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INSTITUT FÜR FLECKFIEBER - UND VIRUSFORSCHUNG DES
OBERKOMMANDOS DES HEERES AT ROTH, BAVARIA

27 - 30 April, 1945
16 - 17 May, 1945

Summarized from Reports By

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Composition of Team: As shown on Page 1.

C O N F I D E N T I A L

C O N F I D E N T I A L

Introduction: The information contained herein represents a consolidation of two separate reports. The first was prepared by Captain Hans E. Schlumberger, M.C., A.U.S. and 1st Lieutenant Eugene P. Soles, M.A.C., A.U.S. after a trip to the several targets during the period 27-30 April 1945. The second report was by Lt. Col. Joseph E. Smadel, M.C., A.U.S. and was confined to a discussion of his investigation of the Institut für Fleckfieber-und Virusforschung des Oberkommandos des Heeres on 16 and 17 May 1945. Those portions of the original reports which were primarily administrative in nature have been deleted from this summary.

Section I

INSTITUT für FLECKFIEBER-und VIRUSFORSCHUNG des OBERKOMMANDOS
des HEERES at Roth, Bavaria.

General Remarks. The Institute is located about $\frac{1}{2}$ mile south east of Roth, a town of about 7000 inhabitants situated on Highway 2, some 20 miles south of Nurnburg in Bavaria. The main building is a three-story stone structure of fairly modern construction about 150 x 50 feet and containing about 80 rooms. This was used as a convalescent hospital before the war. It was enlarged for military purposes during the war and was turned over to the Institute on August 1944. The main building is set on a hill in a fenced-in 3-acre plot containing gardens and walks. Adjacent to the main building are several wooden sheds which now house small animals. The property extends an indefinite distance into the pine woods which surround the central plot. About 100 yards from the main building are two wooden barracks each of which measures about 100 x 30 feet and contains some 20 fair-sized rooms. These barracks were used as a Luftwaffe training school for radio and navigation until the area was occupied by the Americans. Several large rooms in the main school house of Roth have been used by the Institute for am-puling vaccines and storage of supplies. A wooden barracks in the grounds housed a mouse breeding colony. The area was taken by the 7th Army on 20 April 1945. During the capture one shell blew an eight foot hole in the roof and did minor damage to the third floor of the main building.

History of Present Organization. The Institut für Fleckfieber-und Virusforschung des Oberkommandos des Heeres at Roth represents an amalgamation of the staffs and equipment of three such institutes that were set up in Poland. They were at Rabka (near Cracow), Lemberg and Cracow, under the direction of the Wehrmacht. It may be noted that I.G. Beringwerke also had a typhus vaccine production plant at Lemberg which began operating late in 1943; this was independent of the Wehrmacht Institute. Dr. Hermann Eyer Oberstabsarzt Wehrmacht, was in charge of the Cracow Laboratories, Drs. Eyer and Weigl were co-directors of the Lemberg Laboratories and Dr. Bickardt was director of the Rabka Laboratories. Rabka

produced mouse lung typhus vaccine principally but had begun to develop the production of egg vaccine. Lemberg made only louse intestine vaccine while Cracow manufactured louse intestine vaccine principally but also had begun about 1943 to make mouse lung vaccine. Information obtained from technician assistant Anna Rohrmann and from examinations of available records at Roth does not permit an accurate estimate of the quantity of vaccine produced by their three laboratories in Poland. It is evident that these laboratories were ordered to produce sufficient vaccine for the immunization of 2,000,000 persons in 1940. Presumably these orders were complied with. However, in another report, mention is made that about 1,000,000 lice were constantly maintained at Cracow. Since 100 infected lice are required for the three cc of vaccine used to immunize one man and, since it takes 20 days from the time of hatching of lice until the harvesting of infected lice, the maintenance of such a stock of lice would yield not more than sufficient vaccine for 180,000 men per year. The Rábka laboratory harvested the lungs of 100-200 infected mice daily. Each pair of lungs were suspended in 5 to 10 cc of diluent depending on the rickettsial content of lung smears, hence, the production was approximately one liter of lung vaccine per day or in one year sufficient to vaccinate about 50,000 men with a course of 3 injections of 1cc each. No information on the production capacity of Lemberg was obtained.

