing that they would be used in Block 46 for experimen-
tal purposes, was Professor Lautenschläger of Frankfurt. So
much for the question of typhus.

I now come to experiments with phosphorus, particularly made
on prisoners of Russian origin. Phosphorus burns were inflicted in
Block 46 on Russian prisoners for the following reason. Certain
bombs dropped in Germany by the Allied aviators caused burns
on the civilians and soldiers which were difficult to heal.
Consequently, the Germans tried to find a whole series of drugs
which would hasten the healing of the wounds caused by these
burns. Thus, experiments were carried out in Block 46 on Russian
prisoners who were artificially burned with phosphorus products
and then treated with different drugs supplied by the German
chemical industry.

Now as to experiments on sexual hormones...

M. DUBOST: What were the results of these experiments?

BALACHOWSKY: All these experiments resulted in death.
Wszechkie prawa zastrzeżone


175. Cmentarz Obrońców Lwowa — Mazurówka, G 5.

7. Szkoły.
191. Liceum Handlowe — plac Strzelecki, E 3.

197. XI im. Śmiechowskich (mat-przyr.) — ul. Szymonowska, G 5.

Seminaria.

Szkoły powszechne.

8. Teatry.

9. Towarzystwa i stowarzyszenia.
Earlier this century, the German biochemist Emil Abderhalden deceived the scientific world with his spurious "defence enzymes". Unless there is a change in clinical thinking, such a fraud could happen again.

Uta Deichmann and Benno Müller-Hill

Science is a social construct, as some sociologists of science claim, or is it its structure independent of social conditions? In the forefront of science, where everything seems possible, data may be misinterpreted and errors litter the path of science. In physics and chemistry such mistakes are usually quickly corrected by colleagues or the authors themselves. But what about fraud? Fraud assumes intention, which is difficult to prove. We think the deliberate invention and interpretation of data in science is a social construct. In physics and chemistry such social constructs are extremely rare; they are quickly detected and they have half-lives of just a few years. But we propose that this is different in medical science, in which science and social constructs may peacefully coexist.

We will demonstrate this by presenting the case of the non-existent Abwehrfermente (defence enzymes) created by Emil Abderhalden (1877-1950), who was professor of physiology and physiological chemistry at Halle University from 1911 to 1950, president of the Leopoldina—the oldest German academy of science—from 1931 to 1946, editor of several journals, and author of several books and more than 1,000 research papers.

Abderhalden's fraud

Abderhalden was born in 1877 in Switzerland. He received a medical education at the University of Basel, and in 1902 he went to Berlin to work with the great organic chemist Emil Fischer on the synthesis of peptides and the action of proteases, which are enzymes that break down proteins. In 1908 he became professor of physiology at the Tierärztliche Hochschule in Berlin, and three years later became professor of physiology and physiological chemistry at the University of Halle. He was due to become director of the Kaiser Wilhelm-Institut for physiology in 1914, but the First World War intervened. As a kind of compensation, the Kaiser Wilhelm-Gesellschaft financed his research with substantial grants until 1944.

Abderhalden's name as a biochemist was achieved through two types of experiments. First, with Emil Fischer he began to synthesize and isolate peptides, and in his career he synthesized and isolated more than anyone else in Germany. Unfortunately, little use was made of them. In 1909 he published his first work on the second topic, the Schutzfermente (protection enzymes) or, as he called them later, the Abwehrfermente. In 1912 he published a book about them, and considered them to be his most important discovery; three new editions appeared before the end of 1914.

According to Abderhalden, animals and humans produce specific enzymes, called Abwehrfermente, when they are challenged with foreign proteins. For example, the serum produced by pregnant women contains proteases specific to proteins of the placenta. The test for this claim is straightforward. Placenta is boiled, and the denatured, insoluble placental proteins are treated with serum from a pregnant woman. Peptides that arise through the action of the defence enzymes in the serum are dialysed and then identified by Biuret or ninhydrin reactions. Sera from non-pregnant women and men supposedly do not show this reaction.

