G 12 Ap 55

VIII.

WAR NEPHRITIS.

Germany (Territory under Allied Occupation, 1945- U.S. Zone) Office of the Naval Advisor Project

Translation prepared by:

Office of Military Government for Germany (U. S.)
Office of Naval Advisor,
Medical Section

1. Clinical Variations, Etiology, Geographical Distribution.

Oberstabsarzt (Major, MC.) Prof. VOIGT.

War nephritis is a diffuse, acute glomerular nephritis. As far as I can see the three cardinal symptoms of hypertonia, edema, and hematuria are present in all cases, whereby, however, it must be considered that the increase of the blood pressure sometimes may be rather transitory and often only very small. The same applies to the hematuria, which according to my experiences frequently can be detected by microscopical inspection only. Hemorrhagic urine is found in rare cases. To give a particular term to the glomerular nephritis, which under certain conditions frequently occurs with the combat units, is certainly justified, as with regard to the clinical symptomatology and especially to the etiology the war nephritis differs from the usual picture of the diffuse glomerular nephritis.

1. Clinical symptoms: The onset is usually sudden, and there are cardiac symptoms. A sometimes general, sometimes limited edema restricted to particular parts of the body, especially to the scrotal region and the medial side of the thighs, stands in the foreground. In rare cases the disease sets on slowly with vague complaints. It may be classified into two groups, which naturally may merge into each other.

a) With a certain number of patients a moderate amount of albumin (2 to 5 per cent) is found with the usual deposit, particularly erythrocytes, a very distinct and prolonged increase of the blood pressure with an obvious increase of the diastolic value, and moderate edemata, which are of a cardiovascular character and seem to be relatively rich in protein as far as could be determined by a qualitative analysis. After an opportune and correct therapy the edemata used to regress rapidly, and usually a complete restitution ensues.

b) With the other group the blood pressure symptoms are less distinct being of a short duration only. The nephrotic component stands quite in the foreground with an extremely heavy albuminuria and an edema of the highest degree, which is remarkably poor in protein as occurs with nephrosis. No double refracting substances are found. No determinations of cholesterin in the blood could be performed. However, since no lipoid substances are found in the urine, it must be taken into consideration whether the edemata mentioned are identical with the marantic edemata due to a tissue cachexia occurring with the glomerular nephritis and which were recently studied by NONNENBRUCH. In some cases a considerable improvement was observed after a more copious diet with an additional intake of protein after several days of hunger and thirst.

The quantity of the excreted urine of both groups is considerably reduced and the specific weight is slightly reduced, while the total renal efficiency is hardly disturbed.

Accordingly we found normal nonprotein nitrogen values in the blood (up to 60 - 70 mg.per cent) in the majority of cases (about 80 to 85 per cent) while the xanthoprotein value was normal and the indican-reaction negative. Only in cases of an increasing oliguria and anuria, did symptoms of an acute renal failure occur. Here, I can only confirm the statements of BECHER that particularly the increased amount of phenol and its derivatives indicate an improved prognosis, better than the nonprotein nitrogen value. The patients with a considerable increase of the blood pressure are particularly in danger, above all if the diastolic blood pressure is raised. They are disposed to convulsive uremia more than the other patients. The sodium chloride values of the blood were usually normal, sometimes increased (that means above 100 mg per cent) rarely diminished. No determinable regularity was observed, particularly no concurrence with the nonprotein nitrogen or xanthoprotein values. During the edematous stage the blood was frequently thickened as was observed earlier by NONNENBRUCH and KELLER. An anemia sets on early, but it does not attain a very high degree. The blood sedimentation rate is only moderately increased.

In a stationary war hospital we performed systematic examinations of the eyes and were able to determine that the well known vascular alterations, such as a constriction, and a pallor of the arteries, a venous congestion, and an edema of the papilla occur at an early time. Even hemorrhages and degenerated foci could sometimes be recognized during the acute stages, as was described for the war nephritis by VOLHARD. Usually the alterations disappeared when the nephritis was cured. The occurrence of a genuine neuro-retinitis during the acute stage means not at all that the outlook is bad. However, it was almost regularly the severe cases with a considerable increase of the blood pressure which showed alterations of the eye fundus.

The body temperature took a peculiar course. There were cases without any fever and others with a sudden ephemeral high fever of 39°Centigrade, which frequently occurred at the onset of the disease, or others in the course of which the temperature was increased during several days without any other infection being proved as the cause. When discussing the etiology I will refer to this again. Patients suffering from renal disease repeatedly complained of violent pains in the tibia, although there were no symptoms speaking in favor of trench fever. By the way, the same was observed by HIRSCH during World War I.

The following complications occurred:
1. An acute renal failure in consequence of anuria, which fortunately is relatively rare.

2. An eclamptic uremia, and
3. rather frequent circulatory disorders. Bradycardia is seen almost regularly. The X-ray examination exhibits already during the first days a heart which is considerably dilated to both sides, frequently even in the auricular region. This usually occurs with patients who showed only a slight tendency to form an edema. A presystolic gallop rhythm frequently occurred and in one case I observed a recoil of the apical beat during the diastole, which is a sign of a beginning failure of the left ventricle and which was described by VOLHARD. A large amount of strophantin was given. Venesection!

Repeatedly I saw cases of "war nephritis without any nephritis", which was described by NONNENBRUCH a.o. that means patients with an increased blood pressure, changes of the eye fundus and an edema with which an albuminuria appeared only at a later time. One of the patients even suffered from an eclamptic uremia.

I am of opinion that the principal task of the consulting medical specialists is to insist in an early diagnosis of the nephritic cases, so that treatment by VOLHARD's hunger and thirst cure can be started immediately. Besides confinement to bed, this therapy was applied within one Army district, usually in separate wards and it showed very good results.[1)] Treating nephritis in the casualty clearing stations was prohibited on my suggestion by the Chief Medical Officer of this army. Mild cases were sent back to their units when they had completely recovered, but their number was rather small. Almost all other cases, who recovered only slowly after the disappearance of the nephritis were transferred to hospitals in the rear and in the recent time to newly established homes for convalescent soldiers at Stalino and Dnjeprotscherinsk. Permission to leave the bed was given to the patients when the blood pressure had dropped and the edema disappeared. A residual albuminuria and a very slight hematuria were no absolute indication against leaving the bed. The water and concentration test frequently showed even an excessive excretion. When there was a chronic edema with which the nephrotic component stood in the foreground particularly we made a cautious attempt with Salyrgan. Its success was usually transitory; in one case an eclamptic uremia occurred subsequent to its administration. It is useless to employ other diuretics. A peroral administration of $CaCl_2$ sometimes may effect a better diuresis. VOLHARD's water test showed good results only with those patients, who were on the way to recovery and still had a latent edema. Sometimes it was successful during the acute stages, but then one usually may forego from its use.

---

1) The period of observation might be too short to give the final opinion on the prognosis of the war nephritis.

The evacuation of patients suffering from renal diseases should not require a prolonged period of time and should be performed in the supine position. When the Russians broke through in our army district, two war hospitals and several field hospitals had to be evacuated quickly. In view of the large number of severely wounded soldiers the renal patients could usually only be transported by ambulances in a sitting position. I examined many of them immediately before evacuation and after arrival in the new hospital. Generally, short transports were relatively well endured, even when the disease was acute, and above all no massive edema occurred. After a transitory increase the blood pressure dropped soon.

2. Etiology: While during the summer months cases of glomerular nephritis were very seldom, they occurred in an increased number from the month of October on, particularly, however, after the onset of the severe cold in November. The presence of 80 to 120 patients suffering from renal disease in the same field hospital was not rare. Almost regularly these soldiers were attacked, who were exposed to the cold outdoors, such as motor-cyclists, dispatch-riders, soldiers of horse drawn units, whereas soldiers employed in offices, motor pools and hospitals rarely fell sick, or only then when they were exposed to cold and moisture outdoors, that means when they were on guard, march, etc. There is no doubt that the effect of cold upon the skin and the occurrence of nephritis are related to each other, although it is not easy to form an opinion on its development. If one searches for previous infectious diseases one sometimes hears of a transitory cold with fever or an enteritis. A temporal and causal relation between them and the nephritis often seemed to be doubtful, the more so as during this period everybody was sick with such slight infections. I did not find that the nephritis resulted from tonsillitis or any other apparent contamination with streptococci. With our scarlet fever patients too, no diffuse nephritis occurred. Although there were numerous cases accompanied by ulcera cruris and furunculosis due to a louse eczema, I am doubtful as to the skin being the entrance of a bacterial invasion. There is no urinogenous origin, which, at this time , was discussed by NAUNYN. Although many soldiers frequently complained of an increased micturation in the winter months and were admitted to the hospitals with enuresis, nothing particular was found in their urine. An infection is suggested by the increase of temperature, which, however, was found only in a small number of cases. A marked enlargement of the spleen was not observed.

It is possible that metabolic disorders occur accompanied by a general vasoconstriction as a result of the cold. The increase of the urine quotient C:N during a diffuse glomerular nephritis and nephrosis speak in favor of this explanation. In my opinion it

is not likely that physical exertion, malnutrition and a vitamin deficiency effecting a diminished resistance are the exclusive cause of nephritis. If any, they may have a releasing effect.

I believe that a certain disposition, perhaps of an allergic character, may be one of the conditions of a development of war nephritis. If external factors are effective in addition, among which I should like to regard the influence of cold as the most important component, the symptoms of an acute glomerular nephritis develop.

2. Doubtful Problems, Anatomical Difference between War and Ordinary Nephritis.

Stabsarzt (Captain, MC.) Prof. RANDERATH:

A large number of cases of war or field nephritis was seen the first time during the winter campaigns in Russia during the present war. The increased occurrence of nephritis was restricted to a relatively delimited period of time, particularly the period of frost. In my army district more than 700 cases were reported in the period from 1 December 1941 to 31 March 1942.

The observation that during the frost period the number of nephritic cases was increased, underlines the importance of the disposition for the occurrence of nephritis, as was stressed by the pathologists and clinical physicians during World War I, who, besides an impairment due to cold and wetting, made reference to a physical over-exertion and an insufficient nutrition. During the winter operations in Russia we had the impression that above all the influence of the cold on the whole organism favored the development of nephritis by way of a simultaneous vegetative reaction of the renal blood vessels while the vascularization of the skin was altered. The above mentioned factors of disposition, however, cannot explain what the cause of the nephritis is. The views given in the Manual of Medical Experience during World War I, that infectious agents and above all streptococci play an important part as a cause of the nephritis besides the above mentioned factors of disposition are still valid. However, even now nothing definite is known of how the concurrently effective factors act together to cause nephritis. After the first examinations of LETTERER the recent experimental studies are more appreciated, which assert that the glomerular nephritis is an inflammatory reaction of the allergic type. To substantiate this assertion the investigations of MASUGI were used, which were confirmed by studies made in Germany and concerned with endeavors to provoke a glomerulo-nephritis in animal tests by means of a specific anti-serum.

The cases recently observed in Russia seem to confirm this concept because of their unexpected onset. During post mortem examinations I noted cases of soldiers, who fell acutely sick when they were on guard during a great cold, and who showed the fully developed symptoms of nephritis within a short period of time, so that the disease could be diagnosed with a great probability even from the external aspect.

The recently observed cases of field nephritis naturally gave raise to examine again the problem discussed during World War I, of whether the nephritis occurring with the combat troops is a particular form of that disease, which differs from the usual nephritis. It is well-known that during World War I, particularly in 1915, the simultaneous occurrence of many cases of nephritis created the opinion that war nephritis is a particular form of the nephritis. In this war, too, we observed the simultaneous occurrence of many cases within a short time. During World War I, however, it was shown by the anatomical examination of the cases by BORST, ASCHOFF, LOEHLEIN, ROESSLE and finally by the discussion of war nephritis in the "Handbuch der aerztlichen Erfahrungen des Weltkrieges" (Manual of Medical Experience during World War I) by HERXHEIMER that anatomical signs of war nephritis are entirely equal to those of the usual glomerulo-nephritis.

This experience is confirmed by the cases recently observed in Russia. It shows that the term "war, or field nephritis" is not applicable if it is to characterize a particular disease. The term "war nephritis" is justified only on account of the increased occurrence of nephritis under the influence of the above mentioned factors of disposition, which are more effective during war than in peace-time.

The question is whether certain peculiarities occurring with the usual nephritis, and distinguishing the recently observed cases, are present without their being traced. In numerous cases, even of the most acute stage, a considerable albuminuria and a particular disposition to an edema was noticed. In a large number of cases these symptoms even of the acute stage of the disease can be regarded as a distinct nephrotic component in the sense of VOLHARD's concept. It is remarkable that during the first 3 to 4 weeks of disease no corresponding nephrotic alterations of the epithelium of the uriniferious tubules, which would be a sufficient substrate of the nephrotic symptoms and particularly the albuminuria were seen neither by us nor by HERXHEIMER during World War I.

In connection with new examinations made during peace-time this suggests to explain the relation between anatomical and clinical findings as follows:

As VOLHARD, we consider the diminution or suppression of the glomerular vascularization as the principal glomerular disorder during glomerulo-nephritis,

which on the one hand explains the diminished excretion of urine, that may even lead to an anuria, and on the other hand the accumulation of nonprotein nitrogen in the blood. The pathologists, however, were not able to produce evidence for VOLHARD's theory of a spasmodic-ischemic origin of these disorders of the glomerular vascularization as the cause of the inflammation. This also applies to the recent cases of war nephritis. I am rather of the opinion that the disorders of vascularization, which are certainly present, accompany the progress of inflammation in the glomeruli, since such circulatory disorders are regularly present in any inflammated area. They are particularly effective in the glomeruli on account of their special anatomical structure.

As to the functional disturbance of the glomeruli, resulting in an extravasation of erythrocytes and leukocytes there is no difference of opinion. The occurrence of erythrocytes in the urine as a result of an inflammatory impairment of the glomerular vessels is particularly distinct in cases of the so-called hemorrhagic glomerular nephritis. The extravasation of leukocytes during inflammation from the glomerular capillaries is also certain.

There are differing views on the part of the kidneys where the protein is excreted during glomerular nephritis and when there is a nephrosis.

For a long period of time the well-known nephrotic alterations of the tubuli were the basis of the concept that the protein excretion through the kidneys is caused by disorders of the tubular function. Recent anatomical investigations raised doubts whether this idea is correct, and the presently observed cases of field nephritis underline these doubts, since microscopical alterations of the tubuli may be entirely absent in the acute stage, although there is a considerable albuminuria. One rather must assume that the disorders of the glomerular vascularization are accompanied by an impairment of the vascular walls resulting in an increased permeability, which explains the protein loss of the blood plasm as an excretion of protein through the glomeruli. Consequently, in addition to VOLHARD's impairment of the glomeruli during glomerulo-nephritis disorders of permeability of the glomerular capillaries must be assumed as a further disturbance of the glomerular function, which is prior to the development of nephrotic alterations of the tubuli.

In extreme cases the two forms of functional disorders may occur separately; the disorders of vascularization as the most important functional impairment during the acute diffuse glomerulo-nephritis, and the disorders of permeability alone as the most important functional impairment during the pure nephroses. Both disorders of function may be associated to a varying extent during the mixed cases of glomerulo-nephritis and nephrosis and in the borderline cases, which here-

tofore are difficult to explain. Thus, we are able to find an explanation for them.

These statements have practical value for clinical medicine, since, according to VOLHARD, the prognosis of the glomerulo-nephritis must be regarded as depending on the degree and the duration of the circulatory impairment. Thus, it is quite clear that the disorders of the permeability during glomerulo-nephritis, which are indicated by a considerable albuminuria, can only become effective, if the vascularization is preserved to a certain extent at least. In addition to the effect of therapy, this can be regarded as the cause of the relatively good outlook hitherto seen with the war nephritis.

In accordance with these statements it was shown by VOLHARD that the nephrotic symptom complex of the glomerulo-nephritis is effective the more as a persisting damage of the glomerular capillaries develops from the primary impairment of the vascularization.

As far as this is concerned, no final evaluation can be made of the war nephritis, as there was only an insufficient period of observation and the anatomical experience in cases of death due to a chronic war nephritis are not enough. It is, therefore, desirable that all cases of death due to war nephritis and its chronic sequelae become subject to a thorough clinical and anatomical investigation in order to clear up all the problems still connected with it.

Discussion:

KRAUSPE: In accordance with RANDERATH a very great permeability of the glomeruli was found in an acute case of war nephritis. The occurrence of the disease with the medical orderlies in charge of hospital wards where patients suffering from war nephritis were admitted, suggested that this disease is infectious.

ASSMANN: During this winter renal diseases of the clinical type of the war nephritis have occurred at home too, which in contrast to the ordinary glomerulo-nephritis known from peace time were characterized by considerable nephrotic symptoms, an early cardiac deficiency, and the absence of a previous tonsillitis or other infections with streptococci. It is remarkable that particularly among the few cases which were observed of war nephritis at home, were particularly medical orderlies. One of these cases was a soldier supervising the clothes warehouse. In the cases at home the influence of cold played no part. There was no previous tonsillitis. It is most likely that it is a specific infectious disease. The possibility of contamination by lice must be taken into consideration.

SCHULZE: Various observations speak in favor of a specific disease.

1. The different symptomatology of war nephritis as compared with that of the ordinary nephritis.

2. Contamination of the disease caused by personal contact?

3. Number of cases and the epidemic curve.

As to the therapy it must be mentioned that the decapsulation of the kidney may be attempted if other clinical measures fail.

GUTZEIT: According to my impression obtained from hundreds of patients suffering from nephritis the clinical symptoms of war nephritis are entirely different from those of the ordinary glomerular nephritis occurring in peace time. It is a particular disease. There is no uniform etiology. Impairment by combination of various factors is possible. Many reasons, however, speak against this assumption. The disease sets on even if there was no influence of cold. An increased occurrence within small units was observed. Thus, a specific infection is suggested. It is, therefore, recommended to make investigations which permit to discover the germs responsible for it, or to clear up the mode of spread with this disease (animal vaccinations, infection tests, epidemiologic studies). Among the civilian population, too, the hydropic diffuse glomerular nephritis is increased in number. (No influence of cold!)

Directions as to the Diagnosis and the Treatment of the War Nephritis.

1. Etiology and Pathogenesis:

Clinically and anatomically the so-called war nephritis is an acute diffuse glomerulo-nephritis. The experimental, clinical and anatomical experience suggests an allergic reaction of the glomeruli. The increased occurrence of war nephritis was observed first during World War I.

As regards the etiology and the pathogenesis a number of factors are effective, which may provoke a war nephritis. Such factors are: The influence of severe cold on the skin, drenching, probably a physical and psychic over-exertion and malnutrition. Infections originating from the skin, above all with streptococci, are of a particular importance. In every case the factors, which may have participated in the development of nephritis, should be investigated by the medical officers. A particular search should be made for previous infections.

2. Terminology:

The term "war nephritis" is only justified from the point of view of a numerically increased occurrence

of cases under the influence of the above mentioned disposing factors, which come more into effect during the war than in times of peace. Here, the attention of the clinical physicians and of the pathologists is attracted first of all by the considerable nephrotic component of that disease.

3. Clinical Symptoms:

In accordance with its character as a glomerulonephritis, we find the following cardinal symptoms of the war nephritis: Hypertonia, edema and hematuria occurring regularly, whereby it must be stressed that the increase of the blood pressure often may be transitory and sometimes even insignificant. The same applies to the hematuria, which is frequently found by a microscopic examination only.

The onset is usually sudden. The cardiac symptoms and a sometimes general and sometimes limited edema occurring on single parts of the body stand in the foreground. The nephrotic component frequently prevails even during the initial state. The increase of the blood pressure is relatively small (high diastolic blood pressure), the amount of protein in the urine is very high and the edema is pronounced.

The excretion of urine is always considerably reduced and its specific weight slightly diminished, while the total function of the kidney is hardly disturbed. Hence, the nonprotein nitrogen value of the blood is usually normal, or only slightly increased. The xanthoprotein values are normal and the indican reaction is negative. Only in cases of an increasing oliguria resulting in anuria, do symptoms of an acute renal failure occur.

The well-known alterations of the vessles of the eyeground are found rather frequently and early, such as a pallor and a constriction of the arteries, a venous congestion, and an edema of the papilla; even hemorrhages and genuine foci of neuro-retinitis can be observed. With the disappearance of the nephritis these alterations use to disappear entirely.

Complications are:

1. An acute renal failure due to an anuria by clinical symptoms of a genuine uremia.

2. An eclamptic pseudo-uremia.

3. Relatively frequent circulatory symptoms, such as bradycardia, cardiac dilatation with an acute onset of symptoms of a cardiac failure, particularly of the left ventricle.

In rare cases the increase of the blood pressure and the development of an edema may precede the urinary changes by several days. A certain number of cases show fever.

4. Prognosis:

With an early diagnosis and an early and adequate therapy the prognosis is usually favorable.

5. Therapy:

The treatment consists of a strict observance of VOLHARD's hunger and thirst therapy. Simultaneously this is the best prophylaxis against the menace of an eclamptic uremia. The patient is strictly confined to bed for several days and the intake of food or fluid is forbidden. Then, in acute cases the blood pressure drops usually to normal, and the edemata are promptly eliminated. Subsequently, the diet must be poor in salt and protein, but rich in carbohydrates.

Leaving the bed depends on the behavior of the blood pressure and the elimination of the edema (balance). A slight albuminuria and hematuria is no counter-indication. In this case the water and concentration test shows an excessive secretion of urine.

There is no use to administer diuretics. An attempt may be made with those cases in which the nephrotic edemata are not eliminated inspite of a thirst and hunger cure.

The blood circulation requires a particular survey. Cardiants and drugs effective on the vessels (strophantin) should be administered before the symptoms of a circulatory failure are obvious. Early venesection. If an eclamptic uremia occurs a repeated lumbar puncture is advisable.

The treatment of the renal patients is carried through best in separate wards. Treatment in casualty clearing stations is not permissable.

6. Transportation:

Any transfer of renal patients should be effected in the recumbent position and as expeditiously as possible. Cooling must absolutely be avoided. As long as a considerable increase of the blood pressure and an edema is present, the patients should not be evacuated over a long distance.

IX. D I P H T H E R I A.

Translation prepared by:

Office of Military Government for Germany (U.S.)
Office of Naval Advisor,
Medical Section.

1. Early Diagnosis, Therapy except for Serum Therapy, Pharyngeal and Wound Diphtheria, Bacillus Carriers, Active and Passive Immunization.

Oberstabsarzt (Major, MC) Prof. VOIT.

From the month of October a certain accumulation of severe diphtheria cases occurred within the 17th Army, the clinical progress of which was remarkable for two reasons.

1. It happened repeatedly that no pathological changes were found on the tonsils or on the pharyngeal walls, not even a reddening. The only symptom was a very severe hoarseness; in a number of cases the fever was remarkably high, attaining even 40°C. The first cases were not diagnosed in due time as a laryngeal diphtheria by the medical officer in charge of them, and the disease took a fatal course. Moreover, patients were found who, in addition to a pharyngeal and nasal diphtheria, were suffering from a laryngeal diphtheria too, which was accompanied by a considerable swelling of the lymph glands. The laryngoscopy showed very distinct formation of membranes in the larynx. The autopsy revealed that the diphtheritic membranes extended far into the trachea and even into the bronchi. This localization of diphtheria in adults is unusual, as these are symptoms which one usually observes with children. The frequently very high pyrexia is also more common during the diptheria of children. However, I want to emphasize that I have repeatedly observed a high pyrexia, even during slight infections, during the winter months in hospitals. We were under the impression that the soldiers, particularly the young ones, showed the reactions of infancy.

It is well known, that the laryngeal diphtheria of adults was more frequent in former times than during the last 15 - 20 years. During the years 1895 - 1897 [illegible] = (37,7%) cases of croup with a mortality of 36.4 % occurred among 1318 diphtheritic cases of the infection wards of the Kaiser-Franz-Joseph-Hospital in Vienna. During the years 1927 - 1930, however, only 150 (= 6.0%) cases of croup with a mortality rate of 25.3 % occurred among 2426 cases of diphtheria. I read in a study of SEIFERT, that laryngeal diphtheria apparently is increasing among the civilian population too. In the beginning, such patients caused diagnostic difficulties to the medical officers with the units since the findings on the tonsils and on the pharynx were negative. Later on, a laryngological examination was made in all cases of acute hoarseness, or serum was immediately given when this was not possible. Reference was repeatedly made by the Chief Medical Officer of this Army Group to an atypical course of the diphtheria.

2. Moreover I noticed that a post-diphtheritic paralysis and an impairment of the myocardium were rather frequent occurrances; particularly a paraplegia of the legs with severe disorders of gait was repeatedly seen.

Cases of wound diphtheria which usually took a mild course occurred even during the month of October. There was no connection with the pharyngeal or laryngeal diphtheria. I observed no general symptoms due to wound diphtheria. The inspection of the inner organs revealed nothing particular and no sequelae were seen subsequent to wound diphtheria. The only appropriate therapy of the pharyngeal, nasal, and laryngeal diphtheria is the serologic treatment. It is well known fact that it not only prevents a general diphtheritic intoxication, but also arrests the local processes. Therefore, treatment is the more successful, the earlier the serum is given. We used the standard dose of 500 (immunity) units per kg. of body weight. A higher dose, if there is any need to give it, should be administered in very severe toxic cases only. It may be advisable to increase the stock of diphtheria serum of the hospitals. To my knowledge the available stock of field hospitals is supposed to be 2 x 60 000 antitoxic units. This amount was frequently too small, particularly when no medical depot was within reach. I should like to refer particularly to the Fermo serum. Local treatment with a concentrated serum has no particular results, not even in the case of wound diphtheria; however, it is an adequate measure to attempt the treatment of the chronic nasal diphtheria with cotton wool plugs drenched with an ichthyol-zinc-precipitate (ichthyol and Hydrargum praec. alb. 1.0, Ungt. Zinci ad 100.0). KILLIAN particularly recommends chinosol (oxyquinoline) for the treatment of wound diphtheria. The treatment with an adrenal extract combined with high doses of vitamin C sometimes has a good effect, but there is no certainty as to its success. One does not need to mention that the decision whether the serum therapy should be applied or not depends exclusively on the result of the clinical examination, and the bacteriological findings should not be waited for. The problem of what should be done with the bacillus carriers is of great practical significance. If after about two weeks following the disappearance of the symptoms the patients were not yet free of bacilli, we transferred them to hospitals further in the rear, although we were well aware of the fact that such a transfer entails a certain danger to the people around them. But in view of the great number of admissions to the frontline hospitals it was frequently not possible to retain them for a prolonged period of time. Everybody knows that the problem of making diphtheria bacillus carriers free of bacilli is not yet solved. Like most of the other preparations and paints the sulfonamides and the X-ray treatment have frequently failed. KLEINSCHMIDT particularly recommends drops of a 3% watery solution of pyoktaninum coeruleum (methyl violet) for the treatment of nasal diphtheria. A prolonged exposure to the open air is still the most efficient way, as in the course of time the virulence of the germs is diminished.