In the summer of 1944 as the Russians approached the Cracow area plans were made to move the typhus vaccine laboratories into central Germany, Roth was determined upon as the new site and in August 1944, Dr. Eyer began to repair and remodel the building now occupied by the Institut. Equipment and female technicians were sent back from each of the laboratories in Poland to stock and staff the new laboratory. Work was carried on at the parent laboratories until 19 January 1945, two days before they were occupied by the Russians. The remaining officers and men who were subsequently captured at Roth by the Americans departed at that time from the Polish area with several convoys of equipment. Some of this was destroyed by American bombers while in transit. Most of the equipment from the Lemberg Laboratory was abandoned at Tschenschow because of the rapid pursuit of the Russians.

Adaption of the main building at Roth to laboratory use proceeded during the following winter of 1944. In December small trial lots of egg and mouse lung vaccine were prepared for the first time in the new location. Soldiers were employed for most of the skilled technical work in the production of louse vaccine. A few small lots of louse vaccine were made after their arrival in early February. Large-scale production of none of the three types of vaccines had begun at the time of capture by the Americans. However, laboratories for the manufacture of egg and mouse vaccine had been completed as had part of those for the preparations of louse vaccine.

Staff. At the time of the American occupation the staff

of the Institut consisted of 54 persons; there were; Leiter; Oberstabsarzt Prof Dr. Herman Eyer, Assistenten; Stabsärzte Dr Joseph Daniels and Heinrich Naecten, some 33 non-commissioned officers and men of the Wehrmacht, 6 highly trained female technical assistants who apparently had a status in the Wehrmacht similiar to that of civilian technical assistants in the US Army, 10 women who had formerly been employed as army censors and who were to be taught some laboratory techniques, a Polish mechanic and a German caretaker.

Dr Eyer who is about 38-40 years of age was formerly Professor at the University of Erlangen. He has done good investgative work in the field of virus and rickettsial diseases. He joined the Wehrmacht as Captain and was sent to Poland in 1940 to be co-director with Weigl of the typhus vaccine institute at Lemberg. He was promoted to his present rank of Major in 1941 or 1942. The female technicians deny that Eyer had any Nazi affiliations, in fact, they maintained that the Wehrmacht was as non-political as is the American Army. In agreement with their expressed statements regarding Eyer it may be noted that his own signed correspondence, that was examined, never ended with "Heil Hitler", but that many letters he received from others did use such a form.

Captain Joseph Daniels worked at the institute in Lemberg apparently directly in charge of the louse vaccine laboratory. In addition he worked on rabies vaccine at the Pasteur Institute in Lemberg.

The female technicians and female helpers work half of each day caring for the animal and louse colonies and doing stand by work around the Institute under the direction of Captain Miner. They live in part of one barracks which was formerly the Luftwaffe school. They receive no compensation other than quarters. Their food is purchased by them through civilian channels. They have enough savings to continue on the present basis for a short time.

Animal & Louse Colonies. There are several hundred rabbits housed in one of the wooden sheds and in several rooms in the basement of the main laboratory building. They seem in good condition but casual inspection failed to reveal the presence of young. Several hundred guinea pigs are also housed in the basement of the main building. They appear well and there are many young animals. Mice are being raised in two places, i.e., in a large room on the top floor of the main building and in half of a barracks building in the yard of the school house in Roth. The mice are well cared for and are producing young. Two mouse strains are maintained. One is a white strain which is said to be heavily infected with ectromelia. While typical cutaneous lesions of this disease were not seen in the few mice examined, in general this line appeared to be not in the best of condition. According to the female technicians the second strain, a cross between the white mice and wild gray mice, was developed in order to get a strong healthy stock. The cross breed mice are sleek and frisky. A total of 1500 to 2000 mice make up the colony.