This test intrigued gynaecologists and biochemists worldwide. Between 1912 and 1913, more than 25 papers from various gynaecological laboratories appeared that dealt with Abderhalden's pregnancy test, most of them with positive results. In 1914, the directors of German university women's hospitals were asked by a medical journal to describe their experience with this test. Of the 15 that replied, all had more or less positive results, and none had negative results.

The excitement increased. In the fourth edition of Abwehrfermente (1914), Abderhalden quotes 451 papers, many of them in non-German journals, which describe various uses of his test. As well as in pregnancies it was used successfully in three other contexts: the diagnosis of sarcomas and other carcinomas; the diagnosis of infectious diseases such as syphilis; and the diagnosis of psychiatric diseases such as schizophrenia. Cancer therapy using Abwehrfermente seemed just around the corner.

Why no one stopped him

We have to keep in mind that all these medical scientists deluded themselves: defence enzymes do not exist! It was a case of the emperor's new clothes: when everybody sees and admires his elegant clothes, just one child can destroy the social construct by pointing out that the emperor is naked. This 'child' was the German-Jewish biochemist Leonor Michaelis. In 1913 he had just published with Maud Menten the seminal paper on enzyme kinetics. Working in the biochemical laboratory of a hospital, he was asked by its director to establish the validity of Abderhalden's pregnancy test. He found that he and his collaborator were unable to repeat Abderhalden's experiments, despite spending a week in Abderhalden's laboratory in Halle. There was no difference between the sera of pregnant or non-pregnant women or between women and men: the pregnancy test did not work. In 1914, Michaelis and his collaborator published their negative results; it marked the end of his academic career in Germany.

But Michaelis was not the only biochemist who could not repeat the results. Donald van Slyke from the Rockefeller Institute and Florence Hulton from the University of Pennsylvania failed too. In 1920 Jacques Loeb wrote to Michaelis, who was still in Germany: "Nobody speaks of the Abderhalden reaction any more in the United States and I am very much surprised to see that in your journal Abderhalden still continues that myth." The reply from Michaelis seems timeless: "In Germany one can succeed only when one presents practical..."
applied science, however bad it may be. Anyone who wants to work on pure science is regarded as a nut, and so he finally stops working. About Abderhalden he wrote: "For me his type of work is disgusting. My position in Germany has suffered because of my opinion against his pregnancy test. There may be many who see through him, but nobody dares to say anything against him." Michaelis left Germany in 1922 to become visiting professor at a Japanese university, and later became a lecturer at Johns Hopkins University in Baltimore, Maryland, and then a member of the Rockefeller Institute in New York.

But how could Abderhalden continue with the Abwehrfermente from 1915 until his death in 1950? His strategy was simple and straightforward. He must have had collaborators who found what he wanted them to find (he dedicated the second edition of his book about the Abwehrfermente to his "faithful collaborators"). In general, he argued that the pregnancy test and other tests had worked in a large number of laboratories; so many scientists could not have deluded themselves. He conceded that in some laboratories the test did not work properly, and claimed that this demonstrated that the method was difficult; that it was not properly used, and - alas - that it was not perfect. So Abderhalden and his co-workers continued to streamline his method. The test became technically more and more complicated, and supposedly safer and safer. But the material to be tested became simpler. His research received a fresh impetus when he published a paper saying that the pregnancy test could work with urine, which was much easier to collect than blood and supposedly contained specific Abwehrfermente than blood.

How could Abderhalden continue with the Abwehrfermente from 1915 until his death in 1950? His strategy was simple and straightforward. He must have had collaborators who found what he wanted them to find.

Sinister applications

In the 1930s and 1940s, a wide range of topics were analysed in half a dozen German institutes with the help of the Abwehrfermente. There were tests for various forms of cancer, the final objective was cancer therapy. Tests for psychiatric diseases such as schizophrenia were developed; the Abwehrfermente were also used for effective shock treatment of psychiatric patients. Tests were worked out to diagnose the various psychological types proposed by the psychiatrist E. Kretschmer. (To test how patients dealt with fear, guns were fired behind their heads and pictures were taken; one schizophrenic patient is quoted as saying over and over again: "We want poison gas, why do they not give us poison gas?") The Abwehrfermente were used by Abderhalden's son Rudolf to diagnose various infectious diseases. They were even used to distinguish races of sheep. Remember that none of these diagnostic tests could possibly work because the Abwehrfermente do not exist, so the therapeutic value of the injections was dubious to say the least.