During post-diphtheritic paralysis strychnine was very effective, while I observed no particular results, when vitamin preparations were given. No new facts can be contributed to the treatment of the diphtheritic myocardial injury. Sympatol, cardiazol, ephetonine, and in serious cases strophantine are well known efficient drugs.

The question is of a particular interest as to how it happened that such a great number of serious diphtheria cases occurred in winter. CLAUBERG is of opinion that the diphtheria bacilli are not of a uniform nature and that there is a difference of types. There is the possibility that the disease of this winter may have been caused by a special type of bacillus ("gravis" type). On the other hand, environmental and individual peculiarities cannot be included as causative factors for the frequent occurrence of this disease. The thesis of DEGKWITZ who asserts that a particular disposition to cardiac damage is released by food rich in lipoids which exert an influence upon the tissues (fatty infiltration) hardly applies to our cases, as the food was particularly poor in fat during this period. On the other hand I should like to attribute a certain importance to the lack of vitamin C in the food, which actually was the case. This applies particularly to the liability to wound diphtheria. Upon the administration of vitamin C an improvement is frequently seen. The significance of the general reduction of resistance due to physical and psychical exertion, the influence of the weather, inadequate food etc. may sometimes be exaggerated, but in the case of diphtheria the importance of those factors should not be underrated. The frequent occurrence of severe diphtheria was proved especially during the winter months, when all these circumstances came together.

I noticed local variations. While in the area of the Army Corps to which I am assigned numerous cases of diphtheria occurred, another Corps in the vicinity had no cases of diphtheria. The disease was not distributed throughout one certain unit of our Army group as a local epidemic, but the patients belonged to entirely different units.

Before finishing I want to make reference to the immunization against diphtheria. The passive immunization, preferably with bovine or sheep serum is applicable only as a direct protection of exposed persons living close to the patient. It is a well known fact that the protective effect persists for three weeks only. In practice it will be used, when there are isolated cases of diphtheria.

The problem of an active immunization with 0.2 cc. of Behring's serum Al.F.T. (which consists of diphtheria toxins bound to aluminum hydroxide and neutralized with formol) or with the Asid vaccine of the Anhalt Serum Works (bound to alum) is of a greater importance. There is no doubt that extraordinary results were obtained from the new depot vaccines. The serum therapy is in no way influenced by the immunization. It is an unfortunate incident that with older adults accessory symptoms occur frequently, which according to CLAUBERG was revealed, when the physicians and the nursing personnel of 64 Berlin hospitals were immunized. CLAUBERG, therefore, in particular demands immunization measures of adults (Schick test, no diluting of the vaccine). They appear necessary to avoid losses. As the examination of the individual immunity and the subsequent immunization of the combat units would be most embarrassing, and as the combat units of the Eastern theater have to undergo numerous vaccinations, while on the other hand the number of diph-

theritic cases and a fatal outcome of this disease did not exceed certain limits with our Army Group command, I should like to suggest that no active prophylactic immunization of the field units should be attempted.

Discussion:

SCHULZE: An isolated diphtheria of the oral cavity may be followed by all complications usually observed after pharyngeal diphtheria.

GUTZEIT: The frequently occurring polyneuritis after diphtheria does not result from a reduced resistance, but it is a peculiar feature of the present epidemic; for, first of all even the slightest and unnoticed cases of diphtheria are followed by such nervous disorders, and secondly even fit and well nourished men fall sick with a post-diphtheritic paralysis without any preceding symptoms of disease. During the last years the course of diphtheria has become not only more severe, but the disease has altered its symptomatology too.

In view of the increased frequency of the diphtheria the bacillus carriers, particularly among the nursing, cookhouse, and hospital personnel (also Russians) should be strictly checked and, if necessary, be subjected to a successful treatment.

2. Treatment of Diphtheria within the units, Active Immunization, Reference is made to the present Epidemiology of the Diphtheria.

Oberstabsarzt (Major, MC.) Prof. CLAUBERG

Reference is made to the present epidemiology of the diphtheria occurring with the units: Frequent occurrence, increased severity of symptoms, unusual course of the disease, increase of the wound diphtheria, considerable amount of bacillus carriers.

Difficulties of prophylaxis and treatment: The hygienic measures required are discussed. Sometimes they cannot be carried through in the Eastern Armies or only with difficulties, so that one is compelled to reduce the strictness of the rules to be applied.

The pathogenicity and the epidemiological properties of the various diphtheria bacilli are not the same. The experiments which formerly were customary and sometimes are still made in recent times in order to collect evidence for the evaluation of the infectiousness and the pathogenicity of diphtheria bacilli and to find out therapeutic measures, are not adequate. This is due to the fact that bacilli which were proved as highly pathogenic for man suffering from diphtheria, may appear as being non-toxic during the guinea pig experiments, while reversely apathogenic forms gained from bacillus carriers are able to cause the death of the test animals. The classification of the

bacilli as bacilli originating from patients and bacilli from carriers is also liable to fail, since it is not possible to obtain a clear survey on the individual disposition of the persons concerned. In the same way the classification of the diphtheria bacilli in those occurring with ordinary contact carriers and those originating from supposedly more dangerous carriers, the so-called incubation bacillus carriers shortly before the outbreak of the disease, means no advantage, as under the given conditions no decision in favor of the one or the other direction can be reached. Contrary to that the differentiation of the diphtheria bacilli by determining their type is a valuable method. The diagnosis of the bacteriological type is very easy and it is practicable in any field laboratory. It should not be used generally. But in particular cases, most of all with the frequently unavoidable checking of bacillus carriers, this method provides the opportunity to differentiate dangerous breeds of the bacilli from the less dangerous ones, and to determine the necessary extent of our medical or epidemiological action. The sense of this diagnosis of the bacteriological type which should be applied in single cases, is frequently misunderstood.

As regards the active prophylactic diphtheria immunization there is no reason why it should generally be carried through with the units. The practice of the French Army to administer Diphtheria-Anatoxin together with typhoid and paratyphoid vaccine and tetanus anatoxin as a mixture, does not seem to be justified by the previous experience. Only in units, which are largely contaminated with bacilli and where the diphtheria occurs as an epidemic, should an active immunization be taken into consideration in every individual case. When it is carried through one must take into account that in view of the latent diphtheritic contamination of the German people there is an increased tendency to an allergic reaction with the increase of age. Therefore, the state of immunity of the men to be immunized should possibly be determined by a Schick test before the immunization. This test may be sufficient as a yardstick of the specific hypersensitivity. If there is a strong pseudo-reaction one must abstain from a prophylaxis, even if the Schick test is distinctly positive. If there is a weak pseudo-reaction the dosage of the vaccine should be reduced to 0.1 cc. The active diphtheritic immunization of persons older than 35 years should generally be avoided. Instead of the highly effective adsorbate vaccines which irritate the tissue by the content of aluminum flakes, the not adsorbed anatoxin vaccines may be used for the immunization of the units. For adults small quantities of these vaccines are sufficient to attain the desired results. It is certain that this prevents the precipitation of the aluminum flakes on the syringe or on the container of the vaccine and their injection into the tissue together with the vaccine remnants, when several persons are immunized, which would cause a necrosis of the tissue. This is a possibility to which sometimes no attention is paid although it is of importance for the origin of pathological reactions by the immunization.

Discussion:

SCHREIBER: As far as the medical inspection of the vicinity of bacillus carriers and the determination of the bacteriological type is concerned the suggestions of CLAUBERG are impracticable for the combat units.

GINS believes that the active immunization is not practicable. The passive immunization should be performed. For this purpose the quality of the serum must be improved, because its therapeutic value is not the same as 30 years ago.

WOHLFEIL warns not to overvalue the importance of the bacillus carriers. Despite many carriers only isolated cases of diphtheria occurred which were severe, because they were not diagnosed while being with the units. An active immunization is recommended with a dose of 0.1 cc. in cases of emergency.

KLOSE suggests an active immunization of the Labor Service units. Among 2500 men immunized actively and passively, a considerable reaction to the vaccine occurred only with those who were more than 27 years old.

TIETZ: Field laboratories are practically not able to make an environmental examination, in as much as in 30% of the cases of pyodermia diphtheria bacilli were found.

CLAUBERG: It should be mentioned that uniform directions are absolutely necessary. 0.1 cc. of the anatoxin is sufficient to procure an active immunization.

LAUCHE: From the reports of the Consultant Medical Officers I should like to mention:

1. Concerning the diagnosis: In the area of several Army Groups diphtheria was frequently overlooked (BOEHME, KNOLL, KOEBERLE), because of its atypical course, and also because of a simultaneous injury or other disease.

2. Variations of the ordinary course: site deep in the larynx, the trachea, and the bronchi, while no changes of the pharynx are present. Peripheral paraplegiae, a liability to hemorrhages, and a hemorrhagic bronchopneumonia, an extensive myocarditis, which occasionally may lead to a sudden cardiac death after short sickness (BOEHMIG) are frequent.

3. Diphtheria occurs frequently as a complication of other diseases (injuries due to cold, exanthematic typhus, battle injuries), and as a result of a generally reduced resistivity.

4. Wound diphtheria. Cases of wound diphtheria are frequent. The relation to the diphtheria of the respiratory tracts is not sufficiently clear yet. There are numerous bacillus carriers (BOEHNE). The contamination during evacuation, in casualty clearing stations and in hospitals is a frequent occurrence. BOEHMIG reports a case of a toxic state with necroses of the spleen and the liver and with a

myocarditis after wound diphtheria, without a diphtheria of the respiratory tracts being present.

KRAUSPE: The presence of diphtheria bacilli in suppurating wounds is so frequent that sometimes it is difficult to distinguish a true wound diphtheria from a secondary growth of bacilli as it is possible that virulent bacilli may be present in the wounds without provoking particular anatomical or clinical symptoms.

SIEGMUND: Refers to a Special Report in accordance with the directives as to the reduction of the general physical condition and an increased resistance to infections, dated 22/12/41 and issued by Army Physician 17.

KOCH: The question of whether the wound diphtheria is a source of an internal infection within hospitals is so important that the pathologists must also pay a particular attention to it.

ROESSLE: Wound diphtheria depends to a large extent on the physical condition and particularly on the nutritional condition of the wounded men.

During the recent time several cases of a malignant (hemorrhagic) diphtheria were observed.

RANDERATH reports of cases of pure pharyngeal diphtheria with a conspicuous disposition to hemorrhages which occur not only locally and in the form of a hemorrhagic bronchopneumonia, but also as an extensive hemorrhage of the skin, petechial hemorrhages of the brain and subserous hemorrhages.

GRUBER: The diptheria has become more frequent at home too, where many soldiers without any injury fall sick from it. Sometimes it is the cause for an unexpected death and the explanation of a cardiac deficiency. When inquiries are made this occurrence may be traced back to a diphtheria. It is most unfortunate that the clinical diagnosis of the diphtheria is frequently missed.

DORMANNS: The pathologists noticed that during this winter, particularly during the first months of December and January the results of the clinical diagnosis were somewhat disappointing as far as the diphtheria is concerned. While a correct diagnosis of 12 cases of exanthematic typhus was made without any mistake, only 2 out of 12 cases of diphtheria were diagnosed. The first 5 cases observed were five cases of a severe myocardiac lesion after tonsillitis, which also displayed signs of a severe postdiphtheritic infection so that they may be regarded as cases of diphtheria. Attention was immediately called to these mistakes of diagnosis which had the result that the erroneous diagnosis happened less frequently. As a whole, however, the diagnostic results of this winter were such that about 50 to 60 % of the fatal diphtheritic cases were not diagnosed by the clinical examination.

The explanation of these occurrences may be that first of all not all cases of death, where diphtheritic changes

were found, were the result of a diphtheria, but that with a great number of them another cause of death was traceable in addition. Sometimes the diphtheria was only a terminal secondary disease during an exanthematic typhus, but usually it had happened that the attention was diverted from the larynx when there were severe injuries. I remember one very impressive case which gave rise to many doubts for the surgical specialists. This was a soldier with a gunshot wound and a hematothorax of the right pleural cavity, who after about ten days showed the symptoms of a pneumothorax of the left side. It was only natural to assume that this pneumothorax was due to an injury, although this was not likely because of its delayed ocurrence and its site. The investigation revealed that there had been a concussion by a shot injury of the right lumbar region, and that the pneumothorax could be explained as a pneumothorax due to concussion, while the symptoms of the other side, where the emphysema was found, were caused by a laryngeal diphtheria which was not diagnosed in due time. There were several other cases in which an emphysema was also formed and in which nobody thought of a diphtheria as the possible cause.

An important feature is that the site where the infection becomes manifest is no longer the same as in earlier times. VOIT has already mentioned that more frequently than we are accustomed to see it, a laryngeal and tracheal diphtheria with most extensive pseudomembranes reaching far into the bronchi is observed instead of the pharyngeal diphtheria, as well as giant pulmonary emphysemae. These are forms which frequently occur with infants, but which are rare in adults.

It is most difficult to decide whether the character of the diphtheria as a whole has changed, or whether the symptomatology has become completely different. I should like to direct the attention to what ROESSLE mentioned this morning during a conference that severe cases of diphtheria with hemorrhages were observed. We are accustomed to consider a severe hemorrhagic component as a sign of an increased severity of any disease as a whole, and to interpret it as a sign of a considerably reduced resistance.

Within our Army Group wound diphtheria was a rare occurrence. Even though diphtheria bacilli are sometimes found, wound diphtheria is not necessarily present. This diagnosis is only permissible, if there are symptoms of a diphtheritic inflammation of the wound. SIEGMUND mentioned that in a case of a penetrating injury through the oral cavity, a wound diphtheria developed on both sides. Here one will have to assume that the patient was a bacillus carrier, and it is possible that a considerably reduced resistance of the facial tissue which otherwise possesses a great resistance to such an infection played a part in the development of the wound diphtheria. Within our command it never took a fatal course.

This discussion revealed that according to the observations of all bacteriologists present here, all lesions which are the usual result of diphtheria are

not observed with wound diphtheria; no evidence could be produced of severe myocardiac lesions or lesions of other organs. Neither could we obtain any proof as to the wound diphtheria being the cause of a propagation of the laryngeal diphtheria.

Therapy and Prophylaxis of Diphtheria.

1. Pharyngeal diphtheria: For an effective treatment an early diagnosis is necessary which enables a quick specific serum therapy and isolation and disinfection. The serum therapy should not depend on the bacteriological diagnosis.

The bacteriological examination of the environment including a check of the auricular smear in secernent cases of otitis media are necessary. In doubtful cases of disease such as suspicious catarrhal affections of the upper respiratory tracts, one should not forget to think of diphtheria (tracheal and bronchial diphtheria) and one should make efforts to accomplish a bacteriological diagnosis from the pharyngeal and nasal smears, and by investigating the sputum for diphtheria bacilli.

2. Wound diphtheria: All superficial diphtheritic tissue lesions including injuries due to cold and eczemas must be regarded as wound diphtheria.

Patients with wound infections may subsequently fall sick with a real laryngeal diphtheria. They must be isolated. Their treatment should mainly consist of local chemotherapeutic measures such as a chinosol (oxyquinoline) solution 1:2000. In fresh cases moist dressings with the specific serum may be attempted. Toxic symptoms justify the parenteral application of serum. If diphtheria bacilli are simultaneously present in the pharynx, an appropriate chemotherapeutic treatment should be attempted and the nasal and pharyngeal area be included (a nasal application of appropriate medicaments such as a 1% targesin solution to the recumbent patient is advisable).

In cases of wound diphtheria the bacteriological examination of the environment is also indicated.

3. Carriers of diphtheria bacilli. Since their number is very frequent there is no means to prevent the men from being exposed to the contamination with diphtheria bacilli. The preventive measures required must be taken individually. These are some useful suggestions: Bacillus carriers living among healthy people may be disregarded. If the contaminated carriers belong to the cookhouse personnel or to the nursing personnel of hospitals they should be transferred to another field of duties.

An isolation of bacillus carriers within special bacillus carrier wards is not advisable, as experience has shown that these carriers frequently contaminate each other again and that those with a special disposition under certain circumstances do not become free from bacilli at all.

If there are several bacillus carriers within one unit, they should possibly be separated from the other men and preferably be subjected to duties in the open air, where they have the best chance to become free of bacilli.

If it is desired to find out whether a carrier is particularly infectious, the bacteriological type diagnosis should be employed.

4. Active immunization: The active diphtheria immunization should be used in exceptional cases only, if in a unit contaminated with bacilli, cases of diphtheria occur repeatedly despite the usual prophylaxis. As a vaccine, anatoxin should be possibly used in a dosage of 0.1 cc. given subcutaneously twice or three times with an interval of 14 days between each injection.

X. TYPHOID FEVER.

Translation prepared by:

Office of Military Government for Germany (U.S.)
Office of Naval Advisor,
Medical Section.

The Epidemic in Paris and the Experience Gained with Regard to Immunization.

Oberfeldarzt (Lt. Col., MC.) KREY

I. The Epidemic

1. Outbreak
2. Inquiries as to the Source of Infection
3a. Clinical and
3b. Epidemiological Peculiarities
4. Organization of Therapy and Prophylaxis
5. Course of the Epidemic and its End

II. Experience

1. Clinical Experience
2. Sanitary Experience
   a) In General: Organization and Supervision of E.M.Clubs (Soldatenheim) etc.
   b) In Particular: Statements and Conclusions regarding the Problem of "Epidemics and Immunization

I. First of all I want to outline roughly the course of the epidemic itself:

1. During the Christmas days of the past year (1941) an ever increasing number of members of the Armed Forces was admitted to the Station Hospitals in Paris with at first vague symptoms of a severe acute intestinal infection. By the evening of December 27th the impression was created that this was an epidemic of typhoid fever from one common cource.

2. It was traced back to one of the big Paris Soldiers' Clubs ("Soldatenheim") as the apparent place from which the infection originated. In view of the characteristics of the disease, which right from the beginning was severe, the Club was closed, when the first case of death occurred, on December 28th, 1941, even before these infectious diseases were bacteriologically confirmed on December 31st as cases of genuine typhoid fever.

To make inquiries as to the source of infection the Soldiers' Club was thoroughly investigated before, during, and after it was closed, with regard to its sanitary facilities and outfit, the foodstuff employed and served, and its personnel: the results of these hygienic, bacteriological, and police investigations which supplied no conclusive information will be discussed later.

3a. As to the clinical symptomatology it was surprising that the progress of the disease which after an incubation period of barely 2-3 days was extraordinarily severe from the very beginning on, and in isolated cases even was most acute

showing severe meningeal or cerebral symptoms, which before January 3rd resulted in an early death of 6 cases out of 236 cases of disease in Paris alone.

The tendency to an unusual number of complications and particularly to frequent recidivations during the further progress of the epidemic agreed with this observation.

The assumption resulting from these clinical peculiarities that this was a particularly massive or particularly virulent and toxic infection was substantiated to a high degree by the qualitative investigation and differentiation of the epidemic bacterial breeds which was accomplished in the Military Academy (by Professor Dr. KLIEWE), and in Prof. RODENWALDT's Institute in Heidelberg; I made the suggestion to use these breeds for further preparation of vaccine.

3b. In addition, the particular epidemiological danger of this outbreak of typhoid fever resulted from the fact that in accordance with the peculiarity and the purpose of the soldier's clubs the members of the Armed Forces fed in this big Paris soldier's club during the period, within which the infection took place from about December 16th to 28th, belonged to many different units of all branches of the Armed Forces inside and outside Paris, and that therewith the infection was distributed throughout the whole occupied Western territory, even as far as to the home country right from the beginning on.

The number of hospitalizations rose sharply before December 27th, when the highest rate of admittance was 60 cases per day, and it dropped step by step during the month of January. 559 soldiers altogether reported sick in Occupied French Territory and about 15 - 20 at home, the latter figure not being complete yet; to this in Paris 51 French civilians have to be added (personnel of the Soldier's Club). The death rate among the Armed Forces amounted to 36 = 6.45 % , among the civilians to 5 = 9,8 %.

4. The therapeutic and prophylactic measures against the typhoid fever had to depend on this dangerous appearance of the epidemic with its serious military consequences. Our aim was to stop as far as possible any further disturbance of the duty within the units by a further distribution of the disease throughout the Occupational Forces as well as throughout the home country; therefore, in addition to local sanitary measures of epidemiological prophylaxis,-such as quarantine, bar on leave, particularly throughout the entire Paris area - any travel to Paris and any leave within the Occupied Territory and for Germany was generally barred.

5. In consequence of these measures of confinement the epidemic was terminated according to plan; that means that after the termination of the 21 days' incubation period from the closing of the Soldier's Club on no fresh cases and no new infections originating from this Club were admitted after January 18th. Contact infections were also restricted to very few isolated cases.

Therefore the epidemic could be regarded as extinct by the end of January, and the ban could be lifted, while the sanitary supervision was continued.

This does not include the last, approximately 30 convalescents which, as an expression of the frequently complicated and recidivating clinical course of the disease in individual cases, are still under hospital treatment. On the other hand, no contact carriers were heretofore observed in Paris during the purposely prolonged and careful clinical supervision of all cases.

II. What is the lesson of this epidemic?

1. It would be premature to draw clinical conclusions, and I would not venture to do this. But I want to make reference to Professor Dr. BERTRAM, who, being in charge of the treatment of the 341 epidemic cases in three Paris hospitals as the Consulting Medical Specialist discussed or mentioned interesting and particularly significant questions in his preliminary report, and who is going to make detailed investigations including also the cases outside Paris.

Here I only mention the questions as to the conspicuous frequency of recidivations, the principal complications of this epidemic, and the critical evaluation of the comparable therapy of the typhoid fever with sulfonamide preparations which probably was made here for the first time.

2. The lesson of this epidemic for military hygiene was:

a) The general lesson first: Even though the origin of infection was not ascertained with certainty as a natural contamination such as a cookhouse infection in the usual sense or as a sabotage, the investigations concerned with that matter nevertheless gave rise to a methodic organization.

In the future the quasi-military institutions such as particularly the Soldier's Clubs which in the occupied countries are frequently entertained by foreign leaseholders, will be fully subjected to the military rules as to the hygienic operation and supervision of military cookhouses and commissaries (H.Dv. 43a); it is required that all foreign food supply enterprises supplying the Armed Forces be subjected to an increased sanitary supervision.

To exclude all active or even the careless sabotage of the health of the troops, all such services of the Occupational Forces must in addition be supervised by counter-intelligence agents with a particular regard to all the foreign personnel employed therein; our relevant application was already given consideration by the Chief of the Military Administration in France.

b) Before finishing I want to throw a light to the particular and practically the most important problem of the connection between "Epidemics and Immunization".

This question was raised immediately after the outbreak of the typhoid fever by the medical officers with regard to a possible after-vaccination and also as a certain criticism from military officials.

The medical authorities decided that relying upon the present immunization of the units on the one hand, and under consideration of a possible "negative phase" after immunization, which was heretofore feared, on the other hand, no immediate re-vaccination should be accomplished throughout our command.

According to the directives issued by Oberstarzt (Colonel, MC) SCHREIBER, the typhoid fever, once broken out, was to be eliminated by sanitary measures and a re-vaccination was to be made only after a definite delimitation of the source of the epidemic, this has been in progress since the end of March.

I conclude this lecture with the reservation that Professor BERTRAM himself will check in the near future his preliminary statistics and the siginificant conclusions from it as to the immunization during the incubation period. For this purpose he will also include the cases of the typhoid fever epidemic outside Paris. To clarify the entire problem of the prophylactic immunization this last conclusion from this most instructive epidemic is also put up for discussion today.

Discussion:

GUTZEIT: I have had a statistical evaluation of the figures obtained from the investigations of Professor BERTRAM on the relation between the immunization and the course of the disease. They are available to me as a preliminary report and were used for the statistical evaluation. They showed that

1. The variations of morbidity between immunized and non-immunized persons were greater than the incidental variations would be. Hence it results that the smaller sick rate of immunized persons is statistically well founded.

2. That the smaller sick rate of persons immunized during the incubation period is statistically well founded.

3. That the variation of the severity of the typhoid fever between persons immunized at an earlier time and those vaccinated during the incubation period - the latter showed a slighter disease - is above the incidental figure to be expected, since the symptoms and the condition of the typhoid patients immunized during the incubation period were less severe.

All these conclusions are correct only if the comparable series of cases were exposed to infection under constant conditions and no casual factors were effective on o ne of the series exclusively.

Under these conditions no negative phase of the prophylactic immunization against typhoid fever would be demonstrable, and it is advisable to re-vaccinate immediately all persons exposed after the outbreak of a new epidemic. No essential difference was found between the sick rate and the severity of the disease of persons vaccinated three, four, or seven months before the outbreak of the epidemic.

For the clinical physicians the following observations of BERTRAM during the typhoid fever epidemic in Paris are remarkable:

1. The incubation period was short and varied with the severity of the disease. In fatal cases it was 5 days, in cases of severe sickness 6 days, and in slight cases 10 days.

2. The Paris typhoid fever was most liable to recidivations. With 5 patients 3 relapses were observed. In some of the cases it happened that only the severe symptoms of the relapsed typhoid fever established the diagnosis and that the first outbreak of the disease took an abortive progress. A plentiful diet and the duodenal tube are alleged to have provoked occasional recidivations.

3. In the cases treated with Eubasin the blood and the excretions were free of bacteria remarkably early, so that one may assume that Eubasin has a bactericidal effect in cases of typhoid fever. Further observations of this phenomenon are required with regard to their significance for the treatment of the bacillus carriers.

A re-vaccination during the incubation period does no harm - but there is no proof yet of its good result. However, the idea that there is a negative phase must be given up. An early disappearance of the bacteria from the stools and the urine was observed after the Eubasin therapy. This must be checked by further observations.

RODENWALDT: The course of the typhoid epidemic in Paris has an extraordinary resemblance to that in the Moselle area during the first winter of this war. It is well known that typhoid fever occurs despite prophylactic immunization, as the experience obtained in German South-West Africa showed. KISSKALT's laboratory experiments demonstrate that the infection with a great number of bacteria plays a great part in such cases.

ZEISS: brings CZERNY's opinion back to mind: "The negative phase is a negative phrase". The possibility of sabotage cannot be excluded.

MUGROWSKI was able to demonstrate during a typhoid fever epidemic of an independent unit that 1) the assertion that this unit was completely immunized was wrong, since more than 30 % of the men were not immunized at all, while the immunization of other men was accomplished a long time ago, and 2) that the assumption was wrong that there were no bacillus carriers among the indigenous population. This was revealed by the thorough investigation of 800 stools and 1400 blood samples.

SCHREIBER asks 1) what the interval between two re-vaccinations was, and 2) what the permissible period of immunization during the incubation period is?

GUTZEIT replies that the epidemic in Paris revealed that there is no difference of the immunization between persons immunized three months ago, and those immunized eight months ago. To continue the immunization during the incubation period is advisable only if there is no rise of the body temperature.

Directions

(Statements and conclusions with regard to the prophylactic immunization against typhoid fever originating from the preliminary report of Professor Dr. BERTRAM of 28 February 1942 on the Paris Typhoid Epidemic 1941/42).