Laboratories. A detailed description of the laboratory facilities of the Institute will not be given. Briefly, it may be stated that large well equipped rooms are available for the inoculation of egg embryos, adequate incubator space is at hand for the incubation of about 2500 eggs at one time and other facilities are available for the harvesting and processing of infected yolk sacs. Similarly rooms are equipped for the inoculation of large numbers of mice and for the harvesting and processing of infected lung tissue. A laboratory for the handling and hatching of normal lice is completely equipped. One room with tables and special equipment for six operators for the intrarectal inoculation of lice is completed. Several similar inoculation rooms are in various stages of completion. A large room is equipped for dissection of intestines of infected lice by some 20 or 30 workers. Adequate space and equipment are available in rooms on each floor for the cleaning and sterilization of glassware. A tissue culture room is ready for use. A large library is well stocked with complete or almost complete series of the bound volumes of many of the important journals in the field of medicine and related subjects. A large kitchen occupies part of the first floor and a machine shop equipped with several lathes is found in the basement.

Techniques.

1. Louse Typhus Vaccine.

The main emphasis in typhus vaccine production during the entire war has been on the louse intestine type of product. The techniques employed are essentially those of Weigl with various minor modifications introduced to facilitate large scale production. "Sterile" hatched larvae are maintained under semi-aseptic conditions for 15 days, then inoculated with a louse strain of epidemic typhus rickettsiae. They are harvested on the 5th day and the dissected intestines are ground and suspended in 0.5% phenol-physiological saline solution. Three dilutions are prepared for immunization: 1st dose of 1cc contains material from 17 lice, 2d dose material from 33 lice and 3d dose material from 50 lice. The dissection of lice intestines is considered a more tedious task than the intrarectal inoculation of lice by the technicians. A good worker can dissect about 300 lice per hour and the top number per day is about 2000 for an exceptional technician. The dissectors never work more than 6 hours daily because of the eye strain and nervous tension. Generally one dissecting apparatus is shared by two workers who alternate frequently at the bench. Arrangements for the mass feeding of infected lice on typhus immune persons had not been made at Roth. In Poland, civilians were given one mark daily and some extra rations for louse feeding. According to the female technicians there were always plenty of towns-people willing to carry lice (in boxes) for this recompense. Louse stocks and infected lice at Roth were carried only by members of the Institute at the time of the arrival of the Americans. Typhus infected lice were immediately destroyed. Dried infected louse material stored in ampules is available if the vaccine work is to be continued. All of the workers had recovered from

epidemic typhus. They considered the infection as inevitable and depended on preliminary vaccination to ameliorate the attack which it apparently did in every instance. The impression in the laboratory was that infection generally occurred from the inhalation of rickettsiae-laden dried louse feces.

2. Mouse Lung Typhus Vaccine

A mouse lung adapted strain of epidemic typhus is used to infect mice by the intra-nasal route. The inoculated animals sicken and die about the 4th day. Impression smears are made of a number of lungs with the typical hemorrhagic pneumonia and are stained with victoria blue. On the basis of microscopic examination of this sample the batch is rated as † or †† rickettsial and diluted accordingly after grinding; 5cc of phenol saline are used per pair of mouse lungs when the rating is † and 10 cc when it is ††. The largest trial run made at Roth was with 300 mice. Technicians Anna Rohrmann thinks that this is the maximum number that can be handled at one time with the present equipment but that 3 such runs could be made each week. The laboratory facilities seemed adequate for such an output, however, this would require about 1000 mice each week which would necessitate a great increase in the mouse colony or purchases from other breeders.

3. Yolk Sac Typhus Vaccine.

Dr Eyer as well as certain German, French and Polish workers lay great stress on the morphological appearance of rickettsiae used for vaccine; long bacillary forms are frowned upon for immunization. As a result of this belief a peculiar cycle of passage is in current use in the Wehrmacht typhus vaccine laboratories. A strain is carried for 10 passages in the yolk sac, then passed through guinea pigs and the infected guinea pig brain returned to yolk sacs. This is followed because at about the 9th or 10th yolk sac passage the rickettsiae begin to appear as elongated structures. As a result of this policy it is debatable if a really well adapted egg strain of typhus rickettsiae was ever obtained at the institute. In any case the strain that was being used for egg work was lost when the 30°C refrigerator stopped because of the failure of electricity for some days after our occupation.

