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INTERVIEWS ON CHEMICAL WARFARE

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REPORT ON INTERVIEWS WITH

Prof. Bacq
Dr. Moritz Ney
Ing. chemiker Robert Thill
Dr. Keller
Dr. D'Huart

Reports by

Lt.Col. H.Cullumbine, R.A.M.C.
Capt. Paul V. Seydel, C.W.S.
Capt. James F. Munn, C.W.S.

CIOS Black List Item
8-CHEMICAL WARFARE

COMBINED INTELLIGENCE OBJECTIVES SUB-COMMITTEE
G-2 Division, SHAEF (Rear) APO 413

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PERSONNEL OF INSPECTION TEAMS

Lt.Col. H.Cullumbine, R.A.M.C.
Capt. Paul V. Seydel, C.W.S.
Capt. James F. Munn, C.W.S.

REPORT I

Subject: Visit to Prof. Bacq at Liege University.

1. Reason for visit.

Information received from Cmdr. Eley U.S.N., M.C., and Mr. Sherwood N.D.R.C., that Prof. Bacq had prepared a BAL-like structure effective against arsenical vesicants.

2. Movements

3 November 1944. Left London by air at 11.00 hours for Brussels. Arrived Brussels 13.00 hours.

After 2 hours wait "begged" a "lift" from airfield to Brussels. Reported to D.(C.W. and T.), 21 A.G. This proved to be the correct procedure for Lt.Col. Cave who "fathers" all C.I.O.S's investigators in 21 A.G. area, had booked me accommodation. He arranged transport to take me to Liege on 4 November 1944.

Inquired whether Prof. Bacq or his colleagues or their work were known to D. C.W. Assured that M.I.10 list of Belgian C.W. personalities was complete and did not contain Bacq's name. Nor was anything known of Bacq or his work.

4. November 1944. Brussels to Liege by road. Did not take an organic chemist with me as only T.O. with such qualifications was at Eindhoven and in any case Liege was in the American area.

Called on M. Lereux and Dr. Déchamps of the Société Belge de l'Azote, 16 Quai de la Grande Bretagne through whom, Mr. Sherwood said, Prof. Bacq would be the most readily contacted. They said that Prof. Bacq was ill in hospital. They themselves could give no details of Prof. Bacq's researches.

Called on Prof. Bacq at the University Hospital. He had a carbuncle of the cheek and could not open his mouth to talk. Arranged to visit him again in 2 days time. Returned to Brussels.

5. November 1944. As Col. Chittick U.S. Army and Mr. Sherwood had interviewed Prof. Bacq, M. Leroux and Dr. Déchamps some weeks previously, I asked D. C.W. if they would check on the reliability of these people and find out what positions in the Belgian C.W. organisation they held.

Heard that No.3 Anti-Gas Laboratory had contacted certain personalities of Brussels University so decided to visit the Laboratory and enquire whether they could tell me more about Prof. Bacq. Major Gear, O.C. of the Laboratory, was most helpful. He introduced me to Prof. Jean Brachet of Brussels University. Prof. Brachet said that Prof. Bacq was a Physiologist (now Professor of General Pathology, formerly Professor of Animal Physiology) and had been in charge of Belgian medical C.W. research before the German occupation. Professor Bacq had continued to work on C.W. throughout the German occupation and had published many papers on the subject.

6 November 1944. Brussels to Liege again. Saw Prof. Bacq at hospital and also some of his collaborators at Liège University.

Returned to Brussels.

7 November 1944. Reported to D.(C.W. and T.) and arranged for a T.O. to visit Dr. Desreux at Liege University in two weeks time to collect further information.

Received request from ETOUSA to visit Dr. Dessaine, Brussels, who had worked with Prof. Bacq. Called on Dr. Dessaine but he was not at home. Arranged for him to be interviewed later in the day by D.(C.W. and T.)'s staff.

15.00 hours. Returned by air to London.
19.30 hours. London to Porton by train.