Some uses of the Abderhalden reaction were particularly disturbing. In November 1942, the human geneticist Otmar von Verschuer was appointed director of the Kaiser Wilhelm-Institute for Anthropology in Berlin. His former postdoc Josef Mengele joined him there in the winter of 1942–43. Mengele had been wounded in the war and spent some months convalescing in Berlin before moving in April 1943 to the Auschwitz concentration camp to become camp doctor. He must have discussed the scientific possibilities of Auschwitz with his teacher, because, when Mengele left, von Verschuer immediately applied for a grant from the Deutsche Forschungsgemeinschaft to finance Mengele's work in Auschwitz on the Abwehrfermente produced by members of various races deliberately infected with infectious diseases. They planned to use the Abderhalden reaction to demonstrate racial differences, and von Verschuer sent a technician to Abderhalden's laboratory in Halle to learn the technique.

Aware of the technique was not easy, von Verschuer called on Günter Hillmann to supervise the tests. Hillmann was an experienced biochemist who had worked in the laboratory of Karl Hinsberg, who had set out to improve the test of the Abwehrfermente for cancer cells; indeed, Hillmann himself had synthesized and tested a chemical that allowed a better quantification of the peptides released by the Abwehrfermente. But he had difficulties with Hinsberg, and in 1942 he moved to the laboratory of Adolf Butenandt, who had won the Nobel prize for chemistry in 1939.

Mengele sent blood samples from infected Jewish and Gypsy twins to Hillmann, who began analysing them. On 4 October 1944, von Verschuer wrote to a friend: "Precipitates have been prepared from the plasma of more than 200 individuals of various races, some twin pairs, some families. Abderhalden's method has been used and supplemented by a method newly discovered by Hillmann (who has joined us as collaborator). So very soon we can now begin our real research. The aim of our various efforts is not in vain, to establish that the influence of heredity is important in various infectious diseases, but rather how hereditary factors act and what kind of events take place in their action."

A workshop on Abwehrfermente was held in 1947 in Tübingen, chaired by Butenandt. In a two-page report on the meeting, Gerhard Mall, a collaborator of Kretschmer, wrote that Mall, Hinsberg, Kretschmer and Bersin had found specific defence enzymes. But Butenandt asked for the use of chemically homogenous proteins to re-test the claims.

That was not the last word on the Abwehrfermente, however. After Emil
Abderhalden's death in 1950, his son Rudolf declared that they were the perfect diagnostic tools to determine the optimal cell type for the Frischzellen-Therapie (fresh cell therapy) invented by Paul Niethams', and so for a few years the Abderhalden reaction was used again. But two clinicians demonstrated that it made no difference whether the patient was healthy or sick; the sera reacted just the same. They did not know when the Abwehrfermente finally disappeared as a diagnostic tool. Last year the Frischzellen-Therapie was outlawed in Germany by the Department of Health, but this ruling has been challenged by doctors who claim it infringes the rights of both doctors and patients. The Supreme Court of Germany is pondering the problem, but this is likely to take a long time.

Behind the fraud

It is worth noting that Abderhalden was a convinced eugenicist. Given that his main scientific activity was based on self-deception and fraud, it is interesting that between 1922 and 1935 he edited a journal about ethics (Ethik). He wrote a textbook of biochemistry that appeared in 28 editions between 1906 and 1948 and was translated into four languages. He was president of the Leopoldina Academy from 1931 to 1950. After 1933, the notes "membership terminated" or "membership extinguished" were secretly added to the title cards of the more than 90 German members of the academy; the members were not informed, but they no longer received the academy's journal or invitations to events. All candidates for new international membership were discreetly vetted by the German foreign office to see whether or not they were Jewish. After 1945, Abderhalden claimed that no Jewish member was ever expelled from the Leopoldina. Truth was not his business.