In the preparation of egg vaccine, 7 day embryos are injected into the yolk sac with a few tenths of a cc of 1/10 dilution of infected yolk sac. The eggs are harvested on the 4th to 6th day when the embryos become sluggish. The shell over the air sac is removed with scissors, the egg is poured into a petri dish and the yolk sac picked up with forceps and transferred to a second dish where it is drained and then put into a glass jar with beads. The yolk sacs are emulsified by shaking with phenol saline solution. Representative yolk sacs in each lot are smeared and stained with victoria blue; the

slides are classified as \pm $\pm\pm$ or $\pm\pm\pm$. The last group is used for passage and when pooled for vaccine diluted with 25cc of phenol saline. Egg pools rated as $\pm\pm$ are suspended in smaller amounts of phenol saline and eggs which are only \pm are discarded. It is obvious that the above procedure is not well adapted to the rapid handling of large numbers of infected yolk sacs.

4. Processing of Crude Typhus Vaccines.

Little information was obtained on the processing of the crude suspension of typhus vaccine described above in 2, and 3. However, an inspection of the finished product gives one the impression that little final processing is used other than low speed centrifugation. There are thirty liters of crude vaccine stored in a cool but unrefrigerated room in the basement, waiting to be finished and placed in ampules but the available staff does not know the necessary procedures.

The space occupied in the school house at Roth contains ampules and packing containers for at least 2,000,000 courses of louse vaccine. One room which is used for bottling vaccine has four of the ordinary type ampule filling and sealing machines.

5. Preparation of Yellow Fever Vaccine.

In 1940 Dr. Eyer was sent to the laboratory of Dr. Schüffner in Amsterdam to learn the technique for the preparation of yellow fever vaccine. A considerable amount of this vaccine was made in 1942 but all production was stopped early in 1943 when the Allies re-conquered Africa. Technician Rohrmann thinks that Dr. Eyer obtained a mouse neurotropic strain of yellow fever virus designated 564 from Schüffner. Some work was done with vaccine prepared from infected chick embryos and with tissue culture material but most of the vaccine prepared for the Wehrmacht was made from infected mouse brain. Twenty, one gallon Dewar flasks were found in the attic packed with cotton and small ampules labelled yellow fever vaccine and containing dried material. The glass ampules are crudely made and the labels are not of the usual commercial type. This vaccine, approximately 2000 ampules was kept at -30°C until August 1944, when it was moved from Cracow; it has been at room temperature since then and is undoubtedly inactive now.

6. Rabies Vaccine.

Several small cartons containing sets of two dozen 1cc ampules of rabies vaccine were found. These were labelled Institut für Fleckfieber-und Virusforschung, Lemberg-Cracow, but the last two words had been crossed out. Eight rabbits supposedly inoculated with rabies virus were found in the isolation animal room in the basement of the main building. One of these showed signs of central

nervous system involvement when inspected. Additional information on Rabies vaccine production could not be obtained.

Trench Fever. The present situation at the Institut presents a unique opportunity in this war for a study of the infectious agent of Trench Fever. Trench Fever, or Wolhynian fever, which is caused by *Rickettsia quintana* was apparently not considered a problem of importance by the German Army, at least little evidence of investigative work on this disease has come to light. The typhus vaccine laboratory workers considered it a common and bothersome disease in Poland which frequently caused infection of their louse strains and of the human feeders. Lice infected with *R. quintana* and inoculated with rickettsiae of typhus were not excluded from the commercial batches of typhus vaccine.

Several of the soldier technicians who maintained louse strains in Poland and at Roth had suffered from Trench Fever. One of these had his first attack about December 1944 and recurrent mild attacks occurred after he came to Roth. Two of the female technicians accepted louse strains from the soldiers when they were captured on 20 April. About two weeks later one of these girls, Meiser, developed generalized pains and fever and was hospitalized for several days. Her lice also became sick and most of them died; the rest were killed because none of the other girls would accept them. About this same time another girl, Boehm, had a mild attack of a similar nature but was not hospitalized. On 16 May Boehm again developed malaise and chilly sensations. She had maintained her louse colony throughout this period. The juxtaposition of persons with Trench Fever, infected and normal stocks of lice, and laboratory facilities for the handling of fertile eggs warrant an attempt to isolate *R. quintana* by passage in the yolk sac of embryonated eggs. It will be recalled that Trench Fever was a common disease on the western front in the last war but that extensive studies failed to reveal a method of propagating the casual agent except in human beings or in *Pediculus humanus* which is an obligate human parasite.