3. Prof. Bacq's story:

Prof. Bacq was appointed head of the Department of Physiology of the S.P.G. in Oct. 1939. He then commenced his researches on H, PS, CN and similar agents. On 11 Nov. 1939 he noticed that dilute H on a frog's nerve-muscle preparation behaved like monoiodoacetic acid in preventing relaxation of the muscle after contraction. Therefore assumed that H acted like monoiodoacetic acid and "blockaded" the -SH groups of proteins. PS and CN behaved similarly as did all the lachrymators and vesicants tested. (Lewisite, DC and other arsenicals were not tried because of "their instability in aqueous solution"). They all inhibited lactic acid formation by muscle juice from protein. Therefore the action of these agents on various enzyme systems studied, using yeast cells or yeast cell juice. In addition a histochemical method of detecting this "blockading" of -SH groups in tissues was devised.

This was the extent of the progress made by May 1940 when Belgium was invaded.

After the occupation Prof. Bacq continued his studies on the mode of action of C.W. agents as part of his routine research at Liege University. The action on crystalline ovalbumin, denatured ovalbumin, globulin (from the lens of the eye), urea, urease, pepsin, etc. was investigated and he concluded that H, PS, CN had a marked and indeed selective action on -SH groups unless high concentrations were used. With PS and CN, R-S-S-R' compounds are formed by the oxidative removal of 2-H atoms by 2-Cl atoms from PS etc. With H, R-S-CH₂.CH₂-S-CH₂.CH₂-R' or R-S-CH₂.CH₂-S-CH₂.CH₂-Cl compounds are formed. The proteins so formed behave like "foreign" proteins i.e. have antigenic properties and so produce systemic effects, hypersensitivity and local tissue necrosis.

The decontaminating properties of solution of cysteine and reduced glutathione have also been assessed. They were effective in preventing the effects of PS on the human skin and also mitigated the burn produced by liquid H - if they were used almost immediately after contamination.

Dr. Desreux, lecturer in Physical Chemistry at Liège University, has been in charge of the chemical side of this investigation. He suggests that they have a very sensitive method of estimating quantitatively the amount of H, PS, or CN present by means of this reaction with -SH groups. For example, for H vapour the latter is absorbed in chloroform or carbon tetrachloride, to the solution is added a dilute cysteine solution and then one of three things can be estimated viz.:

- (a) chloride content
- (b) change in pH
- (c) change in cysteine content.

The latter is the more sensitive and full details of the method will be available in 2 week's time. I arranged for D.(C.W. and T.) to collect these details and to forward them to us here.

Prof. Bacq provided me with several score of his published papers on this research. These will be forwarded as soon as possible, when a more detailed survey of their work will then be possible.

4. Comment:

There is nothing really new in this work and the deductions drawn would not be accepted here. However, detailed criticism can wait until the papers have been fully studied.

It is interesting to note that the Germans allowed this research to continue; they never once, apparently, questioned Prof. Bacq and his colleagues as to the aim of their research.

It is strange that the Chief of the medical research section of the Belgian C.W. organisation should have been unknown to our own Intelligence or C.W. organisation, especially as he and his colleagues at Liege had continued to work and publish their findings throughout the German occupation. It is suggested that a perusal of the scientific literature of the liberated countries might be of value. Definitely new discoveries may not have been made but, from the physiological, medical and biochemical points of view especially, any fresh ideas on the mode of action or the therapy of the common C.W. agents would be most useful at this present juncture.

It is further suggested that the team of workers at Liège should be encouraged to continue their researches into the mode of action of H, PS and CN - subject to a confirmation of their political reliability.

It would facilitate future investigators of similar reports if they could be provided with a brief account of their quarry's political, C.W. and scientific background.

/s/ H. CULLUMBINE

Lt.Col. R.A.M.C.

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APO 887

REPORT II

SUBJECT: Interviews with Dr. Ney, M. Thill, Dr. Keller and
Dr. D'Huart.

INTRODUCTION

The interviews described in this report were made outside of the sphere of CIOS. After the interviews were obtained, it was discovered that Robert Thill was on the CIOS Target List. Since M. Thill was not originally the primary target, during the interview with him it was only attempted to find out if what he said checked with Dr. Ney's statements, and if he knew anything that Dr. Ney had not mentioned. As far as could be determined, Thill held his position in German gas defense thru the recommendation of Dr. Ney.