I. Statements.

a) A preceding prophylactic immunization against typhoid fever has apparently reduced the disposition to typhoid fever. There is a difference of 23.2 % (statistically demonstrated) to the disadvantage of the non-immunized persons between the sick rate of immunized and non-immunized persons. The severity of the typhoid fever was not substantially influenced by the immunization.

b) The time interval between the last immunization and the contamination with the disease had no noticeable influence upon its outbreak and its progress.

c) The immunization after the outbreak of this typhoid fever epidemic reduced the specific disposition as well as the severity of the typhoid fever. The differences found are statistically substantiated. In no case was any harm done by the immunization during the incubation period.

II. Conclusions.

a) Hence it results that the prophylactic immunization against the typhoid fever was successful and should be continued.

b) There is no reason why the heretofore practiced re-vaccination turn of eight months should be reduced; it is recommended to continue it.

c) In all cases of a new outbreak of typhoid fever

epidemics an immediate re-immunization of the exposed persons should be accomplished.

III. Special clinical observations.

a) The length of the incubation period varied. In fatal cases it amounted to 5 days, in severe cases to 6 days, in slight cases to 10 days.

b) The epidemic showed a pronounced tendency to recidivations, Early as well as retarded recidivations occurred very frequently. With five patients 3 relapses were observed, usually subsequent to abundant food. The duodenal tube sometimes released a relapse.

c) In 22 cases treated with Eubasin the typhoid bacilli vanished comparatively soon from the blood and the excretions.

XI. TULAREMIA.

Translation prepared by:

Office of Military Government for Germany (U.S.)
Office of Naval Advisor,
Medical Section.

1. Diagnosis, Agglutination, Skin Reactions, Epidemiology, and Serology.

Oberstabsarzt (Major, MC.) Professor BOGENDOERFER.

The area, where our observations were made had suffered a large tularemia epidemic in 1938 which was most exactly observed by the Russian Physicians. Accurate notes were available on its course and its distribution.

At that time this epidemic comprised more than 5000 cases. To my opinion the connection of the tularemia, which is a zoonosis, with the large river basin of the Volga is remarkable.

Subsequent to the epidemic of 1938 a considerable number of cases appeared even in springtime and autumn of the years 1939 and 1940, but the high point of 1938 was not again attained.

In December 1941 we were faced with this disease for the first time, since the units billeted in small villages remarked that in most of the houses one or several individuals of the indigenous population suffered from tularemia.

The contact carriers of tularemia are the rodents, in our particular cases the mice. As the crop had been left in the fields as sheaves, the mice had bred rapidly and with the onset of winter had moved into the houses. A direct contamination by mouse bites was observed several times. The most frequent source of infection, however, is contaminated food, such as bread at which the mice had gnawed, or flour contaminated by the excretions of mice.

The contamination by biting causes the first of the four forms, by which the tularemia appears. They are:

a) the ulcero-glandular type,
b) the oculo-glandular type,
c) the glandular type,
d) the typhoid type.

Among approximately 1000 cases of tularemia I saw only two cases of the 1st type. In one of these cases a soldier was injured on one of his fingers by a mouse bite. The wound would not heal for several weeks, showing a peculiar circular, granulating form, and a few days later a swelling of the axillary and cervical lymph nodes to the size of an apple appeared. The other case took a similar course.

No case of the oculo-glandular form was noticed, while the glandular form occured in about 30 % of the cases. The remaining 70 % showed the characteristics of the typhoid form.

As to the typhoid form I should like to refer to this term as being most inadequate indeed. The characteristic feature of the typhoid diseases is the somnolence, which is entirely absend during tularemia. Only the type of the temperature curve reminds one vaguely of an abdominal typhus.

Concerning the diagnosis the following must be mentioned: The diagnosis of the ulcero-glandular form is very easy, as well as that of the purely glandular form. The conditions of the typhoid form are difficult, and only serological investigations enable a correct diagnosis. In a really very well organized Russian laboratory we found the specimens required, and the agglutination tests of several thousand blood samples were made in the two field laboratories of our Army group.

In the beginning we believed that the titer of 1:50 of our soldiers would serve as an evidence of tularemia, but later we had to extend the limit, because a quiet contamination of many units had apparently occurred. For the time being an agglutination titer of 1:100 or 1:200 is considered as an evidence of tularemia. It cannot be stated definitely that the agglutination test is strictly specific, but I think that this is probably the case.

In addition to the agglutination there is still the other possibility to ascertain the diagnosis by a skin test, which was developed in a similar way as the tuberculin and which is called tularemin. While the serum agglutination appears only 8 days after the onset of the clinical symptoms, the skin reaction generally is positive already on the 3rd day. Therefore, one must be careful when the skin reaction is evaluated. If a skin test is made with tularemin in the 2nd or 3rd week of disease one frequently may release recidivations. I observed several cases of this kind, so that I want to ask for caution.

The following observation of Dr. GAEDE (1st Lt. MC., in our Army group) and KAIRIES (bacteriologist) is remarkable: The medical officers made agglutination tests of several hundred soldiers and demonstrated that 60 to 70 % of the men of the frontline units living under unhygienic conditions showed positive reactions, while contrary to that only 1 % to 2 % of the soldiers living under better hygienic conditions had a positive reaction. From this observation it may be concluded that an occult immunization against tularemia occurs.

It frequently happens that one meets a double agglutination against exanthematic typhus and tularemia. In such cases the tularemia titer is moderately increased to 1:200/400, while the Weil-Felix agglutination amounts to 1:50. There it is usual that the clinical symptoms of an exanthematic typhus develop, which is also characterized by the result of the Weil-Felix reaction. After about 10 days the serological result is that the tularemia titer augments to 1:200, as before, while the Weil-Felix titer has risen considerably to 1:800 or so. This most probably is not due to para-agglutination but it is likely that such patients were sick with tularemia which was overlooked several weeks ago and then fell ill with an exanthematic typhus. Reversely, there are cases which according to my observation are very rare, where the Weil-Felix reaction is positive at a titer of 1:100, even though there is no exanthematic typhus, but only a tularemia.

The Weil-Felix reaction is not strictly specific. We even observed genuine classic clinical cases of exanthematic typhus in which the Weil-Felix reaction remained negative. Particularly with the exanthematic typhus stress must be laid on the fact that the clinical symptoms are decisive.

The clinical symptoms of tularemia, particularly of the so-called typhoid or influenza form, are not pronounced, so that we have to rely upon the serological diagnosis. This is essential, as there are few other diagnostic possibilities. The blood count shows nothing peculiar either. The number of white blood cells is 8000 to 10 000, with a relative lymphocytosis, but I do not believe that this occurs as a strict rule. The diazo-reaction was always negative. The course of the body temperature is sometimes indicative but it is not always a safe means of diagnosis. It generally happens that the typhoid form of tularemia sets on with an attack of high fever. Subsequently it drops during the following 2 or 3 days, and then it rises again to a continua, which rarely exceeds 39°C. with the highest temperature. This continua persists for 8, sometimes for 14 days. Then the temperature returns slowly to normal values. But there are frequent recidivations.

The contamination of the tularemia from man to man allegedly is not possible and I made no observations apt to suggest the contrary. The contact carriers are mice and rats, at least throughout our Army group. Their extermination is the basis of the prophylaxis against tularemia. The infection is apparently contracted through the gastro-intestinal duct. For this reason it is particularly important to insist on a suitable storing of the food in the food stores as well as with the individual soldiers. I believe that most of the cases of tularemia originate from eating bread left lying about at night and contiminated by mice.

In the Soviet Army tularemia is probably also a widespread disease. We found Soviet Army orders containing detailed rules as to the extermination of rats and mice.

No fatal cases occurred, but cardiac lesions were rather frequent. Once it even happened that a pancarditis developed. Even though the tularemia may be a very slight disease, as was mentioned repeatedly, it nevertheless is a condition which sometimes may render a great number of men unfit for duties. Therefore, particular attention must be paid to it.

2. Distribution, Length of Sickness, Serological Diagnosis.

Oberfeldarzt (Lt.Col.MC.) Professor BIELING.

Before the campaign in Russia tularemia was known as the plague of the rodents, which was easily contracted by man in whom it causes relatively pronounced symptoms. After their disappearance a long period of convalescence

ensues, while its lethality rate is remarkably small. We were also well aware that this plague was to be expected in Russia, and it was, therefore, no surprise to us, when we met tularemia by the end of November and the first days of December. With the antigens prepared we were able to diagnose it serologically without delay.

Then we observed that tularemia was distributed throughout the river valleys of the Volga basin, while it was not found in the river basin of the Don and Dnjepr. The cause of this will be discussed elsewhere.

Therefore, we were surprised to a lesser degree by the occurrence of the tularemia but rather by its symptomatology and its form of appearance, and the way in which it was distributed. The typical manifestations of the ulcero-glandular and the oculo-glandular form were seen only very rarely. In the beginning the pure glandular form did not stand to the fore either, but we rather were faced with symptoms which were called by the Russians with the misplaced term "typhoid syndrome" or "influenca syndrome", although there were neither a "typhus" nor symptoms of an affection of the respiratory tracts worth particular consideration. Therefore, the diagnosis had frequently to be made by the physicians per exclusionem, and for this purpose it was important to exclude other infectious diseases. The final decision was to be obtained from the confirming result of the biological reactions.

Two such reactions were available:

a) The intracutaneous test with tularemin, which we had prepared already in peacetime as a matter of precaution and which was a practical success right from the beginning on. From the 4th day of sickness on (no test was made before the 4th day) specific skin reactions could be provoked by this preparation. After an intracutaneous injection of 0.1 cc. of the skin test agent an edematous swelling was developed after 3 - 4 hours close to the site of the injection, which continued to increase and attained its largest size during the second day. It was as large as a thumb nail, frequently even considerably larger, and usually showed a central reddening, which, however, used not to be so extended as the swelling itself. This made the difference between the tularemin-reaction and the tuberculin-reaction. Patients with a particular sensitivity of the skin showed a particularly extensive swelling, and in the course of the following days a small necrosis not exceeding the size of a lentil, developed at the site of injection. For this reason it is recommended to abstain from using the tularemin-reaction after the end of the 2nd week of sickness, or to use a diluted solution of tularemin.

b) From the beginning of the second week of sickness on the serum of the patients has the power to agglutinate the tularemia bacteria, in this case rather high and specific values are found. The co-agglutination of Bang bacilli, as described in the literature, was disregarded, since it was most moderate and regularly recognizable and

as a co-agglutination by its small agglutination titer. We were under the impression that the Bang breed in use was specially suited for these investigations and showed specific results.

A very good result was obtained with the serological diagnosis by means of the dry-drop-method similar to that used by KUDICKE and STEUER for the Weil-Felix reaction. It has the great advantage of being practical even under very primitive environmental conditions without any difficulties and of revealing immediately the positive result, so that the obligatory sanitary measures can be taken at once, wherever this is necessary.

Both reactions, the intracutaneous test and the serum reaction, revealed that apparently many more persons fell sick with tularemia than was assumed according to the reports of the medical officers. During the tularemia season all sera and particularly those of the patients with an exanthematic typhus and suspected of suffering from an exanthematic typhus, were examined as to their tularemia titer. Persons living in the environment of patients with the signs of a clinical manifestation of tularemia were also subjected to a biological examination. With the exanthematic typhus patients it was repeatedly observed that there was a considerable tularemia titer at a time when the Weil-Felix reaction was still negative, and that the former was diminished, while the Weil-Felix rose. We had the impression that this was a rapidly disappearing reaction originating from a previous tularemia and that it was provoked by a new infection of the former tularemia patients with exanthematic typhus. The patients confirmed frequently that several weeks before they had suffered from a disease which had been regarded as an influenza. For, unfortunately, the term "flu" is also applied to such infections, the nature of which is not clear or cannot be clear to the general practitioners who apply this term to any infectious disease with an unknown or vague etiology. This faulty terminology which is not in accordance with our present views on the nature of the virus influenza, is apt to cause a delay of the discovery and the diagnosis of new epidemics, as has already happened, and it may retard the establishment of appropriate preventive measures by the sanitary officers.

A further surprise was caused by elucidating the way in which the epidemic was contracted and spread throughout the area observed. That hares and rabbits could not be responsible for the distribution of the disease, as was the case in the last epidemic known to us, resulted from the simple fact that practically no such animals occurred there. The water rats, who were known to us as important contact carriers from former epidemics, such as that in the district of Rjasan, one of the targets of our Army group, could not be held responsible for the distribution of the tularemia during December. It rather became obvious that the field mice were the focus and the source of this disease. Those were comparatively large mice with a short tail which live in the

fields during the hot season. With the onset of cold weather, however, they go into the villages and a huge number of them assembled in the heaps of the unthreshed corn or in the granaries. In the dwelling places of sick villagers I was regularly able to detect these mice during the epidemic period. If the corn-threshing is continued over a long period of time, as was the case in the last year, the mice plague is particularly great, and tularemia which is endemic among mice will largely be distributed as again last year and great masses of these rodents will die. The mouse plague and the mouse epidemic, therefore, occur prior to the tularemia of man, because it is a passive zoonosis which is spread spontaneously among the animals only attacking man, if he crosses its path, while man sick with tularemia plays no or no considerable part as a contact carrier. It appears as if the mice are contaminated with the epidemic by the water rats, into the holes of which they usually move when they return to the fields during springtime. This may also be the reason why the area of distribution of human tularemia is the same as the distribution of the water rat and not that of the field mouse, although the latter communicates the disease to man.

In rare cases the infectious material is communicated from the mouse to man by biting. In this case a primary ulcer develops at the site of the bite, and the lymph glands pertaining to that area are swollen to a particular degree. In this country biting insects apparently do not play a part as they do in the United States, because primary ulcers would have been observed more frequently at the site of an insect bite. The epidemic is possibly communicated from mouse to mouse by lice. The part played by mites (lelaps) may be still more important. These are small animals of pinhead size which are regularly found among the mice in the tularemic areas. There is also the possibility that these small animals possessing a diminutive biting apparatus bite and contaminate man, if they live in the straw. It appears to me that the communication of tularemia by dust arising when the corn heaps inhabited by the mice are threshed, and by the distribution of the mice excrements is still more important. Here, I particularly think of the communication of the tularemia by foodstuffs lying about and contaminated by mice. It may be communicated in the same way by bed-straw contaminated with dead mice or their excrements. One must also take into account that the disease is spread by water, particularly brook water, because tularemia bacilli were found in a small brook flowing through a contaminated "colchose" (group of huts). Cats catching the sick mice and eating them may also be contaminated and distribute the disease.

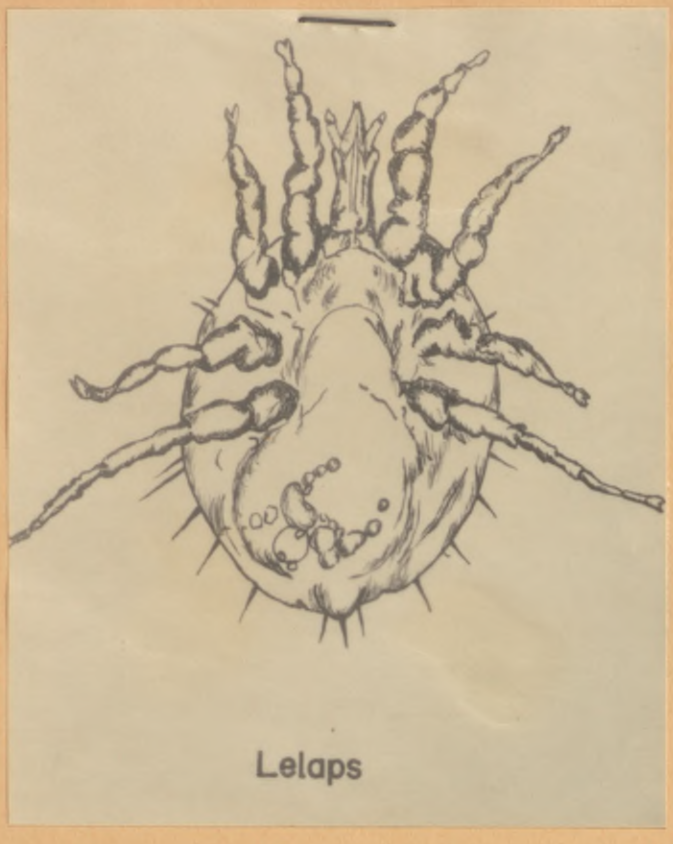


Illustration (lelaps)

The Russians denied that there is a direct communication of the disease from man to man. Some observations, however, reveal that under certain conditions one must also take into account that patients suffering from tularemia and admitted to a casualty receiving station may communicate the infection to soldiers admitted at a later time, but it is necessary to have an eye on these observations.

According to what was said above the preventive measures have to be directed against the mice under the conditions of the present time. It is important to prevent the mice from moving into the corn heaps and the granaries when the cold season sets in. This may be accomplished by deep trenches with vertical walls. The mice in the dwelling places should be exterminated with all means and one must insist in the corn being threshed in the autumn as rapidly as possible. The units should be instructed on the significance of the field mice for the distribution of the epidemic and told not to touch living or dead mice with the hands, but to burn them. The use of unboiled water of brooks for the purpose of washing the face (infection of the eyes) and washing the dishes is not permissible.

3. Pathology, Anatomy, and Histology of the Tularemia.

Oberfeldarzt (Lt. Col. MC.) Professor LAUCHE.

As far as I know, no fatal case of tularemia occurred in the German Army. In addition I know that no lymph nodes of definite cases of tularemia were examined by the Army pathologists. As tularemia of man was hardly observed in Germany except for some few cases in the Eastern provinces none of the Consulting Pathologists assigned to this meeting has a personal experience with the tularemia of man. I am giving this lecture myself, because I was more able than other scientists to look through the literature and to contact people acquainted with tularemia. I am indebted to Ministerialrat Dr. HENNINGER, Berlin-Dahlem, and Dr. REICHLE, of the Katharinenhospital in Stuttgart, who from his former activities in Cleveland, USA, is acquainted with tularemia by the knowledge of surgical and autopsy material. Moreover, CHIARI placed photos at my disposal of a case discussed by him in the Wiener Medizinische Wochenschrift. Consequently my report is based on this information and not on my personal experience. Due to the shortness of time I am only able to refer to the most important problems and not to discuss this topic exhaustively.

As regards the macroscopic picture of the tularemia I should like to modify the heretofore practiced classification from the anatomical point of view and to distinguish the following forms:

I. The glandular form (bubonic form)
II. The internal form (intestinal or enteral form)

In accordance with the site, where the germs gain access, the glandular form may be further classified into:

1. The cutaneo-glandular form with a dermal site of access, usually one of the fingers. The primary affection is frequently insignificant and usually heals rapidly. A lymphadenitis and a considerable swelling of the regional lymph nodes occurs, which are usually the axillary lymph nodes in accordance with the most frequent site of access.

2. The oculo-glandular form. Access is gained through the conjunctiva when the germs are spread around or rubbed in. It usually occurs as a unilateral affection of the eye. There is a considerable conjunctivitis accompanied by a swelling of the pre-auricular lymph nodes (sometimes on both sides) and later also of the cervical lymph nodes.

3. The tonsillo-glandular form (tonsillitis form). The germs gain access through the tonsils of the pharyngeal mucous tissue. The primary site of infection is frequently small, while there is a considerable swelling of the maxillary and cervical lymph nodes.

4. The so-called "pure glandular form", where there were no primary changes by the germs at the site, where the micro-organisms gained access. A more or less extensive swelling of the lymph nodes is found at various parts of the body.

All these four forms may be transformed into the ulcero-glandular form by suppuration and when the bubos perforate the skin. To my opinion this form cannot be compared with the above mentioned 4 forms, as a different principle was applied when it was outlined, and as all above mentioned forms can be changed to it by the rupture of the bubos.

The enteral form may be classified into

5. The intestinal, abdominal or typhoid form, if the affection of the lymphatic apparatus of the intestines and of the mesenteric lymph nodes prevails. Apparently the micro-organisms gain access to the body through the gastro-intestinal canal. Most of the laboratory infections pertain to this group.

6. The pulmonary form, if the affection of the lungs in form of sometimes rather chronic bronchopneumoniae prevails.

If the infection is widely distributed throughout the body one may also distinguish:

7. A tularemic septicopyemia which is accompanied by pseudo-tuberculous necroses in nearly all organs, and which allegedly not infrequently show a considerable affection of the meninges.

There are still only few reports of post mortem examinations. Some of them were available only as short abstracts, since most of them have been published during the last years in foreign periodicals. In most of the cases the presence of numerous nodes from miliary to pea-size in the spleen is mentioned as the most remarkable alteration (so-called punctured spleen of tularemia, BSTEH, case of PAUL). Despite their small size PAUL found purulent cavities in the nodules. In general, however, they closely resemble caseous tubercles. The central necrosis of the large nodules is sharply delimited from the splenic pulp by a grey-white tissue looking like a capsule.

In the lungs, rarely in the liver, and occasionally in the adrenal glands (BREUCKEN, quoted after CHIARI) such foci may also be found. The lymph nodes are swollen to a different degree. The largest swelling occurs with these lympho-glandular groups which are linked to the area, where the germs gain access. They are soft at first and numerous small grey foci are found in them. Later, sometimes even after a couple of weeks, pus is formed in them. This pus is distinguished from that of an ordinary purulent lymphadenitis by the presence of caseous particles. There is also an inflammation and a congestion of the environment of the lymph nodes so that the lymph nodes grow together

if this disease persists for a long period of time.

With the typhoid form ALLEN and SMITH observed intestinal ulcers of the ileum, particularly in the area of Peyer's patches, and a considerable swelling of the mesenteric lymph nodes, which showed a tendency to suppuration. The septic form may provoke nodules resembling tubercles "in all organs". With this form of tularemia the meninges are affected to a considerable degree (KIMMELSTIEL and CALDWELL).

A larger number of reports is available on the histological investigation of the lymph nodes, because inflamed and swollen lymph nodes were occasionally extirpated in order to confirm the clinical diagnosis. In all these reports the great resemblance of the tularemic granulomas to tubercles is underlined. The tularemic granuloma also consists of epitheloid cells with a varying number of Langhans' giant cells and a central necrosis. Contrary to tuberculosis, however, an accumulation of polymorphonuclear leukocytes is found in the center of the granulomae as well as a zone of decomposition variable as to its extent at the borderline of large necrotic foci. These alterations occur with tularemia as well as with the lymphogranuloma inguinale, and the pseudotuberculosis of the rodents not observed in man which, however, plays a certain part with the animal tests. CHIARI regards the occurrence of nodules containing giant cells in the perilymphoglandular fatty tissue as particularly important for the differential diagnosis, as well as the occurrence of perivenous infiltrations with a simultaneous proliferation of the vascular endothelia which finally leads to an occlusion of the veins (proliferating phlebitis). Some if the investigators make a particular reference to the fact that the granulation tissue of the tularemia is vascularized and that contrary to the tuberculosis shapes of vessels are demonstrable similar to the gummae (KIMMELSTIEL and CALDWELL, HELLWIG) inside the necrosis.

While most of the investigators (CHIARI, KOEBERLE, HELLWIG, BSTEH) emphasize that in cases of tularemia the epitheloid cells are also arranged in palisade formation around the necrosis as with tuberculosis, REICHLE writes that the absence of the palisade formation is characteristic. This author is of opinion that the histologic picture of the prevalence of a large mononuclear reaction without any palisade formation and with the phagocytosis of the red blood corpuscles and cell fragments by the mononucleates, together with the clinical symptomatology of an insignificant ulcer, usually on the hands, and the lympho-nodular swelling connected with it, is almost a pathognomic feature of tularemia. It is quite clear that this applies only to the cutaneo-glandular form.

These statements reveal that besides a secondarily infected tuberculosis infection granuloma inguinale and glanders must be considered for the differential diagnosis. For the time being no definite histological characteristics

are known and, therefore, one has to rely on serological or bacteriological investigations, if one wants to confirm the histological findings.

Lately we have several times received extirpated lymph nodes for histologic examination because of a suspected tuberculosis or lympho-granulomatosis. They also showed histological alterations which could not be distinguished from those which were designated as characteristic for tularemia. I shall show you several such cases and I am most desirous to know what your diagnosis will be. In these cases, too, large zones of nuclear fragments were found as well as vessels in the necroses and in the granulation tissue, and frequently also a perivenous infiltration in the fatty tissue around the lymph nodes. One of these cases was also examined by REICHLE. He was of opinion that it was not only possible, but even likely that this was a case of tularemia. The serological investigation, however, had a negative result, and according to HENNINGER, who personally examined the patient, the clinical examination also excluded a tularemia. As this swelling was observed on one of the supraclavicular lymph nodes a lymphogranuloma inguinale was not likely either. In the other cases, there was also no sufficient support for the assumption of a tularemia. I do not remember having seen similar cases at an earlier time, at least not in such a large number.

Summarizing I want to state that no sufficient characteristic findings permitting a definite anatomical or histological diagnosis of tularemia can be obtained from the literature or from other papers available to me. For the time being one will only be able to make a diagnosis or probability which will have to be confirmed by serological and above all by bacteriological investigations.

Before finishing I want to make reference to the difficulties arising from the serological diagnosis: for several cases were observed in which the agglutination was positive (up to 1:400) without any clinical or anatomic facts being found suggesting the presence of a tularemia. A small number of such specimens were sent to our institute. In every case the examination revealed an exanthematic typhus. I hope to be able to clear up these difficulties by discussing them with the bacteriologists.

LITERATURE:

ALLEN and SMITH, Arch. of Path. 26, 1052, 1938.
BSTEH, Zbl. Chirurg. 1940, 1248 (case Paul).
CHIARI, Wien. Med. Wschr. 1937, No. 40.
HELLWIG, Ziegl.Beitr. 83, 544, 1929
HENNINGER, Zbl. Bakt. I Orig.140, 105, 1937.
KIMMELSTIEL and CALDWELL, Am.J. Path., 15, 1,1939.
KOEBERLE, Zbl. Path. 69, 190, 1938
PUTSCHER, THORNSKILL, TUCKWILLER and FISHER, Ref.Zbl.Path.74,143, 1940.
REICHLE, Arch. of Path. 29, April 1940
ZEISS, Arch. Schiffs-und Tropen-Hygiene, 36, 344, 1932.

Discussion:

GUTZEIT: The principal interest should be concentrated on the value of the diagnostic reaction and the problem of how the infection develops.

HENNINGER: More attention must be paid to the water. There is the danger of infection when contaminated water is used for the purpose of cleaning and washing. The period of convalescence is most extended, and in the first 3 months after the sickness had subsided the patients should not be accused of malingering if they still complain.

RODENWALDT: In Turkey tularemia was also found with frogs and in the water.

ZEISS: The stump-tailed mouse (steppe-mouse) also plays a part with the Kirgheez plague, just as the ground-squirrel and the marmot with the tularemia. The studies of the Russians showed that tularemia is not communicated from man to man, but that it rather is distributed by bread contaminated with urine. The distribution of the present cases in Russia agrees with the contaminated areas given by JUSATZ in his tularemia charts and it demonstrates the importance of the medico-geographical maps containing prognostic evaluations for war operations.

BICKERT: Received reports on 270 cases from the area of three Army groups. The preponderance of the swelling of the cervical lymphatic glands points to the importance of an infection by eating bread contaminated by mice.