Typhus Vaccines in Stock. Relatively little typhus vaccine is on hand at the institute in Roth. 3500 sets of three ampules each of crude louse, egg and mouse vaccine, total 30 liters, or roughly enough for 10,000 courses of immunization, are stored in the basement of the Institut. Most of the crude vaccine was prepared in Poland and shipped to Roth before the Germans were driven out of Cracow.

Louse stocks were maintained by certain of the female technicians and by the soldiers. When the latter were taken away, several gave their colonies to girls who had not been feeding lice previously. A discussion of the subsequent infection of two of these girls with what was thought to be Trench Fever. Lice are carried in small wooden containers with two wells covered by silk screening; these are adaptations of the usual louse carriers but are surprisingly light

They are sterilized at frequent intervals. In addition the skin area used for feeding is scrubbed with alcohol prior to attaching the louse box and the lice are handled by sterile technique throughout their lives. Lice are fed once daily at present and are kept in 37°C incubators between feedings. Cloth patches laden with eggs are stored at 37°C in test tubes with a constriction near the base. The hatched larvae fall to the bottom of the tube and are easily collected.

Potential postwar uses of the Institute at Roth.

The Institute has facilities for the production of an appreciable amount of typhus vaccine. Arrangements had been made locally for acquiring 1000 fertile eggs per week but the equipment could handle 5000 eggs per month. The theoretical capacity, thus, is about 1,500,000 cc of egg vaccine per year. Mice could be handled at the rate of 1000 per week and should theoretically yield about 500,000 cc annually. Actually production should be at least one third of the figures given above. Equipment is available for manufacturing about 350,000 cc of louse typhus vaccine per year but actual production would depend on the availability of immune persons to feed the lice. Certain other biologicals can also be produced at the Institut.

It should be pointed out that the Beringwerke of I.G. Farben at Marburg can make 12,000,000 cc of typhus vaccine annually and can produce practically all of the other types of vaccines, antisera, and diagnostic biologicals required in Germany. However, is it our intention to leave the I.G. in a completely monopolistic position in Germany?

Rapid Aggluturation Test.

Dr. H. Eyer has developed what he calls a Fleckfieber-Folien-test (FFT). See Eyer H. and Brix, W.: Die orientierende Probeagglutination als diagnostischer Schnelltest. Die serologische Fleckfieberdiagnose unter Feldverhältnissen, Deutscher Militär Arzt: p 193, 1943. The material consists of 50 test sheets packed in a bakelite box; instructions for use are included in each box. Each sheet measures $2\frac{1}{2}$ x 1" and is transparent. It resembles heavy cellophane. Near one end is a dried, blue stained suspension of Proteus OX-19. At the other end of the sheet is a space for the date, name of patient and result of test. A drop of water is placed on the sediment and allowed to remain there without stirring until a uniform suspension is obtained. A drop of patient's blood is then added. If the test is positive, the bacteria will agglutinate as blue-black clumps, leaving the background a bright red. The test is not positive until the 6th day of illness. A number of these test kits were found in the Institut.

Section II

Laboratory at Schwarzenfeld

This laboratory is located in a monastery at Schwarzenfeld on the top of a hill from which it dominates the surrounding countryside. The building occupied by the laboratory was built about 1934 for use as a seminary. The conversion to a laboratory is quite complete. The individual rooms are fitted for studies and work rooms for the investigators. In many of the rooms there are galvanometers, ammeters, all manner of electrical equipment, spectrosopes, balances, etc. A large collection of books on electron and atomic physics are present in several rooms. The condition of the laboratory would indicate that an attempt had been made to move out the books and equipment.

At the time of inspection, the building was being used by a signal corps unit as a radio relay station. The caretaker put in an appearance and was questioned. According to the informant, the director is Professor Nikuradsa, physicist at the University of Berlin and formerly at the Technische Hochschule in Munich. The laboratory was moved from Berlin to Schwarzenfeld about 1 October 1943. Associates of Dr. Nikuradsa were Dr. Berger and Frau Dr. Joarges. Dr. Berger who appeared during inspection of the building, was interrogated. He was very anxious to obtain his personal papers and insisted that he and the other investigators had been conducting non-military studies on "fundamental problems of physics". Since no one present had sufficient technical knowledge to be wholly certain of the truth of the statement, Dr. Berger was forbidden to remove anything from the building, though permitted to continue working therein. This latter was done primarily with a view to prevent looting and needless destruction of equipment. Dr. Berger will report to the burgomeister who will turn the building over to the military government.