As a result of this, detailed notes were not taken after the interview with Thill, since with the exception of the information noted in paragraph 7, no new information was obtained.

However, since the information obtained from Dr. Ney was essentially that desired from Thill, it was decided to present the report in its original form to CIOS.

1. Personnel Interviewed

Based on a recommendation in Report No. 31, CWS-EEIST No.1 (21/1/45) signed, Capt. James F. Munn, a further interview with Dr. Moritz Ney, chemist, of 8 Rue de la Garde, Metz, was arranged with Cml O, 12 Army Group and Cml O, 3rd Army. Information obtained from this interview led to interviews with the following chemists:

- a. Ing. chemiker Robert Thill, Rue d'Orange 4, Luxembourg.
- b. Dr. Keller, Rue George V, 5, Hayingen (Chief chemist of "Les Petits Fils de Wendell and Cie."...steel mill. This mill is located west of the center of Hayingen, on the road to Longwy).
- c. Dr. D'Huart, Floratstrasse 8, Hagendingen (Chief chemist of the steel mill "Usines Hagendingen", formerly part of the Herrman Goering Werke).

2. Description of Robert Thill.

M. Thill was visited 31 January by the undersigned, in company with Capt. Munn and Dr. Ney. Thill and Ney are very close friends, and say they intend to open an analytical laboratory in Bordeaux or Marseille after the war for import and export service. Thill is blond, about 5 ft. 8, about 150 lb., long face, wears very heavy dark horn-rimmed spectacles. His wife is Belgian, born in England. They have a three-year-old daughter. Thill speaks French, German, Luxembourgish, and a little English. His laboratory and equipment for gas analysis is at present in the Luxembourg government laboratory, where analytical work on foods, water, fertilizers, wine, etc. is carried on. Thill is said to have been outspokenly anti-Nazi, and to have been saved from getting into serious trouble only by previous connections with diplomatic corps work. He was very cooperative and friendly, but did not seem to know a great deal about German CW beyond what was necessary to run gas analyses and do decontamination work.

3. Interview and Description of Dr. Keller.

Dr. Keller was visited by the undersigned, Capt. Munn and Dr. Ney on 1 Feb. 45. At the time of the visit he was at home recovering from extremely bad sore throat, and could hardly talk. Subject is about 55 or 60 years old, partly bald, medium height, weighs about 150 - 160 pounds, did not wear glasses, roundish face. He had spent three weeks in Nuremberg, Germany to learn the process

for making steel casings. Dr. Keller evidently was the only one at the mill who had complete knowledge of the subject, and access to all the papers. He had one of his assistants give us a few test diagrams, and samples of a finished shell and one in an intermediate stage, and said that if we would return next week when his throat was better, he would give us copies of any papers we wanted, and complete information on the methods of testing and manufacture. This information was given to Col. Toftoy, Ordnance, Hq. ETOUSA, who will follow it up.

4. Interview with Dr. D'Huart.

Dr. D'Huart was visited by the undersigned, Capt. Munn, and Dr. Ney on 1 Feb. 45, at the Usines Hagendingen, and later at his home for tea. Subject was of slight build, short, brown hair, round face, pleasant expression. He is married, and has two girls about six and ten years old. Dr. D'Huart had no information of value to the CWS, but had formulas for making HE and armor-piercing shell which they had made for the Germans. These were chrome-vanadium Thomas steels. He showed us the formulae, and offered to give any information we desired. If this information is of value to the ordnance, it may be obtained when Dr. Keller is visited. (Dr. D'Huart described how he and his family and several others hid in the woods west of the town when the Germans retreated, as the Germans took most of the populace with them. One of the directors of the steel mill, a M. Claus, was strongly pro-Nazi, during the occupation, and returned with the Germans to Germany).