BIELING: Tularemia bacilli were found in Russia in brook water. A communication from individual to individual surely is very rare.

DORMANNS reports of a case of tularemia in Charkow. This was a case of sickness with the cutaneo-glandular form which occurred after the skinning of a hare. According to the anamnesis, the course of the disease, the temperature curve and the histological appearance of one of the lymph nodes the diagnosis may be regarded as definite. As there were no serologic or bacteriologic diagnostic facilities, the histological investigation of this case, which according to Dr. HENNINGER was the first tularemia of the Army communicated by "hunted animals" was the only possible and very rapid way to confirm the diagnosis.

Together with the general circumstances (anamnesis, course of disease and pyrexia) the histologic examination is of a decisive importance for such cases.

RANDERRATH made the post mortem examination of a case with the clinical diagnosis of tularemia, made on the basis of a tularemia titer of 1:400. The autopsy revealed an exanthematic typhus. There were no macroscopical or microscopical signs of tularemia.

BOGENDOERFER: As to the clinical symptomatology of the tularemia, I should like to make reference to the tularemia occurring in four different forms. The first form is the ulcero-glandular type, the second the oculo-glandular, the third the purely glandular type, and the fourth form is called the malignant or tribal type. The various forms are distinguished according to their origin which is easiest to imagine with the ulcero-glandular type. This type of tularemia was observed twice among a comparatively large number of patients. A mouse bite as the cause was demonstrated so clearly that there was no doubt as to the way of infection. The mouse hung onto the finger so that it had to be removed by force. The wound resulting from that incident healed slowly having the appearance of an ulcus with peculiar edges, and the swelling of the axillary, cervical, and maxillary lymph nodes was developed within a few days to such an extent that this could not be caused by an ordinary lymphadenitis. The histological examination confirmed the diagnosis of tularemia which certainly was right from the beginning on.

The other form of the tularemia during which the cervical lymph nodes are particularly affected and during which the patients complain of a tonsillitis, may develop in such a way that, as BIELING mentioned above, the dust may have communicated the micro-organisms causing the disease. Finally, it happens that similar to the tuberculosis the hilus glands and the cervical and pharyngeal lymph glands be affected. The diagnosis of this form is also easy, since such a swelling of the lymph glands occurs only during Hodgkin's disease, during a sarcoma, or similar diseases, which practically will hardly be taken into consideration, if such a large number of soldiers is affected. But there, too, the serologic diagnosis is valuable.

The oculo-glandular form was not observed among the 2000 cases of tularemia attended by us. I am not sure whether this was due to the fact that the contamination with dust was small.

About 70 % of our cases were those of the fourth form, the influenza or typhoid form. I am somewhat reluctant to use the term "typhoid", since these patients are always cheerful, lively, able to read and do not have the appearance of typhoid patients. The term "influenza form", however, probably may be appropriate. As the clinical symptoms of this form are not characteristic the diagnosis usually may have to rely on the serological tests. The fever usually sets in with a high initial deflection which is followed by a short remission but then by a continua which persists for a period of 8 to 14 days. The only symptom which would suggest a typhoid fever, the pulse rate, is not substantially diminished. The spleen is sometimes enlarged. But on the whole we are faced with a non-characteristic syndrome which, as regards muscle pains and neurologic symptoms, causes only a moderate discomfort and results in only one complication: a cardiac affection. We observed that even among selected and constitutionally healthy men a

cardiac failure occurred during this stage which sometimes showed even the symptoms of a pronounced insufficiency. This is one of the important practical points which must be taken into consideration when the prognosis quoad restitutionem is given.

Tularemia disappears gradually, sometimes however, very rapidly. It was mentioned above that most likely there is a great number of latent cases; but in those accompanied by pyrexia we must always take into account that the heart is impaired, and therefore it is advisable to have these patients medically attended and to pay more attention to them.

For the prophylaxis it was requested that a particular regard should be given to the extermination of mice and vermin. No specific therapy is known yet. As it is comprehensible all applicable means were attempted. With an appropriate nursing tularemia is cured even without any treatment.

Directives as to the Diagnosis and Treatment of the Tularemia.

(Tularemia Leaflet).

Character of the disease: Tularemia is the plague of the rodents, and it is largely distributed throughout the Russian village population and was also spread to German soldiers. The disease was heretofore known as the hare-pest. It is a real zoonosis.

Causative micro-organism: Bact. tularense, a very small rod resembling a coccus and showing neither motility nor the formation of spores. It is Gramnegative and difficult to demonstrate as it is difficult to cultivate and to stain. The causative micro-organisms are demonstrable only by animal tests with the blood of patients (1st week of disease) (caution: because of the danger of distribution by laboratory infections). Later an excised purulent lymph node or the secretion of the primary injury or the affected palpebral conjunctiva may be used for this purpose.

Contact Carriers: In Central Russia these are the water rats and the field mice principally, but also hares, rabbits, and ground squirrels. Under the conditions in Central Russia tularemia is principally communicated to man by a large mouse with a short tail. With the onset of the cold season these animals leave the fields and enter into the corn heaps, the villages and the human dwellings. As a result of this crowding the rodent pest which is endemic among mice is generally distributed and a mass dying will occur. Epidemiology: If there are crowds of rodents and a conspicuous number of dea rodents, a spread of the tularemia micro-organisms should be suspected.

Incubation period: This is short, generally lasting 4 days.

Clinical symptomatology: According to the access one distinguishes:

a) Ulcero-glandular form. Sudden onset with pyrexia, rigor, reduced general health. A "primary affection" (ulcer) develops with a swelling of the lymph glands pertaining to the affected area, (e.g. the axillary glands, if there is a mouse bite on the finger).

b) Not infrequently the "primary affection" is found on the conjunctiva (oculo-glandular form). The so-called Parinaud's conjunctivitis has a close resemblance to this condition and may even be identical with it (unilateral affection, considerably reddened and swollen palpebral conjunctiva on which grey and later yellowish, ulcerating nodules are formed.) There is a pronounced swelling of the auricular, cervical and maxillary glands, or of the parotid glands.

c) The purely glandular form. This is characterized by a swelling of the inguinal and maxillary glands, dysphagia without a pathological alteration of the tonsils (tonsillitis form). This form of tularemia shows no primary lesion.

d) Internal (formerly typhoid) form. According to the site of infection one finds pulmonal , abdominal, and cerebral symptoms. A specific pneumonia occurs, which is a diffuse bronchopneumonia which sometimes originates from the hilus and occasionally is accompanied by pleuritis.

Diagnosis: 1. The diagnosis is based upon the presence of the causative micro-organisms(see above); the method to make it demonstrable is not practical in the field laboratories. 2. It may be accomplished with the intracutaneous test. This is a skin test which is positive from the 4th day on (o.ol cc,intracutaneously), but it is not to be used later than 14 days after the onset of the disease (danger of provocation). 3. Another diagnostic means is to test the patient's serum (at least 5 cc. of blood should be sent in) according to Gruber-Widal employing a killed suspension of bact. tularense (from the 2nd week of sickness on). In places where it is not possible to protect the blood against cold, that means to prevent a hemolysis, when it is sent to the field laboratory, a slide may be used with 2 or 3 thick drops which are well separated from each other as with malaria specimen. These two biologic tests alone are not conclusive for tularemia, because they are positive for a long period of time after it has subsided. The medical officers of the units must restrict themselves to assume a tularemia which is always permissible if the statements of the patients reveal the contact with rodents, or the intake of food contaminated by them, or if there are reports of an epidemic death of hares, mice, rats, and if one of the above mentioned clinical

symptoms is observed. Particularly in all cases of dysphagia due to swollen lymphatic glands without an obvious tonsillitis, but also in cases of the peculiar type of pyrexia described below, one should think of the tularemia, when other febrile diseases such as exanthematic typhus and typhoid fever can be excluded.

Differential diagnosis: Bang's disease, influenza, typhoid or paratyphoid fever, lymphogranulomatosis, bubonic plague, tuberculosis, and other diseases of the lymphatic glands.

Course: The onset is acute with a raised temperature attaning 40°C. and persisting for 2 or 3 weeks. If no complications arise, it gradually returns to normal. 3 or 4 days after the onset of the fever a pseudo-crisis begins. The initial continua with a relatively low pulse rate changes over into a stage of remission with a daily remperature variation of 3 degrees Centigrade (1) and even more. Rigor and perspiration are frequent. The convalescence sometimes takes a slow course and there are many abortive cases with a rapid progress and quick recovery. The outlook is good and a fatal outcome seldom occurs. In fatal cases an autopsy should be made.

Treatment: If a polyvalent immune serum or canvalescent serum is available, it is recommended to make a therapeutic attempt with doses of 15 or 20 cc. Otherwise a general treatment, nursing, and symptomatic treatment is recommended. Swellings of the glands should be subjected to a conservative treatment. A surgical intervention is not advisable.

Prophylaxis: The extermination of the animal plague *) is the principal measure. In addition the food should be protected from mice, rats, etc. Instruct the units. Caught and killed rodents should not be touched with the hands and the carcasses should be burned. In areas where the tularemia occurs as an epidemic, only boiled water should be used for the purpose of washing and cleaning.

*) Dig trenches with vertical walls around the granaries and corn heaps.

XII.

INJURIES DUE TO COLD.

Translation prepared by:

Office of Military Government for Germany (U.S.)
Office of Naval Advisor,
Medical Section

1. General Impairments due to Chilling.
1.Prophylaxis. (Abstract).

Stabsarzt (Captain, MC.) Prof. Dr. KILIAN.

The most important principle for every commanding officer is to prevent a chilling.

This will be achieved by considering the nutritional state, the state of the clothing and the degree of exhaustion of the unit, when tactical tasks are planned and performed, and supervision of the protection from chilling during fighting. A timely issue of the winter clothing and a continued instruction of the men is required, particularly of recently arrived units. An opportune delivery of food rich in calories and vitamins which is adjusted to the requirements of winter time is necessary. Good physical condition must be maintained in an adequate manner during the fighting and rest periods and the conditions of weather must be considered. During freezing and stormy weather in so far as possible it must be avoided that the men perspire or become wet in some other way. Possibilities will have to be provided for soldiers to dry themselves and their clothing. Particular protective measures must be taken when trenches are built (snow-holes, snow huts).

2. Transportation.

The chance of injured soldiers to be kept alive and to be cured is considerably diminished by additional injury due to chilling during the transport. The utmost caution is required. During periods of a heavy frost the transport of wounded should be restricted as much as possible. Any unnecessary transport has to be avoided. Transport during the condition of a primary shock, after hemorrhage, and during the state of chilling will be carried out exclusively in a recumbent position and under observation.

The following measures are important: During a heavy frost the patients should not be undressed, they should be laid down on an adequate insulating layer (paper or straw). Wrapping with blankets, fur-blankets, in addition use of hot water bottles (earthen bottles, heated stones, chemical heating cushions). Hot drinks are permitted, if the type of injury allows this. If possible, sufficiently insulated easily heated means of transportation should be employed (sledges, ambulances, railroad cars). The period of transport should be reduced, stations should be organized where the patients can be warmed up and refreshed. These will be set up in proportion to the territory and the distances. The administration of morphine and scopolamine must be reduced. A narcosis, an anesthesia by conveyance, any local and spinal anesthesia should be avoided during the period of transport as they enhance a local and general undercooling.

3. Therapy.

The thawing and the re-warming of thoroughly chilled or frozen people has to be accomplished under medical supervision. No surgical intervention should be performed before the condition of chilling and the depression of the circulation is cured.

Contrary to the old experience a relatively rapid re-warming of frozen and undercooled people is useful. The old methods of reanimation and re-warming such as rubbing with snow, use of cold baths, of wet, cold sheets and a gradual warming up by degrees are a waste of time and should be omitted.

The following procedure is recommended: The chilled people should be placed in a room of a moderate temperature (18 to 20°C - surgical theater) and wrapped with warmed blankets. Any precipitate warming up by radiating heat or other means should be omitted (danger of collapse). Immediate infusion of a 5 % solution of glucose at body or at a rather low temperature and the additional administration of centrally stimulating analeptic drugs such as "Cormed", coramine, cardiazole (analeptic effect, stimulation of the vasomotor and respiratory centers). Dosage as required, 1 to 2 vials in 500 cc. In addition the administration of suitable doses of camphor, caffeine, and strophantin is permitted. Adrenaline, ephetonine, and all their derivatives should be avoided. The infused volume at first may amount to 500 cc. Subsequently a constantly warm continuous drip is given until that condition is overcome. Cortiron, Percorten may be given.

To complete the therapy hot drinks containing a moderate amount of alcohol should be administered, if the injury permits it. If the patients are somnolent or unconscious, a rectal enema of a solution of 5 % glucose to which a moderate amount of alcohol is admixed should be given.

If required: Artificial respiration, 5.0 cc coramin, very slow intravenous application of Cormed, oxygen breathing.

Furthermore: A cautious stroking massage towards the heart and moving the extremities until the muscular rigidity disappears.

During the pure conditions of chilling a transfusion of blood is neither necessary nor advisable because it frequently causes unconsciousness (increased liability to collapse) It has to be restricted to cases with a simultaneous, severe hemorrhage.

4. Accompanying symptoms of chilling.

Damages of the hepatic and renal parenchyma and the cardiac muscle occur. An impairment of the urinary bladder due to chilling occurs together with an incompetence of its sphincter, polyuria or a demonstrable cystitis. There is anuresis and the danger of local genital frost

bites, bronchitis and pneumonia. In addition an enterocolitis, flactulence and eventually a paralytic icterus, usually as a result of the intake of frozen or undercooled food. Serious disorders of the metabolism, particularly of the carbo-hydrate metabolism, a considerable loss of weight and marasmus may occur. In addition to local frost bites, most of the latter being damage caused by the transport. They require particular treatment according to the general principles.

2. Local Impairments due to chilling.
Frost bites of I to III degree and Freezing (IV degree).

Local frost bite of exposed areas is caused by an abnormal loss of heat not only below a certain limit of temperature of the outside air, but also during a slight cold and even with temperatures above zero, when there is a high degree of humidity in the air and a cold wind. Not only the absolute degree of cold but also the duration of the cooling effect is of a decisive importance.

The formation of local injury due to cold is enhanced by being cold or by a general chilling, since the vascularization of the limbs is considerably reduced in this case (protective measures of the body itself against an abnormal undercooling of the venous blood return). Therefore, all conditions causing a general undercooling enhance the occurrence of local impairments from chill (see chapter I, # 1).

The most important are: Hemorrhages, shock, deteriorated insulation and loss of heat by humidity.

The most significant sign of any local frost bite is an increasing constriction of the regional small and large arteries while the capillaries and veins are dilated simultaneously and are increasingly congested. Circulatory toxins (substances related to histamine) which are formed in the anoxic tissue take part in this process. Therefore the destruction of the tissue with frost bite of the III degree is exclusively a result of the circulatory disorders and of the O_2 deficiency. With a freezing of the tissues (IV degree) the cells die as a consequence of a crystallization of the plasma-fluid.

It is a widespread experience that the lower extremities are 10 times as often affected as the upper ones. Frost bites of the head, the genitals, the genital area, and of other areas of the body occur only in 1 % or 2 % of all cases. About 50 % of the local frost bites occur on both sides. Frost bites of all 4 extremities are rare. In the average 90 % to 95 % of all cases show frost bites of the I and II degree, 5 % to 10 % of the III and IV degree.

The following areas are particularly exposed to frost bites: The face, the top of the nose, the upper margin of the ear, the ear lobes, rarely the scalp.

On the hands the 2nd and 4th finger are susceptible while the thumb is resistant. On the feet the 1st, 2nd and 5th toes, the heels, the area of the ankles, and the patellar area are susceptible. Of the rest of the body the genitals and the genital area are susceptible.

Prophylaxis.

Every soldier is obligated to protect himself against chilling as much as possible. Every senior is bound to supervise the protective measures against chilling. In these are included:

1. The maintenance of the general blood circulation and to avoid an excessive cooling.

2. To avoid any impairment of the local blood circulation.

3. To avoid humidity resulting from a defective insulation.

Attention must be paid to the following prescriptions: The prescriptions as to the clothing and of the special regulations concerned with the protection from chilling have to be observed. Particular care is required when new clothing is issued which must fit neither too tightly nor too loosely. The shrinking of all textiles as a result of moistening must be considered. The gloves, the stockings, the drawers, the breeches near the knees, the garters, the laces, the bindings of the skis and other things should not be laced too tightly. The articular area of the elbows, the knee-joints, the carpal joints, the tarsal joints should be kept warm and not be laced tightly. Facilities for drying wet clothing should be made obligatory for the units and a second set of underwear, particularly of stockings should be provided.

The shoes should be suitably fitted. Attention must be paid to the shrinking of the leather when it becomes wet. The shoes must be so loose that the toes can be freely moved, even if 2 pairs of stockings are put on. Leather shoes insulate poorly from chill; therefore they should be replaced by felt shoes or felt shoes worn over them during the period of chill. If there are no other means felt soles worn in the shoes, straw shoes worn over the leather ones should be employed, or they should be wrapped with a cloth or straw cover. Moreover, the posts of the guards, the floor of carriages, tents, sledges, should be well insulated from cold. When riding, the stirrups must be enveloped with straw. The upper margin of the boots should be tightened by bands. The heaviest frost bites of the III and IV degree were observed when snow had entered the leather or felt boots. Attention must be paid that the feet do not freeze.

Soldiers with perspiring feet are particularly liable to suffer from frost bites. Their feet should be

treated every day with hot baths to which slightly disinfecting and astringent chemicals are added (oak-bark, alum, chinosol, potassium permanganate and other things). After that treatment with dry powder.

Particular recommendation: Prophylactic ointments free from water, protection of the face by masks, for drivers and guards exposed to wind gas-masks without filters. The steel helmets attract cold and wind. Frost bites of the scalp occur even when a protecting cover of the head is worn under the steel helmet. Steel helmets should not be worn if the temperature drops to minus 15°C and below. This applies particularly to the drivers. Frost bites of the right index finger and of the right hand are typical for machine-gunners. The frostbites of the toes of the fore-foot of riders (pressure of the stirrup) and of their fingers (pressure of the reins) are typical. Typical frostbites of ski-troops, mountain-troops, and drivers are those of the genitals and the perineum through too short shirts and failure to button the drawers and trousers completely. During a strong North wind the wearing of bathing trunks has proved to be advantageous.

Alcohol and smoking (nicotine) should be prohibited during exposure to cold. An unnecessary stay in the cold and the intake of frozen undercooled foodstuff and cold drinks should be avoided. The guards should be relieved frequently. Free movement and a possibility to warm up should be provided.

Treatment of local frostbites.

Principal target at first: To get the circulation to work again as rapidly as possible. There is no time to be lost!

1. Treatment of early cases.

The undercooled waxy area shows in the beginning no definite degree of frostbite. Frequently erroneously reported. Complete recovery is as possible as the development of frostbites of the III degree. It may be possible to prevent a serious damage through rapid thawing.

Therefore: Early treatment by the medical officers of the unit or at the casualty receiving station. Careful thawing of the frozen area by tepid baths or dressings of 27 to 30 degrees Centigrade, gradually increasing them to 39 to 40 degrees provided that it does not hurt the patients. Simultaneously this has a cleaning effect. Admixtures of disinfectants or tanning remedies are desirable. Older methods such as the rubbing with snow have to be abandoned in the future. Secondary frost damages of the patient and his helper were observed as a result of such treatment. In addition a light stroking massage of the whole limb towards the heart should be made as well as careful exercises by moving the limb, best of all under water. In serious extended cases attention

must be paid to not spreading toxic substances by massage which might cause a subsequent collapse. If blisters are present the respective area may be left outside the water.

No local treatment should be undertaken without regard to the general state of chilling. Directions for a successful treatment of the general state of chilling are given above. Usually it is sufficient to warm the patients up in a heated room and to supply hot drinks containing a moderate amount of alcohol. If necessary, circulatory analeptics, camphor, cormed, coramine, cardiazol should be administered. Absolutely forbidden are adrenaline, ephetonine and their derivatives, such as Sympatol, Veritol, which are preparations with a peripheral vaso-constricting effect.

If the mobility and subsequently the sensation is not restored completely after 2 to 3 hours, the treatment must be continued under the control of a medical officer in a medical station.

2. Treatment of fully developed frostbites of the I, to III(and IV) degree. (Casualty Receiving Station-Field Hospital - Station Hospital).

The principal aim of the treatment is the full restitution of the blood circulation and a spasmolysis of the constricted arteries.

To increase the effect of the usual means of thawing vaso-dilating and spasmolytic drugs should be administered in addition. Surgical interventions at the vascular nerves or relief of the congestion by incisions is recommended.

a) Spasmolytic preparations:

Papaverin, Eupacco as tablets, and Padutin were proved as not sufficient. Papaverin, Euphyllin, and Eupaverin, given intravenously which may be given even intraarterially in a dextrose solution, are promising. Repeated injections at intervals of several hours.

b) Local anesthesia and paraneural anesthesia:

A local injection in the bordering area between healthy and diseased tissue is permissable as well as a peri-arterial or para-arterial anesthesia and a neural anesthesia of the principal nerves, if it is possible to retain the patient in the hospital for observation until the anesthetic effect has ceased. Similarly the anesthesia of the sympathetic ganglia of the respective limb (ganglion stellatum for the upper extremities and the lumbar ganglia for the lower extremities) is permissable. Local anesthetics with a lasting effect should be used without adding adrenaline, such as pantocain 1:1000 or in a higher concentration without adrenaline. Novocain without adrenaline is not suitable for this purpose.

Spinal anesthesia is also permissible. Surgical interventions at the sympathetic ganglia (extirpation) or at the perivascular nerve network (periarterial sympathectomy) should not be executed in the advanced medical units as the danger of infection, postoperative hemorrhages, erosions, and gangrene is too great. In rear medical units, however, experienced surgeons may intervene.

c) Early treatment of the edemata.

With all frost bites of a higher degree a marked edema develops which impairs the blood circulation and enhances the development of tissue necroses. If elevating the legs and light massage are not sufficient to relieve this condition after a short time, numerous small, superficial, or several long incisions are of a great advantage (appropriate use with late treatment). An absolutely aseptic proceeding is required.

d) Local treatment of frostbites of the I degree.

This has possibly to be made in the casualty receiving station of the unit. Treatment with ointments is preferred: special chilblain ointments, mixed ointments containing ichthyol or camphor, oil balsam with an admixture of camphor also have a good effect. Moreover ointments should be administered containing vasodilating drugs; hormonal preparations, priscol and others, as far as they are available. Similarly 10 % sulfonamide ointments, such as Eleudron or Eubasin ointment. In addition treatment consists of warm baths, a light manual under-water massage, passive and active muscular exercises, later on of cold and hot baths, hardening, early walking, movement of fingers. Dry treatment with powder is also permissible. In emergency cases, bandages usually used for burns or Prontosil-bandages for burns may be used.

e) Local treatment of frostbites of the II degree.

Frostbites of the II degree are characterized by the formation of blisters (content: serous, hemorrhagic, purulent) and superficial abscesses. They are frequently accompanied by smaller frostbites of the III degree.

After thawing in a warm bath and a light massage a careful drying of the affected area is required. Then disinfection and drying by painting or dabbing with alcohol or a 5 % formalin-alcohol solution (a weak iodine-alcohol solution may also be used). 2 to 5 % alcoholic solutions of methylene blue or brilliant green also have an astringent, a drying and a disinfecting effect, but they make observation more difficult and should therefore be avoided.

All blisters, particularly of the feet should be opened and removed. After that careful drying and disinfection. Then as a principle a dry treatment with dermatol, chinosol, or other powders should be applied. With sulfonamide powders the best results were obtained.

(Septoplix, Marfanil, Prontalbin, Eleudron and others).

Powdered gauze strips should be put between the toes. Fixation of the limb with a cotton wool dressing which keeps it warm. The powdered area should be left free and only be slightly covered with gauze. Drying in the air. No additional heating. Change of the dressing every 2 to 3 days. Careful removal of the first bandage with hydrogen peroxide, as it usually is wet. Careful drying and continuation of the treatment with powder, even if there are small abscesses. Subsequently early application of alternate hot and cold baths, careful massage, exercises by using and straining the affected limb.

The duration of the treatment usually exceeds 4 weeks as process of healing is delayed. The vascular impairment and the thrombosis (edematous area) always extend far beyond the area of the frost bites of the II degree. No leather shoes should be worn before the skin is healed. Light duty after return to the unit. For the purpose of hardening, indoor duties. The commanding officers should be told that every frostbite of the II degree leaves an increased sensitivity against new injuries by cold.

f) Local treatment of frostbites of the III degree.

On principle the same as with the II degree. There always are areas showing frostbites of the II and I degree above the necrotic area, as well as an edematous area. From the 3rd day onward every frostbite of the III degree is usually accompanied by a resorption of toxins with temperature increases up to 40°C. According to the seriousness of the case these sometimes are present for weeks without any infection (even after amputation). Apart from the signs of toxin resorption one observes in the urine: a slight albuminuria, in the blood count: always leukocytosis, sometimes a diminution of the erythrocytes; the blood sedimentation rate is increased.

An absolute fixation and an early removal of the nails is usually possible without anesthesia. On principle dry treatment with powder. Sulfonamide powders are preferable. Mummification of the necrotic tissue is the final aim. No moistening or bathing of the necrotic zones. In the region of the feet there is far more frequently a transition to a humid necrosis than in the region of the hands. One must wait for a demarkation (can be recognized by X-raying).

Subsequently the superficial necroses (in the shape of calottes) should be simply removed or an amputation should be made close to the borderline between the healthy and the necrotic tissue. To wait for a complete sequestration of the necrotic bone would mean a waste of time. With the beginning of the stage of granulation of the wound, or after amputation the treatment should consist of application of ointments inditing granulation and enhancing the formation of a new skin. Treat-

ment may be continued with sulfonamide powders. A prophylactic administration of sulfonamide preparations is required when transition to a humid necrosis is to be feared. Attention should be paid to the possibility of mistaking it for necroses from other causes such as from vascular injuries.

General Principles as to Amputation after Frostbite.

The primary amputation when there are local damages from cold of III degree should be performed as a provisional amputation sparing as much tissue as possible and should be performed only when the demarkation is completed. The only exceptions are serious infections (see under complications, No. 1.). As there is the danger of contamination, the secondary amputation to form the final stump should be performed at a late period when the area of demarkation is completely covered with skin again and it should, if possible, spare all important parts. These are the index finger, the thumb, the head of the 1st metatarsal bone and the tuberositas of the 5th metatarsal bone and the supporting surface of the bone. If possible, one should obtain a final stump which enables walking without a prosthesis, but one should avoid badly vascularized zones where chronic abscesses occur easily. To avoid deformities of the remnants of the foot or flexor contractures (of the fingers) one must attempt to provide a new point of insertion for the tendons which are cut off. After every amputation it is advisable to fix the operated limb in an advantageous position by a plaster cast or plaster splint. Before deciding to amputate in the region of the leg, amputation stumps according to LISFRANC, CHOPART, and PIROGOFF should be attempted, because they enable the patient to walk without prosthesis.