Besides the physical research group, the monastery also housed the "Institut für Continentale Forschung" which moved there at about the same time. According to Dr. Berger, the two chief workers of that department were Dr. Günther and Dr. Witt. A library held books on agricultural and industrial statistics of Germany and other countries; likewise, numerous books on continental politics and the Nazi Party. Stacks of newspapers, prominent among them were those of United States and Britain. Many issues of the New York Times had been photostated. All the newspapers dated from 1940 to 1943. Dr. Berger denied any closer knowledge of the work carried on by this group.

Section III

Bunker and Underground Hospital, Nürnberg

The buildings of the Allgemeines Krankenhaus der Stadt Nürnberg are almost wholly destroyed as a result of aerial bombing and fire.

The presence of a large factory target nearby, probably accounts for this destruction. However, on the hospital grounds, there are two units which are undamaged. Both were specially constructed for this purpose during the war.

A large, square, four-story- bunker type, windowless building has a bed capacity of 200. Originally set up as an obstetrical and gynecological units, it is now used for all purposes of a general hospital, including care of infants. Each ward contains approximately twenty two-tiered bunks giving a total capacity of 40 beds. Pre-heated air is pumped in at one end, exhausted at the other end of the room. This air provides both ventilation and heat. Power for the pumps is supplied by electrical motors. If these fail, e.g. during an air raid, an auxilliary diesel engine is used. The operating room facilities as well as over-all organization and equipment of this hospital, are similar to those of any good modern hospital. The 4-6 foot thick walls of reinforced concrete withstood the test of aerial and artillery bombardment. Several direct hits were scored as indicated by the condition of brick super structures on the roof.

In another part of the hospital area is a lawn approximately 100 feet square. Beneath this is a one story hospital of 100 beds. The roof consists of 4 feet of steel beams and reinforced concrete covered by 4 feet of earth. The ventilation and heating is similar to that in the bunker building. The wards and single operating room are well equipped but present no new or unusual features. According to the chief surgeon, only minor tremors were felt even during the heaviest aerial attacks.

A P P E N D I X I

Analysis of Typhus Vaccine Prepared at the Institut für Fleckfieber-und Virus Forschung

Samples of typhus vaccines prepared from infected mouse lung and from infected lice were obtained from the Institut. Both vaccines probably had been prepared late in 1944 since they bore expiration dates of December 1945. It is likely that they were made and ampuled in Poland since their serial numbers were followed by "Krakau". They were issued in sets of three ampules, numbered 1 to 3, and contained suspensions of increasing density and deeper brown color as the series progressed.

Stained smears of the German mouse and louse typhus vaccine showed numbers of intact rickettsial-like bodies. These were quite numerous in the Nr.III ampules of both types of vaccine. The results of complement fixation studies on the German vaccines, indicate that the least concentrated suspension, i.e., Nr.I, of each type contains appreciable amounts of complement fixing antigen and that the Nr.III ampules of louse and mouse vaccine have CF titers that compare favorably with the yolk sac typhus vaccine used by the U. S. Army. Like the American vaccine, the German fixes complement with both epidemic and murine typhus antibodies. Animals were not immunized with the vaccines in order to test their resistance to infection of their anti-body production.

TABLE

Specimen	Serum	C - F Titers			
		Nr.(Series)	I	II	III
*323-Fleckfieber-Impfstoff aus Mauselungen	Epidemic		1:8	1:24	1:32
Ampullen Nr.I,II,III.	Murine		Not Done	N.D.	1:24
Op. Nr. 12. Krakau	Saline		Less than 1:2	1:2	1:2
Verwendbar bis XII,1945	(anti-complimentary control)				
*324-Fleckfieber-Impfstoff nach Weigl	Epidemic		1:4	1:8	1:12
Ampullen Nr.I,II,III.	Murine		N.D.	N.D.	1:8
Op.Nr.G. Krakau	Saline		1:2	1:2	1:2
Verwendbar bis XII,1945	(anti-complementary control)				