Historians of science have largely ignored Abderhalden and his Abwehrfermente. The biochemist Peter Karlsö wrote: "Emil Abderhalden certainly did not invent the Abwehrfermente, he worked in many fields, he was a distinguished professor... and he certainly did not need to increase his fame through dubious publications... presumably one will have to classify the literature on Abwehrfermente as 'unconscious collection of wrong data', some of it auto-suggestion." Theodor Wieland, a peptide chemist, calls Abderhalden the "founder of scientific biochemistry". About the Abwehrfermente, he wrote: "Defence enzymes raised great hopes for theoretical biochemistry and also for practical medicine, which, however, in spite of intensive work, mostly with the participation of his son Rudolf, were not fulfilled. Thus they did not succeed in the isolation and characterization of a defence proteinase." The immunologist Otto Westphal told one of us (U.D., private conversation) that his colleague Hans Brockmann wanted to work with Abderhalden on the Abwehrfermente. "Brockmann tested one or two systems, but was unable to reproduce them. He went to Abderhalden and told him that it worked the first time but not the second time. Abderhalden asked him why he repeated an experiment that worked well once. Brockmann left the institute immediately, considering Abderhalden to be a fraud." Westphal adds: "I had no doubt in the beginning myself, in fact I wrote a review on the Abwehrfermente in 1939. In 1942 or 1943 I spoke to Brockmann. I asked about Abwehrfermente, he said he was a fraud from beginning to end."

Neve repeating an experiment that worked once, or discarding controls that did not work, is not science but pseudoscience or fraud. Abderhalden must have known this. It was his way of trying to ordure a young scientist to join him in the fake world of science as social construct. But Brockmann was a real scientist and fled. Westphal is listed as a participant at the Tübingen workshop on the Abderhalden reaction. Was he critical? Did the participants use a double language that allowed the true scientist to abandon the non-existent defence enzymes and the believers to continue their social construct?

Can it happen again?

Abderhalden was a pure biochemist, but most of those using his method were medical, clinical biochemists. Such researchers often work during the day with patients in a hospital, and their experiments are confined to the afternoon or more likely the night. The senior author of research papers may be the director of a hospital. Clearly the universe of science is rather different from that of patients, who prefer to hear an optimistic diagnosis rather than the simple truth. It is difficult enough for the director of a large laboratory to validate all the experimental details of his collaborators, but for a physician, the director of a clinic who is responsible for many patients as well, this is clearly not possible. He must trust his collaborators, yet he is an authority. Truth may discreetly disappear.

Clinicians were offered the possible advantages of the Abwehrfermente for diagnostic breakthroughs. Most of them failed to admit that their tests did not work. Excellent non-clinical biochemists such as Butenandt and Kuhn kept silent too, at best stating that the specificity of the Abwehrfermente was not rigorously proven. The existence of the Abwehrfermente was seriously questioned only by Michelsen, von Stetke and Winton, and the possibility of fraud was never mentioned in public. In medical biochemistry, ideas or hope may be stronger than experimentally proven reality. It is true that some antibodies have catalytic properties, but the question is whether the existence of specific defence proteases can be measured and proved in repeatable experiments. Here Abderhalden and almost all the people in the field failed.

At the time, Germany was regarded by many to be the leading country for medical science. The story is disturbing when we realise that it did not end in 1950 with the death of Abderhalden. The Abwehrfermente disappeared from the literature in the 1950s but nobody wrote a clarifying obituary. The elite of today are loyal students of the old elite, and they have learned and internalized the old values. Has medical, clinical science in Germany today really changed that much? We doubt it. The Brach-Herrmann-Metelsmann affair provides a brief glimpse into the abyss of medical science in Germany. Will it be soon forgotten by the German medical elite, or will there be a real change in the spirit of science?

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14. Acknowledgements. This work was supported by Deutsche Forschungsgemeinschaft.