Typical Frostbites on Hands and Feet.
(Remarks concerning the technique and the evaluation of the stumps).

1. Upper Extremities.

a) Frostbite of single phalanges of the finger, particularly of the distal phalanges.

Most frequently the 1st and 4th fingers are attacked. If it is not sufficient to remove the nails and to make the bone shorter, secondary amputation at a favorable level with sufficient tissue left to cover it and fixation of the tendons is required. Exarticulation is not advised, but rather the removal of the heads of the phalanx.

b) Frostbites of all fingers up to the metacarpal bone except for the thumb which is normally spared.

Secondary exarticulation in the metacarpal articulation, removal of the articular cartilages and sufficient

tissue to cover the stump.

c) Frostbites of the whole forehand, possibly with parts of the thumb.

Amputation in the area of the metacarpus and forming a secondary stump and if possible, exposing the metatarpal bone I and II as well as parts of the thumb.

d) Frostbites of the whole hand up to the wrist. Secondary amputation in the region of the forearm.

2. Lower Extremities.

a) The 1st, 2nd and 5th toe are particularly liable to frostbites.

Usually total loss. After amputation the heads of the metatarsal bones are conserved and the surfaces of the cartilages, particularly that of the 1st toe are removed with a sufficient cover by skin. This provides a good ability to walk.

b) Frostbites of all toes up to the metatarsal joint. Corresponding to a).

c) Necrosis up to the middle of the region of the metatarsus.

Amputation along SHARP's line sparing the tuberositas of the 5th metatarsal bone, if possible fixation of the extensor tendons. With sufficient tissue left to cover the stump and when the supporting surface is spared a good ability to walk without a prosthesis results.

d) Frostbite of the III degree up to the metatarsus.

Decidedly more favorable than c), as the supporting surface is considerably diminished, and , moreover, the bases of the peroneal and tibialis group are usually lost. There is a tendency to a talipes equinus and a slight club-foot position. Frequently this is accompanied by a necrosis of the calcaneous where the process of healing is delayed. Relapses occur and are difficult to cure. If no plastics of the calcaneous are possible, one must usually amputate at a higher level. If there is no necrosis of the calcaneous a secondary amputation in LISFRANC's articular line should be made, otherwise at a higher level. This results in a relatively good ability to walk, even without a prosthesis, provided that preventive measures are taken against a talipes equinus and the after-treatment is carried through carefully.

e) Frostbite of the III degree at the level of Lisfranc's joint.

This requires a secondary amputation and the formation of a stump in Chopart's joint, if sufficient tissue

is available to cover it. This condition may be accompanied by a necrosis of the calcaneus as in d). It is unfavorable because of a considerable tendency to form a clubfoot. Attempts at fixation of all extensor tendons and of the peroneal and tibial group under tension should be made. If necessary, transplantation of the tendons is advisable. A primary or secondary reduction of the Achilles tendon cannot always be avoided. One is wrong to disapprove Chopart's stump in all cases. There are cases with a favorable outcome who are able to walk when orthopedic shoes are used.

f) Frostbite of the whole foot up to the navicular bone while the calcaneus region of the foot is spared.

If necessary, formation of a long or short Pirogoff stump. The latter is preferred. Operation only by experienced surgeons. As with Chopart's stump usually a prolongation of the Achilles tendon is necessary.

g) Total necrosis of the whole foot up to the level of the ankle and higher.

Secondary amputation and formation of a stump in this part of the lower leg which is sufficiently vascularized.

The orthopedic care of all the final stumps including the therapy by exercise is effected, after definite healing, in special hospitals by the invalid maintenance boards and the professional advisory offices.

2. Pathological Findings with Frostbites, Inanition Imparaments.

Oberstabsarzt (Lt.Col.MC.) Prof. SIEGMUND

Frostbites are the result of a local decrease of temperature which exceeds the amount of heat supplied by the blood. Impairments through cold may even develop at outside temperatures which are well above the freezing point. The decisive factor is the amount of heat withdrawn from a certain part of the body by radiation or convection, if during constant conditions of exposure to cold this amount exceeds a certain value within one time unit. The release of heat is greater in an air current than when there is no wind. Any contact with objects of a good heat convection and a large temperature capacity (metals) increases the loss of heat. The same is valid for water, even if this is in a direct touch with the skin such as the evaporated sweat. Water containing melting ice has the particular effect that it withdraws heat, because it can hardly be warmed up to a temperature above $0^{o}C.$, despite a continuous supply of heat (which is withdrawn from the body). The heat convection by the dry skin is improved by several hundred

percent when it is thoroughly wet. The increase of the temperature gradient within the skin during a drop of the environmental temperature results in diminished vascularization of the skin, in consequence of which the normal range of the body temperature is retained as long as possible because of a diminution of the capillary surface. This regulation is controlled by the excitation of the nervous contact receptors for cold (Krause's terminal parts) in that area of the skin which is exposed to a decreased temperature. It is likely that the excitation of the contact receptors for cold causes a vasoconstrictory stimulation (release of adrenalin) by way of an axon reflex and reduces the flow of blood to the skin parts cooling down. The reduced vascularization of the parts of the skin giving up heat results in a very rapidly developing pallor which is the first symptom of an impairment by cold. As was proved by personal microscopic investigations of the capillaries it is caused by a complete constriction of the blood vessels of the papillary bodies, the subpapillary plexus and the plexus of the corium. According to histological findigs it may also be accompanied by a constriction of the larger arteries. No initial reactive hyperemia was observed. A changed reactivity of the peripheral circulation serving to maintain a constant isothermia of the blood resulting in an ischemia in the area of the cooling skin regions makes it comprehensible that all general and local factors having an unfavorable influence upon the dermal vascularization, such as a general anemia, severe hemorrhages, cardiac impairment, a lability of the vasoconstrictory tonus after infections, a general collapse of the vessels during a shock, discontinuation of the blood supply by vascular injuries, tightly strapped clothes, enhance the occurrence of vascular disorders. The preference given to the toes and the feet as compared with other parts of the body may be due to orthostatic factors which are opposed to the blood flow, in addition to an unsuitable foot gear and the effect of damp ground which withdraws heat. The distal parts of the body are these most exposed to the influence of cold, and particularly these parts of them which are poorly vascularized. Moreover, the unfavorable proportion of their surface to their volume (toes, fingers, helix of the ear) must be made responsible for the frequent localization of the impairments there.

The reflected ischemia caused by the excitation of the constricting nerves continues until the temperature gradient is reversed and a dilatation of the vessels occurs by the excitation of the heat receptors. In the area of the re-vascularized and re-warmed tissue the blood flow is slowed down at first after a short exposure to cold and goes through dilated peripheral vessels. Frequently a state of peristatic hyperemia occurs which is accompanied by an extravasation of fluid (diapedesis of fluid). Besides a cyanotic livid hyperemia this results in a formation of a small edema and a swelling of the affected parts of the body which is usually accompanied by burning and prickly sensations. Controlled circulatory conditions

are usually restored rather quickly (15 to 30 minutes) after the onset of the peristatic hyperemia. Occasionally, however, prolonged local circulatory disorders in the shape of chilblains are left, which are the expression of a fixed peristatic hyperemia in the dilated vessels where the blood flow is slow. The vasomotoric reactivity of such places to other stimuli is usually also disturbed for a longer period of time.

The final condition of tissue parts exposed to the influence of cold is not so much determined by the intensity of the cold as by its duration and by the ischemia caused by it. The influence of cold upon the local metabolism and the parts of the tissue are in this case combined with those of an oxygen deficiency due to the abolished vascularization. When oxygen is consumed and carbon dioxide accumulated a suffocation metabolism is formed and the respiration is changed into an aerobic glycolysis at first and into fermentation, a hyperacidosis of the tissue through the formation of lactic acid, an impairment of the oxidative deamination of the amino acids with a formation of amines by decarboxylization, in which case vaso-dilating substances of the histamine type are formed. After the glucolytic metabolism has ceased the tissue is subject to necrosis. Simultaneously to the separation of the tissue colloids the osmotic pressure is increased by the influence of acid metabolic products during oxygen deficiency, resulting in a swelling of the cells. This explains from a purely physical point of view the increased permeability of the membranes which exists throughout the ischemic area. Possibly it may also be responsible for the dilitation of the vessels occurring later on. The alteration of the electrolytic constituents is connected with the drop of the electric potential of the protein bodies of the plasma and thus it provides the base of the blood-cell agglutination.

With these signs of a suffocation metabolism caused by an ischemia the symptoms of the influence of cold are combined. They are principally the cause of the slow progress of all the chemical reactions which is important for the subsequent ability of the tissue to be restored, and which explains this remarkable ability even after a relatively long exposure to cold. This distinguishes the ischemia due to cold from other types of anoxemia of the tissue caused by a reduced blood supply. On the other hand, according to the investigations of SCHODE it causes a diminished dispersion of the colloids resulting in a flocculence demonstrable in the ultra-microscope, and a loss of the characteristic properties of the colloids on which a regular progress of the cell functions depends. A short rigidity due to a frozen protein is usually reversible, while a longer period provokes irreparable damages, such as a necrosis, even after warming up. It appears in the tissue as a separation of the colloids with a precipitation and results in an opacity within the microscopically visible range and to a granular degeneration. After a complete dis-

sodation of the dissolving fluid a vacuolar degeneration ensues. The cellular alterations during a refrigeration anesthesia described by RISCHPLER and MARCHAND are the same as the results of the disturbed colloidal structure which can be measured in the tissue by means of the elastometry according to SCHADE and which is found reduced with frostbites even in the beginning of an exposure to cold. In addition to the change of the colloidal structure by cold the solubility of the non-colloidal substances is also altered, however, is most difficult to estimate as compared to the disorders of the metabolism caused by the ischemia. A complete freezing of the tissue to ice is certainly extremely rare in man. I saw it only twice when there were shot fractures with injuries of the large vessels in the area of the lower leg. But there is no question that during a prolonged exposure to cold and an ischemia the tissue can become entirely necrotic before the characteristic picture of frostbites can develop as a result of the restored flow of blood. At any rate the considerably diminution of the speed of the chemical reactions causes a considerably long ability of the ischemic tissue to remain living, recover and to react which is of the greatest importance if one desires to comprehend the morphological signs of the sequelae of frostbites and the subsequent course of this condition (preparations of a case of an ischemic necrosis due to frostbites are shown; the capillaries and vessels of all principal parts are completely empty and constricted, the cell nuclei are pyknotic, vacuoles are found in the protoplasm, gaps in the tissue while the general structure of the tissue and the cells is spared).

Immediately after freezing and for the period of exposure to cold the frozen parts of the tissue are completely pale, numb, cold and immobile. This state continues until by a reversal of the temperature gradient at the frostbitten area itself and close to it the afferent artery becomes pervious again (effect of histamine) in consequence of the excitation of the heat receptors by local stimuli (friction) or heat, and blood can flow again into the frozen area. I am not certain whether in this case the excitation of the constrictors of the arteries immediately before the terminal vessels is abolished regularly and simultaneously to its entire extent. The larger vessels usually remain constricted far beyond the frozen area, but they nevertheless permit the flow of blood containing oxygen into the hitherto ischemic area. Only through this repeated connection with the flowing blood the changes of the frozen parts of the tissue are developed which cause the clinical symptoms and determine the final condition of the injured parts. The blood flowing in due to the more or less rapid and complete abolishment of the vasoconstrictory stimulation is conveyed into an area of tissue in which through the existing suffocation metabolism and the tissue acidosis and by the release of vaso-active amino-bases entirely abnormal environmental conditions exist, which influence to the highest degree the blood flowing in even within the lumen of the vessels. The

change of the mutual relations between the flowing blood and the adjacent tissue causes under the given conditions of metabolism and permeability not only an evasion of protein compounds through the endothelial membrane which had become permeable and thus called forth a pathological condition of the acidotic tissue filled with protein. It also influences the speed of flow and the physical and chemical reactions of the vascular blood. The result of these interchanging effects depends on the conditions of the tissues, particularly on the vascular effects as regards the ability of the vessels to be restored for the purpose of reactivating the respiratory metabolism, secondly on the type and the amount of the blood carrying oxygen into the tissues when the vaso-constriction is relieved. If the blood flowing in meets an only slightly injured and easily restored vascular tissue, a controlled vascularization of the tissue is restored at rest as a rule. This occurs after a stage of temporary peristatic hyperemia in the considerably dilated vessels (histamine effect?) while only a small amount of protein and plasma escapes into the tissues and which is rapidly carried away through the lymph vessels. These are the above mentioned and discussed 1st degree injuries from cold. Blisters are formed when the peristatic hyperemia persists for a prolonged period of time and the extravasating blood serum which is rich in protein soaks the tissues and is not carried away so that it lifts the epithelium from its basal membrane. The content of such blisters is clear, bright yellow, rich in protein, and very poor in cells. The fluid pours agglutinates out spontaneously within a short time and leaves an elastic fibrinous coagulation.

In parts where the heaviest anoxybiotic injuries by cold had occurred the normal tissue metabolism is not restored, even if the arterial blood flows in again. Through this blood the vessels are filled to a maximum and their lumina dilated which may be caused in addition by the action of dilating amines, but the protein compounds and the plasma permeate through the capillaries and the walls of the vessels and invade the tissue where they also penetrate into the cell protoplasma under the existing environmental conditions. There they destroy the cells which results in the occurrence of karyolysis and chronatolysis. Simultaneously the blood corpuscles are agglutinated and a flocculence is called forth in the dilated vessels of the remaining plasma protein. That means that a genuine stasis develops with a complete stop of the blood flow and a final hemolysis and cell destruction. This state is irreversible and results in a necrosis of the tissue altered in such a way that it displays the signs of an aseptic dry necrosis. The black-red discoloration of such tissue parts is caused by the congestion of the maximally dilated capillaries and larger vessels by agglutinated red blood corpuscles and a rapid hemolysis. This state corresponds to the clinical condition of frostbites of the III degree, which after a demarkation by sequestration result in the final loss of the necrotic limb.

Between these two extreme conditions such as the rapid restoration of a controlled blood circulation with a complete restitution of the tissue, and the necrosis by a red stasis with a plasma extravasation into the tissues and a coagulation necrosis of the blood and the tissue elements, numerous possible forms of progress differing by degree and extent are interpolated. Their final outcome is decided during the course of this process. The morphological alterations to be found with them and the basic pathogenetic processes demand the greatest interest of medical research because beyond the case of frostbites and their consequences they represent a basic reaction which stands at the outset of various diseases. They are based upon the mutual relations between the blood and the tissue, the wall of the vessels and its contents, between the metabolism and the tissue reaction. They occur in the beginning of various pathological processes and they are observed in all places where the blood flowing in after the release of the vaso-constriction by the cold meets a considerably injured but still restorable tissue and where, sometimes by the opening of the collateral vessels, the terminal vascular areas are not subject to a complete stasis, which permits the flow of blood even though the amount of blood is small and the blood flow slow. The processes taking place during this condition are only mentioned as far as they concern the vascular walls and the blood content of the vessels. The various simultaneous degenerative and regenerative processes of other tissue components, such as the perspiratory glands, the nerves and the epithelium may be mentioned here. Even though the morphological changes observed seem to be most varied at first, they cannot be classified only according to their temporal course on the base of our anatomical and experimental findings, but they must also be considered from a common point of view, from which it is easy to understand all the morphological pictures and clinical conditions.

The common base of all possible morphological and clinical changes is an altered composition of the blood flowing in, which is accomplished in the primarily injured tissue area. This alteration is the result of the separation of the protein from the plasma through the endothelial membranes, which have become permeable, to the vascular walls and tissues showing an anoxic metabolism and by the effect of the pathological metabolic products upon the contents of the blood vessels. These alterations are found in arteries, veins and capillaries and they are accompanied by a reduced vascular flow. The blood is thickened and the vascular walls are soaked with blood fluid containing protein (occasionally with blood corpuscles as well) and the blood flow in the vessels is stopped (Stasis). In various vascular areas, which are not always coherent, the erythrocytes are agglutinated and the remaining fluid components are coagulated. Thus peculiar coagulation and agglutination thrombi are formed in the vascular lumina, which sometimes fill the entire lumen, sometimes are rather adjacent to the walls, or adhere to small areas of the vascular walls. Sometimes they are inserted there or they are connected with exudates

within the walls of the vessels. A coagulated hemogenous accumulation of plasma is frequently found below the elevated endothelial layer. Those penetrate even into the deeper layers of the vascular walls, where they cause a swelling of the elastic fibers. Sometimes they consist of a rather smooth column of erythrocytes which is formed by coagulated and quickly hemolysed and decolored cells. It fills the entire lumen of the vessels or has a rather central site, while the periphery of the vascular lumen contains a ring of a hemogenous coagulated plasma and blood platelets. Just in such cases the vascular walls themselves are not soaked with plasma. As a rule, there is no decomposition or disorganization of their structure and no elevation and no loss of the endothelium. Sometimes pure plasma coagulations are found containing only a few cells which either are distributed throughout the entire vascular wall or are situated more closely to its surface, or which are inserted in it. Sometimes they form peculiar sloughs and networks which are found in the vascular lumen. Finally I observed them as a deposited and compressed mass containing some few red blood corpuscles. It is a characteristic feature of these coagulated formations that the red blood corpuscles contained in them soon lose color and are merged to a coherent finely granulated mass which frequently assumes a bluish tint, if it is stained with hematoxylin. It is significant for these thrombi originating from stasis and containing no fibrinous threads that cells are propagated into them and their free surfaces are covered by endothelium. Like a tissue culture medium they apparently are a most favorable nourishing substance for the cells of the vascular walls, even if they are enclosed in these walls themselves. Thus it soon happens that in spite of an anoxemia cells are rapidly proliferated in the inner layers of the vascular walls soaked with plasma which are propagated into the coagulated masses as well. The thrombi are interspersed with these proliferations which results in a very characteristic picture to be described elsewhere. The proliferating cells partition them, grow around them, dissolve the coagulated masses, enclose them and finally are transformed into formations of connective tissue which at first contain a great number of cells, and then become a loose and fibroplastic tissue. They may completely fill the vascular lumina, then they obstruct them or are developed close to the walls. They fill the vascular lumina forming segments or a small nodular prominence into the lumen (numerous preparations of various stages of development of these alterations are shown). The corresponding process takes place in the small and large arteries and veins of various areas of the vascular system, above all of central and proximal areas, while other vascular regions are not affected and thus may be vascularized. But even large arteries, the lumen of which is usually constricted and large, usually wide veins carrying blood away contain the same coagulations composed of homogenous plasma and some few enclosures of cells are attached to the vascular walls. They are transformed in a similar way to connective tissue and provide the base of the obliterating arteriopathy which is described as being the typical result of injuries due to cold (with a chilling of the toes up

to the metatarso-pharyngeal joint I found these in the arteria dorsalis pedis and in the proximal part of the arteria tibialis). The picture of the proliferation and organization is most varied. In addition to the frequent total obliteration by a loose connective tissue most peculiar cushion-like cell bands are seen which are extended in the lumen like a string. Between their cells remnants of the coagulated mass can frequently be found. As to the histological details I want to refer to papers which are being prepared and in which the problem will be discussed of what type of cells the proliferations consist and of whether the blood cells themselves take part in the proliferations. This is suggested by a number of anatomical findings. Here, I only want to state that the subepithelial exudate and the coagulation thrombus in the vascular lumen are interspersed with cells and organized, while the erythrocytes are rapidly hemolysed, provided that there are any such cells (small amount of hemosiderin). By this process the picture of an arteriopathia obliterans and deformans is developed. Pure plasma coagulations are organized in the same manner and transformed to a cellular compound and the vascular walls themselves, whose tonus is changed, suffer a number of alterations which cannot be dealt with here in detail. Such a process of organization of the separated substance and of the coagulations can only happen, if the cellular structure of the vascular walls is spared and if the blood circulation of the affected area is maintained to a certain degree. Therefore, they are not demonstrable in completely necrotic parts, but only in places where at least a small part of the vascular system is pervious even though it is poorly supplied with blood. In the cases of complete sequestrating necroses of the toes such tissue is found on the dorsum of the foot and on the planta pedis, while they are demonstrable throughout the entire area when there are only slight injuries due to cold. The investigation of the recent slightest cases of injuries due to cold found in addition to gun shot injuries gave valuable hints as to the anatomy and pathogenesis of the alterations discussed above. Our studies reveal the important anatomical and functional reciprocity of RICHTER's thesis on the nervous control of the vascular blood flow, local changes of metabolism in the tissue and on an altered permeability of the endothelial membranes with a mutual reaction of the blood, the tissue, and the vascular walls. They are also related to SCHUERMANN's "Dysoria". It is shown with certainty that a genuine stasis must be exactly distinguished from a plain stoppage of the blood flow and that it occurs on the basis of physical and chemical changes of the environment with a shift of the protein to the tissue and an increased agglutination of the blood corpuscles. It is a matter of further research work to determine to which extent a process of swelling in the walls and of the protein caused by amines must be held responsible for the coagulations. The homogenous masses separated from the protein correspond to the fibrinous threads of DIETRICHS which are found in masses bearing no cellular structure and originating from the vascular walls. However, it may be

disclosed that experimental investigations together with BEHRENS (pharmacologist) leave no doubt as to the importance of the alteration of the tissue metabolism by the ischemia due to chilling for the form and the results of the vascularization setting in after the patients were warmed up. In addition they show that with an appropriate arrangement of the experiments and when the time factor is considered one is regularly successful in provoking a necrosis by chilling and that the resulting morphological alterations are in a perfect accordance with the observations on man, above all as far as the development of the obliterating angiopathia is concerned. It seems to be of some importance, that during experiment the occurrence of a necrosis by chilling is prevented or at least restricted by Heparin. This is a hint for the therapy which apart from all prophylactic measures and from the treatment of the necroses must aim at the control of the re-vascularization of the ischemic tissue so that no persistent stasis occurs and no chrombi are formed.

From the point of view of general pathology the injuries due to cold are a problem of the blood flow in an area which was injured by an anoxic metabolism before, and a problem of the mutual reaction between the blood and the tissue. The process of demarkation and sequestration of necrotic parts offers no peculiarities from the point of view of the pathologists. The zone of demarkation is practically always contaminated by bacteria. In spite of this fact a general infection of a septicaemic character occurs relatively rarely. The development of a peculiar, sometimes verrucous, sometimes exudative phlebitis is worth mentioning which extended as far as to the knee-joint in the one case, and from the inguinal region to the dorsum of the foot of both lower extremities in another case; all veins were transformed to thick-walled yellow tubes with a narrow lumen. Death was caused in both cases by pulmonary abscesses. The occurrence of tetanus after frostbites of the feet is frequent, which in spite of an immediate amputation resulted in death in all cases. Fever was not frequently seen, general disorders of the blood circulation, of the blood pressure and other complications were not observed with 300 patients under treatment.

A detailed description of the results of my investigations from the point of view of the general pathology and pathogenesis of the injuries due to cold is being prepared.

It is quite clear that the occurrence of injuries due to chilling is enhanced by excessive strain and an inadequate caloric value of the food that means by an incongruity of the demand and the supply of calories. It is difficult to estimate the causative relation between a reduced resistance and injuries due to cold as to the latter being the result of the former, because, as a rule, chilling occurs at a time at which there is a reduced resistance and an increased susceptibility to various infections (difficulties of food supply).

Reports are available of Army pathologists on the effect of local injuries due to cold on other parts of the body. They observed intoxications associated with an increased weight of the liver to as much as 1000 gm., a fibrillary degeneration of the cardiac muscle and renal damages (BOEHMIG). A toxic myocarditis was observed by DIETRICH and WURM. SCHULTZ attributed lesions of the skeletal musculature of various parts of the body to an allergy due to chilling and to the occurrence of histaminic toxins. It is likely that chilling promotes the development of inflammatory processes of the intestines and the kidneys.

Discussion:

LAUCHE: The following statements in the reports of the Consulting Pathologists should be mentioned:

1) Particular local findings were made. Several Consulting Pathologists refer to the fact that large phlegmons may occasionally occur in the depth of the tissues, even if the necroses display a dry necrosis (WEPLER, MUELLER - Koenigsberg). The surgeons refuse to take this for an indication to amputate at an early time and more frequently, then they do it for the time being. But it appears, as if a reduced general condition and an increased temperature enable the clinical diagnosis of such foci of inflammation.

2) Effect of chilling on the remaining parts of the body:

a) Purely toxic lesions by the resorption of decomposed substances were found comparatively seldom. BOEHMIG attributed the repeatedly observed increase of the weight of the liver by 600 or 1000 gm. to a deposition of protein or to a distrubed metabolism. A. DIETRICH and WURM observed a toxic myocarditis without a preceding diphtheria. A. SCHULTZ refers to frequent lesions of the skeletal musculature and he believes that histamine like poisons and an allergy towards chilling are the releasing cause.

b) A great number of extensive general infections was frequently observed which sometimes originated from the chilling injury itself. But there was also a fairly large amount of secondary infections, above all with tetanus and diphtheria. For this reason orders were given to immunize the patients against tetanus in all cases, where injuries due to cold had occurred.

c) Colitis occurred frequently as a result of a reduced resistance or a direct effect of chilling by frozen food.

KOCH: Attention has to be paid to central, not regularly noticeable ascending phlegmons (fever). The lymph nodes must be observed.

DORMANNS was able to observe two clinical cases of gas gangrene after chilling but he produced no evidence of the pathogenicity of the micro-organisms obtained by animal experiments (since no animal experiments were practicable within this period), so that these cases cannot be published without reservation.

KOCH: An injury due to cold may occur when the resistance is diminished by gastro-enteritis.

KRAUSPE: Toxic damages of the myocardium during chilling are characterized by fibrolysis and a toxic myocarditis. Later they may cause death as a formation of fibrous tissue results from them.

DORMANNS underlines that the resorptive conditions are very unfavorable contrary to those after burns and that the toxic damages which are so important after burns seem to be slight in cases of chilling.

ASSMANN: I want to make only a short reference to the general and local injuries due to cold on the development and the course of infectious diseases. During the discussions over that matter agreement was reached that one must be very careful when such influences are evaluated; for, we do not know which influences were effective when infectious diseases occurred and, therefore, we are not in the position to draw conclusions as to the course of these diseases under others than these environmental conditions. Those having been with the troops during the last winter campaign in Russia, where there was such an unusual chill and other peculiar factors - such as poor food when the units were cut off, or a severe psychic strain, etc. - are of opinion that as many infectious diseases took an unusually severe and frequently fatal course as a result of these conditions. A particular evidence of this opinion is the experience with such infectious diseases which usually result in recovery such as pneumonia and similar diseases. Concerning dysentery the influence of such circumstances will be discussed in my lecture and I only want to mention that the medical specialists observed that phlegmons and septic diseases occurred with adverse local conditions and I want to refer to experiences of World War I, since it was pointed out by SIEGMUND in his lecture that such infections occurred at that time.