5. Description of Dr. Ney.

With regard to Dr. Ney personally, much time was spent with him during the three days from 30 Jan. to 1 Feb., 1945. He proved to be a very valuable contact for us in that region, since he knew well practically all the important chemists, and is on very friendly terms with them. During the three days, on bringing Dr. Ney without warning into contact with the people we visited, there was nowhere any evidence of a desire to withhold information, nor during all the conversation was there any contradiction of what he had said previously, or of any knowledge in our hands. Ney had gone on two occasions to Berlin, and once to Frankfort aM. to take part in courses in instruction on detection, analysis and decontamination of gases. During this time he had spoken to German chemists, but had not obtained much information beyond that which was necessary for his purposes. Most of the

newer ideas and trends are given in a report on a conference of a number of chemists interested in this field, which Dr. Ney attended. This report will be forwarded with the report on this interview to be written by Capt. Munn. Dr. Ney's wife and two children are in Paris, where they were sent when the German breakthrough began in December. Dr. Ney is greatly interested in photography, and is president of the camera club in Metz.

Dr. Ney's laboratory is one of the best-equipped private laboratories the undersigned has seen (some of the equipment and materials may have been "inherited" from people who have left). He has an exceptionally large selection of both organic and inorganic reagents of all types. Probably fear of losing this life's collection had a great deal to do with his working with the Nazis. Ney has had the lab dismantled many months due to bombardments - it has only recently been set up again.

It is strongly to be recommended that future contacts in this region be made with the assistance of Dr. Ney, who has proven highly cooperative.

Practically all of Dr. Ney's papers were returned to him (having nothing new or of special interest to CWS). It is to be noted that this pleased him very much, and was used as a talking point by Ney himself to help obtain papers from Dr. Keller on steel casings. It is believed that if Keller's papers are brought back to the next interview with him, he will be even more cooperative.

6. Information from Dr. Ney.

In addition to the information given to Capt. Munn's report, the following was given by Dr. Ney:

a. Analysis of H, and detection: The only research problem except for general development of gas detection methods given to Dr. Ney by the Germans was to determine the composition of the compound formed in the reaction of H with Chloramine T and gold chloride. Dr. Ney worked on this difficult problem for some time without ever coming to a definite conclusion. (This sensitive detector reaction is carried out by adsorption of H on silica gel, addition of gold chloride and then addition of chloramine T. It is already known by US CWS). Another method of analysis of H is precipitation from a solution with sodiumdiethylthiocarbamate, which will precipitate H but not dithian (this second compound could be used to simulate H, and is comparatively harmless.)

- b. Detection of CN and BBC: To a solution of either of these agents in carbon tetrachloride is added a few drops of 1% 1,4 dichloro-3,5-dinitrobenzol, then a few drops of alcoholic KOH. BBC gives a violet color and CN a red color. This reagent, developed by Dr. Ney, has the advantage over m-dinitrobenzol of differentiating between these two gases. The reaction is quite sensitive.
- c. Schwarz's reagent for N-mustards: This reagent is specific for N-mustards, and does not react with the ethanolamines. To carry out the reaction, spot a piece of filter paper with the unknown solution, allow it to dry for a minute or two, then add next to this spot a drop of dichlorobenzoquinone in acetone. A blue color will develop in the presence of N-mustards. The test solution is not stable for more than a week and should be prepared fresh. (Schwarz is located at Kiel University).
- d. French field analysis kit: Dr. Ney gave Capt. Munn a small steel kit containing equipment and reagents for conducting field analysis of materials suspected of being contaminated. This kit was designed by Perronet, of Le Bouchet. Some changes had been made by Dr. Ney. The kit will be sent to a Chemical Field Laboratory for investigation.
- e. Organization of gas analysis laboratories: Dr. Ney was in charge of a group of chemists in the neighborhood who had equipment for emergency investigation of gases and suspected contamination. Names of the chemists under Dr. Ney are given on the "Lehrplan" dated 26 Jan. 1944, enclosed. Dr. Ney was known as "Leitender Chemiker", the chemist in charge. As such, he made trips to Germany to study the methods to be used, and in turn taught these methods to the chemists under him, having one meeting a month in which he lectured on some subject, such as mustard, or tear gases, and then held laboratory exercises on analysis. The HKU-Stelle ("Hauptkampfstoffsuntersuchungs-Stelle") was responsible for investigation of contaminated foods, the KU-Stelle, only for ground, or clothing contamination, and similar work. The chemists used any spare time they had to practice the analytical methods. A very large range of mixtures of gases, contaminated with dirt, sand, oils, and miscellaneous items were investigated, and improved methods were discussed for detection of the agents in the presence of foreign materials. (Two documents giving methods of analysis of mixtures will be forwarded with Capt. Munn's report as well as several dissertations on agents written by Ney for his lectures).