A P P E N D I X 2

Articles by Doctor Hermann Eyer

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1940

- | | |
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122, 584, (1940)</p> |
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| <p>Verlausung und Entlausung unter besonderer Berücksichtigung der Fleckfieberbekämpfung.
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Die Fleckfieberprophylaxe beim Deutschen Heer.
Das Fleckfieber</p> | <p>Z.f. Hyg.
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Heft 5 (1941)</p> |
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| <p>Die orientierende Probeagglutination als diagnostischer Schnelltest.Die serologische Fleckfieberdiagnose unter Feldverhältnissen.
Zusammen mit Waldemar Brix
Über den Feinbau der Fleckfieber-rickettsien.</p> | <p>Z.f. Hyg.</p> |

Zusammen mit Hans Ruska

Über das Fleckfieber und seine neu- Wien. Kl.Wo.(1943)
zeitliche Bekämpfung. (Vortrag i.d.
Kaiser Wilhelm Gesellschaft)

- B. Completed experimental investigations, which it was not possible to prepare in writing owing to lack of time
(The protocols are available for inspection).
-

Über die rickettsicide Wirksamkeit der gebräuchlichen
Entwesungsmittel. Zusammen mit Heinrich Muckter.

Zur Frage des färberischen Rickettsienachweises im
strömenden Blut. Zusammen mit Waldemar Brix.

Die Technik der Rickettsienagglutination. Zusammen
mit O. Frey und O. Kristen.

Die Kälte-Hochvacuum-Trocknung empfindlicher biologischer
Substrate. Teil II. Zusammen mit A. Rohrmann.

Über. Bakterienkonserven. Zusammen mit A. Rohrmann
e.E.D. Schroder.

Erfahrungen bei der Herstellung und Lagerung von
Gelbfieberimpfstoffen. Zusammen mit W. Brix und I.
Ulmann.

Die quantitative Agglutininanalyse auf Objektträgern.
Teil II Methodik. Zusammen mit H. Dillenberg und
O.Frey.

Das Fleckfiebertrockendiagnostikum.

Überempfindlichkeitsreaktionen nach Impfungen mit
Läusevaccine. Ein Erfahrungsbericht.

Über das Toxin der Rickettsia Prowazeki. Zusammen
mit Waldemar Brix.

Die Kältehochvacuumtrocknung empfindlicher biologischer
Substrate - Teil III (Ergebnisse)

Die quantitative Agglutininanalyse auf Objektträgern.
Zusammen mit Ortrud Kristen.

Der Fleckfieberfollientest und seine praktische
Brauchbarkeit.

Über die rickettsiide Wirksamkeit der gebräuchlichen chemischen Entwesungsmittel. Zusammen mit Heinrich Muckter.

Das Fleckfieber Schutzgeimpften - Teil II.
Zusammen mit Z. Przybylkiewicz.

Beobachtungen über biologische Verschiedenheiten bei Prowazeki-Rickettsien verschiedener Herkunft.

Die Blutgruppenbestimmung unter Feldverhältnissen.
Zusammen mit Waldemar Brix.

Ein Verfahren zur Gewinnung der Gesamtblutmenge von Mäusen.

Die wertmässige Beurteilung von Fleckfieber-impfstoffen.
Zusammen mit Heinrich Muckter.

Ein Verfahren zur Sterilisation sporenhaltiger Impfstoffe.
Zusammen mit H. Muckter und E. D. Schroder.

Die Wirkung von Keimlingsextrakten auf das Bakterienwachstum.

Beobachtungen bei äusserlicher Anwendung des roten Prontosile.

Uncompleted experiments

Die pathologische Anatomie der experimentellen Fleckfieberpneumonie der weissen Maus. Zusammen mit Erika Lukas.

Rickettsienfärbungen. Zusammen mit E. D. Schroder.