WOHLFEIL: After these statements I want to restrain myself to considering these problems from the point of view of hygiene and to summarize in short the significance of the environmental effects, which, as a result of my personal experience, I always regarded as particularly important evidence of a reduced resistance appeared principally with horse driven units which had particularly to suffer from an extraordinary strain, fatigue, exhaustion, and an inadequate relief from their duties. In addition the difficulties of food provision which were mentioned above must particularly be held responsible for a reduced resistance, and first of all the inadequate supply of clothing before the middle of January of this year, and finally a number of psychic factors which together with

the remaining factors were able to reduce the general resistance of the men. A factor to be mentioned is the state of depression which was developed when the severe cold set in. This was a certain feeling of being defeated which stood in contrast to the psychic condition of the units during the summer when there was a strong feeling among the men that they were superior to the Russians.

Concerning the injuries due to cold I was convinced by the evicence collected with the troops that the food must be held responsible for them first of all and above all the deficiency of vitamin A. Before the month of November or December of the past year the units were frequently supplied with lard only and not at all or inadequately with butter. Furthermore, the reduced heat production by the low caloric value of the food may have been of some importance as well. This could be made sure by the statements of the soldiers which complained of not being satiated.

As for the rest of my personal experience it agrees with the statements of ASSMANN that there is no doubt that a reduced resistance must be held responsible for the frequent occurrence of infectious diseases; for, we observed a great number of people who were in an extraordinary cachectic condition which had been developed by a loss of organic substance without a sufficient supply.

Rules applicable to injuries due to cold.

All injuries due to cold are the sequelae of a disturbed vascularization which cause an anoxia of the tissue and disorders of metabolism. The chilling injuries must be traced back to an increased release of heat. In addition a reduced heat production (inadequate caloric value of the food) plays a part. There are general and local injuries due to cold.

a) General Injuries due to Cold.

An immediate death by chilling is much more infrequent than general injuries. Chilling has an increased effect, if there is a simultaneous hemorrhage due to wounds and a shock, and if the general resistance is reduced by hunger, infectious diseases, and psychic fatigue. The principal symptom is a severe disorder above all of the peripheral blood circulation. Significant features are: A livid, cold skin, a small, or impalpable pulse, rigid muscles, a diminished respiratory rate and unconsciousness, if the condition is severe. The pupils are dilated.

Contrary to earlier experiences evicence was obtained that a comparatively fast warming up of frozen or chilled people causes no additional damage and that this is an inadequate measure. Old methods such as rubbing with snow, use of cold wet sheets or cold baths which are gradually

warmed up is not required and they are a waste of time. It is recommended rather to expose frozen or chilled people to a moderate compartment temperature of 18° C. and to prevent any escape of heat by wrapping them in blankets. Heat may be supplied in the beginning by an intravenous injection of 500 cc. of a 5 % dextrose or tutofusin solution at body temperature.

Central analeptic drugs such as cardiazol, cormed (coramin), and caffeine may be added to these solutions (about 1 vial to 500 cc). All drugs reducing the vascularization of the periphery such as adrenalin, ephetonine and their derivatives are inappropriate. The dextrose solution is administered as a continuous drip. In addition enemas of a 5 % solution are given to which a small amount of alcohol may be added. As soon as the chilled patients are able to drink, warm drinks should be administered.

b) Local Injuries due to Cold.

90 % of the local injuries due to cold are those of the lower extremities. Their development is promoted by all factors causing a reduced local peripheral vascularization, such as tight clothes, narrow boots, roll garters etc. Nicotine has similar effects. The most important factor for the practice is an increased delivery of heat, caused by wetting, such as sweating feet, wet, leaking boots, or the snow penetrating into the boots.

The old classification of the chilling into 3 degrees is still valid. The final condition of tissue parts exposed to cold depends to a minor degree on the actual degree of the cold but rather on the time period of exposure and the ischemia due to it. The first principle of treatment is a rapid restitution of controllable circulatory conditions and a successful therapy of the arterial spasm. For this purpose drugs and surgical measures are available. As to the drugs the principal stress should be laid on the administration of vasodilating medicaments (such as papaverin, padutin and similar preparations). It is of a decisive importance to administer them early and in big doses.

The surgical antispasmodic methods consist of the various forms of conduction anesthesia and the surgical elimination of certain ganglia and the nerve network around the blood vessels. It is permissable to block the vascular nerves by applying local anesthetics containing no adrenalin close to the main ganglia, if the extremities are involved (ganglion stellatum and lumbar ganglia) and around the vessels (peri-arterial anesthesia). An adequate preparation serving this purpose is a pantocain solution 1:1000 without any other agents mixed; this has a continuous effect. In appropriate cases lumbar anesthesia may also be applied.

As to the surgical methods it is not advisable to remove the ganglia but it is permissable to perform a sympathectomy.

For the local treatment of injuries due to cold of the first degree only ointments with different components are employed, preferably ichthyol, or camphor ointment and balms. The blood circulation is stimulated by a cautious massage, cold and hot baths, physical exercises with a simultaneous application of heat (infrared rays, radiating heat, ultraviolet rays, diathermy).

Injuries due to cold of the 2nd and 3rd degree should as a principle be treated exclusively with the drug method. With a chilling of the 3rd degree mummification should result. Blisters should be removed. Desiccation is accomplished by the application of a fairly large amount of sulfonamide powder (septoplix, marfanil, and others). The affected limb is fixed by a cotton wool bandage, whereas the desiccating zone is covered with gauze only so that it can be dried in the air.

When symptoms of inflammation appear (lymphangitis) alcohol dressings should be applied. Incisions in the necrotic areas may be of a great value. A rapid defervescence occurs as a rule. Symptoms of intoxication are an indication for an active surgical intervention. This involves not only an operation of fresh thrombophlebitic abscesses and phlegmons but also an early ligature of the vena saphena. One must wait and see until the demarcation of the necrotic areas is accomplished. If one is successful in improving the blood circulation at an early time, the necrotic area will be small. Elongated incisions in the edematous area were most helpful to improve the circulatory conditions there.

If a wet necrosis supervenes, the right moment of amputation must not be missed. In hospitals close to the frontline the amputation of the necrotic tissue should be accomplished as a provisional measure only close to the borderline of demarkation. The final stump will be prepared at home.

In every case of local injuries due to cold of the 2nd and 3rd degree tetanus antitoxin should be administered as a prophylactic treatment.

Since the circulatory disorders of areas injured by chilling are of a peculiar character, delayed lesions must be taken into account which are extended far beyond the original area of necrosis (ulcers, chronic edema, symptoms of dystrophy occurring on the base of chilling -endangitis).

c) Prophylactic Measures.

1. The possibility of chilling must be considered, when combat operations are planned or carried through.

2. Winter clothing should be provided and delivered at an early time.

3. Care must be taken to supply food rich in calories and vitamins before the winter season comes up.

4. The effects of cold during duties should be considered.

5. The transportation facilities should be heated.

6. The soldiers, especially the inexperienced men, should be instructed how to protect themselves against chilling (see leaflet).

d) General Sequelae of chilling.

A severe chilling reduces the general resistance for a long period of time. This may enhance the development of infectious diseases and make them more severe. This is made sure for tonsillitis, pneumonia, and war nephritis, and most probably it also occurs with other infectious diseases. In addition inanition and exhaustion may often play a part.

e)

It is desirable that a number of scientific investigations be performed in selected institutes before the onset of the next cold period. They principally should imply changes of the metabolism of the injured area, the general acid-base metabolism, the pathogenesis of the endangitis obliterans, and other topics.

XIII. DIMINISHED RESISTANCE.

Translation prepared by:

Office of Military Government for Germany (U.S.)
Office of the Naval Advisor,
Medical Section.

1. Opinion on:

a) the Development of Frostbites,

b) the Distribution of Infectious Diseases.

Stabsarzt (Captain, MC.) Professor WOHLFEIL.

Diminished resistance: What is its importance for a) the development of frostbites, b) the spreading of infectious diseases?

1. What principal environmental effects cause the diminution of the resistance?

a) Exertion, overfatigue, and exhaustion. These are more pronounced with horse-drawn divisions than with mechanized divisions. They are caused by an insufficient relief from duty.

b) Insufficient food. During the summer its quality was sufficient. From October on a considerable deterioration occurred, because of supply difficulties and only one third or one fourth of a loaf of bread per man and day could be issued. In some divisions sometimes no potatoes were available and only a small amount of fat and meat. The caloric value of the food was too small. The food given was not sufficient to satiate the men.

Hypovitaminosis. Some of the soldiers were cachectic. There was a lack of vitamin C, A and D, principally because of the small potato ration. The supply of vitamin B generally was sufficient.

c) Inssufficient protection from the effects of the winter climate. The winter clothing in November consisted only of head protectors and gloves. The boots were too small and no woolen underwear was available. This lack was partly compensated by the requisitioning of Russian clothing. It frequently occurred that the men suffered from cold and that there was no equivalent food rich in fats and calories.

Sometimes the quarters were insufficient from the sanitary point of view, since they usually consisted of foxholes, without any shelter.

d) Psychic factors. With the onset of the severe cold the reactivity generally was diminished and a state of depression together with an occasional feeling of inferiority occurred.

2. Diminished resistance and frequent occurrence of infectious diseases.

a) Dysentery, local injuries of the intestines through sour and spoiled bread, and by a chilling of the abdomen.

b) Exanthematic typhus. It very frequently occurs even in December and January with the prisoners of war whose resistance is markedly diminished. Within the units it does not occur in an increased number before January and February.

c) Colds and associated infectious diseases. From November on chronic catarrhal affections of the nose and the pharynx of almost all soldiers are found which have to be regarded as reactive inflammation. There is an increased occurrence of a severe tonsillitis with a delayed recovery. Increased occurrence of pneumonia with a delayed lysis and a reduced reaction to sulfonamides.

d) Infectious diseases of skin and wounds. The frequency and the severe course of such diseases is partly caused by hypovitaminosis.

e) From January on isolated cases of typhoid and paratyphoid fever have been observed slightly more frequently.

3. The relation between a diminished resistance and the development of frostbites.

Apart from the direct injuries due to cold an increased disposition to frostbites must be traced back to a deficient nutrition, particularly to a lack of vitamin A and to an insufficient amount of food.

4. Diminished resistance and active prophylactic immunization.

A diminished formation of antibodies must be taken into account with persons whose resistance is reduced. An increased severity or a premature outbreak of sickness may under certain conditions be caused by a prophylactic immunization during the incubation period of infectious diseases.

Nevertheless, it is under no conditions permissible to abstain from an active prophylactic immunization.

5. Prophylactic measures to prevent a diminished resistance.

a) To maintain the resistance against dysentery, abdominal protectors should be provided for every soldier of the combat units.

b) The military operations should come to an end in due time, before the severe cold sets in. Deep living shelters should be constructed in the advanced trenches, and suitable winter quarters should be provided in the rear areas.

c) The winter clothing should be issued in due time (October). This must meet the following demands: Large boots or felt boots, woolen underwear, pullovers, fur caps or head protectors, gloves, furs for guards and for the drivers of the baggage train, chilblain ointment for the nose and the face.

d) A sufficient supply of food should be made sure to guarantee the food allowance with a sufficient caloric value. If possible, additional fat rations should be issued. During the winter months preparations containing vitamin A and D, and vitamin C should be given to the soldiers. The latter must also be issued during springtime, before fresh vegetables can be supplied.

e) Psychic hygiene. A frequent relief is absolutely necessary during the trench warfare, best of all within the batallions, or the regiments. Suitable rest quarters, bathing places, and delousing stations should be provided immediately behind the frontline.

During the winter months furlough should be granted.

Discussion:

BICKERT gives data on the reduction of food, the provisioning with winter clothing, abdominal protectors, figures on injuries due to cold, infectious diseases, vitamin supply (not for publication).

2. Disposition to Infection, Altered Course of Diseases, Occurrence of Intestinal Diseases.

Oberstabsarzt (Major, MC.) Professor ASSMANN.

This topic for discussion seems to me as of a particular importance, not only for science, but also for the practice. The solution of these problems, however, is very difficult, because we do not have to deal with obvious facts, but to discuss the possibilities and to consider carefully whether the possibilities are likely to occur or not. We only know the occurrence and the course of the diseases as they actually are, but we do not know whether they would have occurred at all or whether they would have taken another course if due to different external circumstances there was a different resistance. Only if subsequent to conditions causing a considerable diminution of the resistance according to our experience, an extraordinary number, or an extraordinarily severe course of diseases occurs, we may assume with a greater or a smaller probability that their departure from the course expected in accordance with our ordinary experience must be traced back to a diminished resistance.

The following conditions may be mentioned as the principal factors which frequently reduce the resistance: 1. hunger, 2. physical and psychic exhaustion, 3. trauma through battle injuries and accidents, 4. debilitation by infectious diseases, 5. climatic factors: heat, cold, ex-

cessive drought or excessive humidity.

The next question is whether these conditions heretofore played a part for the warfare and whether it is permissible to assume that they will continue to play a part.

As regards the two most important factors of hunger and exhaustion and a diminished resistance due to them, I am not able to give any contribution from my personal experience with soldiers. I should have to disavow my personal reports in which I repeatedly underlined my conviction that the general alimentary and physical condition of the troops was excellent, or at least satisfactory, when they were subjected to great hardships. Of course, I only took part in the Eastern campaign before last December. What happened to the troops during the severe winter now lying behind us, is not known to me from personal experience. It is quite possible that with the delayed supply to some of the units a state of hunger and exhaustion occurred which was increased by the extraordinary cold. I should much appreciate it, if those officers who took part in the winter campaign would join in the discussion of this question. I myself observed that some of the men arriving in the hospital attached to my clinic after a transportation of several days duration in sometimes insufficiently heated cars seemed to be rather exhausted, but they regularly recovered with an extraordinary rapidity.

However, I was able to observe a diminished resistance as the result of hunger in the prisoner of war hospitals. The prisoners being at work which they performed with a visibly diminished strength, had to be supported by others so as not to collapse, and frequently a sudden death occurred. The slightest exertion was sufficient to cause a complete collapse. I am not in the position to decide from personal experience whether infectious diseases were promoted by a chronic state of hunger or whether their course was altered by it. However, it is known of the epidemics of exanthematic typhus that hunger prepares the ground for their spread which is even indicated by its synonym "famine fever". The exanthematic typhus frequently occurred in PW camps too, but I do not know whether it occurred in a larger number than could be expected in view of the infestation with lice, or whether its course was different. During last autumn I observed numerous cases of dysentery in the PW camps, where the physical strengh was weakened not only by the dysentery but also by the starvation.

In addition it must be brought to further discussion, whether a diminished resistivity is caused not only by a reduced caloric value but also by a lack of particular nutritive or vital substances, such as vitamins which would have caused the above mentioned sequelae. There are experimental investigations demonstrating that the seriousness of infectious diseases of animals is increased and that they are more frequently lethal when there is a deficiency of vitamins, particularly of vitamin C. I have no personal experience with sick persons.

In one of the hospitals I was told that the dental officer in charge had observed numerous cases of paradentosis and diseases of the gingiva which he had definitely attributed to a lack of vitamins; therefore, it was intended to make large requests for the supply of vitamin preparations. I immediately examined the patients as far as they were available - only very few were still present - and I made inquiries as to their food before and during their illness. It was revealed that they had just arrived from Denmark, where they had received a particularly rich and variable food containing many vegetables and a great amount of butter. This shows once more, how such connections are invented and how rumors were spread which could easily be avoided, if one had only taken the slight trouble to check the facts. In the periodical "Der deutsche Militaerarzt" other authors such as RIETSCHEL, KRUTTKE, STUTZ, expressed their opinion against the connection between the paradentosis and the hemorrhages of the gingiva and the lack of vitamin C, while KRAMER assumes that such connections exist. Quite apart from the question for the origin of the paradentosis I deem it an appropriate measure to make continuous vitamin C determinations in the chemical laboratories, since it is frequently asserted and even experimentally proved that the resistance against infectious diseases is diminished by a vitamin C deficiency. I suggested performing such determinations in the area of our army.

Experience has proved that infectious diseases occur after a trauma. During this war I observed numerous cases who fell sick with an infectious disease such as diphtheria or exanthematic typhus after a battle injury; however, it can hardly be decided whether the infectious disease was released by such an injury or whether it took a different course. One infectious disease may prepare the ground for a second one. It is generally known that measels weaken the resistance to tuberculosis and diphtheria. In several places of the home area attention was recently attracted by exanthematic typhus immediately being followed by diphtheria. With prisoners of war having recovered from exanthematic typhus the occurrence of an exudative and apparently tuberculous pleuritis was frequently observed. The relatively frequent occurrence suggests a causative connection, but it does not prove it.

After my personal experience I believe that the most distinct influence is exerted by climatic injuries upon the onset and the course of intestinal diseases resembling dysentery. As I mentioned earlier in my report on dysentery, it is most remarkable that dysentery usually appears during the warm season, but as an epidemic only, when a period of cool weather and rain follows upon a continuous heat wave. I observed this already 1914 in the Western territories when after many weeks of heat during the advance, a cool weather and rain set in during the retreat and a sudden epidemic of dysentery broke out. Similar observations were made during the campaign in Poland 1939, as well as in France 1940, when after an

advance favored by excellent weather the first continuous rain poured down just on Armistice Day and all roads were turned to mud; immediately after that many cases of dysentery occurred, particularly in the PW camps. The disease usually was of slight nature only. During the Eastern campaign similar conditions were observed in September 1941. There, a diminished resistance had to be regarded as the probable cause.

As to the effect of climatic factors upon the outbreak and the course of diseases I may mention furthermore that during the advance at a time of great heat, attention was repeatedly attracted during various campaigns by the high sick rate with tonsillitis and in many cases, with peritonsillar abscesses. Under other conditions, too, I frequently observed the common occurrance of tonsillitis during dry weather and a great development of dust, that means at a time of the barometric maximum.

It would be important to discuss in detail whether the number and the seriousness of the diseases was increased by the great winter cold in Russia and the diminished resistance due to it. In general it is not likely that very low temperatures cause such conditions, if there is no wind.

With regard to field nephritis which was frequent during the Russian winter, while it was hardly observed during the other campaigns of this war, at least during the campaign of Poland and France in which I took part, I also do not take it for certain that the exposure to cold was a substantial connective factor. The cold as such a factor is excluded by the fact that a nephritis of the type of the war nephritis even without a preceding tonsillitis occasionally is observed with persons living in the home country, where they were not exposed to any particular cold. Among the few cases who contracted this disease in the home country a comparatively great number of medical orderlies was found. My personal opinion is identical with that of Friedrich MUELLER who assumed that war nephritis is a peculiar infectious disease which unlike glomerulo-nephritis originates not from streptococcal foci in the tonsils, etc. It may be possible that lice play a part as contact carriers. This cannot be asserted with an absolute certainty, since the infestation with lice is very wide-spread.

Hence it results that my lecture on the diminished resistivity produced no substantial evidence as to its part as a causative factor of disease except for the influence of climatic factors upon the spread of intestinal diseases, particularly dysentery. I think that this is a favorable result, because it shows that the most dreaded factors, which according to the general experience have the greater influence upon the distribution and the course of infectious diseases, namely hunger and exhaustion, heretofore played no important part in our Army.

Contrary to that I can and I must report on another noxious influence on the course of diseases which I repeatedly observed. This is the injurious influence of evacuation. I collected a definite experience with that matter in all campaigns and I want to give a few examples.

With the outbreak of the war, I discussed measures against a dysentery epidemic to be expected with the Consulting Hygienist, Professor BUERGER, and we were quite aware of the fact that an evacuation of dysentery patients over a long distance is dangerous to them. To make their way from Poland as short as possible, a dysentery hospital was organized at the frontier of East Prussia at the outermost place where adequate conditions for treatment could be provided. This measure was a success. Contrary to that I shall never forget that during an inspection trip after the end of the war in Poland I found such marasmic patients and such a relatively high mortality in Koenigsberg (in my clinic, which had been transformed into a military hospital in the meantime and from which all former physicians had left for the Army) as I did not encounter neither in the special dysentery hospital nor even in Poland under far more disadvantageous circumstances. Investigations revealed that after a prolonged evacuation the patients had arrived in a very poor condition; some of them even died on the way, while others passed away soon after their arrival.

In the same way I was told during last winter that patients with exanthematic typhus who had boarded the hospital trains in a still satisfactory condition arrived after hours of travel in a very poor physical condition at their destination. The Surgical Consultants report similarly that bullet injuries of the chest frequently are evacuated much too early and that this provokes lethal hemorrhages and, moreover, enhances a contamination of the wounds. I am of opinion that the disadvantageous effect of a prolonged evacuation upon many severe illnesses is beyond all doubt.

This fact had to be made sure at first. The question arises whether this inconsequence can be avoided or mitigated. There is the obvious answer that during wartime the evacuation of patients could be avoided. If this is true there is no sense in discussing that matter. It can indeed not be avoided that even the severely sick patients are evacuated if the evacuation of a hospital is necessary for military reasons, such as during retreat. This may have happened in several places during the winter campaign in Russia. Moreover, an evacuation of hospitals is necessary if an offensive is being prepared or if there are many casualties for whom beds must be made available. Such natural and well founded necessities are not disputable. However, I observed an impairment of the patient by evacuation even under conditions in which there was no need at all to transfer them, not even for reasons of organization. From a report covering the period from 16 to 31 July 1940 in France where there were peaceful conditions at that time I give the following details:

During the transportation of a patient in an ambulance from a field hospital to a station hospital I observed a severe deterioration of his endo-, myo-, and pericarditis. A fatal outcome was observed in a case of agranulocytosis the day after the evacuation from one field hospital to another; in another severe case of agranulocytosis I was asked whether this patient was fit for evacuation to the homeland which would have needed several days and which was absurd considering the serious condition of the patient; in a third case with a pleuritic exudate of three liters a pulmonary embolism and death occurred by the detachment of a venous thrombus in the leg when the patient was moved from his bed to a stretcher. In my opinion such severe and sometimes very grave diseases are transportable under no circumstances. Whatever may have been the motives for the evacuation in the cases discussed here, they obviously were not well founded and moreover were made against the orders. It is likely that some of the medical officers involved had believed that the conditions were better in another place, in a rear area station hospital better than in a field hospital and in a military hospital of the homeland better than in a rear area station hospital. But they underrated the deterioration of the condition caused by the impairing effect of the evacuation. Moreover, the opinion was wrong in many cases that the healing conditions were better in other places. I cannot avoid thinking that in some of the cases a certain fear to take over the responsibility or other quite minor reasons were the cause of the evacuation. All this should not play a part. Only the welfare of the patients and the situation as a whole should be considered in such cases.

The principal experiences regarding a diminished resistance and suggestions to prevent this condition may be summarized as follows:

Injuries due to hunger and exhaustion heretofore were not observed before the beginning of December 1941 in the German Army under the conditions I know from the operational theaters in Poland, France, and Russia. The statements as to an improved condition due to a vitamin deficiency require better reasons than those hitherto given.

A diminution of the resistance through cold and damp plays a considerable part for the development of dysenteric intestinal diseases. Keeping the body warm, as far as the conditions permit it, particularly by abdominal protectors, are the best preventive measures.

There is a definite proof of numerous impairments due to transportation. If the situation permits it, evacuation of severely sick persons, wounded (particularly fresh bullet wounds of the chest) as well as febrile patients (particularly dysentery, exanthematic typhus, typhoid fever, pneumonia), should be avoided.

3. Diminished Resistance and Inanition.

Oberstabsarzt (Major, MC). Professor KRAUSPE.

1. Exhaustion is the loss of the reserve forces of the body which are necessary for a correct functioning of the metabolism, the blood circulation, and the reactions and the nervous regulations caused by physical exertion.

It generally is the result of a rapidly progressing process.

2. Inanition is a particular state of exhaustion caused by a qualitatively and quantitatively deficient intake of vital substances. It generally is developed slowly.

3. Death exclusively from exhaustion by an excessive physical overexertion was never observed. It was always caused by additional damages such as inanition, contamination and other particular pathological processes.

4. Disorders due to physical overexertion and inanition, which have an unfavorable influence upon the wounds by delaying the progress of healing or by enhancing a particularly obvious infection of them, are frequently seen if there is a deficient medical care for external reasons, particularly because of transportation difficulties.

A particularly impressive picture of the changes due to such conditions was offered by the wounded Polish soldiers of the Fort Modlin shortly after its surrender. These had suffered very heavy physical exertions after the great battles of encirclement and they were in a poor state of nutrition. Therefore they were highly emaciated without sufficient medical care.

The wounds of these soldiers were considerably desiccated through the loss of water, and incontrollable tubular abscesses and phlegmons were found below the frequently innocent looking surface. This conditition was accompanied by a disposition to the formation of a severe decubitus which frequently was characterized by the destruction of the soft tissue underneath the preserved skin reaching as far as to the bone. Death was caused by an erysipelas even though the injuries were slight. In addition dysentery with the severest symptoms occurred.

As conspicuous anatomical findings in the internal organs we particularly found signs of inanition which were known already from World War I, such as a small reaction of the spleen which was small and smooth showing a considerable hemosiderosis and a corresponding deficient reaction of the liver, no reaction of the bone marrow, a loss of fatty depots with a marked lipochrome staining of the preserved fatty lobules. The bacterological examination revealed an uninhibited infection with many most varied bacteria, including tribial putrefying germs, and diphtheria bacilli above all. Some observations suggest that similar alterations with notable signs of a generally diminished resistance occur during the influence of a

physical overexertion and poor food, even if the medical care is adequate.

During the winter campaign 1942 SIEGMUND observed similar complications, particularly rapidly progressing gas gangrene among wounded soldiers which was caused by poor food and a diminished resistance. The anatomical examinations showed the alterations of the organs described above and a particularly remarkable underweight of various organs (heart less than 300 gms., liver less than 1400 gms.)

Reports are given on observations of the comparatively unfavorable development of slight abdominal injuries after a physical exertion (LAEWEN), but it is possible that particular factors such as the impairment by transportation and similar things play a part.

5. According to the experience gained with the impairments due to transportation, the development of pneumonia and animal experiments etc. it is certain that severe physical exertion promotes the persistence of wound infections or infectious diseases.

6. The onset and the progress of an infectious disease show a tendency towards deterioration under the pure influence of inanition.

An epidemic of amebic dysentery broke out in the camps where poorly nourished French colonial troops were detained. Under certain conditions a peritoneal tuberculosis supervened.

The development of bacillary dysentery is also promoted by inanition, while no pronounced influence of this condition upon the anatomical symptoms can be stated with certainty. The intestinal alterations may be very pronounced, or very slight despite serious general symptoms. Great difficulties arise from the fact that the anatomical signs of dysentery cannot always be distinguished from those due to a pure impairment by inanition such as a vitamin C deficiency and incidental injuries due to cold.

The development of diphtheria, exanthematic typhus and influenza diseases is enhanced by the state of inanition. In such cases the symptoms of diphtheria may consist of extensive pseudomembranes extended as far as to the bronchi, but there are cases in which the anatomical diagnosis is difficult because of the formation of small pseudomembranes which are confined to the larynx.

No detailed data on the course of the exanthematic typhus during inanition are available. But here, too, a deteriorating effect must be assumed.

7. A hunger osteopathia, as occurred in World War I, was not observed during this war.

8. A partial food deficiency resulting in a pronounced avitaminosis practically played no particular part. Paradentoses generally had to be traced back to other causes even if they occurred to a large number. No connection

was demonstrable between paradentosis and vitamin C deficiency. Of course, the significance of a hypovitaminosis shall not be underrated (experimental findings of disorders of the course of the dysentery and other infections when there was a vitamin C deficiency).