A similar system of laboratories was organized in the Luxembourg district under Robert Thill.

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f. Possible German use of phosphine or arsine: Dr. Ney related a story told to him by Professor Wolff, of Strassbourg..... At the beginning of the war when the French broke through the Siegfried line, some dead soldiers were found without any trace of wounds. Autopsy showed according to Dr. Ney, the presence of certain porphyrins in the blood, which indicated possible phosphine or arsine poisoning. Wolff suspected use of the agents in a mine-field, and requested that Dr. Ney (among others) develop immediately some means of protection, as the canister then in use did not protect against these gases. Dr. Ney made an addition for the canister of a silver chromate-impregnated pumice, which also absorbed HCN. This, however, was said to be too expensive, and the French were furnished with sacks containing wood shavings impregnated with bichloride of mercury, and kept damp with glycerine. Dr. Ney said these were actually issued, but he did not approve of them because of the poisonous possibilities of $HgCl_2$. They were to be used on the end of the canister.

g. Future intentions of the Germans: Dr. Ney believed that the Germans counted on the classical agents for effect, and further on nitrogen mustard. He had a sample of tri-(2-chloroethyl)amine which was still colorless and contained practically no polymerized solid after two years storage. He said he believed no stabilizer had been added, and further believed that the best method for stabilization of H and N- mustards was a high degree of purification. The Germans make a wide use of chlorinated rubber, and of benzyl cellulose in producing thickened mustards, which they claim are extremely difficult to decontaminate by the ordinary methods. Dr. Ney states that he believes these thickened mustards to be stable in the absence of air. Iron carbonyl is being manufactured as an anti-knock agent for gasoline, and installations are therefore prepared to manufacture quantities of this material, and know how to handle it. However, Dr. Ney knew nothing of German intentions with regard to this agent, and the normal methods of analysis were not prepared to handle it. He claimed that palladium chloride was the best detector, and knew of no new reagents for it. He did not believe the Germans would use HCN, principally because of its low density and high volatility, and the fact that although it killed quickly, it did not produce casualties that would require much treatment. Also he did not believe they would use phosgene oxime. He had heard the Germans discuss a highly purified arsine, which they claimed had practically no odor, but did not know how this was prepared (phosphine is usually responsible for the odor in arsine). He knew nothing at all of eye-affecting gases, except lachrimators (therefore nothing about PF). Except for a general knowledge of and an interest in propellants,

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he knew nothing of the German propellants and explosives. He spoke of German use of Calcium arsenide for preparation of arsine, but did not know about magnesium arsenide. He claimed to know nothing of the work on silicon halides and mercaptans for interfering with motors, done at Le Bouchet, nor of any work by the Germans on this. (Ney was supposed to visit Le Bouchet at the beginning of the war, but was prevented from so doing by the arrival of the Germans.) The Germans were experimenting with mixtures of "Doppelst" (probably Q or T) with H in proportions of 60-40 to increase the staying power and difficulty of decontamination.

h. Decontamination of N-mustards: The Germans, according to Dr. Ney, have no really effective method of decontamination. A preliminary treatment is given with "Entgiftungsstoff-N" (sodiumbisulfate) to make the agent watersoluble, then the contaminated material is thoroughly washed and treated with the purest calciumhypochlorite obtainable. The small amount of acid left from the sodium bisulfate aids in releasing chlorine for decontamination. (This pure calcium hypochlorite is known as "Entgiftungsstoff 40"). For skin decontamination, and decontamination of small objects, the following solution may be used ----- potassium permanganate 10 g, acetic acid 10 cc, acetone 90 cc. This solution is not stable. Discoloration produced by the permanganate may be removed with bisulfite.