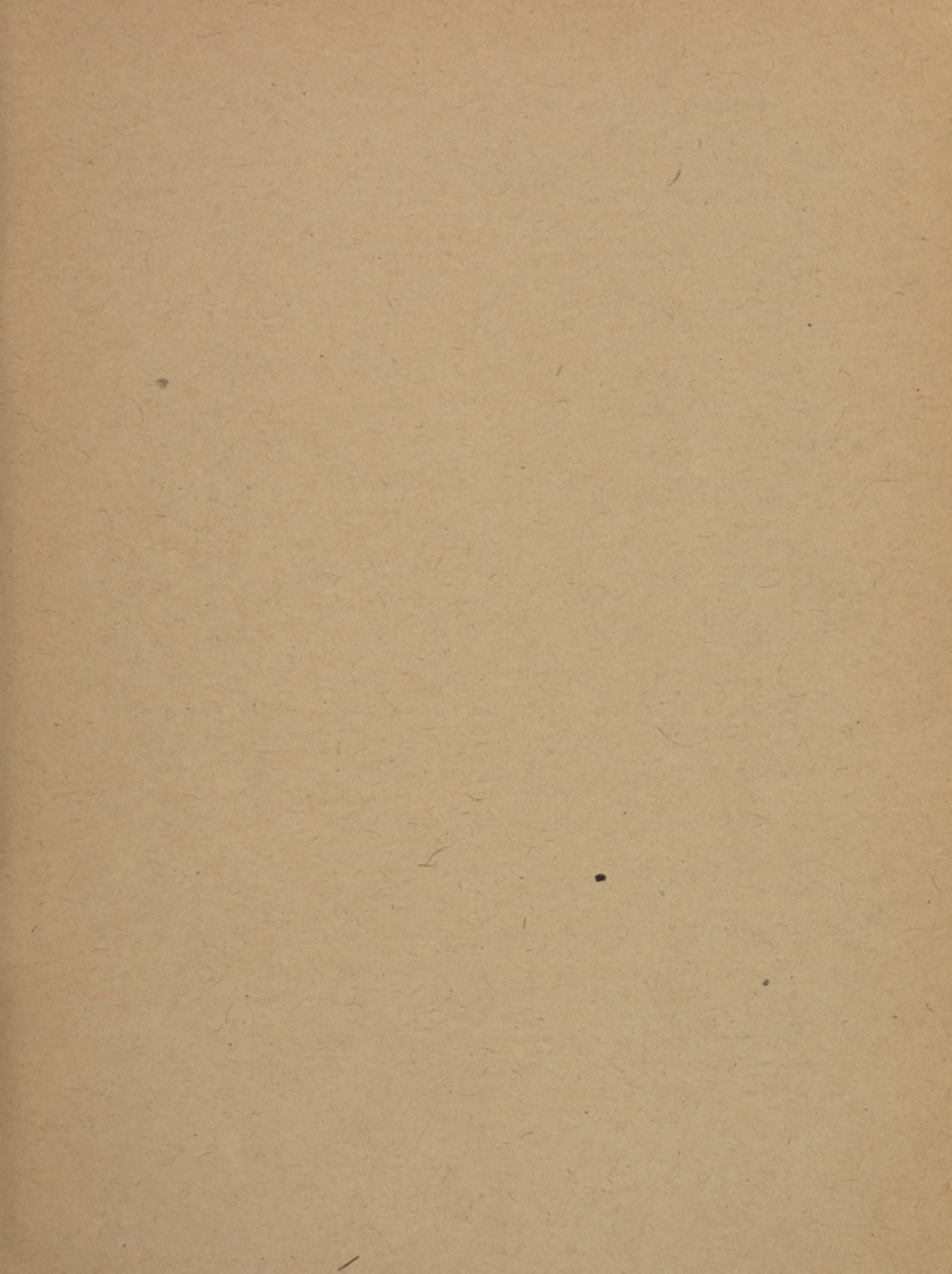
Versuche mit Fleckfieberimmunsereen.

Versuche zur Beseitigung unspezifischer Eiweisswirkungen in den gebräuchlichen Fleckfieberimpfstoffen

Über das wirksame Prinzip des Fleischwassers.

Die bevölkerungspolitische Situation einiger oberpfälzischer Landgemeinden. Zusammen mit Gertrud Eyer-Decker.

Zur Frage der Rickettsienmorphologie. Vergleichende elektronenoptische Studien an verschiedenen Rickettsienarten. Zusammen mit Hans Ruska.



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