One also could include an insufficient oxygen supply with the deficiency of food. In this case one should particularly remember the deteriorating sequelae of local disorders of vacularization for the development of gas gangrene and other wound infections and a decubitus. An anoxemia will always have to be taken into consideration as a complication.

9. It is very difficult to estimate the diminution of the resistance by exhaustion and inanition in connection with the constitutional structure of the body. It is well known that particularly with the leptosome constitution with a disposition to a rapid reaction of the connective tissue (fibroplastic type) the wound infections frequently take a surprisingly rapid and favorable course. Whether differences of race really exert a decisive influence in the injuries mentioned and the progress of the wound healing does not seem to have been sufficiently investigated yet and it is still a matter of detailed research whether a difference of race really exerts a decisive influence on the above mentioned conditions of disease and the healing of the wounds. Sometimes other factors from without may play a part here.

10. Particularly in connection with exhaustion and inanition mental influences must principally be considered (suicide attempts of severely wounded soldiers). A good mental care and a special nursing are of a great importance.

11. Ideas on the effect of inanition and exhaustion upon the development of a diminished resistivity.

The following points must be considered:

a) Impairment of the blood circulation and the blood distribution. Alteration of the tissue structure, particularly of the vascular walls, and lack of oxygen. The deficient supply of protein is particularly effective here (hunger edema).

b) Disorders of the blood structure and the hemato poiesis. The dystrophy of the hemoplastic organs during inanition should also be considered. There were deficient cellular and humoral reactions and disorders of the blood and tissue pH (GRAEFF, FISCHBECK).

c) Further points worthy of consideration are: A deficient function of the spleen and the liver during inanition (a deficient cellular defense, hemosiderosis).

d) The exhaustion of the fat depots (vitamin depots), the adrenal cortex and other organs (disorders of the cholesterol metabolism).

e) The lack of important components of the food (hypovitaminosis, particularly lack of vitamin C and vitamin A, a disordered course of the infections during animal experiments with a diet poor of protein, poor or entirely free of fat.)

f) The part of the psycho-nervous influences as an additional factor.

12. The following measures are suggested:

a) To provide a mixed and possibly appetizing diet for injured persons with inanition and exhaustion.

b) To avoid as far as possible additional physical exertion, particularly if injuries due to cold are present simultaneously (no evacuation over long distances, no additional strain by the administration of drugs in cases of injuries due to cold).

c) To replace rapidly the blood and protein in cases of inanition (cf. studies by LINNEWEH).

d) To improve the blood circulation.

e) To pay regard to the mental care, and particularly to a good nursing (by professional nurses).

Discussion:

BOGENDOERFER: The death rate of pneumonia as well as of diphtheria was particularly high during the months of December and January, which are particularly disadvantageous as far as the alimentation and the protection are concerned.

VOIT: It is possible that sometimes too much use was made of the term "generally diminished resistance"; in many cases it may be of importance but it is remarkable to see how rapidly the wounded and the patients recover in the hospitals. Typical cases of avitaminosis were rare, while scurvy and a few cases of pellagra were observed several times. The vitamin C deficiency may play a part in the disposition to diphtheria. However, the diminution of resistance is a concept which causes many difficulties to the clinical analysis.

SCHULZE: The diminished resistance is due to a summing up of various factors.

1. In cases of disease and combat injuries the progress and convalescence of the Air Force men is decidedly more favorable than that of the men of the Army.

2. The simultaneous occurrence of war nephritis and exanthematic typhus almost always takes a fatal course.

GUTZEIT: warns not to draw premature conclusions as to the accumulated occurrence of diseases and the increase of the degree of severity of certain diseases under the influence of cold, overexertion, loss of weight, and lack of food. It is certain that after dysentery, particularly after a chronic dysentery, alimentary injuries may occur as the result of a reduced resistance. Cases closely resembling sprue were observed. A loss of weight may not be sufficient to make the prognosis of the infectious diseases worse. This is demonstrated by the remarkably good outcome of pneumonia during a hypophysical cachexia.

The paradentoses occurring throughout the forces and even in regions with the best supply of vegetables and fruits (Southern France) surely have no connection with a C-hypovitaminosis. Avitaminoses in the forces are a rare occurrence, even among those units who lived for a long period of time under very unfavorable dietary conditions.

LAUCHE: From the reports of the Consultant Specialists I should like to mention:

There is no infectious swelling of the spleen (TESSERAUX). An unusually rapid failure of the heart occurs even during small surgical interventions, and extended infections (MUELLER- Koenigsberg). Severe general symptoms occur with relatively slight intestinal catarrhs, which BOEHMIG does not consider as dysentery.

The shift of the tissue pH towards the alkalotic side asserted by GRAEFF was recently confirmed by the Institute for Physiological Chemistry at the Military Medical Academy by FISCHBECK.

KOCH makes reference to the frequent combination of hunger cachexia with tuberculosis.

ROESSLE: Attention is attracted by the peculiar large fat content (rich in lipoids, ochre yellow) of the adrenal glands of the starved Russian PW's. This permits important conclusions as to the causative disorders of the cholesterol metabolism.

SIEGMUND: refers to the speical report by the Chief Surgeon 17th Army of 22 December 1941 on the diminished resistance of persons with fresh wounds and patients with chronic diseases.

XIV.

TREATMENT OF PSYCHOGENIC REACTIONS.

Translation prepared by:

Office of Military Government for Germany (U.S.)
Office of Naval Advisor,
Medical Section.

1. The Problem of Psychopaths with the Field Army.

Oberstabsarzt (Major, MC) Professor Dr. K. SCHNEIDER.

I should like to restrict the topic assigned to me, namely "Treatment of Psychopaths",(psychoneurotics)on the one hand, and to widen it on the other hand. I restrict it insofar as I am only referring to the treatment of psychoneurotics with the field Army, as no other experience is available to me. I widen it by not only discussing the treatment of the psychoneurotics with the field army, but also several other remarkable topics of this problem. It is only natural that the discussion of this problem also serves for the use of the therapy.

Where are Psychoneurotics found with the field army?

No psychoneurotics are seen during warfare in the open country. In the casualty receiving stations, the field and station hospitals and in the casualty clearing stations, internal diseases are very rarely observed and psychogenic diseases occur extremely seldom. Besides, the casualty clearing stations are of a particular importance for our problem, since the psychoneurotics and persons with an abnormal emotional response bear no wounds and show the symptoms of severe sickness in very rare cases only. Therefore, it is a matter of liklihood that they appear at the casualty clearing stations. There is no doubt that here it may happen that they are sent back further to the rear and that the casualty clearing stations are the opening through which the psychoneurotics escape to the home country. The official term "casualty evacuation unit" suggests this task to the casualty clearing stations as the principal line of activity. I inspected a lot of such casualty clearing stations in the Eastern and Western territories and I did not observe many psychoneurotics and patients with an abnormal response to personal experience. However, one must bear in mind that certain mistakes may occur. It is easily possible that psychoneurotics and an abnormal reaction to personal experience are not recognized because they are hidden behind somatic complaints. The seniors in charge of these casualty clearing stations usually are young and inexperienced medical officers. In addition it is a common occurrence that for reasons of indolence the daily reports give no information on psychiatric cases. This is the easiest way to get rid of the inspecting Psychiatric Consultant who hardly is in the position to inspect all patients and to avoid supervision. In many cases an additional medical examination would be required before one is able to find out what patients report sick with psychoneurotic complaints or psychogenic disorders, or, in other words, what patients report sick without any disease. The usually temporary accommodation of the patients in the casualty clearing stations also makes it difficult to examine them systematically.

With the course of the time a psychiatric department was usually set up in one of the station hospitals. (When this was not worth while I emphasized the establishment of a psychiatric outpatient department in one of the station hospitals which was known to the medical units and the courts

martial of our Army. One of the psychiatrists of the personnel reserve was put in charge of this outpatient department which of course had not enough visitors to keep him busy). In the psychiatric departments one also sees only a few psychoneurotics. The figures of the admissions to the station hospital Nikolskoje (near Leningrad) from 19 October to 31 October 1941 are available to me. 90 patients were admitted which were classified in 35 neurologic organic cases, 16 cases of an abnormal personal reaction, 12 cases of epilepsy, 9 cases for observation without any psychiatric or neurologic findings, 7 psychoses in the proper sense, 6 cases of mental debility, and only 5 cases of psychoneurosis. If the cases of an abnormal psychic reaction to personal experience are added to the latter, 21 cases are found among the 90 patients admitted, which are of interest to us. Considering these figures one should remember that the advance operations of the 18th Army were stopped since the midst of September and that snow had fallen, the temperature being at a rather low level. As far as I remember, the classification of the patients of the psychiatric departments of the hospital units of the 2nd Army in France had similar results. There is no doubt that during static warfare the number of patients admitted with psychoneurosis is increased. In France this was observed after the armistice. A number of psychoneurotics who took part in the fast advance without difficulties failed under the impression of the re-established peace-time training and exercises.

What types of psychoneurotics are observed?

New types of psychoneurotics were neither expected nor observed. There is the well known failure of the asthenics which frequently have physical deficiencies and, therefore, should regularly be examined by a medical specialist. Furthermore, there is a hypochondriac and depressed variant which particularly occurs with persons in an advanced age. These are persons who quarrel with themselves and the people around them, being unable or unwilling to take over any responsibility, unable to make up their minds, irascible and difficult and in many cases being worried by the state of their personal affairs. A hypertony may frequently be present. Moreover, one occasionally observes the well known irritable character and the personalities with a lability of mood and in correspondence to that with difficulties of adaptation to service, and finally the querulous patients to be classified with the hyperthymic or fanatic personalities who like to interfere with matters they should not be concerned with and who show the inclination towards improving and reforming matters. Other types of psychoneurotics are still more infrequent, but every type occasionally occurs, as usual in all matters of life.

Now we are going to discuss the abnormal reactivity to personal experience which is displayed by the psychoneurotic personalities. This reactivity is not regularly specific and attributable to certain personalities. They do not require in the least a psychoneurotic personality as an abnormal permanent base. If there is a very intense personal

experience a non-psychoneurotic may even show an abnormal reaction. In a hospital at Dorpat I observed a patient with a considerable excitation and disorientation of a short duration which closely resembled psychogenic somnambulism. This man had been liberated from Russian captivity and showed cuts on the neck. If a person was saved in the last moment from such a great danger and then developes such a reaction, one should not always assume that this is a psychoneurotic personality. If somebody is subjected to an adequate personal experience, he is liable to develop such a reaction. Moreover, the psychogenic state of excitation was made worse and prolonged by narcotics as frequently happens in such cases; this will be discussed below.

Of the abnormal mental reactivity I first mention the psycho-somatic disorders. This condition usually is denoted with the inadequate term "neurotic". It is inadequate from the linguistic point of view, since these patients are indeed no neurotics - which is the most important result of the psychopathological and psychotherapeutic studies in this field during the past decades. The term "neurotic" is contrary to the characteristics of the symptom complex. (However, it is difficult to find another term, particularly if it is desired to avoid the term "hysteric". It seems to me to be the best to use the term psycho-somatic disorders and to speak of persons with psycho-somatic disorders instead of neurotics). Such a condition was relatively rare in the Western territories as well as in the Eastern territories. If it was found, its purpose was not always apparent. Doubtlessly there are persons who under a certain mental and frequently even physical stress are sized by such obvious psychogenic conditions without having any particular intentions. In some of the cases all symptoms known from the last war were observed and even relapses of psycho-somatic disorders which were developed at that time long ago. The anxiety which is usually present is worth mentioning as well. It usually occurs with persons who have experienced real hardships such as being cut off from the own troops or who narrowly had escaped captivity or death. Particularly in the evening hours they feel uneasy and they may not be capable of remaining alone in their quarters. They are frightened by the slightest noise and are persistently afraid of sudden attacks. Hints of such a condition may be experienced particularly in times of increased activities of the partisans. This is connected with nocturnal pavor during sleep. The contents of the dreams are fighting and danger. Not infrequently the dreaming persons jump out of bed, wake their fellow soldiers up, take their arms and sometimes are a serious danger to the other men. It happened that some soldiers were admitted to hospital exclusively because of pavor nocturnus with a corresponding state of excitation. A prolonged excitation and disorientation closely resembling the psychogenic state of excitation and somnambulism are seen not infrequently in alternation with such an extraordinary prolonged loss of consciousness, as one is not used to see with hospital patients during peacetime. With this group of patients too, I never was under the impression that the psychogenic disorders were a purposeful reaction but that rather regularly they

are a primitive genuine relief. In such cases the amnesia was extended over an extraordinarily prolonged period. Sometimes one was under the impression that exhaustion and hunger were important causative factors in addition to the excitation. Conditions of pseudo-dementia occurred occasionally. The diagnosis of one particular case at Riga was very difficult. After a doubtful cerebral concussion a soldier alleged to have forgotten his entire past. He informed himself on his particulars by means of his pay-book and learned only from this that he was married. From letters which he carried with him he found out that the photo of a woman attached hereto was the picture of his wife. He alleged not to know the person in this picture. In this case I was most doubtful, whether this was a Korsakoff syndrome or a pseudo-dementia. Since otherwise this man showed no signs of an organic injury I was rather inclined to assume a pseudo-dementia. However, he never made contradictory statements even during very detailed interviews in the course of which a number of traps were laid. It is most regrettable that such cases usually escape further observation and I do not know any means of learning what had happened to them. A second case of pseudo-dementia was that of a flying officer who after troubles with his seniors suffered from some state of somnolence. The medical officer attached to the unit suspected an encephalitic or a cerebral tumor and therefore sent this officer to the neuro-surgical department of the military hospital at Dorpat with an alarming report. There the patient gave senseless answers and displayed conspicuous symptoms of GANSER's syndrome, and in addition there were psychogenic optical hallucinations or delusions. In the course of the usual neurological examinations and particularly after the encephalographia the symptoms disappeared rather rapidly.

As borderline cases I further want to mention the intoxications which frequently result in some wellknown delinquencies. In France these were seen often enough. Addiction to alcohol was seen in Russia too and it is evident that large quantities of alcohol are always consumed wherever it is available. I observed only one case of addiction to morphium. - I myself had no occasion to observe suicide attempts but I was told of such cases. Our Army pathologist noticed an increased number of suicides in France after the armistice. Self-mutilations were not rare, but only one case was under my attention for psychiatric inspection and expert opinion. This was a young soldier who committed several frauds. First of all he wrote to his family after a slight injury that he would be a cripple for the rest of his life. One day he reported back from Russian captivity. He was interviewed and gave a detailed report of what he had experienced and how he had escaped. A war reporter made a long detailed article from this story which was published in a newspaper with the full name of this "hero". But nothing was true in this report. Subsequently this was quite obvious. The Russian officers were described as they were seen in the operetta wearing dark green suits and fur caps. His description of a unit formed of women was also most unworthy of belief as well as his assertion that they "had

even no consideration for the dearest souvenir of a soldier, for the picture of his parents' grave". The reason for this swindle was not so much the wish to call attention to himself, but the urgent desire to go on leave. Some day he produced a letter before his commanding officer which he allegedly received from his fiancé and in which one read that the farm of the parents in the Rineland was destroyed by an allied air raid and that his mother was dead. The commanding officer recommended to send him on leave in spite of the situation. Before he was sent away inquiries were made at the village burgomaster at home which revealed that all this was a free invention. After this attempt had failed the soldier shot through his steel helmet and laid himself on the road beside his motorcycle simulating unconsciousness. He was found and admitted to a field hospital under the diagnosis "penetrating shot through the skull" and he simulated an aphasia. During narcosis, however, he regained the power to speak. His simulating was revealed and he was discharged to his unit as fit for duty. Soon afterwards he injured himself by shooting himself through the thigh with a pistol he had stolen from the sergeant major. At first he stated that a Russian boy of about 16 years of age was the one who had injured him. When he was told that all villagers of that age will be assembled so that he could identify this man, he admitted this swindle as well as all his earlier frauds. The purpose of the swindling was his desire of leave and not the wish to become unfit for service. He was an otherwise quite agreeable young soldier who had lost his father shortly ago and who was a milksop suffering from home-sickness. The story of his captivity with the Russians had also his desire of leave as a background. His belief was that he would be sent on furlough after such an experience. The sentence by the court martial is not known to me.- Concerning sexual delinquencies I was faced with a most remarkable case. In July 1941 I was invited to give my opinion on the following incident which was made known to me by documents: A soldier had attempted to touch the genitals of his neighbor on the adjacent bed while asleep. After an expert decision he was acquitted because he was acting in a"state of trance". To my opinion this interpretation was most unlikely and in view of the serious consequences, if this soldier was convicted I recommended a psychiatric examination. I met this man again in November on the psychiatric department of a station hospital. In the meantime he had received his promotion to a sergeant as well as a decoration and it was easy to see that he had not lost his reputation within his unit. The officer in charge of the unit asked to speed up the investigation since this soldier was difficult to replace and he denoted him as an extraordinarily efficient man. The patient's description of the incident was credible and suggested indeed that he acted while somnolent. Therefore, I considered # 52.1 of the German Penal Code as applicable. Since no harm was done to anybody, one had to bear in mind in this case that there would have been a disproportion between a sentence for "improper conduct with men" and what had really happened, even though such a consideration should not influence the expert opinion on the guilt. In France I once observed a pseudo-transvestite.

He was a soldier who had left his quarters in women's clothes which he had found there. The suspicion of a sexual perversion was raised which, however, was not confirmed. He had put on the women's clothes exclusively for the reason to loaf about without being recognized. In addition he committed a theft by taking a small sum of money from the pockets of another soldier before leaving the quarters. This man used to suffer from time to time from an affective crisis during which he ran about. This was revealed by a letter of the man's mother. For his absence without leave paragraph 51.2 of the German Penal Code was applicable while this could not be granted for the theft, since only his absenteeism was related to the affective disorder. But there was no connection between the theft and this psychic condition.

All this seems to be rather easy. But eventually extraordinary difficulties of diagnosis frequently arise, particularly with the problem of whether there is an abnormal reaction to a personal experience or a schizophrenic psychosis. Even if one is very sure of the diagnosis in peace time, particularly in those cases in which one does not recognize any transitory stage between the two groups of mental abnormality, but makes a definite decision for the one or the other condition, one is faced with a very difficult, if not an impracticable, diagnosis during war. The differential diagnosis between abnormal reactions and symptomatic psychoses may be very difficult (I even disregard the incidental difficulties of diagnosis, the primitive conditions for the psychiatric examination and the fact that this psychological state frequently vanishes when the patients arrive at the improved living conditions of the station hospitals). The reasons for these diagnostic difficulties are: Since the dreams of the soldiers are extraordinarily lively and full of matter, as it was mentioned above, and since the fighting and the danger play an important part as a content of the dreams, it is quite clear that any pathological state of unconsciousness after a cerebral concussion or during fever is extraordinarily rich in symptoms. The dreams particularly contain a great number of the war experience with the result that this form of a lost consciousness resembles closely the abnormal reaction to personal experience similar to psychogenic somnambulism and disorientation. The schizophrenic ideas too contain the battle experience when this disease occurs with soldiers of the combat units and thus it happens that it is very difficult to distinguish the schizophrenic attacks of such men from the abnormal reaction to personal experience as well as from the symptomatic psychoses. I am under the impression that the diagnosis schizophrenia is made too frequently within the field army since the figures were strangely large. The reverse happened to myself as far as I was able to check this. Once I had to examine a young man during the morning hours in a casualty clearing station in Burgundy who had attracted attention by telling his seniors that contrary to the "Hitler Youth" the comradeship within the Armed Forces was not such as it should be, and who had expressed some criticism of

the program of a party within the unit under these aspects. My assumption was that this was a case of a querulous psychoneurotic although I did not entirely exclude the slight suspicion of a psychosis. Towards the evening hours this man came under my observation again in a field hospital where he had been admitted in the meantime. He stood in the courtyard separated from the others and even from a long distance it was easy to recognize that he was schizophrenic. Later on, in a station hospital he hallucinated and the diagnosis was entirely clear. There was another case in which I made the diagnosis of one of those conditions of night pavor, but the symptoms of this man were soon developed to a paranoid schizophrenia. In addition I want to mention that the diagnosis is frequently rendered difficult by the symptoms being vague and toxic due to the administration of drugs. One is compelled to sooth these patients who cause much disturbance for the hospitals and thus it happens that they frequently are somnolent and that a toxic vagueness hides the symptoms. In a special medical report I made reference to the fact that in the field army the diagnosis of an acute psychosis is so difficult that a great reserve towards the first diagnosis is advisable in any case, even though it is justified to consider particularly the opinion of these who observed the acute stage of a terminated seizure by a mental disease.

What has to be done with the psychoneurotics of the field army?

The psychoneurotics should generally be treated in the station hospitals. A psychiatric department attached to a station hospital is the right place for the examination and the treatment of psychoneurotics. During peaceful periods they may be observed in field hospitals as well and treated within the well known limits. Even persons with psycho-somatic disorders cease to complain after a short period and usually without any active treatment. They observe that the really sick men are sent home and that they themselves have to remain and are not sent away with the hospital trains even if they have many complaints. Thus, they get tired of the hospital life in time. After a certain period of time one will always be able to sent the psychoneurotics back to the units as fit for duty, but the period of observation should be sufficiently long. Even with doubtlessly unwilling psychoneurotics, who are immediately recognized as such, it would be a mistake to deal roughly with them and to sent them back to their units without waiting for a certain while. The impression must be created that they were carefully examined and that notice was taken of their complaints which were considered. Differences of opinion with the units are frequent. These may often like to have such people sent away and the medical officers of the units state readily according to the desire of the commanding officers that no use can be made of such a soldier in the unit and in the field army and that, therefore, he should be sent home. In these cases one must not give way. In cases of an entirely entangled situation it is advisable to suggest that the patient is posted to another unit, where things suddenly go ahead rather smoothly. If such medical reports are given to the

units, one better avoids the term "psychoneurotic" since it induces non-psychiatric trained medical officers and particularly the officers of the units to believe that they are really sick people. It is preferable to denote them as difficult personalities and to explain their weak points. Of course there is always the danger that such psychoneurotics are sent away from their units through other channels and that they thus find a hole through which they escape to the homeland. Once I examined a patient in a casualty clearing station in France who had immediately been returned to that station by the medical officer of the unit in spite of a psychiatric report made during hospital observation and although the fitness of this man for service was underlined. The casualty clearing station was not far from sending him home. In another case the casualty clearing station also took a most inadequate action. I had examined a man with slight psychogenic disorders in the field hospital and recommended sending him back to his unit through the casualty clearing station. Although this was to be read in the medical history sent with the patient the medical officer in charge of the casualty clearing station evacuated the patient further to the rear to another field hospital for a second expert examination by a psychiatrist. There I met him again without being in the position to give another advise so that the time was wasted. If one returns a patient to his unit one sometimes will have to take some risk into account. Once I was told that a soldier had shot himself on the way back from the casualty clearing station through the troop collecting center. Much noise was caused by this incident and everybody was inclined to the belief that this case was not taken seriously enough. Then, however, it was found out that this man was murdered on the way to his unit shortly after having left Dorpat at the same place, where another soldier was found dead a short while ago. Nothing spoke in favor of a suicide, neither the behavior of that man when he left the casualty clearing station, nor the details of the case.

While psychoneurotics with no other symptoms than a difficult character should by no means be sent home, it is permissible to dispose more kindly of more aged psychoneurotics, particularly if they are in a poor physical condition, or if they are hard of hearing or if they have poor vision. Prior to their return to the units one may admit willing psychoneurotics to a convalescent home for a short period of time if such an institution is available, as well as patients with psycho-somatic disorders after they have given up their complaints. This should be done in either case, if physical exhaustion or starvation played a part. Any kind of a psychotic excitation should be sent back to the rear if the particular local circumstances such as the admission to the psychiatric department of a station hospital or a mental home do not permit an exception from this rule. The evacuation of excited psychotic patients often is practically very difficult, since the hospital train commanders do not like to admit them and since they require special supervision or sedative measures. A state of pavor may sometimes compel the medical officers in charge of treat-

ment to transfer such a patient to the homeland, since he is dangerous to the other men. The patients with psychosomatic disorders, the "neurotics", heretofore were no particular problem. If a great number of such patients occurs, one does better to evacuate them from the operational area of the army. The psychiatric departments of the station hospitals are generally not adequate for an active treatment according to plan. If the patients are returned to the homeland, they should never be sent to their proper home for treatment, as the influence of the family frequently is a decisive factor in such cases. Receiving visitors and a furlough may be used as a reward. During leave a medical re-examination is advisable and the return to hospital for treatment should be enforced, if the symptoms have re-appeared. - Severe addicts to alcohol and morphine have to be sent back to the homeland. As for the rest, all these measures depend on the available personnel and the medical institutions. If the psychiatric department of the station hospital is billeted in a mental home, as was the case with the above mentioned institute at Nikolskoje, one can keep more patients than in a temporary hospital. In France the conditions were entirely different from those in Russia. The task of the consulting psychiatrists to regard the respective circumstances is particularly attractive. There is no need to mention that strategic and tactical views frequently have to be taken into consideration.

Jurisdiction.