i. Railroad decontamination: The Germans had a train set up described by both Thill and Ney for decontamination of railroad installations. One car was equipped as a lecture room with projector for instructing railroad employees in stations and yards, part of one car was set up as a laboratory for detection and analysis of agents and contaminated materials, a supply of bleach, sand, water, and brooms was carried for decontamination. Quarters for personnel were furnished (Thill said there were about ten or twelve crew members, but this figure seems high). Altogether either three or four cars were said to be used.

j. Impregnated clothing: Neither Thill nor Ney had heard of impregnation of clothing to give permeable protection, but both knew of heavy impermeable clothing and light plastic capes.

k. Karl Meier: Dr. Ney was asked about Meier, who ran a decontamination station and laundry. He said this man was a Nazi who came over in 1940 and took over a cleaning establishment that had belonged to a Frenchman. Machinery was added to clean clothes and for decontamination purposes. When the Americans threatened Metz, Meier skipped back to Germany.

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l. Dr. Dehlmann: This man was in charge of gas detection work in Berlin, and gave the courses which Dr. Ney attended. He is said to be a civilian who was commissioned major in the German Army for this work during the war. Ney believes he is not Nazi.

m. Dr. Jess, Metz: On questioning Ney about this man, he stated that he had French sympathies, but that he was not much of a chemist; that he did only generally routine types of analysis.

n. Dr. Turk, Frankfurt aM: Ney visited this man in conjunction with work on analysis of agents. He stated that Turk was once a good chemist, but is now 85. Turk had manufactured diphosgene in the last war at Frankfurt. (Ney claims that only the old chemists in Germany know anything ... saying that the younger ones have not had time for chemical training due to military work being done.)

o. Dr. Wagner (believed to be in Wiesbaden): Also an old man, having obtained his PhD in 1900. Ney stated that he works in a government laboratory on CW agents, and has developed a method of analyzing mixtures of agents in small quantities.

7. Information obtained from Thill.

Thill did no research work, merely preparation for emergency analyses. His information was comparatively meager, and confirmed that given by Ney. Thill stated that he had been visited by RAF officers, who took his files and still had them.

a. Visit to Eisenbrot (suburb of Prague): Thill stated that the instructional laboratories for district gas analytical chemists had been moved to this location from Berlin due to bomb damage in Berlin (1943 ?). He took a ten-day course in gas analysis. He stated that as far as he knew, only defensive measures were studied in this laboratory.

b. Bleach situation: Thill stated that there was a definite shortage of bleach for decontamination purposes. The Germans were stressing use of as little bleach as possible, or even use of just sand or dirt and lots of water.

8. Information received from Dr. Keller about steel shell casings.

Dr. Keller had a bad throat infection and could not talk very well, but offered to give any information desired as soon as he recovered.

Dr. Keller visited Nuremburg in 1941 or 1942 for three weeks to learn the process for preparation of steel casings. The plant

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in which he made these studies was located in a woods, about an hour's walk from the end of the car line. It was called "Eisen-und Metallfabrik". An airport was nearby, and on the other side of the airport was located the Homeier steel works. Dr. Keller said that he could locate these on a map (unfortunately, none was present). The Germans taught him how to make these casings from Martin steel and from electro-steel. He himself later made casings from Thomas steel in his own plant. He claims these casings may be used four times. Definite limits of Brinell hardness are necessary (charts enclosed show some tests made in his laboratory, and on one chart is pencilled the approximate limits, as Dr. Keller remembered them). The steel is colddrawn in four steps, with heat-treatments in between.

Dr. Keller also possesses two patents on the manufacture of railroad rails, which he claims are the "best in the world" for heavy rails.

Dr. Keller's chief assistant is a M. Schwender.

9. Recommendation.

Recommend that this case be closed as concerns CWS, and that information obtained be turned over to Ordnance for further investigation.

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