In recent times there is a general agreement that the paragraph # 51, 1 and 2 of the German Penal Code is not applicable in cases of psychoneurosis. Part 1 of this paragraph applies exclusively to a marked somnambulism. I remember a case of a soldier who in the front-line had refused to go on guard duty and who had committed a severe insubordination without an apparent reason for both delinquencies. After this he was escorted to the Command Post. There was much shooting so that the guards took cover, while this man continued to march along singing and whistling which was a definite proof that he could not have committed the insubordination from cowardice. He was detained and awoke on the following morning with a complete amnesia; there was a complete incontinence. The anamnesis revealed nothing indicative of epileptic attacks. In spite of this it is doubtful whether this condition had to be interpreted as psychogenic somnambulism. Such cases occur and one must take them as they are. To the very rare cases of delinquency while half asleep one is compelled to apply paragraph 52, part 1 which was mentioned above when that case of homosexual delinquency was discussed. Part 2 of paragraph 51 is applicable to psychoneurotics who simultaneously are considerably feebleminded. In France I had to give my expert opinion on a soldier who was accused of cowardice in the face of the enemy. He was a man of a poor somatic condition and a poor intellect who also suffered from psychogenic fits and nocturnal enuresis. He was sentenced to

10 years penal servitude, but the commanding general disapproved the sentence as he was of opinion that the death sentence should have been passed. After my expert opinion granting part 2 of paragraph 51 the sentence was reduced to 4 years of penal servitude. The following case which was put to my attention as a psychiatric expert by the courts-martial of a division caused a lot of difficulties to me: An 18 year old soldier who before the Russian war showed an excellent conduct, fell in a state of great anxiety as soon as there was any engagement with the enemy. Then he fell sick with headaches, giddiness, eye-flicker, heart-beating, perspiration. Otherwise he was an excellent well-intentioned man whose only defect was that he was not in possession of the qualities required for a front-line soldier and who during any dangerous situation fell into a state of tremendous anxiety. He repeatedly failed to advance even when he was supposed to stand the test. Once he had considerably impaired the fighting strength of his unit because he failed to follow with the machine-gun spare parts. At another time he was found deeply asleep. My expert opinion was very responsible insofar as the death sentence was not avoidable if a full responsibility was assumed. I underlined the physical disorders and their overwhelming power which could not be overcome by the willpower and I assumed that the paragraph 52 part 2 was applicable which aroused the serious criticism of various instances. However, the commanding general adopted my opinion and confirmed the 5 year sentence of the division courts-martial. One must be aware of the fact that there are persons who are not born soldiers. Sometimes one is faced with a considerable conflict when such an expert opinion is requested, as it is repugnant to see a young soldier executed who otherwise has excellent human qualities. On the other hand it is not permissible that the brave soldiers are prejudiced by the cowards and it is essential for the warfare to prevent the occurrence of cowardice and to maintain the fighting strenght. - There was a very sad case of a 21 year old soldier. He was a high school pupil who previously was a member of the German underground movement at Prague. For this reason he was in prison for 5 months when he was 17 years old. He not only was an active politician, but a thoughtful young man who also tried to write poems and plays. Towards the end of June 1941 after a slight injury of the hand he had not followed his unit which he tried to regain on the following day in vain. While asking for information on his unit at a military post a sergeant dealt roughly with him. As a result this young man, who was easily offended in his sense of honor, fell into a reaction of obstinacy. His thoughts might have been that he did so much for Germany and now they dealt so roughly with him. After a few days had passed he no longer had the courage to report to any unit. He went further to the rear and became a farm-worker. After two months during which his division was engaged in heavy fighting and had suffered heavy losses, he was detected, detained, and sentenced to death. After the ratification of the sentence the commanding general ordered a psychiatric examination because the father of this man, who was

an officer, had directed attention to conditions of absenteeism in his youth. However, nothing was revealed that could serve as a psychiatric excuse. The absenteeism of this soldier during his youth was no abnormality: he had disappeared from home because of his underground activities. Nothing else could be done than to give a psychological explanation of all this and of what kind of man he was. The soldier was executed immediately after the delivery of my expert opinion. In such cases it is preferable not to be asked for the opinion, if there is no intention to consider it.

Discussion:

WUTH is glad to note that Professor Dr. Kurt SCHNEIDER also does not want to use the term "psychopath". One also should restrain from using the term "neurosis". Appropriate means for a thorough examination are indispensable. The "psychopaths" cannot generally be considered as malingerers. They really feel their complaints and an organic disease may be hidden behind the neurosis. A slightly unwilling soldier will do what everybody does, while officers, particularly if they are in an advanced age, suffering from the strain of warfare should be sent to the rear, since strict standards of efficiency are to be applied to them. It is no solution of this problem to transfer such soldiers to construction units since a great deal of strain is required of these. In addition to heavy physical exertion they have to fight as well and frequently they have the most difficult stand of all.

Addicts to morphine should be eliminated from the units. This applies particularly to medical officers addicted to morphine, even if they are cured, as there is always the danger of a relapse.

The danger of alcoholism depends on the occasion.

As to the homosexual perversion a frequency of relapse of 10 to 30 % was found as a result of several inquiries. It is not advisable to promote again those who had lost their ranks as punishment for this perversion, since no guarantee can be given concerning a possible relapse.

CARL SCHNEIDER suggests distinguishing homosexual perversion as such from casual homosexual activities. He discussed the case of a Lt. (M.C.) who was a married man having several children. After a heavy drinking this officer returned to his quarters without revealing signs of a particular sexual predisposition and there he committed a homosexual offense in two cases. The expert opinion on this officer was contradictory. The consciousness was not entirely clear. The sentence was loss of rank and now this officer is serving with a special unit. The seniors of this officer had an excellent opinion of him, as he was an efficient medical officer who regularly participated in combat patrols. In addition he possessed an extraordinary organizing skill. His unit would like to

have this medical officer with them again, but it cannot be predicted with certainty that no homosexual relapse would occur.

Rules as to the Treatment of Psychoneurotics.

1. The psychoneurotics should generally be retained in the station hospital and should be transferred to the units from there.

2. The same procedure should be applied to mild and isolated cases of psycho-somatic disorders (neurotics). Severe and refractory cases which require an active treatment and a particular organization should not be kept back in the Army.

3. Well intentioned psychoneurotics and patients with psycho-somatic complaints may be admitted to convalescent homes for a certain while after they have given up their complaints and before they return to their units. This is particularly advisable if physical exhaustion plays a part.

4. A particular attention must be paid to the masking of psychoneurotic and psychogenic symptoms by physical symptoms. The casualty clearing stations must increasingly be screened for such patients.

5. The problem of whether a certain state is a psychosis or an abnormal reactivity to personal experience, which is difficult to solve under field conditions, should be investigated most carefully.

This is my principal experience with the psychoneurotic problems of the field army.

2. Treatment of War Neurotics.

Oberstabsarzt (Major, MC.) Prof. CARL SCHNEIDER.

I am also of opinion that a difference must be made between the psycho-neurotic conditions occurring during mobile and static warfare and I agree with Kurt SCHNEIDER. But the same differentiation must be made between the front-line and homeland units, or the units in the rear of the armies. With the duration of war the resistance against psychogenic reactions is usually increased. The homeland and the army rear services are particularly susceptible and these reactions occur increasingly with the prolonged duration of the war.

Under the present conditions it is almost impossible to classify man in the same way as one was able to do in earlier times. Nowadays certain constitutional types occur who are not fit for frontline service, while they are useful in civilian life. I am under the impression that the number of the psychoses is considerably diminished.

Principally we were faced with conditions of a constitutional reaction. A number of cases of organic diseases will also report sick in the psychiatric departments. Therefore, a medical specialist should be appointed for the "neurotic" departments.

I should like to distinguish the following types:

1) Functional lability
2) Emotional lability
3) Psychogenic lability

The intentional factor of the psychic reactions is increased in the same succession. Within the group of functional lability I distinguish further the constitutional abnormality from the organic lability of function.

A considerable number of the latter show a large variation of the blood pressure. The blood pressure of such persons exceeds 200 after an animated conversation. After a short period of mental relaxation it drops to a normal level or below it. These are usually persons with symptoms of mental depression or failure.

It is not easy to find out how this organic functional lability should be considered.

If the types are established, the infantiles take a special position within the group of the psychogenic labiles and they must be considered separately, as they are increased in importance with the prolonged duration of the war. As an infantile condition I denote an insufficient physical training and an insufficient psychic development. With the prolonged duration of the war and the difficulties of replacement connected with this, an increased number of these types appears within the forces. Thus, the increased number of psychogenic reactions is explained to a large extent. The process of pubescence is not constant. There are people of 17 years of age, whose physical and mental development is completed and there are 24 year old people whose physical and mental development is on a level with that of 14 year old persons. A variation by 3 or 4 years is found everywhere. Thus a difficult task arises for the prophylaxis of mass reactions during this war.

From World War I I know several soldiers suffering from hysterical fits who were sent away on my initiative and whom I met again as very useful members of community, one of them being a university lecturer.

One must agree, that there are people suffering from a disease which the doctor does not recognize, therefore, giving no credence to them. In such a case the patients are forced into a psychogenic reaction. As an example I want to make reference to a man with a traumatic injury of the skull who is under my treatment now. He had made complaints for a long period of time but nobody believed him that he was really suffering. The reactivity to the real organic disorders is different. Hence it happens that the medical officers are inclined to disregard even justified complaints.

Different measures should be applied in the cases of hysterical tremor. Patients sick with tremor from horror, excitement and fear, must be subjected to a differing treatment. The occupational therapy is an adequate therapeutic measure for all of them.

Patients who suffer from a hysterical tremor create the impression of being martyrs within the units as well as at home. I make these persons lose their feeling of being martyrs and thus I approach them from different sides.

It is urgently requested that such patients are attended by psychiatrists instead of being treated in other departments and sent around in the hospitals. Any treatment by medical officers without psychiatric qualification should be forbidden. The transfer of such patients to neurological hospitals is absolutely necessary.

A psychogenic mass disease may certainly be controllable. The first principle should be to treat the patients within their units which practically means that the patients will have to remain with their units. An accumulation of them in the homeland must be avoided. Persons with psychogenic reactions attract more attention at home than seriously wounded soldiers, and the sympathy shown to them is not apt to promote their recovery.

I earlier made the suggestion to establish special departments in the hospitals and now I repeat this suggestion. In addition special units for soldiers who are not useful in frontline units are desirable. They should be put under the command of medical officers with a special training.

Willing patients should be treated with occupational therapy while unwilling patients should be oppressed.

Discussion:

WUTH: Too many special units have come into existence and no others can be set up in addition. It would be absurd to form a unit of gastric patients under the command of gastric patients, or to establish a special formation composed of feebleminded men, which was suggested by certain consultants.

v.STOCKERT: The presence of soldiers with a constitutional deficiency will always cause difficulties and conflicts. Most of them are feebleminded men showing a physical deficiency as well. They are a burden to the units.

WUTH: In many cases we are compelled to recruit persons poor in health and intellect. In the present time it is not possible to set up an elite army. This is indeed not necessary, since there are villages in which it is sufficient to clothe one single man with a uniform, which is enough to establish order. The men are urgently required and we cannot do it without

them in our people's army.

v. STOCKERT: Some of these personalities stand the trial very well, some of them fail and want to fail. This frequently occurs with the men in a more advanced age. There are many men who are taken for simulators, while they are really sick, and others again having only a slight deficiency take it as an excuse of their unwillingness.

WUTH: If possible we should reach an agreement on uniform rules to be applied. A strict distinction must be made between non-cooperative and non-efficient patients. For this purpose the careful examination by a medical specialist is absolutely necessary. But in all cases it proved necessary as well, to consult a psychiatrist.

For the non-cooperative men the special units are available as a means of correction. But no patients with a constitutional deficiency should be admitted to them.

Rules for the classification of psychogenic reations.

During World War I abnormal psychogenic reactions occurred after 1914 as a mass disease, which impaired the fighting strength of the units considerably by some kind of psychogenic propagation. Such reactions were:

State of anxiety and disorientation
Psychogenic disorders, such as

Paraplegia,
Aphasia,
Deafness,
Agnosia
Coarse hysterical tremor,
Contractures,
Loss of power to walk
Customary adhering to somatic impairments after injuries and diseases.

The most important task is to prevent the recurrence of such mass diseases of an abnormal mental reaction. This is not possible without a full cooperation with the psychiatrists at home and those of the field units. It also requires the full and attentive cooperation particularly of the medical officers of the units.

Under certain conditions (such as catastrophic experiences, severe exhaustion, after-effects of a severe disease) soldiers of a completely sound, physical and psychic condition and an excellent efficiency may be affected by such abnormal psychic reactions. Consequently it is not permissible to condemn and to defame patients suffering from an abnormal psychic reactivity and it should be avoided to do this in the interest of the moral care for the troops. The medical officers of the units should know the constitution of the soldiers attended by them,

and, therefore they should be able to find out the correct diagnosis. Treatment consists in transfer to the nearest quiet hospital. The emotional tension and the physical exhaustion of the patients must successfully be treated there by rest and persuasion. Sedatives and narcotics may be given, if there is any need to do so. After several days or weeks such abnormal psychic reactions of persons with a healthy constitution disappear and the afflicted patients are fit for duty again. Recreation in the rest billets or in a recreation center will be necessary in rare cases only.

If restitution does not ensue after several weeks and if the disorders persist, 2 causes may be held responsible: The one is that the patients who originally are healthy are prevented from regaining their health by certain wishes and desires (such as the desire to be transferred to the homeland, the wish to be transferred to another unit, the desire to avoid a conflict with seniors, etc.). In such cases the persistance of the abnormal psychic reaction has a certain purpose, but this means no malingering, as these tendencies frequently do not come clearly to the surface of consciousness. The other one is that the abnormal fixation of the pathological psychic reactions is the expression of an abnormal personality.

The terms neurosis, psychoneurosis, pseudoneurotic reaction are frequently applied to this condition. These terms are usually too vague and they have the important biological difference between the various personalities and their abnormal reactions. They lead to a monotonous faulty treatment of the patients and consequently disturb the re-assignment to duty, and prevent the medical officers from learning to recognize and to describe the constitutional structure of personalities. Therefore, most of them should disappear from the medical terminology, particularly from the expert reports, the epicrises, the results of medical inquiries and similar papers and they should be replaced by a true description of the personality.

To all the abnormal personalities the principle is applicable that a transfer to the homeland must be avoided by all means except for such cases which are to be selected according to the opinion of experienced psychiatrists.

If abnormal personalities are transferred from the homeland to the field units the psychiatrists should be consulted to prevent these disorders from being distributed throughout the field army.

There are innumerable variations of abnormal personalities. For the military medical examination, however, only some of these variations are of a practical value. These are either purely psychic abnormalities (abnormal personalities) or predominantly somatic abnormalities or a union of psychic and somatic anomalies.

Two groups of the abnormal psychic personalities are of importance:

1. Abnormal Characters:

This group includes persons with a defective discipline, a superiority complex, pathological swindlers, irritable characters, violent characters, persons with lability of mood, querulents, unsociable personalities, and those with an abnormal thinking. I also include ordinary criminal characters and socially defective personalities.

This is the group of psychopaths in the proper sense which are a disturbing factor of military routine (charactero-paths).

There is no treatment for these personalities. All that is left to the practitioners or the psychiatrists is to determine the type of personality and to inform the units about it. If the attempt to adjust these abnormal characters to the requirements of military service fails, their transfer to a special field unit must be taken into consideration. It is not permissible to send them to casualty clearing stations to get rid of them. It is advisable to point out to the medical officers of the casualty clearing stations that abnormal personalities of any kind should only be transferred to the homeland if this is requested by a psychiatric expert.

2. Reduced psychic resistance.

This group includes timid persons, undecided and immature persons, who in spite of their efforts to be useful and to do their duties properly are not capable of any independent action to be expected from every average soldier from anxiousness, helplessness, exaggerated sense of responsibility or obedience, although they are willing soldiers of a sufficient premparedness. They are liable to a state of anxiety and excitation or to a negligence of duties from an inner repression, to anxious dreaming, to pavor nocturnus, and frequently endanger the other soldiers by precipitate actions induced by fright.

This is the group of the psychosthenics who are "failures" during their military service.

A psychiatric examination and evaluation of such personalities is absolutely necessary. By agreement with the psychiatrists such persons may be employed in adequate positions of the rear services with only few exceptions. It may be difficult to establish general rules, since the conditions are variable with the strategic situation, the operational area and the organization of the respective army (armored army).

There are personalities who tend to the fixation and the production of abnormal reactions and who are liable to purposeful conflict reactions, that means to the so-called escape into the disease in order to escape from difficult situations more or less consciously, and to provoke simultaneously the pity of the other men from which they take advantage. This is the group the condition of which particularly occurred during World War I and was called "war neurosis". The bulk of the hysterical war tremblers (coarse tremor) of the persistent fixed paraplegias, the hysterical disorders of speaking, mutism, deafness, blindness and the hysterical pseudodementia range within this group.

Such patients should not receive any preliminary treatment by the medical officers of the units or by non-specialists but they should immediately be attended by the psychiatrist attached to the station hospital and treated in an adequate department of the station hospitals the organization of which should be adapted to the particular conditions of the strategic situation and the various armies. The treatment should consider the general rules of modern psychiatric development. The after-treatment with a strict occupational therapy or in special convalescent units (if there is a large number of such patients in one and the same army) has the result to make them fit for service again. A continuous recidivation or serious abnormalities, however, sometimes require special measures. It is suggested that special units should be set up in adequate places to prevent the units as well as the homeland from disintegration by this particular type of man.

Two groups of these somatic abnormalities are important:

I. The abnormal reactions with apparent deficiencies of the physical constitution (deficiency of the structure of the body, disorders of growth, disorders of the non-secretory glands, infantilism, and a pressed physical development of any kind).

II. The labile constitutional types with the liability to functional disorders of various organs and organ systems (such as patients with vasomotoric disorders, with a vegetative lability, with the tendency to a cerebral swelling, seizures of convulsions, somnambulism, tetanoid symptoms after a strain, etc.)

To recognize correctly and to evaluate these constitutional deficiencies as far as they occur as the cause of abnormal mental reactions, the psychiatrists and the medical specialists must unite in close cooperation. The task of the psychiatrists is not only to find out the correct psychic structure of the examined personality, but also to delimit these conditions from genuine psychosis. The differential diagnosis from the endogenous depression plays a special part here, since abnormal mental reactions frequently occur with this group of abnormal personalities under the symptoms

of a depressive reaction with pseudo-neurasthenic symptoms, while on the other hand, the endogenous depression may be hidden behind functional organic damages and disorders (gastric, intestinal disorders, anorexia) as a so-called monosymptomatic depression. In addition, the psychiatrists and neurologists must direct their attention to the problem of whether the functional lability of the organs or organ systems is not due to undiagnosed organic diseases of the central nervous system. To do this a great experience and the use of the most modern diagnostic means is frequently required. Therefore, it is absolutely necessary to fit out the psychiatric stations with all available facilities.

The task of the medical specialists within the scope of such a co-operation is to detect genuine organic damages in which case a particular attention has to be paid to incipient circulatory disorders of persons in an advanced age. They may be hidden for a long time behind abnormal mental reactions.

The fitness for service depends on the kind and on the extent of the functional abnormality. The structure of a modern army leaves enough places for the most different constitutions. Those giving their opinion should consider what functions are particularly stressed by the various arms of the forces and they should enforce the accomplishment of transfers against all difficulties opposed to such a measure.

A special yard stick should be applied to those youths between 17 and 20 years, the physical and psychical pubescence of whom sets in too late without there being signs of an abnormal personality. This occurs rather frequently. In such cases one must insist in a prolonged training period or in a return to the training units to await the full pubescence while being trained.

Attention must be paid to the prevention of relapses. This can be ordered by increasing the intensity of treatment with the increase of the abnormality of personality or constitution, by insisting on an adequate line of duties for such patients, by removing the incurable cases in due time from the frontline units and transferring them to the special field units or to adequate positions within the services in the rear. Finally this may be accomplished by the suppression of the abnormal desires and tendencies of the abnormal personalities with the help of the organization and the supervision of the psychiatric departments.

The mass occurrence of abnormal psychic reactions may be prevented too, if one maintains a sound spirit of obedience and preparedness in all hospitals of the field and the home army and if one applies a careful and understanding attention and nursing of the sick and wounded soldiers, and if one avoids any kind of effeminacy and ennervating laziness.

XV.

THE SULFONAMIDE TREATMENT OF NEUROLOGICAL DISEASES.

Translation prepared by:

Office of Military Government for Germany (U.S.)
Office of the Naval Advisor,
Medical Section.

1. The Sulfonamide Treatment of Neurological Diseases.

Oberstabsarzt (Major, MC.) CRHISTUKAT:

Sulfonamides.

One should not forget that there is a considerable difference of opinion concerning the dosage, the way of administration, and on the mechanism of effect of the sulfonamides. The experiments revealed that there is a certain probability of the sulfonamides having a bacteriostatic effect, that means that they inhibit or delay the growth of the micro-organisms. It is most remarkable that the effect in vitro is not identical with that in vivo. It shows a direct antagonism to the effect of certain acridine coloring agents, which are less toxic and which are eliminated from the organism in the same way as the sulfonamides. These have an excellent effect in vitro, but they are of no use in vivo.

The number of sulfonamide preparations was considerably increased during recent times. Well known preparations are: prontosil in its various forms, namely prontosil rubrum, prontalbin and the prontosil soluble, then neo-uliron, albucid, eubasinum, globucid, marfanil and cibazol.

The sulfonamides are administered locally, per os, per injectionem and through the cerebrospinal canal. By the clinical physicians and the manufacturing firms reference has repeatedly been made to the fact that the same preparation of sulfonamide is not applicable to all diseases, but that different preparations should possibly be selected in accordance with the different properties of the bacteria. Concerning this matter it was revealed that prontosil and cibazol are predominantly effective with streptococci, while eubasin, and, to a slighter degree, albucid act upon meningococci and pneumococci, just to mention a few. The neurologists are interested prevailingly in three groups of neurological diseases: 1) acute anterior poliomyelitis, 2) the encephalitis group, and 3) the meningitis group. With the first two groups of diseases sulfonamide therapy was not successful. With the last group the results of the treatment showed that the syphilitic meningitis does not respond to the sulfonamides, while in the cases of the tuberculous meningitis the administration of sulfonamides is useless, as they represent the final stage of a general organic tuberculosis. Therefore, the following forms remain for consideration: 1) the streprococcal meningitis, 2) the meningococcal meningitis, and 3) the pneumococcal meningitis. As regards the administration of these drugs, the investigations did reveal that the therapeutic effect of the sulfonamides depends on their concentration in the blood. The barrier between the blood and the cerebrospinal fluid is particularly permeable for sulfonamides so that the sulfonamide concentration in the cerebrospinal fluid becomes equal to that of the blood. Tests were made with a continuous drain of the cerebrospinal canal during which the sulfonamide con-

centration in the blood was 6 mgm %, and that in the cerebrospinal fluid 5 mgm.%. The use of eubasin has been prohibited for a certain period of time, because cases of death occurred after endolumbar injections. No such incidents are reported of the other preparations. But various authors give the advise to restrict the administration of the sulfonamides by endolumbar injection. As the direct application of these drugs into the cerebrospinal fluid is hardly of any significance, it is advisable to administer them per os or intramuscularly, or to inject them slowly into the veins.

Incidental symptoms during the administration of sulfonamides are: digestive disorders, diarrhea, headaches, vertigo, cyanosis (frequently as a result of the formation of methemoglobin) neuritis, exanthema and psychic disorders.

With all this one should never forget that the old approved methods such as the serum therapy as well as frequent lumbar punctures should be used further on any account.

Discussion:

KOLLE: After the application of sulfonamides neurologic damages and inflammatory alterations of the liquor occur.

CARL SCHNEIDER: In spite of all the possible incidents I made attempts with blood transfusions and I recommend a frequent rinsing of the cerebrospinal canal, particularly during meningitis.

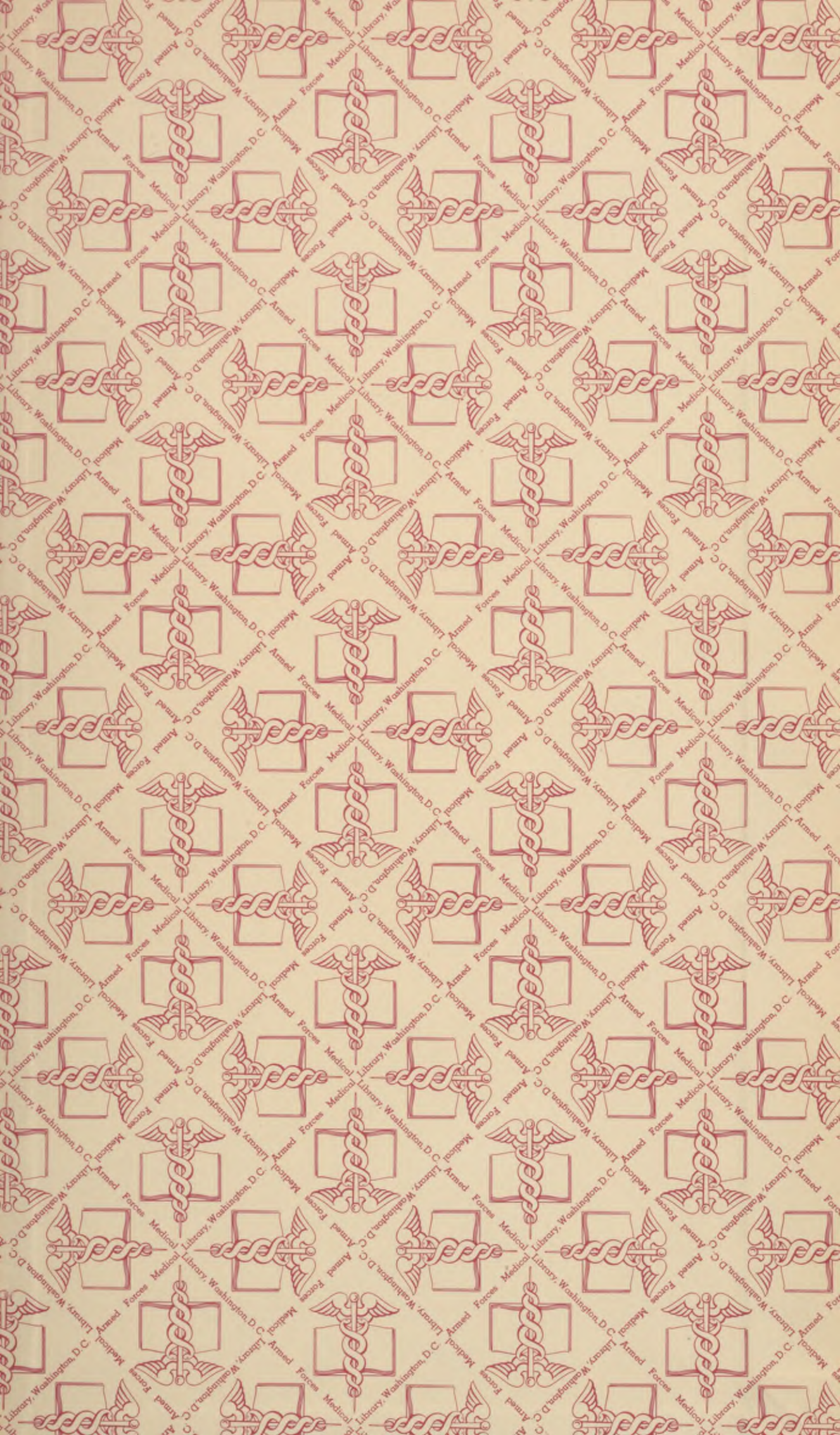
WUTH: I should like to suggest that one should be careful with the intravenous or intramuscular sulfonamide therapy. One particular case is described, in which a female patient was treated with cibazol, while there was a continuous pyrexia. When somebody discontinued the application of cibazol the fever disappeared. In this case it was even intended to make a surgical intervention in order to remove the gall bladder because of an alleged cholecystitis which was believed to cause the pyrexia.

No experience was made with encephalitis. It should be possible to obtain such experiences particularly in White Russia.

VON STOCKERT: Such therapeutic attempts were made in Minsk, but no positive results were obtained in about six cases which died within 2 or 3 days. I observed a few cases of encephalitis japonica, but no positive results of the use of sulfonamides were demonstrable.

Rules for the Sulfonamide Therapy.

Since it is definitely proved that the intralumbar application of eubasin caused severe injuries and since it cannot be excluded with certainty that the same also happens with other preparations, it is recommended to avoid the intralumbar application of all the sulfonamide preparations. According to VONKENNEL the sulfonamides pass over rapidly from the blood vessels to the cerebrospinal fluid. The oral, the intramuscular, and the intravenous application is preferable. With meningitis the serum treatment and frequent lumbar punctures continue to have their recognized value.


Armed Forces Medical Library, Washington, D.C.